



TPACK Newsletter, Issue #29: July 2016

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

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

Gratuitous Quote About Knowledge

"Knowledge is power, but enthusiasm pulls the switch."
- Ivern Ball

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1. TPACK Newsletter Update

The TPACK Newsletter has been published via the tpack.news email list since January 2009. It has 1172 subscribers currently. Subscription numbers have held steady (+ or – 1% to 3%) since October 2011.

2. Recent TPACK Publications

Below are recent TPACK publications that we know about: 32 [articles](#), 16 [chapters](#), 2 [books](#), and 4 [dissertations](#) that have not appeared in past issues of this newsletter. If you know of

others that were published within the past several months, please let us know at: tpack.news.editors@wm.edu.

Articles

Akkaya, R. (2016). Research on the development of middle school mathematics pre-service teachers' perceptions regarding the use of technology in teaching mathematics. *Eurasia Journal of Mathematics, Science & Technology Education, 12*(4), 861-879. doi:10.12973/eurasia.2016.1257a

Abstract: "This study aimed to investigate the changes in teacher perceptions regarding the use of technology subsequent to the training about technology integration in mathematics teaching. A training program that included combined technology, pedagogy and content knowledge was prepared and implemented on pre-service teachers with this aim. Exploratory sequential mixed method, one of the mixed method designs that include qualitative and quantitative research techniques, was utilized in the study. While pretest-posttest experimental design with no control groups was used in the quantitative dimension of research, pre-service teachers' written views were collected during the qualitative part of the study. Study participants were 34 pre-service teachers attending Middle School Mathematics Teaching Department of a state university during the spring semester of 2013-2014 academic year. Perception Scale for Technology Use and interview forms were used as data collection tools. Descriptive statistical methods and t-test were utilized for analyzing quantitative data whereas content analysis was preferred for qualitative data. Research results presented that significant differences were identified in middle school mathematics pre-service teachers' perceptions regarding the use of technology as a result of the training related to technology integration in mathematics teaching. Based on the findings, it was concluded that trainings that incorporate technological, pedagogical and content knowledge that are provided during teacher training process develop pre-service teachers' perceptions related to the use of technology in mathematics teaching."

Almerich, G., Orellana, N., Suárez-Rodríguez, J., & Díaz-García, I. (2016). Teachers' information and communication technology competencies: A structural approach. *Computers & Education, 100*, 110-125. doi:10.1016/j.compedu.2016.05.002

Abstract: "Teachers' information and communication technology (ICT) competences are a key variable to integrate such resources into the teaching-learning process. One problem with teachers' ICT competences is the proliferation of various frameworks which entail a lack of definition of these competences. The objective of this article is twofold: to establish a basic framework that shapes the subsets of ICT competences (technological and pedagogical) in all teachers at all levels (Primary, Secondary and Higher Education); to determine how various personal and contextual factors influence these subsets. For this purpose, a study of secondary analysis has been made with data from two survey design studies on teachers' ICT competences that collect information from a sample of 1095 male and female Primary, Secondary and Higher

Education teachers in the Valencian Community (east Spain). A Multiple Indicators and Multiple Causes Model (MIMIC) was used to validate the teachers' ICT competences model. The study results indicated that teachers' ICT competences form a unique set composed of two subsets, technological competences and pedagogical competences. Moreover, the technological competences influenced the pedagogical ones. We also found that personal and contextual factors have a relevant impact on the competences subsets. This article helped clarify and delimit the framework of teachers' ICT competences. Besides, this basic model of ICT competences should be a key element for teacher training in ICT. This article also shows how the influence of personal and contextual factors must be considered when designing training plans."

Atasoy, E., Uzun, N., & Aygun, B. (2016). Technological pedagogical content knowledge of prospective mathematics teachers regarding evaluation and assessment. *World Journal on Educational Technology, 8*(1), 18-24. doi:10.18844/wjet.v8i1.496

Abstract: "The 'technology integrated assessment process' is an innovative method to capture and determine students' understanding of mathematics. This assessment process is claimed to provide a singular dynamism for teaching and learning activities and it is also claimed to be of the most important elements of instruction in the educational system. In this sense, this study aims to investigate technological pedagogical content knowledge (TPACK) of prospective mathematics teachers regarding the 'evaluation' and 'assessment' process. To achieve this aim, the method of qualitative research was conducted with 20 teachers. Video records and lesson plans were collected and a Mathematics Teacher TPACK Development Model was utilized to reveal themes and key features of the data. The findings revealed that, although the majority of teachers stated that they would like to use technology-integrated tools in the assessment and evaluation processes, they strongly preferred to use traditional assessment and evaluation techniques, such as pen and paper activities, multiple-choice questions in virtual environments, etc. Hence, the evidence suggests that teachers would be unable to use appropriately the technological assessment process in order to reveal students' understanding of mathematics. As seen from the teachers' lectures, they perceived that technology would be suitable for evaluation and assessment but in a limited way."

Belo, N., McKenney, S., Voogt, J., & Bradley, B. (2016). Teacher knowledge for using technology to foster early literacy: A literature review. *Computers in Human Behavior, 60*, 372-383. doi:10.1016/j.chb.2016.02.053

Abstract: "A literature review was conducted to describe the knowledge and skills teachers need for using technology to foster early literacy development in kindergarten classrooms. The study was guided by three research questions, concerning 1) effects of specific technologies, 2) effective design characteristics and 3) effective use of such applications. The sample consisted of 46 articles that reported on the affordances of technology in relation to kindergartners' early literacy development. The review included studies on electronic books, computer-based training programs, technology-rich literacy curricula, assistive technology, and other

educational media and sources for technology-rich literacy education. The following software applications were found effective in fostering kindergartners' early literacy development: Electronic storybooks, computer-based phonics and vocabulary training programs, software applications that enable children to 'read and write', software applications that are designed for tutorial activities, and educational television programs with a narrative format. Few of the studies reviewed provided specific information about effective design characteristics of such applications or concrete guidelines for using technology in developmentally appropriate fashion in kindergarten. Theoretical and practical implications are discussed."

Bilici, S. C. (2016). An examination of science teachers' knowledge structures towards technology. *International Journal of Environmental and Science Education*, 11(5), 571-586. Retrieved from <http://www.ijese.net/makale/112/an-examination-of-science-teachers-knowledge-structures-towards-technology>

Abstract: "The purpose of the study was to examine science teachers' knowledge structures on technology, who participated in a TPACK-based Professional Development (PD) program. The PD program was executed in the summer of 2015-2016 academic year with 24 science teachers. Data was collected with the Word Association Test (WAT). A holistic case study approach was followed throughout the study. The stimulus words used in WAT can be stated as; *technology, information and communication technologies, computer, instructional materials, Web 2.0 tools, and Technological Pedagogical Content Knowledge (TPACK)*. Cut-off points were identified by the frequency tables of response words towards stimulus words. The cut-off points helped create the concept networks on technology. At the end of the PD program, progress in science teachers' knowledge structures toward technology was observed. The results showed that the 21st century technologies included in the PD program such as Web 2.0 tools, Algodoo, animoto, probeware, and student response systems were found to be prominent in teachers' responses."

Blackwell, C. K., Lauricella, A. R., & Wartella E. (2016). The influence of TPACK contextual factors on early childhood educators' tablet computer use. *Computers & Education*, 98, 57-69. doi:10.1016/j.compedu.2016.02.010

Abstract: "Tablet computers are increasingly becoming commonplace in classrooms around the world. More than half of early childhood educators in the U.S. now have access to tablets, making it imperative to understand how they are using the device and what influences such use. The current study draws on survey data from 411 preschool educators serving 3- to 5-year-olds in school-based, center-based, and Head Start preschool programs to investigate how TPACK contextual factors (e.g., student background, teacher attitudes, and school support) influence teachers' traditional and student-centered tablet computer practices. Results suggest that teacher-level factors—especially positive attitudes toward technology—are most influential. Overall, this study emphasizes the need for preschool teachers and teacher educators to understand and address the critical contextual factors of tablet computer use in preschool education. Implications for education policy include expanding traditional funding models beyond technology access to provide on-going educator support, and developing new

initiatives that encourage novel professional development models based on the same learned-centered practices that teachers are encouraged to use themselves.”

