TPACK Newsletter, Issue #17: September 2013

Welcome to the seventeenth 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

"New technology is common; new thinking is rare."
- Sir Peter Blake

In This Issue

1. TPACK Newsletter Update

The TPACK Newsletter currently has 1221 subscribers. 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: 23 articles, 5 chapters, 2 books and 9 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 (tpack.news.editors@wm.edu).

Articles

Akkoc, H., & Ozmantar, M. F. (2013). Use of multiple representations in technology rich environments. *Research in Mathematics Education, 15*(2), 189-190. doi: 10.1080/14794802.2013.797750

Abstract:
"The article presents a study regarding the use of multiple representations (MRs) with technology. It mentions that forty prospective mathematics teachers participated in the course designed using the Technological Pedagogical Content Knowledge (TPCK) wherein they were enrolled in a teacher preparation programme in a state university in Istanbul, Turkey. The result of the study indicates that the content of teacher preparation or professional development programs could be prepared by Ainsworth's taxonomy. It says that the three main functions of MRs defined by Ainsworth's taxonomy include to , constrain, and construct."

Altun, T. (2013). Examination of classroom teachers' technological, pedagogical, and content knowledge on the basis of different variables. *Croatian Journal of Education, 15*(2), 365-397. Retrieved from http://hrcak.srce.hr/index.php?show=toc&id_broj=8571

Abstract:
"This study aims to examine classroom teachers' Technological Pedagogical and Content Knowledge (TPACK) on the basis of different variables. A total of 322 classroom teachers in the city of Trabzon participated in the study. An adapted Turkish version of the TPACK scale was used as the data collection instrument. The obtained data was analyzed using SPSS 15.0 software. Independent t-test, ANOVA and Mann Whitney U-tests were used for statistical analysis. The results indicate that there are meaningful relationships and significant differences between variables of gender, having an Internet connection and the use of an ICT lab in the school, the use of educational software and the sub-factors of the TPACK scale. It is recommended that more practical CPD (Continuous Professional Development) opportunities for classroom teachers be provided in order to exploit the pedagogical benefits of ICT in primary schools."

Bassi, J., Kushniruk, A. W., & Borycki, E. M. (2013). Application of the Technological Pedagogical Content Knowledge framework in integrating an educational EMR into health informatics education. *Studies in Health Technology and Informatics, 183,* 49-53.

Abstract:
"The discipline of health informatics is highly immersed in information technology, specifically health information systems. Students graduating from Bachelor degree programs in health informatics are expected to be familiar with a variety of systems upon entering the workforce. The adoption of systems like electronic

medical records is on the rise across Canada, therefore it would be highly beneficial for students to have exposure to such systems in their coursework. While some individual instructors have done this to some extent on an ad hoc basis, formal strategies for EMR integration do not exist. A prominent framework for technology integration in learning that has been applied in many scientific disciplines is the Technological Pedagogical Content Knowledge (TPCK) framework. This paper describes how TPCK was used and applied as the guiding conceptual framework for exploring the integration of an educational EMR into undergraduate health informatics education."

Campbell, T., & Abd-Hamid, N. (2013). Technology use in science instruction (TUSI): Aligning the integration of technology in science instruction in ways supportive of science education reform. *Journal of Science Education & Technology, 22*(4), 572-588.

Abstract:
"This study describes the development of an instrument to investigate the extent to which technology is integrated in science instruction in ways aligned to science reform outlined in standards documents. The instrument was developed by: (a) creating items consistent with the five dimensions identified in science education literature, (b) establishing content validity with both national and international content experts, (c) refining the item pool based on content expert feedback, (d) piloting testing of the instrument, (e) checking statistical reliability and item analysis, and (f) subsequently refining and finalization of the instrument. The TUSI was administered in a field test across eleven classrooms by three observers, with a total of 33 TUSI ratings completed. The finalized instrument was found to have acceptable inter-rater intraclass correlation reliability estimates. After the final stage of development, the TUSI instrument consisted of 26-items separated into the original five categories, which aligned with the exploratory factor analysis clustering of the items. Additionally, concurrent validity of the TUSI was established with the Reformed Teaching Observation Protocol. Finally, a subsequent set of 17 different classrooms were observed during the spring of 2011, and for the 9 classrooms where technology integration was observed, an overall Cronbach alpha reliability coefficient of 0.913 was found. Based on the analyses completed, the TUSI appears to be a useful instrument for measuring how technology is integrated into science classrooms and is seen as one mechanism for measuring the intersection of technological, pedagogical, and content knowledge in science classrooms."

Chen, H-Y., & Syh-Jong, J. (2013). Exploring the reasons for using electric books and technological pedagogical and content knowledge of Taiwanese elementary mathematics and science teachers. *Turkish Online Journal of Educational Technology, 12*(2), 131-141.

Abstract:
“This study highlights trends and features of E-books and their versatility of this tool in elementary educational settings. There has been little quantitative research employed to examine teachers' reasons for using or not using E-books. The purpose of this study was to examine elementary school mathematics and science teachers' reasons for using or not using E-books and to assess how the use of E-books relates to TPACK among Taiwanese teachers. The survey was developed based on an overview of discussions from prior research related to the benefits and drawbacks of using E-books. The results show the percentages for four reasons for using E-books were high, and low for four reasons for not using E-books. The teachers' perceptions of E-books' usefulness and ability to increase motivation and interaction were significantly different according to gender and the perceptions of E-books' ability to increase interaction were significantly different according to teaching experience. Elementary science teachers demonstrated significantly higher TPACK than elementary mathematics teachers. There was no significant difference found in TPACK according to gender, except for in teachers' technological knowledge. Teachers who had more years of teaching experience demonstrated significantly higher TPACK than the teachers who had fewer years of teaching experience. The results of this study can provide researchers, policy makers, and school administrators with a better understanding of elementary school teachers' perspectives.”

Chikasanda, V., Otrel-Cass, K., Williams, J., & Jones, A. (2013). Enhancing teachers’ technological pedagogical knowledge and practices: A professional development model for technology teachers in Malawi. *International Journal of Technology & Design Education, 23*(3), 597-622. doi: 10.1007/s10798-012-9206-8

Abstract:
“This paper reports on a professional development that was designed and implemented in an attempt to broaden teachers' knowledge of the nature of technology and also enhance their technological pedagogical practices. The professional development was organised in four phases with each phase providing themes for reflection and teacher learning in subsequent phases. On-going support, reflection and feedback underpinned the professional development processes to enhance teachers' prospects of putting aside old traditions and culture to implement new practices in their classrooms. The teachers collaboratively explored new concepts through readings of selected scholarly papers, making presentations of their views generated from the readings and engaging with peers in discussing learning, curriculum issues and concepts related to the nature of technology and technology education. A qualitative analysis of the teachers' journey through the phases of the professional development showed the teachers' enhanced knowledge of technology and technology education. However, their classroom practices showed technological pedagogical techniques that reflected their traditional strategies for teaching technical subjects. It is argued that although the teachers'

conceptualisation of learning in technology was still fragile at this point, attempts to shift teachers' beliefs and practices require deep theoretical grounding and transferring that into technological practices. A professional development built on existing ideas and context helps expand the teachers' views about the nature of technology and technology education."

