TPACK Newsletter, Issue #18: December 2013

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

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

Gratuitous Quote About Technology

"The good part about writing about technology is that you never run out of ideas, because it's changing so fast. The bad part is that it's changing so fast that there's a million new products and ideas every day and every week."
- Walt Mossberg

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1. TPACK Newsletter Update

The TPACK Newsletter has 1215 subscribers currently. Our subscription numbers have held steady (+ or – approximately 3%) since October 2011. The newsletter has been published since January 2009. In the next issue, we will be celebrating the newsletter's 5th anniversary.

2. Recent TPACK Publications

Below are recent TPACK publications that we know about: 28 articles, 5 chapters, 1 book and 5 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

Anderson, A., Barham, N., & Northcote, M. (2013). Using the TPACK framework to unite disciplines in online learning. *Australasian Journal of Educational Technology, 29*(4), 549-565. Retrieved from http://ascilite.org.au/ajet/submission/index.php/AJET/article/view/24

Abstract:
"This paper builds on a previous case study in which a group of lecturers from various disciplines were interviewed about their practice as facilitators of online learning. The lecturers' comments about their teaching practices revealed their awareness of specific types of teacher knowledge about online teaching. This was an unintended outcome of the previous study. Subsequently, as reported in this paper, the data were interrogated further using a new lens to investigate the extent to which these elements of teacher knowledge were evident throughout their practices. The technological, pedagogical and content knowledge (TPACK) theoretical framework enabled the researchers to identify the lecturers' views about the content taught in online and blended environments, the pedagogy which guided teaching and course design, and the technology selected to facilitate students' learning. This paper also considers practical issues about using the TPACK framework as a research tool as a lens through which to view online teachers' knowledge about pedagogy, technology and content."

Barujel, A. G., Morado, E. P., & Pet, J. V. (2013). Conocimiento tecnológico-didáctico del contenido en la enseñanza de Ingeniería Informática: un estudio de caso colaborativo con la perspectiva del docente y los investigadores [Technological pedagogical content knowledge of a computer engineering professor: A collaborative case study with the perspective of professor and researchers]. *REDU, 11,* 349-374. Retrieved from http://red-u.net/redu/index.php/REDU/article/view/634

Abstract:
"The framework of this paper is a coordinated research project between three universities (Barcelona, Sevilla and Santiago de Compostela) entitled: Professional knowledge of university professors: the Construction and transfer of teaching practice. It is based on an unexplored higher education theoretical approach: analysis of pedagogical content knowledge (PCK), an original Shulman (1986) construct that Mishra and Koehler (2006) extended to Technological Pedagogical Content Knowledge (TPCK). It is a multiple case study. Each university took three cases of three professors selected as good teachers. We focus here on the case of a teacher of the Degree in Computer Engineering from the School of Engineering at University of Santiago de Compostela (USC). Non participant observation of classes and in-depth interviews were carried out. Data were analyzed based on theoretical dimensions and those arising from the observations. This paper presents the dimension "transformation of knowledge" that allows realizing the teacher's TPCK, and a dialogue between the teacher who was the own "case" and two USC researchers. This crossing perspective is around two issues: the relationship between teaching and research and TCPK. The results show limited

relationship between research and teaching and poor use of specific technologies to help students understand the subject."

Brantley-Dias, L., & Ertmer, P.A. (2013). Goldilocks and TPACK: Is the construct "just right?" *Journal of Research on Technology in Education, 46*(2), 103-128.

Abstract:
"In the education community, the Technological Pedagogical Content Knowledge (TPACK) framework has become a popular construct for examining the types of teacher knowledge needed to achieve technology integration. In accordance with Katz and Raths' "Goldilocks Principle" (cited in Kagan, 1990), TPACK, with its seven knowledge domains, may be too large (vague or ambiguous) of a construct to enable reasonable application. In this article, we provide a critical review of the TPACK construct and address the development, verification, usefulness, application, and appropriateness of TPACK as a way to explain the teacher cognition needed for effective technology integration. We make suggestions for returning to a simpler conceptualization to re-focus our efforts on what teachers need to achieve meaningful technology–enabled learning."

Editors' Note: The journal in which this article is published became available in paper and electronic formats to subscribers on December 1, 2013. Non-subscribers can purchase a copy of the article for $5.00 USD at:
http://www.iste.org/store/publications/downloads/jrte

Çalik, M., Özsevgeç, T., Ebenezer, J., Artun, H., & Küçük, Z. (2013). Effects of 'environmental chemistry' elective course via technology-embedded scientific inquiry model on some variables. *Journal of Science Education and Technology.* Advance online publication. doi: 10.1007/s10956-013-9473-5

Abstract:
"The purpose of this study is to examine the effects of 'environmental chemistry' elective course via Technology-Embedded Scientific Inquiry (TESI) model on senior science student teachers' (SSSTs) conceptions of environmental chemistry concepts/issues, attitudes toward chemistry, and technological pedagogical content knowledge (TPACK) levels. Within one group pre-test–post-test design, the study was conducted with 117 SSSTs (68 females and 49 males—aged 21–23 years) enrolled in an 'environmental chemistry' elective course in the spring semester of 2011–2012 academic-years. Instruments for data collection comprised of Environmental Chemistry Conceptual Understanding Questionnaire, TPACK survey, and Chemistry Attitudes and Experiences Questionnaire. Significant increases in the SSSTs' conceptions of environmental chemistry concepts/issues, attitudes toward chemistry, and TPACK levels are attributed to the SSSTs learning how to use the innovative technologies in the contexts of the 'environmental chemistry' elective course and teaching practicum. The study implies that the TESI model may serve a useful purpose in experimental science courses that use the innovative technologies. However, to generalize feasibility of the TESI model, it should be evaluated with SSSTs in diverse learning contexts."

Cavanagh, R.A., & Koehler, M.J. (2013). A turn toward specifying validity criteria in the measurement of technological pedagogical content knowledge (TPACK). *Journal of Research on Technology in Education, 46*(2), 129-148.

Abstract:
"The impetus for this paper stems from a concern about directions and progress in the measurement of the Technological Pedagogical Content Knowledge (TPACK) framework for effective technology integration. In this paper, we develop the rationale for using a seven-criterion lens, based upon contemporary validity theory, for critiquing empirical investigations and measurements using the TPACK framework. This proposed seven-criterion lens may help researchers map out measurement principles and techniques that ensure reliable and valid measurement in TPACK research. Our critique of existing TPACK research using these criteria as a frame suggests several areas of theorizing and practice that are likely impeding the press for measurement. First are contradictions and confusion about the epistemology of TPACK. Second is the lack of clarity about the purpose of TPACK measurement. Third is the choice and use of measurement models and techniques. This article illustrates these limitations with examples from current TPACK and measurement- based research and discusses directions and guidelines for further research."

Editors' Note: The journal in which this article is published became available in paper and electronic formats to subscribers on December 1, 2013. Non-subscribers can purchase a copy of the article for $5.00 USD at:
http://www.iste.org/store/publications/downloads/jrte

Chai, C., Chin, C., Koh, J., & Tan, C. (2013). Exploring Singaporean Chinese language teachers' technological pedagogical content knowledge and its relationship to teachers' pedagogical beliefs. *Asian-Pacific Education Researcher, 22*(4), 657-666.