Cahyono, B. Y., Kurnianti, O. D., & Mutiaraningrum, I. (2016). Indonesian EFL teachers' application of TPACK in in-service education teaching practices. *International Journal of English Language Teaching*, 4(5), 16-30. Retrieved from <http://www.eajournals.org/wp-content/uploads/Indonesian-EFL-Teachers%E2%80%99-Application-of-Tpack-in-in-Service-Education-Teaching-Practices.pdf>

Abstract: “This study examines how TPACK-oriented teaching practice course benefits Indonesian EFL teachers in improving the quality of their EFL instructional designs and teaching practices. It involved 20 secondary school teachers from various areas in the province of East Java. They were taking the Teaching Practice course as part of their education for a master’s degree in ELT at Universitas Negeri Malang, one of the leading universities in Indonesia. The teachers attended 16-session course in which they were introduced to TPACK framework and were assigned to make instructional designs based on TPACK framework. Moreover, they were asked to teach their colleagues (peer teachers) by using the TPACK-oriented instructional designs. At the end of the course the teachers were given a questionnaire asking the benefit of the TPACK-oriented teaching practice course in improving the quality of their EFL instructional designs and their EFL teaching practices. The result of the study showed that the teachers benefited a lot from the TPACK-oriented teaching practice course and they have successfully prepared instructional designs and performed the teaching practices by applying TPACK framework.”

Cherner, T., & Smith, D. (2016). Reconceptualizing TPACK to meet the needs of twenty-first-century education. *The New Educator*. Advance online publication. doi:10.1080/1547688x.2015.1063744

Abstract: “As technology continues developing and being integrated into all facets of society, it has a direct impact on education. In response, TPACK (Mishra & Koehler, 2006) was developed as a framework to guide how teachers think about the relationship between their knowledge of pedagogy, content, and technology. However, since its first articulation, significant changes to the technology have occurred. Plus, upon careful review, TPACK’s basis in research, selection of terms, and focus on teacher knowledge limited its usefulness. In response, research that supports TPACK’s multiple dimensions was added, which resulted in TPACK being focused on students learning twenty-first-century skills.”

Curry, K., & Cherner, T. (2016). Social studies in the modern era: A case study of effective teachers’ use of literacy and technology. *The Social Studies*, 107(4), 123-36. doi:10.1080/00377996.2016.1146650

Abstract: “The purpose of this research project was to highlight the practices and philosophies of two effective—but different—social studies teachers who balance the demands of teaching in the modern era while honoring their own philosophies for teaching social studies. This

project was ground in the theoretical framework provided by TPACK and used a case study methodology for its research design. While the pedagogical content knowledge of the participants was strong and technology was used abundantly for instructional purposes, this research raised questions regarding how teachers can most effectively use technology to enhance instruction by helping students conceptualize content knowledge and apply their learning in new ways.”

Drummond, A., & Sweeney, T. (2016). Can an objective measure of technological pedagogical content knowledge (TPACK) supplement existing TPACK measures? *British Journal of Educational Technology*. Advance online publication. doi:10.1111/bjet.12473

Abstract: “In recent years, approaches to developing teacher competency in technology integration have moved away from an over emphasis on technological knowledge, to focus on the essential connections between technology, pedagogy and content knowledge (TPACK) (Chai, Koh, & Tsai, 2013a; Harris, Mishra, & Koehler, 2009; Mishra & Koehler, 2006). A number of extant studies have established the construct validity of the TPACK framework (Chai, Ng, Li, Hong, & Koh, 2013; Lin, Tsai, Chai, & Lee, 2013; Schmidt, Baran, Thompson, Mishra, Koehler, & Shin, 2009). However, it remains unclear whether the self-reported knowledge assessed by the TPACK scales, might be supplemented by preservice teachers' objective knowledge in sub-areas of TPACK. Here we use a well-established measure—discriminability indices (d') (Macmillan & Creelman, 2005)—in a novel domain (TPACK) in an attempt to evaluate the extent to which the subjective knowledge assessed by the TPACK-deep scale (Yurdakul *et al.*, 2012) relates to preservice teachers' ability to discriminate between true and false statements about TPACK. There was only a small correlation between discriminability and TPACK-deep scores ($r = 0.25, p < 0.05$). The results suggest that the subjective knowledge assessed by TPACK scales could be supplemented by the inclusion of objective indices of technological pedagogical and content knowledge to form a more complete picture of preservice teachers' TPACK.”

Gökçearsan, Ş., Karademir, T., & Korucu, A. T. (2016). Preservice teachers' level of web pedagogical content knowledge: Assessment by individual innovativeness. *Journal of Educational Computing Research*. Advance online publication. doi:10.1177/0735633116642593

Abstract: "Technological Pedagogical Content Knowledge, one of the frameworks proposed in order to popularize the use of technology in a classroom environment, has been customized and has taken the form of Web Pedagogical Content Knowledge. The Relational Screening Model was used in this study. It aims to determine whether a profile of preservice teachers based on their “individual innovativeness” can be used as a significant predictor in also categorizing them according to their knowledge of web technology, pedagogy, and content. A total of 170 preservice teachers studying at various departments of the Faculty of Education at a public university in Ankara, Turkey participated in the study. This study, in which Discriminant Analysis was used to determine whether this predictor is significant or not, found that teachers in the Early Majority category had high scores in terms of pedagogical web content and general

web knowledge, and that “individual innovativeness” was effective in predicting the general web and communicative web categories to which they belonged. Certain conclusion can be made regarding Web Pedagogical Content Knowledge and future studies on this subject, based on results of the study.”

Handal, B., Campbell, C., Cavanagh, M., & Petocz, P. (2016). Characterising the perceived value of mathematics educational apps in preservice teachers. *Mathematics Education Research Journal*, 28(1), 199-221. doi: 10.1007/s13394-015-0160-0

Abstract: "This study validated the semantic items of three related scales aimed at characterising the perceived worth of mathematics-education-related mobile applications (apps). The technological pedagogical content knowledge (TPACK) model was used as the conceptual framework for the analysis. Three hundred and seventy-three preservice students studying primary school education from two public and one private Australian universities participated in the study. The respondents examined three different apps using a purposively designed instrument in regard to either their explorative, productive or instructive instructional role. While construct validity could not be established due to a broad range of variability in responses implying a high degree of subjectivity in respondents’ judgments, the qualitative analysis was effective in establishing content validity."

Hao, Y. (2016). The development of pre-service teachers’ knowledge: A contemplative approach. *Computers in Human Behavior*, 60, 155-164. doi:10.1016/j.chb.2016.02.054

Abstract: “This study investigates the effects of meditation on enhancing pre-service teacher knowledge based on the framework of technological pedagogical content knowledge (TPACK) by deepening the reflective process. Participants were students enrolled in an ICT literacy course during the fall 2014 semester. Pre- and post-course surveys indicated that the teachers had significant growth in TPACK and other types of teacher knowledge and in the depth of their reflective practice. Post-course interviews indicated positive effects from their reflective practice, showing that meditation helped the teachers prepare themselves for learning, conduct cognitive and affective tasks, and improve self-efficacy and inner strength. Several implications were noted for the future direction of teacher education programs and research.”

Heitink, M., Voogt, J., Verplanken, L., van Braak, J., & Fisser, P. (2016). Teachers’ professional reasoning about their pedagogical use of technology. *Computers & Education*. Advance online publication. doi: 10.1016/j.compedu.2016.05.009

Abstract: “This study focused on teachers’ reasoning about the use of technology in practice. Both teachers’ professional reasoning and their technology use were investigated. Through video cases, 157 teachers demonstrated their technology use in practice and commented on the reasoning behind their actions. Results show that most technology use was intended to strengthen both pedagogy and subject matter, or else pedagogy alone. Reasons addressed making learning attractive for students, realizing educational goals and facilitating the learning

process. The majority of teachers' technology use in practice shows aspects of the knowledge transfer model of teaching. Most technology tools were used to support a learning activity; the use of technology was essential in only a few video cases. About half of the video cases showed alignment between reasoning and practice. The results contribute to better understanding of how teachers reason professionally about their technology use."