Cook, D. (2013). Infusing music technology in music education: A descriptive analysis of the status of high school music technology and professional development in large Suffolk County, NY school districts. *Long Island Educational Review, 12*(1), 16-26.

Abstract:
"This study investigated what large school districts in Suffolk County, NY are utilizing in music technology, what their vision is for the future of incorporating music technology into their programs and how they are accomplishing this technology integration in regards to both finance and professional development of their high school music staffs. Technology utilization was discussed to determine if what the high schools own in music technology and teachers experience in professional development, is demonstrated in the technological competence and integration of technology of the music teachers who utilize this technology. The personal value each supervisor of music places on the importance of technology in their high school(s) and how that influence effects the growth of music technology at the high school(s) was also discussed."

Dexter, S., Herring, M., & Thomas T. (2012). Editorial: Technology leadership for the teacher education initiative. *Contemporary Issues in Technology and Teacher Education, 12*(3), 255-263. Retrieved from http://www.editlib.org/p/42007/

Abstract:
"Teacher education leaders must attend to leadership practices that set direction, develop people, and redesign their programs of teacher education in order to develop technology, pedagogy, and technology knowledge and skills in preservice teachers. A planning framework to be used at the 2012 National Technology Leadership Summit is presented here. It highlights focus group results from deans and other college of education leaders as to the context-specific products and processes they would need to create at the local level."

Foulger, T. S., & Slykhuis, D. A. (2013). TPACK as a tool for teacher professional learning. *Learning & Leading with Technology, 41*(1), 20-22. Retrieved from http://www.learningandleading-digital.com/learning_leading/201308 - pg22

Abstract:
"Designing effective inquiry-based lessons takes more than just cool tools. The National Technology Leadership Coalition offers a new resource guide to help

teachers integrate technology well by blending it with pedagogy and content knowledge."

Gao, P., & Mager, G. M. (2013). Constructing embodied understanding of technological pedagogical content knowledge: Preservice teachers learning to teach with information technology. *International Journal of Social Media and Interactive Learning Environments, 1*(1), 74-92.

Abstract:
"This paper reports the key findings of a qualitative, exploratory study on preservice teachers' learning to teach with information technology (IT) across the last three semesters of their preparation programme. Triangulated qualitative data were collected and analysed on an ongoing basis to track what the nine preservice teachers learned, and how they learned as well as how they used such learning to what effect. This study suggests that learning to teach with IT is an idiosyncratic, multi–dimensional, and developmental process that involves confirmation and adjustments to many aspects of change simultaneously. Six participants showed the steady progress in using a variety of IT in various field placements and became technology advocates. Thus, learning to teach with IT holds the potential to transform teaching and learning in schools amongst and through preservice teachers."

Han, I., Eom, M., & Shin, W. S. (2013). Multimedia case-based learning to enhance pre-service teachers' knowledge integration for teaching with technologies. *Teaching & Teacher Education, 34*, 122-129. doi: 10.1016/j.tate.2013.03.006

Abstract:
"This study investigates the effects of case-based learning on pre-service teachers' knowledge integration related to teaching with technologies. 78 pre-service teachers were provided with interventions that included either video cases or no cases. ANCOVAs were performed to compare two groups' TPACK scores representing technological, pedagogical and content knowledge, and their integration. The results showed that video cases improved pre-service teachers' perceived learning of technological and pedagogical knowledge, and knowledge integration of these knowledge areas. However, content-relevant knowledge for technology integration was not developed through case-based learning. The results were discussed in the context of current teacher preparation programs."

Hughes, J. E. (2013). Descriptive indicators of future teachers' technology integration in the PK-12 classroom: Trends from a laptop-infused teacher education program. *Journal of Educational Computing Research, 48*(4), 491-516.

Abstract:
"This research examined preservice teacher graduates' positioning toward integrating technology in future teaching. Participants included 115 preservice teachers across three cohorts in 2008-2009 who graduated from a laptop-infused teacher education program. The study implemented a case study methodology that included a survey administered upon graduation. Indicators of positioning toward technology integration included: digital technology self-efficacy, attitude toward learning technologies, pedagogical perspective, personal/educational digital technology behaviors during the program, and TPACK knowledge used to rationalize their most valued technologies for future teaching. Results indicated graduates held moderate digital technology self-efficacy, positive attitude toward learning technologies, and moderate constructivist philosophy. During their preparation, productivity software activities were used most widely for educational purposes. Their most valued technologies for teaching subject matter were predominantly productivity software as well as general hardware, such as computers, projectors, and document cameras. They described teachercentric uses three times more often than student-centered. Graduates showed low depth of TPACK. Teacher education programs need to consider the degree to which their candidates are exposed to a range of contemporary ICTs, especially content-specific ICTs, and the candidates' development of TPACK, which supports future technology-related instructional decision-making. Such knowledge is developed across the teaching career, and technological induction programs may support continued TPACK development. Future research should employ longitudinal studies to understand TPACK development and use across novice and veteran teachers."

Koehler, M., Mishra, P., Akcaoglu, M., & Rosenberg, J. M. (2013). *The technological pedagogical content knowledge framework for teachers and teacher educators.* New Delhi, India: CEMCA. Retrieved from http://cemca.org.in/ckfinder/userfiles/files/ICT%20teacher%20education%20Module%201%20Final_May%2020.pdf

Abstract:
"In this paper, we present Technological Pedagogical Content Knowledge (TPACK) as a framework for the integration of technology within teaching. Three main bodies of knowledge – technological knowledge, content knowledge, and pedagogical knowledge – inform the design of this theoretical framework. Accordingly, we describe the characteristics of these three bodies of knowledge, along with the bodies of knowledge that emerge from the interactions between and among them. In this chapter, we argue that knowing how to integrate technology emerges from an understanding both of the three main bodies of knowledge and their interactions. We believe the TPACK framework has significant implications for teachers and teacher educators; specifically, we argue that teachers should be considered "designers" of curricula, and with regards to teacher educators, we identify "learning technology by design" and activity types as two key methods for the development of TPACK."

Koh, J., Chai, C., & Tsai, C-C. (2013). Examining practicing teachers' perceptions of technological pedagogical content knowledge (TPACK) pathways: A structural equation modeling approach. *Instructional Science, 41*(4), 793-809. doi: 10.1007/s11251-012-9249-y

Abstract:
"The seven constructs of the technological pedagogical content knowledge (TPACK) framework has been widely adopted as a theoretical basis for understanding the scope of teachers' information and communication technology (ICT) expertise. Despite this, very little is understood about the inter-relationships between these constructs, especially how these relationships are related to teachers' TPACK. As a result, the theory-practice nexus of this framework remains weak. In this study, a structural equation model based on Mishra and Koehler's TPACK framework was developed to describe the TPACK perceptions of 455 practicing teachers in Singapore. The study shows that teachers perceived TPACK to be formulated from the direct effects of technological knowledge and pedagogical knowledge. They also perceived these knowledge sources to contribute to the development of technological pedagogical knowledge and technological content knowledge, which also contributed to their TPACK. In these teachers' conceptions of TPACK, however, the effects of content knowledge and pedagogical content knowledge were not evident. The implications of these relationships to the design of teacher professional development in ICT are discussed."