Abstract:
"The notion of technological pedagogical content knowledge (TPACK) has recently emerged as a key theoretical framework that could help explain the complexity involved when teachers integrate ICT into classroom teaching. While the framework has been employed in hundreds of published studies, surveys of teachers' TPACK for specific subject matter, especially for language teaching, has been rare. In addition, there is also a lack of studies about the relationship between teachers' TPACK and teachers' beliefs. This study investigates the profile of Singaporean Chinese language teachers' technological pedagogical content knowledge (TPACK) and their pedagogical beliefs. It first validated an adapted questionnaire entitled 'Technological Pedagogical Chinese Language Knowledge'. Based on the data collected from the questionnaire, the findings reveal that the teachers rated themselves as most competent in content knowledge but least competent in TPACK. The qualitative findings provide further support on the teachers' self-rated profile. The relationship between Teachers' TPACK and how it is related to teachers' constructivist or traditional pedagogical beliefs are investigated

through Pearson's correlation. The findings suggest that teachers' TPACK is more related to the teachers' constructivist pedagogical beliefs than to the traditional beliefs. Implications of the current study in terms of Chinese language teachers' professional development are discussed."

Courey, S., LePage, P., Siker, J., Roschelle, J., & Blackorby, J. (2012). Preparing middle school mathematics teachers: Rethinking engagement and learning. *The Mathematics Enthusiast.* Advance online publication. Retrieved from http://hub.mspnet.org/index.cfm/24474

Abstract:
"In this theoretical research paper we describe a collaborative effort between researchers and university faculty to improve how teachers are prepared to teach middle school mathematics. Two powerful instructional frameworks, UDL and TPACK are dovetailed within in a web-based dynamic textbook, *Proportional Dynabook* that focuses on proportional reasoning concepts related to ratio, similarity, and linear function. Theoretical tensions between special and general education teacher preparation programs influence the ongoing design of *Proportional Dynabook*. Pre-service and in-service special education teachers used *Proportional Dynabook* in a graduate level methods class to design a ratio lesson for a student who struggled with the concept. Teachers developed deeper understanding of ratio and related pedagogical strategies that make the content of mathematics accessible to diverse learners."

Editors' Note: This article was made available online shortly before the journal stopped being published. To our knowledge, the article and journal are no longer available in print format.

Donna, J. D., & Miller, B. G. (2013). Using cloud-computing applications to support collaborative scientific inquiry: Examining pre-service teachers' perceived barriers towards integration. *Canadian Journal of Learning and Technology, 39*(3), 1-17. Retrieved from http://cjlt.csj.ualberta.ca/index.php/cjlt/article/view/630/368

Abstract:
"Technology plays a crucial role in facilitating collaboration within the scientific community. Cloud-computing applications, such as Google Drive, can be used to model such collaboration and support inquiry within the secondary science classroom. Little is known about pre-service teachers' beliefs related to the envisioned use of collaborative, cloud-based technologies. These beliefs may influence future integration. This study finds several first-order barriers, such as perceptions that these tools would take too much time to use. Second-order barriers include perceptions that this technology would not promote face-to-face collaboration skills, would create classroom management challenges, and beliefs that the technology does not help students understand the nature of science. Suggestions for mitigating these barriers within pre- service education technology courses are discussed."

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.

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."

Edyburn, D.L. (2013). Critical issues in advancing the special education technology evidence-base. *Exceptional Children, 80*(1), 7-24.

Abstract:
"The field of special education technology is devoted to a variety of activities that ultimately serve to augment, bypass, or compensate for a disability. Much like a kaleidoscope, perceptions of the field may be viewed through the reflection of multiple lenses. The three lenses of innovation, policy, and theory provide a mechanism for filtering, viewing, and using the special education technology research and practice knowledge base. This article examines characteristics of the emerging special education technology knowledge base when viewed through each of the three lenses. The intent is to provide readers with an analysis of qualities found in the emerging special education knowledge base in order to highlight critical issues needed to advance the evidence base of the field through future research, theory, development, policy, and practice."

Hechter, R. P. & Vermette, L. A. (2013). Technology integration in K-12 science classrooms: An analysis of barriers and implications. *Themes in Science and Technology Education, 6*(2), 73-90. Retrieved from http://earthlab.uoi.gr/ojs/theste/index.php/theste/article/view/123

Abstract:

"This paper examines the barriers to technology integration for Manitoban K-12 inservice science educators (n = 430) based on a 10-item online survey; results are analyzed according to teaching stream using the Technology, Pedagogy, and Content Knowledge (TPACK) framework. Quantitative descriptive statistics indicated that the leading barriers experienced by all teachers are inadequate: access; time; resources; training; budget; and support. Upon further examination, Middle Years and Senior Years teachers are considerably more likely to report that access and time hinder technology integration than their Early Years counterparts. Nearly 80% of all teachers remarked that technology was available to them, but about one quarter of respondents expressed frustration about the barriers that hinder effective technology integration in their classrooms. Implications of this study inform school division teacher support programs and planning, inservice professional development opportunities, and preservice teacher education."

Hu, H-W., Walker, K., & Hsiao, W-Y. (2013). Developing elementary pre-service teachers' technological, pedagogical, and content knowledge for learning and teaching division of fractions. *International Journal of Technology, Knowledge and Society, 9*(2), 185-204. Retrieved from http://ijt.cgpublisher.com/product/pub.42/prod.932

Abstract:
"Several studies indicate pre-service elementary school teachers' (PSTs) lack of understanding in division of fractions due to limited conceptual understanding in this content area (Ball, 1990; Schwartz, 2008). The purpose of this study is to examine how TPACK (integrating technological, pedagogical, and content knowledge) can enhance PSTs' conceptual understanding of division of fractions. The outcome of this study shows PSTs are able to create models to convey the concept; write mathematic sentences to describe these models; explain their understanding in words; and demonstrate connections between different mathematical representations by using TPACK."

Jang, S-J., & Tsai, M-F. (2013). Exploring the TPACK of Taiwanese secondary school science teachers using a new contextualized TPACK model. *Australasian Journal of Educational Technology*, *29*(4), 566-580. Retrieved from http://ascilite.org.au/ajet/submission/index.php/AJET/article/view/282/611

Abstract:
"Technological pedagogical and content knowledge (TPACK) has been one of the steering theoretical concepts widely employed by researchers in order to examine and develop teachers' knowledge of integrating technology into teaching. Existing research on TPACK shows little about in-service secondary school science teachers' TPACK through a quantitative approach. The purposes of this study were to explore TPACK of secondary school science teachers using a new contextualized TPACK model. Associations between in-service teachers' TPACK and other factors were also examined. The TPACK questionnaire was mailed to secondary schools randomly selected across different parts of Taiwan, and return envelopes were provided for

completed questionnaires. There were 1292 science teachers from secondary schools for factor analysis. An independent samples *t*-test was conducted when there were two groups (i.e., gender) to be compared for TPACK. ANOVA was conducted when there were more than two groups (i.e., science teaching experience) compared for TPACK. The results indicated that secondary science teachers' TPACK was statistically significant according to gender and teaching experience. With the consideration of other TPACK sub-components, male science teachers rated their technology knowledge significantly higher than did female teachers. Experienced science teachers tended to rate their content knowledge and pedagogical content knowledge in context (PCKCx) significantly higher than did novice science teachers. However, science teachers with less teaching experience tended to rate their technology knowledge and technological content knowledge in context (TPCKCx) significantly higher than did teachers with more teaching experience. The study shows how gender and teaching experience were influential factors for secondary school science teachers' TPACK. The research implications of this study are provided along with suggestions."