Holland, D. D., & Piper, R. T. (2016). A technology integration education (TIE) model for millennial preservice teachers: Exploring the canonical correlation relationships among attitudes, subjective norms, perceived behavioral controls, motivation, and technological, pedagogical, and content knowledge (TPACK) competencies. *Journal of Research on Technology in Education*, 48(3), 212-226. doi: 10.1080/15391523.2016.1172448

Abstract: "Intellectual goods can follow the same pattern as physical goods with the product life cycle of birth, growth, maturity, and decline. For the intellectual good of technological, pedagogical, and content knowledge (TPACK), its birth began with Shulman (1986, 1987). Canonical correlation analysis (CCA) was used to test the relationships among five of the 12 constructs in the technology integration education (TIE) model developed by Holland and Piper (2014). Based on the patterns of cross-loading correlations, this study found that there were limited correlational relationships between the set of independent variables and the set of dependent TPACK variables. For this pilot study, the sample consisted of 90 elementary education majors and 51 secondary education majors."

Khine, M. S., Ali, N., & Afari, E. (2016). Exploring relationships among TPACK constructs and ICT achievement among trainee teachers. *Education and Information Technologies*. Advance online publication. doi: 10.1007/s10639-016-9507-8.

Abstract: "Teaching in the classroom today can no longer sustain the interest of students and be effective if the process involves traditional approach - teachers as sole provider of content information. In recent years, technology has played a significant role in transforming education to more progressive and interactive activities. However, the use of technology itself does not produce positive results in quality of learning and students' achievement. Teachers must be competent in subject knowledge, pedagogical skills and technological know-how. The Technological Pedagogical Content Knowledge or TPACK as a conceptual framework can guide teachers to understand the complex relations between the six components of the model. There has been numerous studies on TPACK in international contexts beyond cultural and language boundaries. This paper examined recent studies on TPACK in various countries and reports findings from a study conducted with student teachers in the UAE."

Kihoza, P. D., Zlotnikova, I., Bada, J. K., & Kalegele, K. (2016). Classroom ICT integration in Tanzania: Opportunities and challenges from the perspective of TPACK and SAMR models. *International Journal of Education and Development using ICT*, 12(1), 107-128. Retrieved from <http://ijedict.dec.uwi.edu/viewarticle.php?id=2035>

Abstract: “With the education systems demand of contemporary technologies, teacher trainees should be imparted with competencies and skills to integrate information and communication technology (ICT) into their future teaching and learning practices. This study assessed classroom ICTs integration opportunities and the challenges in relation to Technological Pedagogical and Content Knowledge (TPACK) and SAMR (Substitute, Augmentation, Modification, and Redefinition) models. The case study involved tutors and teacher trainees (N=206) from teacher training colleges. Results indicated that, majority of respondents have low pedagogical ICT competencies. However, tutors exhibited good knowledge level in all TPACK and SAMR constructs that we assessed, teacher trainees’ revealed poor skills and inefficient support on the use of basic ICTs (hardware, software, and associated peripherals). The impacts of TPACK and SAMR models characteristics related to the technology use planning and redesign of learning tasks was evident. Most of the challenges identified were associated to the lack of infrastructures, readiness to change and lack of competencies on pedagogical ICTs applications. Among others, we recommend the government to work on a harmonized ICT in education integration framework; that consider the existing opportunities and challenges facing Tanzania teacher training systems. Further work should focus on carrying out an experimental research design to unlock the existing ICT use realities.”

Koh, J. H. L., Chai, C. S., & Lim, W. Y. (2016). Teacher professional development for TPACK-21CL: Effects on teacher ICT integration and student outcomes. *Journal of Educational Computing Research*. Advance online publication. doi:10.1177/0735633116656848

Abstract: "This article explicates the conception and evaluation of an information and communications technologies (ICT) professional development process for developing teachers’ technological pedagogical content knowledge for 21st century learning. The process emphasizes teachers’ prolonged engagement with peers and researchers in design teams. Supported by technological pedagogical content knowledge rubrics and technological pedagogical content knowledge design heuristics, the process enabled teachers to assess their current ICT lessons, set design goals, redesign, implement, and evaluate student learning outcomes, as well as reflect on their pedagogical practices. A year-long implementation study conducted with 37 teachers from a Singapore primary school who were organized into seven lesson design teams found that the process had positive effects on teachers’ confidence for technological pedagogical content knowledge for 21st century learning and lesson design practices. Five of the seven design teams were able to make pedagogical changes toward 21st century learning, and six of the teams realized improvement in student learning outcomes. The implications for teacher ICT professional development are discussed."

Kontkanen, S., Dillon, P., Valtonen, T., Renkola, S., Vesisenaho, M., & Väisänen, P. (2016). Pre-service teachers’ experiences of ICT in daily life and in educational contexts and their proto-technological pedagogical knowledge. *Education and Information Technologies*, 21(4), 919-943. doi:10.1007/s10639-014-9361-5

Abstract: “Many pre-service teachers are members of the net generation and are expected to be familiar with different ICTs, yet several studies have indicated that they are not necessarily able to use them for teaching and learning. The notion of teachers’ technological pedagogical knowledge (TPK) is central to this concern. In this study we use the responses of 146 pre-service teachers to open-ended questions about the experiences and knowledge of ICT and pedagogy they brought with them when they entered university teacher training. The data were analysed qualitatively with content analysis based on an integrative framework generated from a number of theoretical perspectives. Derived categories and subcategories were used to construct a framework for ‘proto-TPK’ as a basis for establishing a starting point for the coordinated development of TPK with students in their university training and early careers.”

Kwangsawad, T. (2016). Examining EFL pre-service teachers’ TPACK through self-report, lesson plans, and actual practice. *Journal of Education and Learning*, 10(2), 103-108.
doi: 10.11591/edulearn.v10i2.3575

Abstract: “Technological Pedagogical Content Knowledge (TPACK) has been proposed as a conceptual framework to describe the knowledge base teachers need for effective technology integration. The present study aimed to determine EFL pre-service teachers’ TPACK through self-report, lesson plans and actual practice. This study used a wide range of approaches (self-report, lesson plan assessment and classroom observations) to measure TPACK of EFL pre-service teachers in order to examine EFL pre-service teachers’ ability to apply and foster the interplay between content, pedagogy and technology in their classrooms. The results of self-reported data (as measured by TPACK survey), lesson plan assessment and classroom observations showed high scores for all domains. The EFL pre-service teachers’ actual practice aligned with their self-reported and their lesson plans. “

Lehtinen, A., Nieminen, P., & Viiri, J. (2016). Preservice teachers’ TPACK beliefs and attitudes toward simulations. *Contemporary Issues in Technology and Teacher Education*, 16(2). Retrieved from <http://www.citejournal.org/volume-16/issue-2-16/science/preservice-teachers-tpack-beliefs-and-attitudes-toward-simulations/>

Abstract: “This study investigated the effect of an intervention regarding the use of simulations in science teaching on primary school preservice science teachers’ (n = 36) self-assessed technological, pedagogical, and content knowledge (TPACK). The connection of their self-assessed TPACK on their views on the usefulness of simulations in science teaching and on their disposition toward integrating simulations in their teaching was also studied. The results showed statistically significant differences between preservice teachers’ pre- and posttests in content knowledge, pedagogical knowledge, and TPACK domains. Preservice science teachers’ technological knowledge correlated with their views on the usefulness of simulation and disposition toward integrating simulations in teaching. The implication for science teacher training is that more attention should be paid to developing preservice teachers’ beliefs about

their technological knowledge throughout their teacher training in order to encourage them to use simulations in science teaching.”

Li, W., & Xia, G. (2016). An empirical study on college English teachers' TPACK: Theory and application. *IOSR Journal of Engineering*, 6(4), 1-4. doi:10.9790/3021-06410104

Abstract: “The article firstly reviews the development tendency and content of TPACK, which the product of close integration of subject content knowledge, pedagogical knowledge and technological knowledge. Then the author makes an analysis of the theoretical frameworks of TPACK and teachers' professional development. Experts have advanced various theoretical frameworks to analyze the content of TPACK from different theoretical orientations. The focus of this article lies in providing the design for college English teachers' professional training model of TPACK and making an empirical study on college English teachers' TPACK to put forward a couple of meaningful inspirations from the comparative study. It is of great value to guarantee that college English teachers can understand and grasp the contents of TPACK correctly and comprehensively, learning to carry out EFL teaching with advanced teaching concept and integrated modern technology.”