Lin, T-C., Tsai, C-C., Chai, C., & Lee, M-H. (2013). Identifying science teachers' perceptions of technological pedagogical and content knowledge (TPACK). *Journal of Science Education & Technology, 22*(3), 325-336.

Abstract:
"The application of information and communication technology in instruction is highly emphasized in the contemporary education of science teachers. This paper hence aims to explore science teachers' perceptions of technological pedagogical content knowledge (TPACK) addressing teachers' perceptions of the affordances of technology application in instruction. A total of 222 pre- and in-service science teachers in Singapore were surveyed. Structural equation models analysis was utilized to examine the model of TPACK involving the seven factors of technological knowledge (TK), pedagogical knowledge (PK), content knowledge (CK), technological content knowledge (TCK), technological pedagogical knowledge (TPK), pedagogical content knowledge (PCK), as well as synthesized knowledge of technology, pedagogy, and content (TPC). The results confirm the seven-factor model and indicate that the science teachers' perceived TPC significantly and positively correlated with all the other TPACK factors. This paper further reveals the relationships between the science teachers' perceptions of TPACK and their demographic characteristics such as teaching experience, gender, and age. The findings indicate that female science teachers perceive

higher self-confidence in pedagogical knowledge but lower self-confidence in technological knowledge than males. Further, female in-service science teachers' perceptions of TK, TPK, TCK, and TPC significantly and negatively correlate with their age."

Pamuk, S., Ergun, M. Cakir, R., Yilmaz, H. B., & Ayas, C. (2013). Exploring relationships among TPACK components and development of the TPACK instrument. *Education and Information Technologies.* Advance online publication. doi: 10.1007/s10639-013-9278-410.1007/s10639-013-9278-4

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

Sahin, I., Celik, I., Akturk, A. O., & Aydin, M. (2013). Analysis of relationships between technological pedagogical content knowledge and educational Internet use. *Journal of Digital Learning in Teacher Education, 29*(4), 110-117. Retrieved from http://www.iste.org/store/product?ID=2826

Abstract:
"This study analyzes the relationships between preservice teachers' technological pedagogical content knowledge (TPACK) and their self-efficacy beliefs in educational Internet use. Findings show statistically significant relationships among the knowledge domains in technology, pedagogy, content, and their intersections. Also, results from the canonical correlation analysis show that a statistically significant and strong relationship exists between the knowledge dimensions in the TPACK model and the self-efficacy beliefs in educational Internet use. Specifically, technology, content, and technological content knowledge domains are statistically significant predictors of preservice teachers' self-efficacy beliefs in educational Internet use."

Seery, M. K., & McDonnell, C. (2013). The application of technology to enhance chemistry education. *Chemistry Education Research and Practice, 14*(3), 227-228. doi: 10.1039/C3RP90006A

Editors' note:
This editorial appeared as part of a themed collection entitled "The Application of Technology to Enhance Chemistry Education," which appeared in the July 2013 issue of *Chemistry Education Research and Practice (*doi: 10.1039/C3RP90007J).

Shinas, V. H., Yilmaz-Ozden, S., Mouza, M., Karchmer-Klein, R., & Glutting, J. J. (2013). Examining domains of technological pedagogical content knowledge using factor analysis. *Journal of Research on Technology in Education, 45*(4), 339–360.

Abstract:
"This study examined the construct validity of the Survey of Preservice Teachers' Knowledge of Teaching and Technology through an exploratory factor analysis using responses from 365 preservice teachers enrolled in an educational technology course in the United States. The participants were completing methods courses and field experience concurrent to the educational technology course, allowing them to contextualize the content they learned during the semester. The survey, grounded in the framework of Technological Pedagogical Content Knowledge (TPACK), is designed to measure seven domains associated with technological, pedagogical, and content knowledge. Although the influence of the TPACK framework on teacher education programs continues to grow, research indicates the need for clearer distinctions between the domains. Results from this study revealed that participants did not always make conceptual distinctions between the TPACK domains. Specifically, factors were congruent across only technological knowledge (TK) and content knowledge (CK) and not congruent across pedagogical knowledge (PK), pedagogical content knowledge (PCK), technological content knowledge (TCK), and TPACK. Additionally, PK and PCK loaded together, indicating the participants did not distinguish PK from PCK. Overall, this study confirms the need to provide more clarity about the TPACK framework and to revisit survey instruments built directly around the framework."

Shoffner, M. (2013). Editorial: Approaching technology in English education from a different perspective. *Contemporary Issues in Technology and Teacher Education*, *13*(2). Retrieved from http://www.citejournal.org/vol13/iss2/languagearts/article1.cfm

Excerpt:
"In order to understand how and why to use technology in ELA, preservice teachers need a solid grasp of pedagogical principles as they support student learning. Simply dividing students into groups does not guarantee collaborative

learning, any more than requiring students to post to a class weblog guarantees thoughtful discussion. Underpinning both activities pedagogically—assigning specific tasks, for example—provides much more support for meaningful student learning. Developing that ability—recognized as technological pedagogical content knowledge (TPCK; Mishra & Koeller, 2006)—requires preservice teachers to make connections between content, pedagogy, and technology in meaningful ways for specific learning outcomes.

How, then, can we support preservice teachers' understanding of technology's place in ELA teaching and learning? We are not required to professionally reinvent ourselves as technology experts (as I hope my experience attests). We are required, however, to believe that technology influences our content area every day, in ways pedagogical, professional, and personal. That perspective requires us to rethink our approach to technology as English teacher educators."

Shwartz, Y., & Katchevitch, D. (2013). Using wiki to create a learning community for chemistry teacher leaders. *Chemistry Education Research and Practice, 14*(3), 312-323. doi: 10.1039/C3RP20180E

Abstract:
"This study focuses on using wikis as a learning environment, as part of a professional development program for chemistry teacher leaders. The study was performed in Israel and involved 20 chemistry teachers. One goal was to investigate how using wiki may promote effective science teacher professional development. Various aspects of the teachers' wiki experience were investigated. Based on their contribution rate to the wiki activity, different participation profiles were revealed: 44% of the teachers were defined as peripheral members of the community, 28% as central members, and 28% as leaders of this community. Differences were observed between younger (below the median age of 45) and older teachers regarding their attitudes, feelings of ownership and preferences of working environment. The current study sheds light on the reasons why some teachers were more reluctant and less active in the wiki environment – the findings suggest that it is neither correlated with technical difficulties, nor with the relevance of the content. We believe that it has to do with the perception of the relevance of the wiki environment itself (as a model of other virtual environments) to their teaching in classroom. Small-scale results suggest a correlation between the teachers' personal participation rate in the wiki environment and their perception of their classroom as 'student-centered' or 'teacher controlled'."

Thomas, T., Herring, M., Redmond, P., & Smaldino, S. (2013). Leading change and innovation in teacher preparation: A blueprint for developing TPACK ready teacher candidates. *Tech Trends: Linking Research & Practice to Improve Learning, 57*(5), 55-63.