Kaya, Z., Kaya, O. N., & Emre, I. (2013). Adaptation of technological pedagogical content knowledge scale to Turkish. *Educational Sciences: Theory & Practice, 13*(4), 2367-2377.

Abstract:
"The purpose of this study was to adapt "Survey of Pre-service Teachers' Knowledge of Teaching and Technology" in order to assess pre-service primary teachers' Technological Pedagogical Content Knowledge (TPACK) to Turkish. 407 pre-service primary teachers (227 female and 180 male) in their final semester in Education Faculties in Turkey participating in this study were selected with criteria sampling which is the method of purposeful sampling. Exploratory and confirmatory factor analyses, including Cronbach's alpha and item-total correlation coefficients, were used for checking the psychometric properties of the adapted scale. Exploratory factor analysis (EFA) identified eight factors accounting for 59.44% of the variance, Cronbach's alpha coefficient was found to be .89 for the overall scale, and item-total correlation coefficients were between .42 and .74. The results obtained from the EFA supported by confirmatory factor analysis showed that there were new four factors based on the subject matter (science, mathematics, social studies and literacy) although four factors were the same as in the original scale. It was concluded that the adapted scale should not be used in academic studies focusing on Turkish pre-service primary teachers' TPACK. The unexpected results of this study were discussed for researchers and program developers in Turkish teacher education."

Liang, J-C., Chai, C. S., Koh, J. H. L., Yang, C-J., & Tsai, C-C. (2013). Surveying in-service preschool teachers' technological pedagogical content knowledge. *Australasian Journal of Educational Technology, 29*(4), 581-594. http://ascilite.org.au/ajet/submission/index.php/AJET/article/view/299

Abstract:

"Many teachers are reporting that they need to develop more subject-specific applications of educational technology. However, there seems to have been a lack of theoretical frameworks to guide educators in preparing and developing in-service preschool teacher education in the area of educational technology until the recent emergence of the notion of technological pedagogical content knowledge (TPACK). This study utilizes the TPACK survey to explore 366 Taiwanese in-service preschool teachers' technological pedagogical content knowledge. Exploratory factor analyses of the TPACK survey used in this study yielded six scales: Content knowledge (CK), pedagogical knowledge (PK), pedagogical content knowledge (PCK), technological knowledge (TK), a combined factor of technological pedagogical knowledge and technological content knowledge (TPTCK) and technological pedagogical content knowledge (TPCK), respectively. The exploratory factor analyses indicated adequate reliability and validity of the TPACK survey. The correlation analyses revealed that more senior preschool teachers might show a certain degree of resistance toward technology-integrated teaching environments. Further analyses also showed that the preschool teachers with higher education qualifications tended to have more knowledge of technology use and ICT integration in their teaching environment."

Liu, S-H. (2013). Exploring the instructional strategies of elementary school teachers when developing technological, pedagogical, and content knowledge via a collaborative professional development program. *International Education Studies, 6*(11), 58-68. doi: 10.5539/ies.v6n11p58. Retrieved from http://www.ccsenet.org/journal/index.php/ies/article/view/30195/18310

Abstract:
"The technological, pedagogical, and content knowledge (TPACK) framework has been regarded as potentially effective in helping teachers integrate technology into the classroom. This study explores the instructional strategies of teachers when developing TPACK. A teacher professional development (TPD) program, in which teaching activities and deep discussions were key processes, was conducted. Instructional observations and focus-group interviews were the primary evaluation methods. Six elementary school teachers participated in this program between September 2011 and January 2012. Analytical findings demonstrate that teachers initially had limited pedagogical knowledge (PK). For intentional use of technology during teaching, the teachers transformed technology operating skills into multiple teaching activities for content learning, and expanding their TPACK base. The teachers then applied PK basis and combined them with subject content and technology through the TPD program, and reorganized their application of TPACK. Moreover, teachers engaged in peer observation and group interviews during TPD, effectively built TPACK. This study provides teacher educators who are interested in examining teachers' TPACK with an effective TPD program for technology integration. We recommend that teacher educators continually enhance the technological knowledge of teachers and promote TPACK through collaborative TPD programs."

Maher, D. (2013). Pre-service primary teachers' use of iPads to support teaching: Implications for teacher education. *Educational Research for Social Change,*

2(1), 48-63. Retrieved from
http://ersc.nmmu.ac.za/articles/Vol2No1_Maher_pp48-63_April_2013.pdf

Abstract:

"In this article the use of iPads in primary schools by a group of pre-service teachers completing their professional experience is reported on. The study was developed as part of the university's activities in the national Teaching Teachers for the Future (TTF) project. The study is a qualitative case study and the data gathering tools consist of participant journals, pre- service teacher focus groups, and staff interviews. Participants consist of 16 fourth-year Bachelor of Education (Primary) pre-service teachers completing a Maths Education subject, and two Maths lecturers at an Australian university. The results indicate that the teachers in the study used a variety of apps as well as inbuilt features of the iPad to support learning across a range of subjects. The teachers also used the iPad for self-reflective and assessment purposes. The implications of iPad use by pre-service teachers for teacher training in universities are discussed."

Mouza, C., Karchmer-Klein, R., Nandakumar, R., Ozden, S. Y., & Hu, L. (2014). Investigating the impact of an integrated approach to the development of preservice teachers' technological pedagogical content knowledge (TPACK). *Computers & Education, 71*, 206-221. Advance online publication. Retrieved from http://www.sciencedirect.com/science/article/pii/S036013151300 2832

Abstract:

"The purpose of this study is to describe an *integrated* pedagogical approach, aimed at advancing preservice teachers' learning on the use of technology and investigate its impact on participants' knowledge (i.e., TPACK) and practice. The integrated approach juxtaposes an educational technology course with methods courses and field experience through careful instructional design. Both quantitative and qualitative data were collected. Quantitative data were collected through a pre-post administration of the *Survey of Preservice Teachers' Knowledge of Teaching and Technology*. Qualitative data were collected through open-ended survey responses and preservice teacher case narratives reporting on the design and implementation of technology-integrated lessons in a field placement. Finding revealed that participants experienced significant gains in all TPACK constructs. Further, findings indicated that participants applied their knowledge in practice though there was variability in the ways in which knowledge domains were represented in participants' narratives. Findings have implications for teacher education programs and for researchers interested in the development and assessment of preservice teacher knowledge of teaching with technology."

Oakley, G., Howitt, C., Garwood, R., Durack, A-R. (2013). Becoming multimodal authors: Pre-service teachers' interventions to support young children with autism. *Australasian Journal of Early Childhood, 38*(3), 86-96.