McKenney, S., Boschman, F., Pieters, J., & Voogt, J. (2016). Collaborative design of technology-enhanced learning: What can we learn from teacher talk? *TechTrends*, 60(4), 385-391. doi:10.1007/s11528-016-0078-8

Abstract: "The collaborative design of technology-enhanced learning is seen as a practical and effective professional development strategy, especially because teachers learn from each other as they share and apply knowledge. But how teacher design team participants draw on and develop their knowledge has not yet been investigated. This qualitative investigation explored the nature and content of teacher conversations while designing technology-enhanced learning for early literacy. To do so, four sub-studies were undertaken, each focusing on different aspects of design talk within six teams of teachers. Findings indicate that non-supported design team engagement is unlikely to yield professional development; basic process support can enable in-depth conversations; subject matter support is used and affects design-decisions; visualization of classroom enactment triggers the use of teachers' existing integrated technological pedagogical content knowledge; and individual teacher contributions vary in type. Implications for teacher design team members and facilitators are discussed."

Meletiou-Mavrotheris, M., & Prodromou, T. (2016). Pre-service teacher training on game-enhanced mathematics teaching and learning. *Technology, Knowledge and Learning*. Advance online publication. doi:10.1007/s10758-016-9275-y

Abstract: “The paper reports the main insights from a study aimed at equipping a group of pre-service teachers with the knowledge, skills, and practical experience required to effectively integrate educational games within the mathematics curriculum. An instructional intervention based on the Technological Pedagogical and Content Knowledge framework was implemented in an undergraduate mathematics methods course attended by thirteen (n = 13) prospective

primary teachers. Participants experimented with different ways in which educational games could help students internalize key mathematical concepts across the primary curriculum, and were familiarized with the design principles for constructivist gaming environments. Upon completion of a unit on game-enhanced learning, they worked in small groups to develop and deliver, during their teaching placements, instructional episodes integrating the use of serious games. Findings indicate a positive impact on pre-service teachers' perceptions regarding game-based learning, and in their competence in selecting, evaluating, and productively utilizing digital games as an instructional tool."

Nordin, H., & Ariffin, T. F. T. (2016). Validation of a technological pedagogical content knowledge instrument in a Malaysian secondary school context. *Malaysian Journal of Learning and Instruction*, 13, 1-24. Retrieved from <http://mjli.uum.edu.my/images/pdf/n13mjli/1validation.pdf>

Abstract: "This study focused on the validation of a Technological Pedagogical Content Knowledge (TPACK) instrument for using ICT in teaching and learning effectively in a Malaysian secondary school setting. The aim of this study was to confirm a seven-factor TPACK model which includes Technological Knowledge, Content Knowledge, Pedagogical Knowledge, Pedagogical Content Knowledge, Technological Pedagogical Knowledge, Technological Content Knowledge and Technological Pedagogical Content Knowledge."

Okumuş, L. L., Wiebe, E., & Hollebrands, K. (2016). Utility and usability as factors influencing teacher decisions about software integration. *Educational Technology Research and Development*. Advance online publication. doi:10.1007/s11423-016-9455-4

Abstract: "Given the importance of teacher in the implementation of computer technology in classrooms, the technology acceptance model and TPACK model were used to better understand the decision-making process teachers use in determining how, when, and where computer software is used in mathematics classrooms. Thirty-four (34) teachers implementing *Geometer's Sketchpad* and *Fathom* in algebra and geometry classrooms were observed and interviewed using the above models. The factors of perceived ease of use and perceived usefulness, and their contributing sub-factors, were used to elaborate on how teachers differed in their perceptions and actual use of these two software tools in different instructional contexts. The two primary themes that emerged were teachers' comfort level with using the software tools and how this interacted with their perceived ease of use, and their understanding of the software's capabilities and alignment with their curricular and teaching goals. This alignment became the over-riding factor driving perceived usefulness. Secondary factors influencing perceived usefulness included alignment with preferred pedagogical strategies and support from fellow teachers. This last factor probably also crossed over to perceptions of ease of use."

Poskitt, J. (2016). What young adolescents think about effective pedagogy and technology use. *Australian Journal of Middle Schooling*, 16(1), 4-15. Retrieved from <http://mro.massey.ac.nz/handle/10179/8284>

Abstract: “A New Zealand comparative case study investigated the impact of technological device use in literacy, over a three-month period, for Year (Grade) 4-6 and Year 7-8 students. In school A (Year 4-6 students) data were gathered from two pairs of control matched classes, one of each pair of classes using technological devices; in school B (Year 7-8 students) comparisons were made pre and post technology use. In both schools, pre and post- standardised achievement data were analysed, along with classroom observations, student and teacher interview data. Whilst significant progress was made in student achievement, when compared with national average point score shifts (Poskitt, in press), of particular interest in this article are young adolescent students’ views about effective pedagogy and technology use. For adolescents, availability of devices made learning more: fun, time efficient, accessible outside of school hours; and enhanced their research and presentation of learning. At times, friends and classmates helped by sharing information and new ideas, but frequent talking and distractions hindered learning. However, the pedagogical actions of teachers (particularly explicit, focused teaching of literacy and technology knowledge strategies) and provision of choices, varied and active learning opportunities were perceived to make the greatest difference to student learning.”

Shamir-Inbal, T., & Blau, I. (2016). Developing digital wisdom by students and teachers: The impact of integrating tablet computers on learning and pedagogy in an elementary school. *Journal of Educational Computing Research*. Advance online publication. doi: 10.1177/0735633116649375

Abstract: “This article investigates a pilot of integrating tablet computers in the elementary education. The research questions address the impact of tablet integration on learning and pedagogy. This qualitative case study crosschecks non-participated observations on students who work with tablet PCs, the school staff reflection on the integration as presented on the school blog, a focus group of fifth graders, interviews with the school principal and four teachers who are involved in the implementation, and three parents who assisted in a tablet-based extracurriculum project. The findings revealed that the most significant added value of tablet use is in mobile learning in out-of-class setting, while in in-class learning teacher would prefer using laptops because of tablet technical limitations. The findings are discussed in terms of technological pedagogical and content knowledge TPACK framework and “digital wisdom” of teachers and students. Pedagogical potential of tablet in developing digital wisdom is analyzed based on five metaphors of mobile learning: using a device as a “toolbox,” “creative mind,” “participation activator,” “shared mobile desktop,” and “connected world.” For massive implementation in the education system, we recommend that decision makers should integrate tablets only if mobile learning is a significant component in the instructional design.”

Smith, R. C., Kim, S., & McIntyre, L. (2016). Relationships between prospective middle grades mathematics teachers’ beliefs and TPACK. *Canadian Journal of Science, Mathematics and Technology Education*. Advance online publication. doi:10.1080/14926156.2016.1189624

Abstract: “As technology become more ubiquitous in the classroom, teachers need to overcome two types of barriers to use it effectively: access to resources (including the development of knowledge) and the development of appropriate beliefs. To assist teachers in overcoming these barriers we must understand the relationships that exist among them. We examined relationships between middle grades prospective teachers' beliefs and their TPACK. We found possible relationships between their beliefs about the nature of mathematics, learning and teaching mathematics, and the use of technology and their content knowledge, pedagogical content knowledge, and technological pedagogical content knowledge respectively.”

Tondeur, J., Aesaert, K., Pynoo, B., van Braak, J., Fraeyman, N., & Erstad, O. (2016). Developing a validated instrument to measure preservice teachers' ICT competencies: Meeting the demands of the 21st century. *British Journal of Educational Technology*. Advance online publication. doi:10.1111/bjet.12380

Abstract: “The main objective of this study is to develop a self-report instrument to measure preservice teachers' ICT competencies in education. The questionnaire items of this instrument are based on an existing comprehensive framework and were created with input from experts in the field. The data were collected from a sample of 931 final-year preservice teachers in Flanders (Belgium). A first subsample was used for an exploratory factor analysis, and a second one to verify the identified factor structure via confirmatory factor analysis. A two-factor structure of ICT competencies was identified: (1) competencies to support pupils for ICT use in class and (2) competencies to use ICT for instructional design. This two-factor structure was confirmed in the confirmatory factor analysis. Recommendations are made on how this reliable instrument can help assess the level and progress of preservice teachers' ICT competencies.”