Abstract (excerpt):
“When preparing TPACK ready teacher candidates, faculty must incorporate and model TPACK within the teacher education curriculum, which often requires an ongoing change process. But for change to take place we must consider the role leadership plays in the innovation of change. Leaders, deans and department heads must be an integral part of this process. The challenge for innovation, change and education technology leaders is to transform teacher preparation programs into fully realized TPACK environments and determine the necessary learning opportunities and support necessary to motivate college leaders and faculty to fully embrace the change process. This article outlines a collaborative ongoing process and blueprint that leaders should consider as they make plans for the effective integration of TPACK into their colleges.”

Wu, H-K., Lee, S. W-Y., Chang, H-Y., & Liang, J-C. (2013). Current status, opportunities and challenges of augmented reality in education. *Computers & Education, 62*, 41-49. doi: 10.1016/j.compedu.2012.10.024

Abstract:
“Although augmented reality (AR) has gained much research attention in recent years, the term AR was given different meanings by varying researchers. In this article, we first provide an overview of definitions, taxonomies, and technologies of AR. We argue that viewing AR as a concept rather than a type of technology would be more productive for educators, researchers, and designers. Then we identify certain features and affordances of AR systems and applications. Yet, these compelling features may not be unique to AR applications and can be found in other technological systems or learning environments (e.g., ubiquitous and mobile learning environments). The instructional approach adopted by an AR system and the alignment among technology design, instructional approach, and learning experiences may be more important. Thus, we classify three categories of instructional approaches that emphasize the “roles,” “tasks,” and “locations,” and discuss what and how different categories of AR approaches may help students learn. While AR offers new learning opportunities, it also creates new challenges for educators. We outline technological, pedagogical, learning issues related to the implementation of AR in education. For example, students in AR environments may be cognitively overloaded by the large amount of information they encounter, the multiple technological devices they are required to use, and the complex tasks they have to complete. This article provides possible solutions for some of the challenges and suggests topics and issues for future research.”

Chapters

Angeli, C. (2013). Teaching spreadsheets: A TPCK perspective. In D. M. Kadijevich, C. Angeli, & C. Schulte (Eds.), *Improving computer science education* (pp. 132-146). New York: Routledge.

Excerpt:
"In this chapter, Technological Pedagogical Content Knowledge (TPCK) is used as a framework that can help us understand the complexity of the required knowledge for teaching spreadsheets. The chapter reports empirical findings from a study that was undertaken to develop pre-service teachers' TPCK in the context of learning how to use Excel for the purpose of developing appropriate learning activities for learners ages 5 to 8."

Bassi, J., Kushniruk, A. W., & Borycki, E. M. (2013). Application of the technological pedagogical content knowledge framework in integrating an educational EMR into health informatics education. In K. L. Courtney, O. Shabestari, & A. M-H. Kuo (Eds), *Enabling health and healthcare through ICT: Available, tailored and closer* (pp. 49-54). Amsterdam: IOS Press.

Abstract:
"The discipline of health informatics is highly immersed in information technology, specifically health information systems. Students graduating from Bachelor degree programs in health informatics are expected to be familiar with a variety of systems upon entering the workforce. The adoption of systems like electronic medical records is on the rice across Canada, therefore it would be highly beneficial for students to have exposure to such systems in their coursework. While some individual instructors have done this to some extent on an ad hoc basis, formal strategies for EMR integration do not exist. A prominent framework for technology integration in learning that has been applied in many scientific disciplines in the Technological Pedagogical Content Knowledge (TPCK) framework. This paper describes how TPCK was used and applied as the guiding conceptual framework for exploring the integration of an educational EMR into undergraduate health informatics education."

Doukakis, S., Koilias, C., Adamopoulos, N., & Giannopoulou, P. (2013). Computer science teachers' in-service training needs and their technological pedagogical content knowledge. In M. D. Lytras, D. Ruan, R. D. Tennyson, P. O. De Pablos, F. J. G. Peñalvo, & L. Rusu (Eds.), *Information systems, e-learning, and knowledge management research (Communications in computer and information science)* (pp. 311–316). Berlin: Springer Berlin Heidelberg. Retrieved from http://sdoukakis.files.wordpress.com/2013/04/sd_ck_na_pg_2013.pdf

Abstract:
“This study examines a national sample of 1127 computer science teachers who teach algorithms and programming in upper secondary education; it measures their knowledge with respect to three key domains as described by the TPACK framework: technology, pedagogy, content, and the combination of these areas. According to the results in the TPACK subscales, teachers state that their knowledge is between the values 4.38 (Content Knowledge) and 3.51 (Pedagogical Content Knowledge). Furthermore, according to the same study, teachers feel that they need further training in how to incorporate technology in their teaching as well as how to teach algorithms, two areas that relate to Pedagogical Content Knowledge and TPACK.”

Foster, A., Mishra, P., & Koehler, M. (2011). Digital game analysis: Using the Technological Pedagogical Content Knowledge framework to determine the affordances of a game for learning. In M. Khine (Ed.), *Learning to play: Exploring the future of education with video games* (pp. 189-212). New York: Peter Lang Publications.

Abstract:
“Foster, Mishra and Koehler (Chapter 10) analyze games with the use of the Technological Pedagogical Content Knowledge (TPACK) framework to determine the affordances of a game in learning. In particular, they closely examine *RollerCoaster Tycoon 2 (RCT#),* a computer-based economic simulation strategy game for building amusement parks. The games present a different pedagogical stance from traditional direct or guided instructional practices (Foreman, 2004), and the attributes include the ability for contextualizing, individualizing, collaborating, and experiential learning. The TPACK framework provides a focused analysis of how technology integrates with content and pedagogy. The authors note that by knowing what content a game offers, the game analysis facilitates what to focus on for assessment of learning. The chapter presents detailed analysis of *RCT3*, which involves understanding of economic principles by using the TPACK framework and Playing Research Methodology (PRM). They conclude that *RCT3* combines knowledge of economics, social studies, and information and technology literacy skills. The players can also learn basic physics principles and mathematics while playing the game.”

Koehler, M. J., Mishra, P., Kereluik, K., Shin, T. S., & Graham, C. R. (2014). The technological pedagogical content knowledge framework. In J. M. Spector, M. D. Merrill, J. Elen, & M. J. Bishop (Eds.), *Handbook of research on educational communications in technology* (pp. 101-111). New York: Springer.

Abstract:
“In this chapter, we introduce a framework, called technological pedagogical content knowledge (or TPACK for short), that describes the kinds of knowledge

needed by a teacher for effective technology integration. The TPACK framework emphasizes how the connections among teachers' understanding of content, pedagogy, and technology interact with one another to produce effective teaching. Even as a relatively new framework, the TPACK framework has significantly influenced theory, research, and practice in teacher education and teacher professional development. In this chapter, we describe the theoretical underpinnings of the framework, and explain the relationship between TPACK and related constructs in the educational technology literature. We outline the various approaches teacher educators have used to develop TPACK in pre- and in-service teachers, and the theoretical and practical issues that these professional development efforts have illuminated. We then review the widely varying approaches to measuring TPACK, with an emphasis on the interaction between form and function of the assessment, and resulting reliability and validity outcomes for the various approaches. We conclude with a summary of the key theoretical, pedagogical, and methodological issues related to TPACK, and suggest future directions for researchers, practitioners, and teacher educators."