Abstract:

"The purpose of this article is to describe two case studies of classroom-based teaching interventions, conducted by final-year pre-service teachers, which were successful in assisting young children with autism engage in and learn literacy through the use of Information and Communication Technologies (ICTs). The 10-day interventions were carried out as part of a two-year Master of Teaching course at an Australian university, and were designed to identify specific learning needs in young children, and then implement targeted interventions. The two cases described here show how ICTs were successfully used to create multimodal texts to support the literacy learning and engagement of young children with autism. The first case involved an intervention that employed two iPad apps--which were not intended specifically for children with autism-- to support the literacy learning and engagement of a five-year-old. The second case involved the use of Microsoft PowerPoint on a laptop to develop multimodal non-fiction texts to improve an eight-year-old's attitude to, and engagement with, reading. Each intervention was found to be effective in improving the participating child's literacy achievement and engagement. Each used multisensory and student-centred approaches that acknowledged the children's strengths and interests, with ICTs being used to transform teaching and learning tasks. This article illustrates the successful drawing together of pre-service teachers' technological, pedagogical and content knowledge (TPACK), as well as their knowledge of the children concerned, to devise evidence-based interventions using ICTs to assist young children with autism to engage in, and learn, literacy."

Parkes, K. A., Dredger, K. S., & Hicks, D. (2013). ePortfolio as a measure of reflective practice. *International Journal of ePortfolio, 3*(2), 99-115. Retrieved from http://distance-educator.com/eportfolio-as-a-measure-of-reflective-practice/

Abstract:
"This instructional article outlines the qualities of effective ePortfolios and how reflection and student growth is measured. Student exemplars and assessment rubrics show how, despite changing tools and evolving standards, sustained collaboration and student coaching yields reflective practitioners in content areas and in technological knowledge. As part of summative assessment within a teacher preparation program, teacher candidates prepare an ePortfolio to demonstrate reflective practice and growth in learning across their arts and humanities programs (e.g., within the Music K-12, History and Social Sciences 6-12, and English 6-12 teacher licensure programs). This article illustrates the importance of privileging meta-cognitive practices that facilitate student ownership of their own learning and growth. Used not as compilation of artifacts, ePortfolios are instead positioned as a pedagogical space where teaching and learning are as transparent as possible. As such, ePortfolios examples and practices are exemplified and discussed within the pedagogical content knowing and technological pedagogical content knowledge frameworks."

Rienties, B., Brouwer, N., Bohle Carbonell, K., Townsend, D., Rozendal, A-P., van der Loo, J.,…Lygo-Baker, S. (2013). Online training of TPACK skills of higher education scholars: A cross-institutional impact study. *European Journal of Teacher Education, 36*(4), 480-495.

Abstract:
"Higher education institutions should provide adequate training for teachers in order to increase their awareness of the complex interplay between technology, pedagogy and the cognitive knowledge in their disciplines. However, research has shown that providing effective staff development from teacher educators to support these teachers' skills is not straightforward. An online teacher training programme created and implemented by a team of 14 teacher educators in a cross-institutional programme in the Netherlands was followed by 67 teachers. Data were gathered using a TPACK (Technological, Pedagogical, Content Knowledge) instrument in a pre-post test design. Furthermore, (perceived) learning satisfaction was measured in order to determine whether the design was appropriate. The results indicate that the teachers' TPACK skills increased substantially. Furthermore, most participants were positive about the design and implementation of the online professionalisation programme. Nonetheless, not all teachers were able to effectively learn in this context, requiring further fine-tuning and research."

Shih-Hsiung, L. (2013). Exploring the instructional strategies of elementary school teachers when developing technological, pedagogical, and content knowledge via a collaborative professional development program. *International Education Studies, 6*(11), 58-68.

Abstract:
"The technological, pedagogical, and content knowledge (TPACK) framework has been regarded as potentially effective in helping teachers integrate technology into the classroom. This study explores the instructional strategies of teachers when developing TPACK. A teacher professional development (TPD) program, in which teaching activities and deep discussions were key processes, was conducted. Instructional observations and focus-group interviews were the primary evaluation methods. Six elementary school teachers participated in this program between September 2011 and January 2012. Analytical findings demonstrate that teachers initially had limited pedagogical knowledge (PK). For intentional use of technology during teaching, the teachers transformed technology operating skills into multiple teaching activities for content learning, and expanding their TPACK base. The teachers then applied PK basis and combined them with subject content and technology through the TPD program, and reorganized their application of TPACK. Moreover, teachers engaged in peer observation and group interviews during TPD, effectively built TPACK. This study provides teacher educators who are interested in examining teachers' TPACK with an effective TPD program for technology integration. We recommend that teacher educators continually enhance the technological knowledge of teachers and promote TPACK through collaborative TPD programs."

Smith, S. (2013). Through the teacher's eyes: Unpacking the TPACK of digital fabrication integration in middle school language arts. *Journal of Research on Technology in Education, 46*(2), 207-227.

Abstract:
"Digital fabrication consists of manufacturing design technology that is used to facilitate the creation of physical objects. Existing research suggests digital fabrication technology can inspire student creativity and innovation in mathematics and science. However, there is a lack of research that informs teacher education by identifying practical pedagogies to meaningfully integrate digital fabrication into language arts curricula, which this article seeks to achieve. Guided by the Technological Pedagogical Content Knowledge (TPACK) framework of 21st century teacher knowledge, this case study explores one middle school teacher's yearlong journey as she integrated digital fabrication technology to create pop-up books in an after school program with a language arts focus."

Sobel, K., & Grotti, M. G. (2013). Using the TPACK framework to facilitate decision making on instructional technologies. *Journal of Electronic Resources Librarianship, 25*(4), 255-262. Available from http://www.tandfonline.com/doi/abs/10.1080/1941126X.2013.847671

Abstract:
"Technological pedagogical content knowledge ("TPACK") is a theoretical framework used primarily in the field of education to facilitate the integration of technology into educational endeavors. This framework can be particularly valuable to librarians, who are heavy users of technology, and can provide a structure that can help librarians to critically examine technologies being considered for integration. In this article, the authors provide an overview of TPACK, discuss its history and uses in libraries and in education, and provide concrete examples illustrating how this framework can be applied to decision-making within libraries."

Stewart, J., Antonenko, P. D., Robinson, J. S., & Mwavita, M. (2013). Intrapersonal factors affecting technological pedagogical content knowledge of agricultural education teachers. *Journal of Agricultural Education, 54*(3), 157-170. Retrieved from http://www.jae-online.org/vol-54-no-3-2013/1765-intrapersonal-factors-affecting-technological-pedagogical-content-knowledge-of-agricultural-education-teachers.html

Abstract:
"The focus of this exploratory study was to examine levels of technology integration, self-efficacy, and Technological Pedagogical Content Knowledge (TPACK) in preservice and inservice agricultural education teachers in Oklahoma. The findings of this study suggest that intrapersonal factors, such as self- efficacy, outcome expectations, and interest, interact with teacher motivation to integrate technology and influence their TPACK. Further, the results suggest that experienced inservice teachers view

technology tools as a mechanism to engage students and achieve instructional gains, whereas novice and preservice teachers tend to perceive technology tools primarily as a mechanism for improving classroom management. Implications include continuing to support and enact a shift in preservice teacher education from direct lecture and modeling-based instruction to more hands-on, constructivist methods of teaching that incorporate a variety of mastery experiences."