Voogt, J., & McKenney, S. (2016). TPACK in teacher education: Are we preparing teachers to use technology for early literacy? *Technology, Pedagogy and Education*. Advance online publication. doi:10.1080/1475939X.2016.1174730

Abstract: “This study examines if and how five teacher education institutes are helping students to develop the technological pedagogical content knowledge needed to effectively use technology for early literacy. Focus group discussions were held with teacher educators in which their responses to expert recommendations were probed. Findings indicate that, currently, very little attention is specifically given to the knowledge that teachers need to foster early literacy through the use of technology. This is due to multiple factors, including the conviction that many new technologies (e.g. tablets) are not used much in schools. Additionally, teacher educators themselves struggle with effective use of technology in their own courses. And although technological and early literacy specialists are available in teacher training colleges, pre-service educators note a distinct lack of integrated expertise in their institutions. Based on these findings, recommendations are given for research, policy and practice.”

Wu, B., Hu, Y., Gu, X., & Lim, C. P. (2016). Professional development of new higher education teachers with information and communication technology in Shanghai: A Kirkpatrick's

evaluation approach. *Journal of Educational Computing Research*, 54(4), 531-562. doi: 10.1177/0735633115621922

Abstract: “As information and communication technology (ICT) continues to develop, it is essential for teachers to acquire ability for teaching with ICT. In China, new higher education (HE) teachers often lack teaching experience because there are limited teaching opportunities during their postgraduate studies. This status quo may compromise the quality of teaching and learning in higher education institutions. In 2013, Shanghai Municipal Education Commission initiated a professional development program for new teachers from all local higher education institutions. This article examines their ICT professional development through the lens of Kirkpatrick’s evaluation model. Data were collected from online surveys both immediately after an ICT module and 6 months later. The results showed that participants intended to integrate ICT in teaching and had an above-average level of Technological Pedagogical and Content Knowledge (TPACK). Participants and their department heads also confirmed distinctive teaching performance of these new teachers and better learning behavior of their students. The study revealed that demographic variables of new HE teachers may also affect their perception of ICT and TPACK. This study suggests that ICT professional development can have positive impacts on new HE teachers’ perception of ICT, their TPACK competence, and ICT-related teaching practice and student learning.”

Chapters

Editors’ Note: We discovered several chapters from Carl Young & Sara Kajder’s edited 2013 book ([Research on Technology in English Education](#)) recently that were omitted from issue #14 of the TPACK Newsletter. We have included them here. Apologies for our oversight!

Beach, R., & Doerr-Stevens, C. (2013). TPACK perspective on learning to engage in dialogic argument through participation in online role-play in the English classroom. In C. A. Young & S. Kadjer (Eds.), *Research on technology in English education* (pp. 185-211). Charlotte, NC: Information Age Publishing.

Abstract: None

Felger, J., & Shafer, K. G. (2016). An algebra teacher’s instructional decision-making process with GeoGebra: Thinking with a TPACK mindset. In M. Niess, S. Driskell, & K. Hollebrands (Eds.), *Handbook of research on transforming mathematics teacher education in the digital age* (pp. 493-518). Hershey, PA: IGI Global. doi:10.4018/978-1-5225-0120-6.ch019

Abstract: “This chapter shares results of a classroom-based action research study on instructional decision-making when teaching a unit on linear functions with GeoGebra, a dynamic algebra environment. The TPACK / Student Knowledge Matrix developed by provided a structure for unit planning and lesson development. The matrix combines the three categories of teacher knowledge – technological, pedagogical, and content – with four levels of student

knowledge – declarative, procedural, schematic, and strategic. While implementing the four-week unit, the algebra teacher used multiple data sources to document day-to-day decision-making. Data analysis revealed decisions were guided by the need to improve clarity, to increase interactivity, to highlight connections between representations, and to use GeoGebra as a tool to increase understanding. Throughout the unit, GeoGebra became a tool for computation, transformation, data collection and analysis, and error checking.”

Harrington, R. A., Driskell, S. O., Johnston, C. J., Browning, C. A., & Niess, M. L. (2016). Technological pedagogical content knowledge: Preparation and support of mathematics teachers. In M. Niess, S. Driskell, & K. Hollebrands (Eds.), *Handbook of research on transforming mathematics teacher education in the digital age* (pp. 1-22). Hershey, PA: IGI Global. doi:10.4018/978-1-5225-0120-6.ch001

Abstract: “The purpose of this study was to analyze the literature regarding implementation of the Technological Pedagogical Content Knowledge (TPACK) framework in the preparation and support of mathematics teachers. A comprehensive literature review was performed on over a decade of relevant peer-reviewed publications and dissertations since the National Council of Teachers of Mathematics (NCTM) first identified technology as a fundamental principle of good mathematics programs. The results indicate that TPACK has become a foundational framework in the research. Specific studies highlighted in this paper show that, while individual components of TPACK are illustrated in the literature, the field is still lacking sufficient examples of these components acting as a “total package” (Niess, 2008). Programs that develop and support mathematics teachers need more guidance from researchers regarding the best ways to realize the vision of NCTM.”

Koehler, M. J., Mishra, P., Akcaoglu, M., & Rosenberg, J. M. (2016). The technological pedagogical content knowledge framework for teachers and teacher educators. In M. R. Panigrahi (Ed.), *Resource book on ICT integrated teacher education* (pp. 20-30). New Delhi: Commonwealth Educational Media Centre for Asia. Retrieved from http://cemca.org.in/ckfinder/userfiles/files/ICT%20Integrated%20Teacher%20Education-Final_Low%20with%20Cover%20Back.pdf#page=48

Abstract (excerpted): “*The Technological Pedagogical Content Knowledge Framework for Teachers and Teacher Educators* focuses on teacher educators need to visualize ICT integration in a holistic manner, and the authors in this chapter present the highly popular framework – TPACK for the readers to consider. It is important to note why adoption of a framework is important to consider Resource Book on ICT Integrated Teacher Education 6 ICT integration in teacher education. They argue that good teaching with technology requires shift in existing practices in both pedagogy and content domains. Teacher educators are therefore urged to think about their own context, and go beyond technology literacy to promote educational practices that innovatively use interaction of technology, pedagogy and content.”

Marshall, A. M. S., & Callahan, K. M. (2016). Mathematics teacher educators’ TPACK and MKT knowledge domains: Designing online discussion blogs. In M. Niess, S. Driskell, & K.

Hollebrands (Eds.), *Handbook of research on transforming mathematics teacher education in the digital age* (pp. 353-380). Hershey, PA: IGI Global. doi:10.4018/978-1-5225-0120-6.ch014

Abstract: “In this chapter, two Mathematics Teacher Educators (MTEs) describe a study that examined the ways that they drew upon their knowledge domains, grounded in the TPACK framework and the Mathematical Knowledge for Teaching (MKT) framework, to design and utilize online discussion blogs as instructional tools to enhance preservice elementary teachers' learning of geometry and measurement. The findings indicate that more attention is warranted on the interrelationships between TPACK and MKT knowledge domains, specifically when MTEs engage in collaborative planning. This work is significant because it illuminates the need for further coding granularity consideration driven by the complexities resident in the construct of Pedagogical Content Knowledge, when analyzing MTEs' engagement with mathematics activities that use technology.”

McBroom, E. S., Jiang, Z., Sorto, M. A., White, A., & Dickey, E. (2016). Dynamic approach to teaching geometry: A study of teachers' TPACK development. In M. Niess, S. Driskell, & K. Hollebrands (Eds.), *Handbook of research on transforming mathematics teacher education in the digital age* (pp. 519-550). Hershey, PA: IGI Global. doi:10.4018/978-1-5225-0120-6.ch020

Abstract: “Secondary geometry teachers from several urban school districts participated in a two-year professional development focused on integrating dynamic geometry into teaching. The chapter documents the positive impact of the professional development for teachers' Technological Pedagogical Content Knowledge (TPACK) development and their students' achievement in geometry through the use of the dynamic geometry approach. Instruments used to develop and assess teachers' TPACK included a Conjecturing-Proving Test, interviews and observation protocols. Participants' TPACK levels were identified using a TPACK Development Levels Assessment Rubric. Findings show that teachers' TPACK tended to remain within the three middle TPACK levels (accepting, adapting, and exploring). Recommendations and suggestions for future research are offered to those who implement school-based, mixed methods research studies involving technology.”

McGrail, E. & Davis, A. (2013). Blogversing with fifth graders: The intersection of blogging, conversations, and writing. In C. A. Young & S. Kadjer (Eds.), *Research on technology in English education* (pp. 263-289). Charlotte, NC: Information Age Publishing.