Books

Baran, E. (2013). The many faces of TPACK: Perspectives and approaches [wikibook]. Retrieved from http://en.wikibooks.org/wiki/The_Many_Faces_of_TPACK

Abstract:
"The Many Faces of TPACK: Perspectives and Approaches is a Wikibook created as part of the Research and Practice on Technology in Teacher Education Course (EDS 536) taught at Middle East Technical University in Spring 2013. This collaborative work between the course instructor/editor and the students/authors intends to present the approaches and perspectives on the Technological Pedagogical Content Knowledge (TPACK) framework which provided a theoretical foundation to the course activities and experiences. All the content in this book as well as the format such as the cover, title, and the table of contents were created by the course participants. The book also benefits from the interviews with the experts and in different disciplines."

Dorfman, J. (2013). *Theory and practice of technology-based music instruction*. New York, NY: Oxford University Press.

Abstract:
"Based on educational theory and on recognized music teaching methods, Theory and Practice of Technology-Based Music Instruction develops a framework for examining music teaching that uses technology to introduce, reinforce, and assess skills and concepts. The framework guides in-depth discussions about theoretical and philosophical foundations of technology-based music instruction (TBMI), materials for teaching, teaching behaviors, and assessment of student work, teacher work, and fit of technology into the music

program. The book includes examples of TBMI lessons from real teachers, and analyses of the successful and developing parts of these lessons.

The book also addresses issues of accountability and standards; recommendations for professional development; and the future of the field, embodied in emerging technologies, alternative ensembles, and social issues. It will be a key volume for teachers implementing new curricular offerings and for music teacher educators as a foundation for teaching with technology beyond a focus on software and hardware."
[Editors' Note: Dr. Dorfman reports that this book "relies heavily upon the [TPACK] framework."]

3. Recent TPACK-Related Dissertations

Beeson, M. W. (2013). *The influence of teacher beliefs and knowledge on planning for technology integration in technology-rich classrooms* (Doctoral dissertation). Retrieved from ProQuest Dissertations and Theses. (3568816)

Abstract (excerpt):
"The purpose of this qualitative study was to examine the decisions three teachers made to integrate technology in technology-rich elementary classrooms. An additional purpose of this study was to understand how the teachers' beliefs about technology and their knowledge of content, pedagogy, technology, and learners influenced the decisions they made during planning for technology integration. Guiding the study was a conceptual framework that suggests that both teachers' beliefs about their technology and their knowledge of learners influence teacher decision-making during planning. […] Cross-case findings revealed that, when planning for technology integration, the teachers made decisions about a) the content they were teaching and the desired end result, b) the learners, and c) the technology tools. Beliefs about technology including a) technology engages students, b) students should be exposed to content through the use of technology, and c) students should be exposed to technical skills through the use of technology, influenced the decisions the teachers made when integrating technology. Strong technological knowledge also influenced the decisions the teachers made during planning. Data analysis suggested that the teachers were still developing their technological content knowledge (TCK) and technological pedagogical knowledge (TPK) (Mishra & Koehler, 2006) and relied mainly on technological knowledge to plan for the integration of technology."

Fryling, M. J. (2013). *Bridging the divide: Second language teachers, pedagogy, content knowledge, and technology* (Doctoral dissertation). Retrieved from ProQuest Dissertations and Theses. (3558163)

Abstract:
“This study examines the use of technology, pedagogy and content knowledge with second language teachers, and comparing Title 1 and non Title 1 schools. Technology can be used to provide unique learning opportunities for second language learners. Second language students can benefit from technology by practicing skills, increasing motivation, providing authentic materials, creating interaction between students, teachers and peers, creating individual learning, encouraging global understanding and increasing communication in safe ways (Lai & Kritsonsis, 2006). Although technology shows promise for increasing second language student achievement, students continue to have varied access at home, perpetuating the digital divide that was thought to disappear with large financial investments. By looking at how K-12 second language teachers use technology and the differences that exist between title I and non-title I schools this study will serve to assess the current state of technology integration and offer suggestions to enhance future integration. This study used the TPACK framework to examine second language teachers use of technology with their students.”

Hersh, E. C. (2013). *Change and challenge: The influence of technology integration in teacher preparation programs* (Doctoral dissertation). Retrieved from ProQuest Dissertations and Theses. (3568450)

Abstract:
“The purpose of this study was to examine the extent to which teacher-preparation programs prepare teachers to integrate technology. It described the relationship between teachers' level of confidence and current practice of applying technology to instruction. In particular, three questions were addressed: (a) To what extent do teacher-preparation programs adequately prepare teachers to use technology in their classrooms and to what extent does it vary across different demographic groups of teachers? (b) To what extent does modeling influence confidence to integrate technology in teacher-preparation programs? (c) To what extent do knowledge of content, pedagogy, and technology influence technology integration? A mixed-methods research design was used to explore the preparation of teachers who were trained in an alternative-certification program from 2009-2012, offered at a suburban college in New York. Fifty four participants completed a survey and 11 of them engaged in an interview to determine their level of confidence in integrating technology to enhance teaching and learning. Quantitative data were analyzed with descriptive and inferential statistics including correlation and path analysis. Qualitative data were analyzed by identifying major themes. The qualitative and quantitative data were analyzed separately, which allowed for data triangulation. Major quantitative findings suggested that men and those with certifications other than elementary education were more likely to integrate technology to enhance teaching and learning. Qualitative findings suggested that the use of technology should be embedded in content-specific and methods coursework to increase teacher confidence. Quantitative findings did not support the hypothesis that the more preservice

programs include modeling of technology, the greater the level of confidence to integrate technology. However, a positive relationship was found between the use of technology and the confidence to integrate technology, thereby suggesting that teacher-preparation programs hold preservice teachers accountable and encourage the use of technology. Finally, this study reaffirmed that effective teaching and learning will take place when the end result includes pedagogy that transforms content; thereby making learning accessible to 21st-century students."

Kulavuz-Onal, D. (2013). *English language teachers' learning to teach with technology through participation in an online community of practice: A netnography of webheads in action* (Doctoral dissertation). Retrieved from ProQuest Dissertations and Theses. (3588563)

Abstract (excerpt):
"The study employs netnography, or online ethnography, in which the researcher collects data through participant observation, interviews, and archiving, all of which is conducted completely online. The aim of this study was to understand the broader culture of learning, collaboration, and mentoring in this online language teacher community by exploring and analyzing its shared repertoire of resources, and activities; ways members engage in the collective development of this technology integration practice; and the role of participation in such an online community of practice on developing language teachers' technological pedagogical content knowledge when designing instruction."