Tokmak, H., Incikabi, L., & Ozgelen, S. (2013). An investigation of change in mathematics, science, and literacy education pre-service teachers' TPACK. *Asian-Pacific Education Researcher, 22*(4), 407-415.

Abstract:
"This quasi-experimental research study aimed to investigate the effect of technological, pedagogical, and content knowledge (TPACK)-based course design on mathematics, science, and literacy education pre-service teachers' TPACK. Participants in the study consisted of 31 mathematics, 32 science, and 38 literacy education pre-service teachers who attended introduction to computers. To collect data, the technological pedagogical content knowledge self-efficacy instrument (TPACKSEI) developed by Graham et al. () was applied before and after the course. The results showed significant improvements in all groups of pre-service teachers' mathematics, science, and literacy education self efficacy on their TPACK. Moreover, there were no significant differences between natural science (mathematics and science education) and social science (literacy) for pre-service teachers' TPACK. However, there were significant differences between natural science and social science pre-service teachers' technological knowledge and technological content knowledge."

Young, J.R., Young, J.L., & Hamilton, C. (2013). The use of confidence intervals as a meta-analytic lens to summarize the effects of teacher education technology courses on preservice teacher TPACK. *Journal of Research on Technology in Education, 46*(2), 149-172.

Abstract:
"The validity and reliability of the Technological Pedagogical Content Knowledge (TPACK) framework to measure the extent to which teachers can teach with technology, hinges on the ability to aggregate results across empirical studies. We synthesized mean difference effect sizes resulting from university classroom studies, which used a survey of preservice teacher knowledge of teaching with technology (TKTT) using confidence intervals (CIs). We then characterized the mean effect sizes for the influence of classroom instruction on preservice teacher TPACK by graphing CIs across studies from 2009 until 2011. The results present approximations of TPACK population parameters as well as implications for researchers and teacher educators."

Editors' Note: The journal in which this article is published became available in paper and electronic formats to subscribers on December 1, 2013. Non-subscribers can purchase a copy of the article for $5.00 USD at:
http://www.iste.org/store/publications/downloads/jrte

Zelkowski, J., Gleason, J., Cox, D.C., & Bismarck, S. (2013). Developing and validating a reliable TPACK instrument for secondary mathematics preservice teachers. *Journal of Research on Technology in Education*, *46*(2), 173-206.

Abstract:
"Within the realm of teaching middle and high school mathematics, the ability to teach mathematics effectively using various forms of technology is now more important than ever, as expressed by the recent development of the Common Core State Standards for Mathematical Practice. This article presents the development process and the results from 15 institutions and more than 300 surveys completed by secondary mathematics preservice teachers. The results suggest that technological, pedagogical, and content knowledge; technology knowledge; content knowledge; and pedagogical knowledge constructs are valid and reliable, whereas pedagogical content knowledge, technological content knowledge, and technological pedagogical knowledge domains remain difficult for preservice teachers to separate and self-report."

Editors' Note: The journal in which this article is published became available in paper and electronic formats to subscribers on December 1, 2013. Non-subscribers can purchase a copy of the article for $5.00 USD at:
http://www.iste.org/store/publications/downloads/jrte

Chapters

Bell, L., Juersivich, N., Hammond, T. C., & Bell, R. L. (2013). The TPACK of dynamic representations. In Information Resources Management Association (Eds.), *K-12 education: Concepts, methodologies, tools, and applications* (pp. 1139-1171). Retrieved from http://www.igi-global.com/chapter/the-TPACK-of-dynamic-representations/88208

Abstract:
"Effective teachers across K-12 content areas often use visual representations to promote conceptual understanding, but these static representations remain insufficient for conveying adequate information to novice learners about motion and dynamic processes. The advent of dynamic representations has created new possibilities for more fully supporting visualization. This chapter discusses the findings from a broad range of studies over the past decade examining the use of dynamic representations in the classroom, focusing especially on the content areas of science, mathematics, and social studies, with the purpose of facilitating the development of teacher technological pedagogical content knowledge. The chapter describes the research regarding the affordances for learning with dynamic representations, as well as the constraints—characteristics of both the technology and learners that can become barriers to learning—followed by a summary of literature-based recommendations for effective teaching with dynamic representations and implications for teaching and teacher education across subject areas."

Deyoe, M. M., Newman, D. L., Asaro-Saddler, K. (2014). Moving from professional development to real-time use: How are we changing students? In J. Keengwe, G. Onchwari, & D. Hucks (Eds.), *Literacy enrichment and technology integration in pre-service teacher education* (pp. 160-182). doi: 10.4018/978-1-4666-4924-8.ch010

Abstract:
"This chapter demonstrates he importance of teacher training in the use of technology in literacy instruction by focusing on the need to update current teachers' skills and practice. In the setting described, the emphasis was on the transfer of Technological Pedagogical Content Knowledge (TPACK) strategies, learned via in-service professional development, to program classrooms supplied with twenty-first century technology in a high needs setting for at-risk students in grades 3-9. In addition to the general at-risk setting, specific literacy-related affective and cognitive learning outcomes are noted for students with disabilities and for English language learners. Program findings indicate the benefits of continuous professional development and embedded training along with embedded implementation of technology within pedagogical and content literacy instruction. Positive literacy-related cognitive results are noted for all students enrolled in the program classrooms; data for students with disabilities and English Language Learners (ELLs) also reveals potential benefits."

MaKinster, J., & Trautmann, N. (2014). The nature of teacher knowledge necessary for the effective use of geospatial technologies to teach science. In J. MaKinster, N. Trautmann, & M. Barnett (Eds.), *Teaching science and investigating environmental issues with geospatial technology: Designing effective professional development for teachers* (pp. 333-353). doi: 10.1007/978-90-481-3931-6_20

Abstract:
"Section II provides insights into the design and implementation of professional development and curricular resources for teaching science with geospatial technology. This final chapter synthesizes what has been learned about the knowledge needed for teachers to successfully implement geospatial inquiry. Technological Pedagogical Content Knowledge (TPACK) serves as a theoretical model that reveals the interrelationships between the types of knowledge and specific pedagogical approaches that teachers use when teaching science with geospatial technology. Examples from the projects profiled in this volume are used to illustrate and define the knowledge domains of Technological Content Knowledge, Technological Pedagogical Knowledge, and TPACK. Ultimately, this chapter provides a framework for understanding teacher knowledge that project designers and researchers can use when designing and studying professional development experiences and related curricular materials."