Abstract: None

McVerry, J. G. (2013). TPACK and new literacies of online reading comprehension: Preparing today's teachers for tomorrow's readers. In C. A. Young & S. Kadjer (Eds.), *Research on technology in English education* (pp. 87-104). Charlotte, NC: Information Age Publishing.

Abstract (excerpted): “Based on the assumptions that literacy practices continuously evolve and that technology is a literacy issue, what are the implications for English instructors? Mishra and Koehler (2006) have outlined a need for teachers to develop technological pedagogical content knowledge (TPACK) as the basis of good teaching with technology. TPACK involves an understanding of the affordances of technologies. Furthermore, teachers need to understand pedagogical practices that allow students to use technology in constructive ways. Educators also need to develop an understanding of particular concept knowledge in English and how that knowledge relates to using technology. Finally, and most importantly, teachers need to understand how the technologies, pedagogies, and content help them negotiate both their own knowledge and their sense of knowing the world (Mishra & Koehler, 2006). Yet the development of TPACK does not involve mastery of different knowledge domains. TPACK for English educators emerges as synergy of technology knowledge, pedagogical knowledge, and content knowledge (Hofer & Swan, 2005).”

Miller, S., Hughes, K., & Knips, M. (2013). Teacher knowledge-in-action: Enacting multimodal literacy pedagogy for DV composing. In C. A. Young & S. Kadjer (Eds.), *Research on technology in English education* (pp. 233-262). Charlotte, NC: Information Age Publishing.

Abstract: None

Mourlam, D., & Herring, M. (2016). Exploring the Intel Teach Elements in teacher education: Integration and technological, pedagogical, content knowledge development. In R. Huang, Kinshuk & J. K. Price (Eds.), *ICT in global context: Comparative reports of innovations in K-12 education* (pp. 217-232). Berlin: Springer Berlin Heidelberg. doi:10.1007/978-3-662-47956-8_11

Abstract: “This chapter reviews the integration of ICT through the development of preservice teacher Technological, Pedagogical, Content Knowledge (TPACK), as well as how the Intel Teach Elements (Elements) have been used to develop teacher knowledge of pedagogy and technologies. In this context, results are shared on the use of the Elements course modules within four teacher educator preparation institutions. Presented are those Elements courses and modules that were used, how they were used within teacher education coursework, and how preservice teacher TPACK changed as a result of being enrolled in a course where they were part of course activities. Data were collected through multiple measures, including a pretest/posttest preservice teacher survey and pretest/posttest performance assessment, which allowed for preservice teacher TPACK to be analyzed. An open-ended faculty questionnaire was also used to describe the integration of the courses or modules, faculty satisfaction, and future plans for Elements use within coursework. Results indicated that faculty integrated the resources into face-to-face, blended, and online modes of instruction using them as both a curricular resource and as part of lesson design projects. Results also suggested that preservice teacher knowledge of each of the TPACK constructs increased at statistically significant levels.”

Myers, J. (2013). Negotiating the privilege of print with the affordances of digital video authoring. In C. A. Young & S. Kadjer (Eds.), *Research on technology in English education* (pp. 213-232). Charlotte, NC: Information Age Publishing.

Abstract: None

Naidu, S. (2016). Technology, education, and design: The sciences of the artificial. In M. R. Panigrahi (Ed.), *Resource book on ICT integrated teacher education* (pp. 46-60). New Delhi: Commonwealth Educational Media Centre for Asia. Retrieved from http://cemca.org.in/ckfinder/userfiles/files/ICT%20Integrated%20Teacher%20Education-Final_Low%20with%20Cover%20Back.pdf#page=48

Abstract: “Technology, Education and Design: The Sciences of the Artificial reflects that the design of effective, efficient and engaging learning and teaching experiences is the product of synergies derived from knowledge about the technology, pedagogy and the subject matter. It includes knowledge about the affordances of each attribute, as well as knowledge that lie at the intersections of these three variables. More recently dubbed as technological pedagogical content knowledge by Mishra and Koehler, this is an idea that extends Lee Shulman’s concept of pedagogical content knowledge to include knowledge about the technology (i.e., the media), and the content (i.e. subject matter that is to be learned and taught). At the heart of synergies derived from this kind of knowledge is design which is a science of the artificial, as opposed to a natural science. And this is about creating and orchestrating how productive learning and teaching experiences ought to be. The ideas that are articulated in this chapter will resonate with teachers and teacher educators as they search for ways to integrate ICTs in their teaching and learning activities.”

Orrill, C. H., & Polly, D. (2016). Developing teachers’ TPACK for mathematics through professional development: The case of InterMath. In M. Niess, S. Driskell, & K. Hollebrands (Eds.), *Handbook of research on transforming mathematics teacher education in the digital age* (pp. 433-462). Hershey, PA: IGI Global. doi:10.4018/978-1-5225-0120-6.ch017

Abstract: “In this chapter, InterMath is introduced as a learner-centered professional development environment that supports the development of Technological Pedagogical Content Knowledge (TPACK). Evidence will be presented from the research and evaluation on InterMath to highlight some of the ways in which InterMath has been successful. Vignettes provide examples of a typical conversation in a TPACK professional development environment. An analysis of findings indicates that the InterMath project contributed to teachers' TPACK development, with a focus on teachers' knowledge of technology and content (TCK). The knowledge and skills of the professional development facilitator was a key factor in the teachers' development. Implications for the design of professional development include simultaneously developing teachers' integrated knowledge of technology, pedagogy, and content.”

Polly, D., Martin, C., Wang, C., Lambert, R. G., Pugalee, D. K., & Middleton, C. W. (2016). The influence of professional development on primary teachers' TPACK and use of formative assessment. In M. Niess, S. Driskell, & K. Hollebrands (Eds.), *Handbook of research on transforming mathematics teacher education in the digital age* (pp. 382-405). Hershey, PA: IGI Global. doi:10.4018/978-1-5225-0120-6.ch015

Abstract: "Formative assessment continues to be heralded as a high-leverage teaching practice that has empirical links to student achievement. This chapter describes the design and influences of a year-long professional development project focused on supporting primary grades teachers' with formative assessment skills in mathematics. The professional development was a blended format that included face-to-face workshops as well as classroom-based activities that were presented and facilitated through an online asynchronous format. Findings from the study indicated that teachers' enacted evidence of various aspects of TPACK, but there was variance in terms of how teachers implemented pedagogies. Implications for the design of professional development focused on formative assessment include the need to situate teachers' learning in their classroom, and provide ongoing multiple modes of support to help teachers enact formative assessment practices."

Slykhuis, D. A., & Lee, J. K. (2016). Using two frameworks to promote e-leadership and teacher development. In R. Huang, Kinshuk & J. K. Price (Eds.), *ICT in global context: Comparative reports of innovations in K-12 education* (pp. 233-248). Berlin: Springer Berlin Heidelberg. doi:10.1007/978-3-662-47956-8_12

Abstract: "Working in partnership with Microsoft, a team of university faculty created the Technology Enriched Instruction (TEI) professional development workshop to promote the effective use of technology in the classroom. This workshop was originally aimed at teacher educators in an effort to support best practices based on theory and research about using technology in teaching. After piloting, the TEI workshop was extended to meet the needs of all higher education faculty. Two conceptual frameworks form the cornerstone of the workshop: TPACK and 21CLD. These frameworks provide the intellectual and practical grounding for all workshop activities. This chapter explores the application of TPACK and 21CLD as well as the decision-making behind and implications for expanding the focus of TEI."

Webb, A. (2013). Virtual worlds for literary study: Technological pedagogical content knowledge in the village of Umuofia and other literary worlds. In C. A. Young & S. Kadjer (Eds.), *Research on technology in English education* (pp. 153-184). Charlotte, NC: Information Age Publishing.

Abstract: None

Books

Panigrahi, M. R. (2016). *Resource book on ICT integrated teacher education*. New Delhi: Commonwealth Educational Media Centre for Asia. Retrieved from

http://cemca.org.in/ckfinder/userfiles/files/ICT%20Integrated%20Teacher%20Education-Final_Low%20with%20Cover%20Back.pdf#page=48

Abstract (excerpted): “There are five chapters included in this resource book as ICT Integrated Teacher Education Models for wider dissemination with the hope that teacher education institutions and organisations in Commonwealth Asia will take steps to develop strategic plans for ICT use in teaching and learning.”