McDowell, D. G. (2013). *Classroom technology integration: A comparative study of participants and non-participants in the 21st Century Model Classroom program* (Doctoral dissertation). Retrieved from ProQuest Dissertations and Theses. (3560722)

Abstract:
"This study provided a unique opportunity to examine how two groups of teachers experienced the integration of technology in a K-12 school system in the southeastern United States. The total number of respondents (n=338) included 21st Century Model Classroom (CMC) program teachers (n=27) and non-participants (n=311). Teachers in the 21st CMC program were given advanced technology equipment and relevant professional development. The non-participants received less training and had limited access to advanced technology equipment. Guskey's (2000) "Five Levels of Professional Development Evaluation" was combined with technological pedagogical content knowledge (TPCK) (Harris, Mishra, and Koehler, 2009) to create a survey for comparing the two groups. Cronbach's (1984) "alpha measurement" of internal consistency revealed an alpha score of .911 for the questionnaire; hence, the quantitative survey was found to be highly reliable. Many similarities were found among the respondents. However, significant differences were found on nine of the forty-four quantitative survey items. Effect size measurements were also

calculated for those nine items. Open-ended survey items yielded rich qualitative data. More than two-thirds of all respondents surveyed were positive about their access to professional development and technology equipment. They were equally optimistic in their overall beliefs about integrating technology in the classroom. The data and the views of the teachers provided exclusive information for improving instruction through technology integration."

Price, G. P. (2013). *Determining the impact of the Integrated Triadic Model on TPACK development in preservice teachers* (Doctoral dissertation). Retrieved from ProQuest Dissertations and Theses. (3562452)

Abstract:
"This study applied the researcher-constructed Integrated Triadic Model (ITM) to an elementary social studies teaching methods course and measured the extent that preservice teachers' technological pedagogical content knowledge (TPACK) changed throughout the semester. The study also gathered preservice teachers' beliefs about the effectiveness of ITM-based course activities for developing TPACK. Participants' self-assessment and reflective writings indicated an increase in preservice teachers' understanding of the relationships between technologies, instructional strategies, and social studies content. Although performance-based data did not support similar growth, contextual limitations of the study were not conducive for accurately measuring a change in participants' enacted TPACK. The application of the ITM created and enhanced course activities that contributed to the development of preservice teachers' TPACK. The ITM represents a new model that combines three TPACK development approaches to prepare teachers to effectively and appropriately teach with technology. The incorporation of learning activities types into the ITM augments existing models that feature learning by design and reflection. Teacher education programs can use the ITM to evaluate and re-design learning experiences in instructional technology courses, methods courses, and field placements to better prepare preservice teachers to integrate technology into teaching and learning activities. Future research should apply the ITM in both preservice and in-service preparatory experiences to engage teachers in a deeper, simultaneous consideration of technology, pedagogy, and content. Research should track teachers' development of TPACK over time using longitudal (*sic*) studies."

Sabo, K. (2013). *A mixed-methods examination of influences on the shape and malleability of technological pedagogical content knowledge (TPACK) in graduate teacher education students* (Doctoral dissertation). Retrieved from ProQuest Dissertations and Theses. (3588303)

Abstract (excerpt):
"Concerted efforts have been made within teacher preparation programs to integrate teaching with technology into the curriculum. Unfortunately, these efforts continue to fall short as teachers' application of educational technology is unsophisticated and not well integrated. The most prevalent approaches to

integrating technology tend to ignore pedagogy and content and assume that the technology integration knowledge for all contexts is the same. One theoretical framework that does acknowledge content, pedagogy, and context in conjunction with technology is Technological Pedagogical Content Knowledge (TPACK) and was the lens through which teacher development was measured and interpreted in this study. The purpose of this study was to investigate graduate teacher education students' knowledge and practice of teaching with technology as well as how that knowledge and practice changes after participation in an educational technology course. […] The results of the study revealed five significant findings: 1) graduate students entering an educational technology course reported lower ability in constructs related to teaching with technology than in constructs related to teaching in a traditional setting; 2) TPACK was malleable and TPACK instruments were sensitive to that malleability; 3) significant gains in reported and demonstrated TPACK constructs were found after participating in an educational technology course; 4) TPACK construct ability levels vary significantly by participant characteristics; and 5) influences on teaching knowledge and practice range from internet resources, to mentor teachers, and to standardized curriculum packages."

Spazak, L. (2013). *Secondary preservice teachers' perception of preparedness to integrate technology* (Doctoral dissertation). Retrieved from ProQuest Dissertations and Theses. (3558231)

Abstract:
"Integrating technology into the classroom has been an enduring topic in the field of education for decades. While the technology types may have changed from slide projectors and calculators, to laptops and smart phones, preparing preservice teachers to integrate technology in the classroom is a constant in teacher education programs. The pace for which technology advances has forced teacher educators to reconsider how to better prepare future teachers. Attention has shifted from preservice teacher awareness of specific technologies to preparing teachers who can effectively evaluate technologies for use in the classroom. In spite of reports that today's preservice teachers are not prepared to effectively integrate technology into the classroom, evidence from this study revealed the opposite. To analyze each component and its possible relationship, a quantitative methodology was used to answer the following research questions: (1) What are the perceived levels of technology preparedness of secondary preservice teachers' as described by the TPACK framework?; (2) What are the perceived levels of self-efficacy with regards to technology integration of secondary preservice teachers?; and (3) What is the relationship between secondary preservice teachers' perceived level of technology preparedness (TPACK) and their perceived level of self-efficacy (SE) with regards to technology integration? Overall, the results indicated that preservice teachers from this sample are prepared to integrate technology into the classroom. The first indicator was the high self-efficacy levels, which are believed to be a predictor of future technology use. The second indicator was the high-levels of

knowledge of the TPACK domains, a framework for effective technology integration. However, it is not as readily apparent whether the preparedness of the teachers was directly related to the teacher education programs, or the age of the participants (digital natives). It is possible that the effective modeling from the teacher educators and cooperating teachers played a part in the positive results. In essence, the positive results indicated that the secondary teachers from this study are prepared to effectively integrate technology in the classroom."

Stonier, F. W. (2013). *The impact of an intensive experience on prospective teachers' perception of the uses of digital, interactive text among K-12 students* (Doctoral dissertation). Retrieved from ProQuest Dissertations and Theses. (AAI3510994)

Abstract:
"The purpose of this study was to measure pre-service teacher perception, awareness, and potential use of digital literacies, media, and digital interactive text in their future classrooms. The study grew from the theoretical rationales of new literacies, technological pedagogical content knowledge, and constructivism. New literacies are essentially the skills teachers and students need to utilize and develop in order to interact with novel digital sources. Research was aimed not simply at exposing pre-service teachers to the possibilities, but to gauge their current knowledge, interest, and views of potential future application of said technologies and student learning needs before and after the experience. One hundred pre-service teachers participated in an intensive semester experience involving a variety of interactive digital text sources and related technologies throughout the course of a semester. Participants read and discussed a variety of articles and interacted firsthand with a number of digital literacy technologies. Data were collected throughout a semester in the form of pre and post surveys, recorded interviews, and recorded class discussions. Findings indicated that pre-service teachers generally maintained or strengthened their perceptions and understandings of digital interactive text, digital literacies, and digital literacy tools. There were several demographic categories that yielded significant results."

4. Recent TPACK Presentations

Baran, E. (2013, June). *Research trends in technological pedagogical content knowledge (TPACK): The past, present, and the future.* Workshop presented at the International Instructional Technologies and Teacher Education conference, Trabzon, Turkey.