MaKinster, J., & Trautmann, N. (2014). Understanding the use of geospatial technologies to teach science: TPACK as a lens for effective teaching. In J. MaKinster, N. Trautmann, & M. Barnett, (Eds.), *Teaching science and investigating environmental issues with geospatial technology: Designing effective professional development for teachers* (pp. 269-286). doi: 10.1007/978-90-481-3931-6_16

Abstract:
"Technological Pedagogical Content Knowledge, or TPACK (pronounced t-pack), is a theoretical framework to examine how a specific technology creates meaningful opportunities for teaching and learning. For 3 years we engaged three cohorts of teachers in a sustained professional development project entitled GIT Ahead. GIT Ahead helped teachers identify ways to teach science using geospatial technologies. This chapter presents a case study of one GIT Ahead teacher's use of Google Earth and ArcView software to teach students about watershed concepts and issues. TPACK provides a framework for analysis of both the types of teacher knowledge required to successfully implement technology-based science learning and the pedagogical choices necessary to achieve intended learning outcomes. In the watershed case study, Google Earth enabled students to explore a 3D representation of their local watershed, change their view or perspective as needed, and access supplementary information that helped them to interpret the landscape. Using ArcView they measured various attributes of the watershed, which required them to understand individual scientific concepts and the interrelatedness of those concepts. Ultimately, TPACK provides researchers with a knowledge framework for research on the use of geospatial technology to teach science. A productive area of future research might examine how content knowledge, pedagogical knowledge, and technological knowledge vary among teachers using similar technologies or teaching similar concepts."

Trautmann, N., & MaKinster, J. (2014). Meeting teachers where they are and helping them achieve their geospatial goals. In J. MaKinster, N. Trautmann, & M. Barnett, (Eds.), *Teaching science and investigating environmental issues with geospatial technology: Designing effective professional development for teachers* (pp. 51-64). doi: 10.1007/978-90-481-3931-6_4

Abstract:
"This chapter presents the flexibly adaptive model of teacher professional development, which was developed in the GIT Ahead project to enable secondary science teachers to incorporate a variety of geospatial applications into wide-ranging classroom contexts. Impacts on participating teachers were evaluated using project application materials, curricular resources developed and implemented by each teacher, written reflections, and questionnaires. Pre-post questionnaire responses showed significant growth in teachers' perceived expertise, interest, and self-confidence with regard to integrating geospatial analyses into their science teaching. When viewed from the perspective of the Technological Pedagogical Content Knowledge (TPACK) framework, teachers grew in Technological Content Knowledge and in the extent to which this knowledge

intersected with their pedagogical and science content knowledge as they learned new ways to apply geospatial technology in their teaching. Key aspects of professional development for the support of teaching science with geospatial technology included intensive summer training, ongoing technological and curricular support throughout the school year, promotion of a supportive learning community, and flexibility in expectations regarding the nature and focus of classroom implementation. Research is needed to create validated instruments for measuring teacher self-efficacy for teaching with geospatial technology and for measuring associated student learning outcomes."

Book

Brouwer, N., Dekker, P. J., & van der Pol, J. (2013). *e-Learning cookbook: TPACK in professional development in higher education.* Retrieved from http://dare.uva.nl/document/504361

Abstract:
"The e-Learning Cookbook provides recipes how to support lecturers in higher education to professionalize their skills in designing or redesigning courses with ICT using TPACK (Technological Pedagogical Content Knowledge). To make good use of ICT in education, it is important for lecturers to learn how they can apply their content, pedagogical and technological (ICT tools) knowledge in an integrated way. The TPACK model describes how a lecturer can integrate this knowledge to achieve a good outcome when designing or redesigning courses. Experiences with the application of TPACK in lecturer professionalisation and in terms of the educational practice of higher education lecturers were collected and made into a coherent whole in the e Learning Cookbook. The book provides instructions, guidelines, tips and inspiration to enable its readers to get going in a practical sense. In addition, it contains many lessons learned about how lecturers can use ICT in an effective way in the education that they provide.

The e-Learning Cookbook is in English and consists of three parts:
1. Recipes for implementing TPACK
2. Dimensions of implementing TPACK course redesign modules and data collection
3. TPACK course redesign professional development modules."
(http://www.surf.nl/en/publicaties/Pages/e-LearningCookbook.aspx)

3. Recent TPACK-Related Dissertations & Theses

DeSantis, J. D. (2013). *The effects of professional development on teachers' technology self-efficacy: A design-based approach* (Doctoral dissertation). Retrieved from ProQuest Dissertations and Theses. (3546006)

Abstract:
"This mixed-methods and design-based study identifies changes in technology self-efficacy and technological, pedagogical, and content knowledge among forty-one teachers following their participation in sustained, collaborative, and scaffolded

professional development for the interactive whiteboard. Self-efficacy is an important determinant in the degree to which a learner adopts a new skill. Identifying means of assisting teachers in integrating technology during their instruction is becoming more important as the rate new technologies enter the classroom accelerates. During this study, one group of participants completed a professional development program, which consisted of a day-long professional development workshop for the interactive whiteboard in August, 2011 as well as monthly after-school technology skills seminars. A second group of participants did not complete the day-long professional development project but did complete the monthly skills seminars. The first group of participants completed a survey instrument created for this project to measure their interactive whiteboard technology self-efficacy before and after their participation in the professional development program. The second group of participants completed the same instrument following their participation in the monthly skills seminars. The quantitative portion of this study was a comparison of the pre- and post-professional development experience scores of the first group of participants and the post-experience scores of data from the first and second groups of participants. The qualitative portion of the study was an analysis of six semi-structured participant interviews collected following the completion of the professional development experience. The researcher found statistically significant improvements in technology self-efficacy in the first group of teachers following their participation in the professional development program. Based on the study's findings, teachers are likely to develop technology self-efficacy following their participation in sustained, collaborative, and scaffolded professional development for the interactive whiteboard. This confirms the value of sustained, collaborative, and scaffolded professional development for educational technologies."

Ingram-Jones, S. A. (2012). *Digit's digital world: A study of mathematics, technology, and student achievement* (Doctoral dissertation)*.* Retrieved from ProQuest Dissertations and Theses. (3540451)

Abstract:
"The purpose of the mixed method study was to determine how and to what extent mathematic teachers were integrating technology into secondary mathematics classrooms. The quantitative component examined whether a teacher's level of teaching experience, gender, or age had a relationship to the teacher's technology integration. Whether there is a relationship between teachers integrating technology in a mathematics classroom and student assessment scores was another quantitative question addressed in the study. A questionnaire asked the participants to rate their beliefs on content, pedagogy, and technology in their classroom. The data from the questionnaire allowed the researcher to develop a technology integration score to complete a Chi-Square test. The qualitative component of the study scrutinized whether there was a difference between how novice, experienced, and veteran teachers integrated technology in their mathematics classroom. The qualitative data from open-ended questions and interviews provided insight into how teachers integrated technology in their classrooms. The theoretical framework of technological pedagogical and content knowledge was the basis of the interpretation of the qualitative data. The

technological pedagogical and content knowledge framework involves teachers being able to assimilate content, pedagogy, and technology knowledge for the betterment of student learning."