Editor’s note: Punya Mishra references the above book in [his blog entry dated June 15, 2016](#).

Phillips, M. (2016). *Digital technology, schools and teachers' workplace learning policy, practice and identity*. London: Palgrave Macmillan UK. doi: 10.1057/978-1-137-52462-1

Abstract: “This book advances an alternative reading of the social, political and cultural issues surrounding schools and technology and develops a comprehensive overview of the interplay between policy, practice and identity in school workplaces. It explores how digital technologies have become an integral element of the politics and socially negotiated practices of school workplaces as school campuses are now awash with digital hardware and growing amounts of school work is carried out on a 'virtual' basis.”

3. Recent TPACK-Related Theses and Dissertations

Farrell, I. (2016). *Examining the relationship between technological pedagogical content knowledge (TPACK) and student achievement utilizing the Florida value-added model* (Doctoral dissertation). Available from ProQuest Dissertations and Theses Global database. (UMI No. 10107756).

Abstract: “The purpose of this study was to examine the relationship between the TPACK of in-service teachers and student achievement measured with each individual teacher's VAM score. The TPACK survey results, and a teacher's VAM score were also examined, separately, with respect to the following teacher attributes: gender, number of certification areas, highest degree earned, years teaching, subjects currently taught by teacher, teaching in/out of subject area, percentage of disadvantaged students at school, and grade level. The study used existing data, VAM scores for each teacher, and data collected from the survey developed and validated by Sahin (2011).

Results showed no relationship between a teacher's VAM score and the TPACK survey overall or its individual constructs. Upon examination of VAM scores and teacher attributes, subject area, the percentage of economically disadvantaged students at the teacher's school, and grade level of the teacher were all significantly related to VAM scores. In addition, the TPACK survey results overall and its constructs were also examined with teacher attributes, among the significant relationships were gender, subject area, the number of certifications, highest degree held by the teacher, years teaching, and teaching in/out of area. This study examined student achievement utilizing the Florida Value-Added Model. Different studies should examine different measures of student achievement. This could involve the use of different Value-Added

models utilized in other states. The study also found a statistically significant relationship between a teacher's VAM score and the percentage of economically disadvantaged students at the teacher's school. Future research should be conducted in additional counties in the State of Florida examining this relationship to determine if this relationship exists in the population. Teacher pay has been historically determined by years of teaching experience, yet in this study years of experience had no relationship to student achievement. Future research should examine the role teaching experience plays with knowledge associated with effective teaching and student achievement.”

Ledford, D. M. (2016). *Development of a professional learning framework to improve teacher practice in technology integration* (Doctoral dissertation, Boise State University).

Retrieved from

<http://scholarworks.boisestate.edu/cgi/viewcontent.cgi?article=2159&context=td>

Abstract: “Technology is now considered a critical component and an integral part of a high quality education (Ertmer & Ottenbreit-Leftwich, 2010). Teachers must be equipped to handle the transactional relationship and dynamics of integrating technology in the classroom (Mishra & Koehler, 2006). Professional development should be designed and implemented to improve instruction and ensure all students are afforded the opportunity to learn effectively using technology. The problem is that current staff development models designed to help teachers integrate technology into their instruction have not resulted in the effective transformation of instructional practices to utilize technology as part of the teaching and learning process (Holland, 2001; Laferrière, Lamon, & Chan, 2006). The purpose of this design based study is to develop and determine a professional development framework that will impact teachers’ instructional practices toward technology integration and transformative practices that emphasize active learning, critical thinking, creativity, and communication. In this study, teachers engage in a 15- week professional learning opportunity with multiple components noted in the literature as impacting teacher practice. The goal of the professional learning opportunity was to move teachers toward effective technology integration. This study examined two iterations during the professional learning opportunity that resulted in the following recommended design components for future professional learning frameworks that will move teachers toward effective technology integration: grade level/team collaborative planning time using the Technological Pedagogical Content Knowledge (TPACK) framework to plan, revise, and evaluate lessons; peer observation time; individual technology coaching time; small, group differentiated learning time based on teachers’ needs/goals; and support materials/resources as part of each component. This should be accomplished via the provision of providing teachers with ample, structured, consistent, and focused time for professional learning in order to develop teachers’ attitudes, self-efficacy, and knowledge and skills for transformative practice using technology. These components coupled with the provision of ample, structured time for learning have the potential for moving teachers toward more effective technology integration.”

Mudindo, F. M. (2016). *Educators' integration of ICT's in teaching mechanics in grade 10 physical sciences in three approved South African high schools* (Unpublished master's thesis). University of the Witwatersrand, Johannesburg, South Africa.

Abstract (excerpted): “The focus of the research was the effective use of ICT in the teaching and implementation of the curriculum CAPS in the context of teaching the topic of Mechanics. Secondly, to examine the contextual variables those affect the pedagogical integration of ICT in three approved South African high schools.

Six teachers from three GDE (a province of influence in South Africa) approved high schools participated voluntarily in this research project. The topic of Mechanics was chosen for this research because learner performance in this topic in the Grade 12 examination has been found to be particularly poor, according to the report of National Senior Certificate Examinations (DBE, 2012).

ICT integration in the Physical Science classroom in teaching complex topic like Mechanics brings about a unique classroom process obviously different from a traditional one. Hence Technological Pedagogical Content Knowledge (TPACK) was used as a theoretical construct that assists in explaining the new science classroom and the teaching dynamics that unfolds in there.

TPACK instruments or tools used in this project were the initial questionnaire, an observation schedule, a main questionnaire and a follow-up questionnaire. The responses obtained from these tools were all collected as data and was prepared by coding individual scripts, duplicating and digitizing for ease of safe storage and scoring. The generated scores were then analysed, using the Rasch statistical model.

The findings reveal that the educators were on average at a developing stage in the effective use of ICTs when teaching Mechanics. The contextual variables that affect the pedagogical integration of ICT in the teaching of Mechanics (research question 2) in these three high schools, according to the participants, include policy or lack of it. The national and provincial policies offer few facts on how educators and schools are expected to incorporate or make use of ICT inside the South African framework.

Individual participants had different notions of the purpose of ICT integration. Mr Sibeko was of the notion that ICT integration was for planning efficiency of the whole school. In contrast, Mr Khumo was involved in ICT integration because the MEC or the higher authority had prescribed it. Ms Nomsa was involved because the school obtained ICT through a private sponsor and Mr Ariel just mentioned that ICT integration was “recommended” in the school.

The revelations from the findings were important in that the TPACK rubric adapted provided measures that can be quantified and thus allowing the extent of TPACK to be statistically determined (using the Rasch Statistical Model) to a certain degree of consistency as measured by the Cronbach Alpha. One was able to determine if the participant was on standard,

developing, elementary or inadequate. Furthermore, each trait enabling or hindering was determined. This was unique to this study and will enable planners to determine areas where educators require assistance and support in ICT integration.”

Theis, J. L. (2016). *Technology predictors of inquiry-based teaching: An examination of two K-12 1:1 pilots*. (Doctoral dissertation). Retrieved from https://etd.ohiolink.edu/pg_10?0::NO:10:P10_ETD_SUBID:113475

Abstract: “This study examined the relationship of technology use and facilitation of inquiry-based teaching across the curriculum through the implementation of a one-to-one technology pilot. The study also explored which technology-related factors (teacher technology use, student technology use, barriers encountered with technology, teachers’ comfort with technology) best predict the use of inquiry-based teaching methods with students. In addition, the researcher examined changes (pre-post) in the use of inquiry-based methods as a result of the one-to-one pilot. The research design of this study is correlational since the researcher primarily examined multiple continuous independent variables (teacher technology use, student technology use, barriers encountered with technology, teachers’ comfort with technology) in relation to one continuous dependent variable (inquiry-based teaching methods).”