Abstract:
"The purpose of this workshop [was] to bring together researchers and teacher educators who conduct research on technological pedagogical content knowledge (TPACK) framework. TPACK has emerged as a clear and useful construct for researchers working to understand technology integration in

learning and teaching. Whereas early research work on TPACK focused upon explaining and interpreting the construct, TPACK has now entered a second generation where the focus is upon using the construct in both research and development projects. In this workshop, the participants [discussed] the TPACK construct through research and development projects where different methodologies were used to investigate teachers' knowledge of effective technology integration. The past and present TPACK research trends [were] also discussed, along with future directions for this work."

Garba, S. A., Singh, T. K. R., & Yusuf, N. M. (2013, May). *Integrating technology in teacher education curriculum and pedagogical practices: The effects of Web-based technology resources on pre-service teachers' achievement in teacher education training.* Paper presented at the 2013 International Conference on Information Science and Technology Application (ICISTA-13), Penang, Malaysia. Retrieved from: http://www.atlantis-press.com/php/download_paper.php?id=6674

Abstract:
"Teachers' ICT literacy skills and competence is a crucial factor that determines the success and sustainability of integrating the use of web-based technology resources in educational practices. Thus, ensuring effective technology integration in teacher education is accorded a deserving attention in most countries. However, meaningful technology integration in teacher education would require on one hand 'the integration of technology in teacher education curriculum'; and, 'the integration of technology in teacher education pedagogical practices' on the other hand in addition to the need for teacher educators to model the use of technology in their practices. This study examines the effects of integrating web-based technology resources in teacher education pedagogical practices using the inquiry approach in line with the GPM model; and the effects of technology (web-based technology resources) in social studies teacher education curriculum in line with the TPACK theory. Three (3) groups quasi-experimental design involving 45 pre-service teachers was employed for the study. The study therefore investigate and compare the effect of three different interventions (ICT Integration) involving the use of Standard technology; web-resources and power point; and, web-based resources and smart board for groups 1, 2, and three respectively. The participants were selected from four colleges of education. One way ANOVA was used for data analysis. Finding from the study shows significant differences in performance between the research groups. Even though, the analysis of the results shows that all the treatments applied were effective, the use of web-based technology resources applied as treatment for groups 3 and 2 were more effective than the treatment applied for group 1."

Jupit, A., Minoi, J. , Arnab, S. and Yeao, A. (2011, July). Cross-cultural awareness in game-based learning using a TPACK approach. In J. Minoi, A. Yeao, and J. Abdelnour-Nocera (Eds). *Designing for global markets 10:*

Proceedings of the 10th international workshop on internationalization of products and systems (pp. 31-49), Kuching, Malaysia. Retrieved from http://sgi.cueltd.net/publications/papers/Teaching_Cultural_Awareness10.pdf

Abstract:
"Our paper focuses on promoting cultural awareness through game-based learning using the Technological Pedagogical Content Knowledge (TPACK) framework. The TPACK framework, proposed by Mishra and Koehler (2008), is widely used as an organising frame for the development of education technology. This framework takes into consideration the use of effective pedagogical practice to enhance teaching and learning environment. Hence, we are looking at using the framework to promote the development of cultural awareness technology and content, by introducing the extended TPACK. We draw a need to expand the TPACK by incorporating another dimension that is the key cultural elements, within the Pedagogy, Content, and Technology components, to mutually interact, in order to promote cross-cultural awareness on a game-based learning (GBL) platform. Specifically, the content-knowledge for promoting cultural awareness would include key elements of cultures. The pedagogical-knowledge includes methods and strategies to promote and encourage understanding and respect of a culture. The advancement of game technology can be capitalised to encourage and sustain engagement in a learning platform. Presently, the work on cross-culture awareness in games is still very limited. As such, the aim of the development of a GBL platform using the extended cultural TPACK framework would be to expose learners to culturally diverse scenarios and engage as well as expose learners to knowledge of the different cultures in myriad ways."

Lowder, L. (2013, June). *Building technological, pedagogical content knowledge (TPACK) among pre-service teachers in a science methods course.* Paper presented at the 2013 World Conference on Educational Multimedia, Hypermedia and Telecommunications (ED-MEDIA), Victoria, Canada. Retrieved from http://www.editlib.org/p/112204/

Abstract:
"This study aims to investigate the timely problem of selecting appropriate technology tools to support instruction. The teaching strategies and learning activities throughout a science methods course were studied to determine an effective sequence of lessons to develop the technological, pedagogical, content knowledge (TPACK) of pre-service teachers. The TPACK framework arms teachers with the knowledge and practices of lesson plan development to enable them to keep up with the changes in technology by keeping the focus on sound instructional design first and then the selection of technology tools that have the specific capabilities to support the learning task designed. Data collection methods employed include qualitative and quantitative data sets in the form of a researcher reflection journal, student reflections and interviews, pre and post

surveys, and pre and post lesson plan artifacts. Analysis methods include preset and emergent coding."

Lowder, L. (2013, June). *Designing an introductory science methods course that supports the development of technological, pedagogical, content knowledge (TPACK) of pre-service teachers.* Paper presented at the 2013 World Conference on Educational Multimedia, Hypermedia and Telecommunications (ED-MEDIA), Victoria, Canada. Retrieved from http://www.editlib.org/p/112270

Abstract:
"Common challenges exist among teachers in the development of lesson plans that are both appropriate and effective for students. Along with decisions about the best technology tools to support instruction, teachers must be knowledgeable of and able to determine, the best tools that will support the curriculum-based teaching and learning needs for their specific context (Hoffer & Harris, 2010). Technological, pedagogical, content knowledge, TPACK, is a concept developed by Koehler & Mishra in 2006. This framework provides a set of guiding tools to facilitate the development of TPACK among preservice and inservice teachers through their lesson plans. This study focuses on the design of an introductory science methods course for preservice teachers. The researcher focuses the data collection and analysis on the activities that support the development of this TPACK knowledge among students participating in the course. Future implications are given at the end of the study."

Mavroudi, A., Angeli, C., & Georgiou, K. (2013, April). *An e-learning adaptive system for teaching teachers how to teach with technology: A perspective from technological pedagogical content knowledge.* Paper presented at the 2nd International Workshop on Teaching Analytics, Leuven, Belgium. Retrieved from http://ceur-ws.org/Vol-985/paper6.pdf

Abstract:
"While systematic and worthwhile research efforts have been undertaken regarding the conceptualization, development, and assessment of technological pedagogical content knowledge (TPCK) within the context of face-to-face learning experiences in higher education and teacher professional development settings, the authors herein posit that the framework of TPCK requires a technological solution, because the limited amount of time that is usually devoted in conventional teacher education courses and one-time only ICT training courses, as well as teachers' different needs, skills, knowledge, expectations, expertise, subject-matter area, and in general readiness, render traditional face-to-face learning experiences inadequate for providing ongoing TPCK development. On the basis of the above rationale, in this paper the authors introduce the design and development surrounding e-TPCK, an adaptive electronic learning environment that teacher educators, teacher trainers, and in-service and pre-service teachers can use to foster ongoing TPCK development."