Maderick, J. A. (2013). *Validity of subjective self-assessment of digital competence among undergraduate preservice teachers* (Doctoral dissertation, University of Nevada, Las Vegas). Retrieved from http://digitalscholarship.unlv.edu/thesesdissertations/1941/

Abstract:
"Technology is now integrated into the Technological Pedagogical Content Knowledge (TPACK) required to be a highly qualified 21st century teacher. Accurate measurement of digital competence has become critical. Self-assessment has been used widely to measure the digital competence of preservice teachers who are expected to integrate technology into their teaching. There is little in the literature indicating that there has been validation of self-assessment as a measure of that competence. While recent research studies have tested the validity of self-assessment verses objective testing among business and accounting students, there have been no studies of self-assessment validity conducted on digital competence among preservice teachers. This study matched surveys of subjective self-assessment and objective assessment on seven domains of digital competence for preservice teachers. The results indicate that all participant groups inaccurately self-assessed their digital competence. The study concluded that subjective self-assessment lacks appropriate validity and is not an accurate predictor of digital competence among preservice teachers."

Peraire-Sirera, C. (2013). *Revisión y estudio exploratorio sobre la integración de las TIC en la Educación Secundaria Obligatoria. Introducción al uso de recursos innovadores para la enseñanza de las Ciencias* [Review and exploratory study on the integration of ICT in secondary education. Introduction to the use of innovative resources for teaching science] (Master's thesis, Universidad Internacional de la Rioja, Barcelona, Spain). Retrieved from http://reunir.unir.net/bitstream/handle/123456789/1963/2013_07_23_TFM_ESTUDIO_DEL_TRABAJO.pdf?sequence=1

Abstract (translated):
"In this master's thesis, the current state of integration of ICT is reviewed, and the problems associated with new innovative teaching approaches grounded in constructivist educational ICT competencies of UNESCO or the model of Technological, Pedagogical, [and] Content Knowledge (TPACK). Furthermore, an exploratory study on the perceptions of students and high school teachers in relation to accessibility, connectivity and ICT competence is presented and evaluated [as well as] their attitudes towards science and ICT in relation to the degree of integration of technology in instruction of [content]. The results of the study confirm the accessibility and digital literacy of students and teachers, the lack of students towards science and learning that contrasts with the positive attitude towards ICT related to a constructivist approach. Finally, we have developed an innovative methodological approach to ICT tools like

Prezi and Glogster, aimed at creating a diverse environment, autonomous, personalized, interactive and cooperative learning, in which students can visualize creatively, deepen, generate and share knowledge with others in the network." (http://82.223.209.184/handle/123456789/1963)

Tai, S-J. D. (2013). *From TPACK-in-Action Workshops to English classrooms: CALL competencies developed and adopted into classroom teaching.* (Doctoral dissertation, Iowa State University). Retrieved from http://lib.dr.iastate.edu/cgi/viewcontent.cgi?article=4342&context=etd

Abstract (excerpt):
"In view of the need to bridge the gap and to develop a fuller picture of how teachers integrate CALL in the classrooms, the present study used an observation instrument based on the TPACK framework (Mishra & Koehler, 2006) to investigate the impact of TPACK-in-Action workshops had on English teachers in Taiwan from four different perspectives: whether the CALL workshops (1) met participants' expectations in helping them integrate CALL; (2) contributed to participants' perception change toward CALL and CALL integration; (3) helped participants develop their TPACK competencies; and (4) helped participants adopt the learned CALL competencies into their classrooms. The 15-hour TPACK-in-Action CALL workshops were conducted as part of the teacher professional development for 24 elementary English Teachers in Taiwan. The TPACK-in-Action model (Tai & Chuang, 2012), developed specifically to help English teachers integrate CALL, was employed to guide the design of the workshops. Situated in the mixed methods research design with the guidance of the TPACK framework, qualitative data through reflections, interviews, and observations, and quantitative data through surveys and reflections, were collected before, during, and after the CALL workshops to help identify the impact of the TPACK-in-Action workshops.

Findings of the present study showed that the TPACK-in-Action CALL workshops had a strong and positive impact on elementary English teachers in Taiwan. In addition to helping them showing positive perception changes toward CALL integration, it was observed that the workshops helped participants develop CALL competencies, such as integrating online materials, using cloud computing for student interaction, selecting appropriate technology for content teaching, and matching the affordance of technology to their instructional goals and pedagogy as well as adopt the learned competencies into classroom teaching. Findings indicated that observations were found to be effective in investigating the impact of the TPACK-in-Action CALL workshops. Not only were observation data triangulated with self-report data to prevent potential discrepancies from happening, they helped identify teachers' CALL competencies and visualize their CALL integration."

4. Recent & Upcoming TPACK Presentations

Carniel, L. C., & Rivero, I. B. (2013, October). *Metodología TPACK para capacitar al docente en el uso y producción de recursos educativos abiertos* [TPACK methodology for teaching training on use and production of open educational resources]. Paper presented at Octava Conferencia Latinoamericana de Objetos

y Tecnologías de Aprendizaje, Valdivia, Chile. Abstract retrieved from
http://www.laclo.org/papers/index.php/laclo/article/view/122

Abstract:
"The new global trend is to give knowledge through the Internet, whether through educational resources specific in knowledge areas, or through scientific publications, all within the framework of the open education movement. This implies a new conception of teaching with the use of technology, research output in open access journals, teaching strategy design in line with new trends. According to this, the following project is presented as one that has the purpose of projecting a plan of teaching training based on the TPACK model, in order to produce open educational resources, followed by scientific writing and communication that evidencing the educational practices with OER. The plan develops in three stages arranged through courses, with the aim of gradually inserting the teacher within the open educational movement, with an initial time establish to sensitize and motivate to join this new paradigm of teaching, then it will be promote the production of educational resources which will be arranged in specialized repositories. Finishing with the projection of the research and scientific publication of the academic act."

Chigona, A. & Chigona, W. (2013, September). *South African pre-service teachers' under-preparedness to teach with information communication technologies.* Paper presented at International Conference on e-Learning and e-Technologies in Education, Lodz, Poland. Abstract retrieved from http://ieeexplore.ieee.org/xpl/articleDetails.jsp?tp=&arnumber=6644381&url=http%3A%2F%2Fieeexplore.ieee.org%2Fxpls%2Fabs_all.jsp%3Farnumber=6644381

Abstract:
"With the growing acceptance of the role of Information Communication Technologies (ICTs) in teaching and learning, it is expected that recent graduates from teacher education would be adequately prepared to integrate the ICTs into their teaching. Nonetheless, research and anecdotal evidence show that many newly qualified teachers feel under-prepared to teach with the technologies. This paper explores the underlying causes of this feeling of under-preparedness. The study employed a qualitative research approach: data was gathered using semi-structured interviews with randomly selected pre-service teachers from a teacher education institution from South Africa. Technological Pedagogical Content Knowledge theory was used as a theoretical underpinning of the study. Analysis of study shows that the main culprit of the under-preparedness is the type of instructions the pre-service teachers receive during teacher training. There is therefore a need in the teacher education to ensure quality and digital age appropriate instructions are offered to the pre-service teachers during their teacher training."