Niyomsap, S., Thongthew, S., & Rodpothong, S. (2013, March). *A teacher training curriculum utilizing technological pedagogical content knowledge approach as content framework to enhance social studies teachers' competency in digital courseware production.* Paper presented at the 7th International Technology, Education and Development Conference, Valencia, Spain. Retrieved from http://library.iated.org/view/NIYOMSAP2013ATE

Absract (excerpt):
"As Thailand is lacking digital courseware with content oriented toward better understand of local communities in particular and Thainess and Thai culture and society in general, it is deemed necessary that social studies teachers, who are responsible for directing the content to students, should be competent in the production of digital courseware holding content about local history and social and cultural aspects of local communities to meet users' and learners' needs. In addition, the courseware should be adjustable, renewable, and revisable in accordance with varying local contexts. It is also necessary that a curriculum, based on learning process approaches framework and technological pedagogical content knowledge approach (TPACK) Conceptual Framework, be developed to enhance social studies teachers' competency in digital courseware production. This paper presents part of an on-going research, focusing on the use of TPACK concept in curriculum development."

Rahimi, E., Van den Berg, J., & Veen, W. (2013, June). *A framework for designing enhanced learning activities in web 2.0-based personal learning environments.* Paper presented at the 2013 World Conference on Educational Multimedia, Hypermedia and Telecommunications (ED-MEDIA), Victoria, Canada. Retrieved from http://www.editlib.org/p/112281

Abstract:
"Deploying web-based Personal Learning Environments, PLEs, in educational settings is becoming a main trend in technology enhanced learning. By combining the main elements of the student's control and the components of technology-based teaching process, a framework for designing enhanced learning activities is proposed. The proposed framework assists teachers to design appropriate learning tasks to be done by students to support their learning process through developing PLEs by making use of relevant web tools. The framework promotes a learning-by-doing approach which can improve digital competencies of students and allows teachers to acquire deep understanding and situated knowledge about content, technology, teaching and learning processes."

Terashima, K., Takesue, S., Koshimizu, T., & Fujiki, T. (2013, June). *Digital guidebook supporting TPACK for teachers to teach learners motor skills in physical education.* Paper presented at the 2013 World Conference on

Educational Multimedia, Hypermedia and Telecommunications (ED-MEDIA), Victoria, Canada. Retrieved from http://www.editlib.org/p/111943

Abstract:
"In this study, the authors developed a digital guidebook for teachers in the instruction of motor skills. They employ the use of the horizontal bar in Japanese physical education as an example. This study offers valuable information and reduces difficulties in teaching this skill. According to the results, the digital guidebook for teachers was positively evaluated. Terminology posed an obstacle to the understanding of its contents; however, the developers can overcome this problem using movies, which are very effective."

Voogt, J. (2013, September). *The uptake of technology in education: Technological pedagogical content knowledge as a way forward?* Seminar presentation at King's College London, London, UK.

Abstract (excerpt from presentation slides):
"TPACK as a conceptual model: as a framework for identifying the knowledge base for teaching with technology [and] as a guide during the design of technology-enhanced lessons and programmes. [Possibilities for] TPACK as assessment model."

Vratulis, V. (2013, June). *An exploration of digital technologies in teacher education: TPCK framework.* Paper presented at the 2013 World Conference on Educational Multimedia, Hypermedia and Telecommunications (ED-MEDIA), Victoria, Canada. Retrieved from http://www.editlib.org/p/112034

Abstract:
"This paper investigates pre-service teachers' experiences with digital technologies within the context of a 12-month, elementary teacher education program. The principal investigator of the project shadowed pre-service teachers through each of their content area courses in order to identify moments of disruption in pre-service teachers existing conceptions of how to integrate digital technologies into classroom practice. Atlas.ti was used to explore the transcripts from 26 exit interviews of pre-service teachers enrolled in the program. Findings reveal that technological knowledge is often positioned in diametric opposition to content knowledge and/or pedagogical knowledge. In addition, digital technologies using the Technological Pedagogical Content Knowledge framework is not a unidirectional process (Koehler & Mishra, 2008). Instead, each body of knowledge interacts with other existing and transient bodies of knowledge to create an emergent, at times even new, body of knowledge."

5. Selected TPACK-Related Blog Entries

Anderson, M. (2013, May 28). Technological, pedagogical and content knowledge [Web log post]. Retrieved from http://ictevangelist.com/technological-pedagogical-and-content-knowledge/

Excerpt:
"What really resonated with me from all of this was the section within Technological Knowledge which states educators should be, "able to recognize when information technology can assist or impede the achievement of a goal". This idea, coupled with other thinking e.g. … Mandinach & Cline (Classroom Dynamics: Implementing a Technology-Based Learning Environment) talk about the levels of confidence and ability of educators to utilise technology in the classroom, really brings home where the most effort and attention needs to be applied in supporting educators in the classroom. Surely, if we want educators to be able to be discriminatory about whether or not the use of technology will "assist or impede" learning, educators have to have some high level knowledge in this area alongside their pre-existing Content and Pedagogical Knowledge.

Educators are already going to be the masters of pedagogy and content knowledge in the classroom. It is their domain of expertise. These two areas will have been studied, examined, researched and developed during their training as educators. It still goes on in their everyday practice too as they further develop their knowledge understanding and skills in these areas. For many however, technology knowledge is not their everyday area of expert knowledge. It goes to say then therefore that teachers need the support of their respective schools in order to facilitate this development so that teachers can make the informed decisions about when it is right to use (or not to use) technology within the classroom."

Webster, A. (2013, March 26). What is the point of educational technology? [Web log post]. Retrieved from http://cagelessthinking.com/what-is-the-point-of-educational-technology/

(This post also appeared on Edudemic.com, April 3, 2013: http://www.edudemic.com/how-teachers-can-best-use-education-technology/)

Excerpt:
"I spend a huge amount of my time reading about the top 5 apps for teachers, the best software for collaborative writing, the best web tool for this, that or the other, how to do something that I've never heard of but should have and now feel guilty about, so I'm going to Google it and try to drop it into a conversation next time I'm face to face with another teacher, so that I seem on top of the ever-burgeoning world of educational technology. Don't get me wrong, I'm a big fan. I might even describe myself as being someone close to the cutting edge of what is going on,

but the more I read, the more concerned I become about the quality of what is going on in schools."

6. Recent TPACK-Related Video

Mishra, P. (Producer). (2013). *TEI-Intro-to-TPACK* [online video]. Retrieved from http://vimeo.com/71520305

Description:
Introduction to the TPACK construct, created for Microsoft's Partners in Learning Teacher Education Initiative (TEI). More information about this international initiative is available online at: http://www.microsoft.com/education/ww/partners-in-learning/Pages/teacher-education-initiative-launch.aspx .

7. 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.). (2013, September 22). TPACK newsletter issue #17: September 2013 [Electronic mailing list message]. Retrieved from http://punya.educ.msu.edu/research/tpck/newsletter-archive/

8. 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 & Diana

…for the SITE TPACK SIG leadership:

Candace Figg,	Co-Chair, Brock University
Petra Fisser,	Co-Chair, University of Twente
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