Dollar, Y. K., & Tolu, A. T. (2013, November). *K-8 English teachers' attitudes toward using technology in their teaching practices.* Paper presented at the International

Conference of Education, Research and Innovation, Seville, Spain. Abstract retrieved from http://library.iated.org/view/KESLIDOLLAR2013K8E

Abstract:
"In the 21st century, technology provides EFL learners and teachers with various sources of information and various tools to apply that information in their educational life. Teachers often achieve high level of success by using technology in their teaching, and they play a very important role in the process of educational change: from traditional to new innovative teaching environments and styles (Cummings, 2008). In the past, teachers used only computers in their teaching, but with recent improvements in technology and recent trends in teacher development, teachers make use of various technological tools in their teaching. In addition, technology helps learners to become creative and motivated in their language learning process (Kajder, S., 2004). Especially with young learners (K-5), some technological tools or web programs such as digital cameras, software, online programs for voice recording, video recording, etc., help learners to enlarge their capacity to create stories, write better, read critically, speak fluently, and become more proficient in language (Stanley, M., 2002). In order to meet the growing needs of the students and the institutions, teachers need to update their technological pedagogical content knowledge (Cummings, 2008). These things in mind, this qualitative case study tries to explore the K-8 English teachers' perspectives on technology use in the classroom and their current practices.

Two research questions guided this study:
(a) How do K-8 English teachers perceive the use of the technology in their teaching?
(b) What do they report that they do in the classroom using their technological knowledge to support their pedagogical content knowledge?

To find answers for these questions, 20 K-8 English teachers were given TPAC (Technological-pedagogical-content- knowledge) survey about their use of technology and perceptions about using technology in their classrooms. Focus group interview with 5 of these teachers was conducted to get more detailed answers from the teachers. In addition, 5 class hours were observed by the researchers to see the classroom practices. The findings showed that K-8 English teachers use technology on a regular basis and they believe that use of technology increases motivation in language classrooms and make classroom learning fun for the students, and they need regular training to follow up the new trends in technology for classroom practices."

Kinchin, I. (2013, December). *The significance of knowledge structures in technology-enhanced learning: A Bernsteinian analysis of the TPACK framework.* Paper presented at the Society for Research into Higher Education Conference, Newport, Wales. Retrieved from http://www.srhe.ac.uk/conference2013/list.domain.asp?domainID=4

Excerpt:
"The TPACK (Technology, Pedagogy and Content Knowledge) framework has been proposed by Koehler and Mishra (2009) as a tool to focus consideration of the

interacting elements of technology, content and pedagogy in order to inform the development of technology-enhanced learning. The typical depiction of the TPACK framework as a two dimensional representation (i.e. length and width, but no depth) portrays a mono-layer of possible interactions between the three main elements… Howard and Maton (2011: 193) comment on the TPACK framework as an example of '*models that list what knowledge is of, but which do not then analyze the forms taken by that knowledge*'. They go on to comment that '*what is   required…is a means of not only seeing knowledge but also moving beyond empirical descriptions of knowledge practices to analyze the principles underlying those practices*' (*ibid.*: 194). This perceived weakness of the TPACK model can be addressed by applying a knowledge structures perspective, which provides a mechanism to enhance the utility of the framework by revealing these underlying practices (Kinchin, 2012; 2013)."

Lane, J. (2012, October). *TPACK iPad Project in Schools (TIPS): Phase 1*. Paper presented at the Australian Computers in Education Conference, Perth, Australia. Retrieved from ted.teluq.ca/files/2013/11/ACEC2012-final-pdf-1.pdf

Abstract:
"This is a paper about 'what has been going on' in Phase 1 of TIPS. It commences with a brief overview of TIPS and presents the rationale for its genesis. Then it moves to an account of research activity during the first phase: starting with a brief description of how data were gathered to establish teachers' needs for professional learning and support to introduce mobile touch tablet technologies, such as iPads, in their teaching; then detailing the intervention, using a blended learning model, plus the monitoring of teachers' learning progress; finally, there is news about the project blog and online professional learning resources, which were developed to support the teachers when using touch technologies and are taking on a life of their own."

Nordin, H., Davis, N., & Tengku Ariffin, T. F. (2013, May). *A case study of secondary pre-service teachers' technological pedagogical and content knowledge mastery level.* Paper presented at the International Educational Technology Conference, Kuala Lumpur, Malaysia. Retrieved from http://www.iet-c.net/index.php?page=publications

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."

Regan, B. & Goley, G. D. (2013). QUANT program evaluation and revision based on an analysis of TPACK growth among the participants. In P. Brosnan, D. B. Erchick, & L. Flevares (Eds.), *Proceedings of the 32nd annual meeting of the North American chapter of the International Group for the Psychology of Mathematics Education* (pp. 1411-1419). Columbus, OH: The Ohio State University.

Abstract:
"Quantifying Uncertainty and Analyzing Numerical Trends (QUANT) is a yearlong professional development program for high school mathematics teachers focused on statistics, probability, and data analysis. QUANT is designed to develop teachers' statistical proficiency for teaching using technological pedagogical content knowledge (TPACK) as a framework. This paper describes the program, its goals, and results from an exploratory pre-post investigation and a participant survey, both designed to evaluate the program's effectiveness and to revise the program itself. Results show that program participants gained content knowledge, pedagogical content knowledge, and increased their confidence and desire to incorporate technology into their instruction."

5. Recent TPACK-related Blog Entry

In early November, Krista Moroder, the Director of Learning for Instructional Technology & Library Media in a Wisconsin USA school district, wrote a thoughtful entry in her blog entitled, "Ed Tech Frameworks: Why I Don't Use TPACK or SAMR with my Teachers." It begins with:

> **I'm going to preface this post by saying that I think both TPACK and SAMR are incredibly useful frameworks — and I use them a lot in my work with education technology.** While I don't want to completely discount either framework in this post, I do want to start a discussion — and explain why I am currently not finding them completely effective in my work with teachers. [Emphasis in original]

The complete entry is available online at: http://www.edtechcoaching.org/2013/11/ed-tech-frameworks-why-i-dont-use-tpack.html. Please consider joining the discussion that Krista began.

6. Other TPACK Updates

From Matt Koehler and Joshua Rosenberg, curators of the tpack.org website:

"With over 2100 users, the tpack.org community is large, and growing daily. The size of the community offers a real opportunity to help one another learn more about TPACK, share resources, and answer each other questions. We want tpack.org to help the community do this. The rest of this newsletter will highlight ways that *you* can help get involved in the large and growing TPACK community.

- The TPACK bibliography – Help grow the list of TPACK-related articles. There are hundreds and hundreds of TPACK-related articles out there. Help find, tag, and collect them using our TPACK Mendeley group. So far, 500+ papers and 300+ users have joined the cause, but that only represents a small fraction of what's out there!
- TPACK Q&A- Have a question about TPACK? Ask our 2000+ members! The flip side of that is that as a member, you can probably help answer some of the TPACK related questions. Stop by the Q&A section of the tpack.org website and contribute! Don't forget to vote for the best answers you see so that good answers bubble up to the top.
- Visit the TPACK academy – We think of the TPACK academy as the place where you can see the best collection of TPACK related resources out there. Visit and learn more about TPACK!
- Consider contributing to tpack.org – We need materials to list in the TPACK academy! You have expertise … consider writing something for the tpack.org website. Write us with ideas."

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, December 5). TPACK newsletter issue #18: December 2013 [Electronic mailing list message]. Retrieved from http://www.tpack.org/

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

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- Judi & Diana

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