4. Recent TPACK Presentations

Aydın, G. Ç., Evren, E., Atakan, İ., Şen, M., Yılmaz, B., Pirgon, E., ... Ebre, E. (2015, June). *Delphi technique as a graduate course activity: Elementary science teachers’ TPACK competencies*. Paper presented at the ERPA International Congresses on Education 2015, Athens, Greece. Retrieved from http://www.shs-conferences.org/fr/articles/shsconf/pdf/2016/04/shsconf_ erpa2016_01135.pdf

Abstract: “This study aims to explore graduate science education students’ views of elementary science teachers’ TPACK competencies by employing a Delphi technique. 9 graduate science education students enrolled in a graduate course participated in the study. In the first round, participants were asked to list the competencies of an elementary science teacher with high level of TPACK and a total of 88 competencies were listed. In the second round, all participants investigated these competencies and eliminated the similar ones. In the third round, the number of competencies was narrowed down to 35 and participants rated them on a 7-point Likert type scale. In the fourth round, participants investigated the interquartile range and median values for those competencies, their own previous ratings and rated the competencies again. At the end, a total of 29 competencies were agreed on by all participants. For agreement criteria interquartile range and median values were used.”

da Silva Cristiano, M. A., da Silva, J. B., da Luz Filho, S. S., Sommer Bilessimo, S. M., Cadorin Nicolete, P., Schardosim Simão, J. P.,...da Mota Alves, J. B. (2015, June). *Using TPACK to assess integration of remote experiments in basic education*. Paper presented at the 3rd

Experiment International Conference, Ponta Delgada, Portugal.
doi:10.1109/expat.2015.7463289

Abstract: “Even though many researchers point to the lack of appropriate models for guidance on the integration of technology in education, this article seeks to point toward a model through actions that show the need for teachers being multifaceted regarding the new educational paradigm. To do so, it will be considered the contributions of TPACK framework on integration of technology in Basic Education in public schools. Even before pointing solutions ready for the use of technology in education, it is necessary to know and make the teachers know themselves, making them realize their convictions and technological knowledge, and bring them to assess the necessity of improvement, in order to achieve efficiency in the process of integrating digital media and computer knowledge in their didactic and pedagogical practice, such as in the use of resources such as Mobile Learning or Remote Experimentation. The study highlights the importance of the three types of knowledge - technological, pedagogical and content - to the teachers committed to the efficient integration of technology into their lessons. In addition to investigating the teachers' perception of the technological resources and their own teaching practices, this study presents a detailed picture of the actual situation through analysis of the results obtained through the questionnaire TPACK, in the Basic Education in Santa Catarina, Brazil.”

Hannaway, D. (2016, April). *Learners' profiles when experiencing technology-based learning in the foundation phase*. Paper presented at the South Africa International Conference on Educational Technologies, Pretoria, South Africa. Retrieved from <http://aa-rf.org/wp-content/uploads/2016/06/SAICET-2016-Proceedings.pdf#page=132>

Abstract: “The role of technology in learning has great importance today as the world is being transformed by digital technologies at an expeditious rate. With this in mind it was increasingly important to question how these changes have influenced Foundation Phase learners and especially their experiences of Technology-based Learning (TbL). Qualitative case study research methods such as photo voice, narratives and field notes were conducted with 10 grade 3 learners at two technology-rich schools in Gauteng and examined through a conceptual framework which included the TPACK framework, generation theory and the learning theory of inter alia connectivism. Data was interpreted according to the main elements of the theoretical framework, namely technology, pedagogy and content in relation to the research themes of technological tools, 21st century skills and TbL. Finally, the significance of this study was that the data gathered proved worthwhile in understanding Foundation Phase learners in context which accounts for inferences to be made from the phenomenon of TbL to all stakeholders involved in Foundation Phase education.”

Lee, K. W., ChoonKeong, T., & Ruei, J. Y. X. (2015, October). *Preparing digital immigrant teachers to teach digital native learners in ESL classrooms*. Paper presented at the International Conference on Teaching and Learning 2015, Bangkok, Thailand. Retrieved from

[https://www.researchgate.net/publication/303923113 Preparing Digital Immigrant teachers to teach Digital Native Learners in ESL Classrooms](https://www.researchgate.net/publication/303923113_Preparing_Digital_Immigrant_teachers_to_teach_Digital_Native_Learners_in_ESL_Classrooms)

Abstract: “Learning in the 21st century is so different from yesteryears, due in most parts to the wide availability and advancements of ICT tools, communications, information, and the manner in which human learn and work. Given this change, education must shift to incorporate computer-based, electronic technologies integrating learning with these technologies within the context of the academic subject areas. In preparing in-service teachers who are digital immigrants to teach in ESL classrooms populated with digital natives, digital storytelling (DST) was introduced as a project-based learning activity in a B. Ed TESL programme ‘Materials Development’ course. The project focused on examining DST as an instructional medium and how they could be used in their ESL classrooms. A total of 138 Primary School English teachers in Borneo Sabah participated in the study. Both quantitative and qualitative data elicited via questionnaire, reflective journals, and focus group interviews seemed to show a positive perceptions and experiences among the teachers. Preliminary investigations of DST as instructional mediums also appeared to have brought about positive development of the in-service teachers' technological pedagogical content knowledge. Implications of the study will also be presented.”

Levitt, C. G. (2016, July). *Using the TPACK model to increase digital skills and pedagogy in graduate nursing education students*. Paper presented at the 27th International Nursing Research Congress, Cape Town, South Africa. Retrieved from <https://stti.confex.com/stti/congrs16/webprogram/Paper79407.html>

Abstract (excerpted): “The purpose of this study, funded by a State University of New York Innovative Instruction Technology Grant, is to increase technology-based pedagogical skills in graduate nursing education students through implementation of an online instructional program, framed by the TPACK model. TPACK focuses on the convergence of digitally based instructional practices across three primary knowledge domains: technological, pedagogical, and content (Koehler, Mishra, & Cain, 2013). Using highly interactive strategies, tools, and methodologies, this instructional program promoted digital skills and effective contemporary teaching methodologies.”

Mishra, P., Graves-Wolf, L., Gunnings-Moton, S., Seals, C., Mehta, R., Berzina, I., Mehta, S., Horton, A., Shack, K., Marcotte, C., Cosby, M. & Pawlicki, D. (2016, July). What the research says? In P. Mishra (Chair), *Reinventing TPACK, STEM teaching and leadership in an urban context*. Symposium conducted at Michigan State University, East Lansing, Michigan.

Abstract: “This symposium discusses the pedagogical make up and impact of the MSU-Wipro UrbanSTEM & Leadership Fellowship program on teacher practices, efficacy, and competence. We will describe our instructional approach, which uses the educative experience (Dewey, 1938) involving real world, hands-on engagement with technological devices, pedagogies, and

teachers' relationships to STEM content. Our fellowship program is driven by the TPACK (Technology Pedagogical Content Knowledge) (Mishra & Koehler, 2006) framework. We will discuss curriculum and practices highlighting several teachers from program. Specifically, we will focus on their teaching experiences showcasing how they creatively integrate technology into their pedagogical practices, with an emphasis on creativity and aesthetics. Among the presenters in this symposium are the leaders of the project, members of the instructional and research teams from the university, and participants from Chicago Public schools."

Editor's note: Please see [a flyer about the symposium](#) for more information.

Peng, C. A., & Daud, S. M. (2016, June/July). *Relationship between special education (hearing impairment) teachers' technological pedagogical content knowledge (TPACK) and their attitudes toward ICT integration*. Paper presented at the International Conference on Special Education in Southeast Asia Region 6th Series 2016, Selangor, Malaysia.

Retrieved from

https://www.researchgate.net/profile/Shaffe_Daud/publication/292615391_INTERNATIONAL_CONFERENCE_ON_SPECIAL_EDUCATION_IN_SOUTHEAST_ASIA_REGION_6_TH_SERIES_2016_Relationship_between_Special_Education_hearing_impairment_teachers'_Technological_Pedagogical_Content_Knowledge_/links/56b03f3508ae9ea7c3adb6e0.pdf

Abstract: "In order to cope with the needs and the demands of the 21st century, integration Information and Communications Technology (ICT) in classrooms has been a challenge to the educational systems across countries and special education is no exception. Special educators play a central role in supporting the education of the special needs students. Their knowledge and attitudes will directly have a great impact on the students. Hence, it is crucial to explore the special education teachers' professional knowledge and their attitudes toward ICT integration. The objective of this quantitative study is to investigate a sample of 126 Malaysian secondary school special education (hearing impairment) teachers' technological pedagogical content knowledge (TPACK) and their attitude toward ICT integration through a self-assessed survey instrument. Descriptive findings show that the special education (hearing impairment) teachers perceived high confidence in their content knowledge (CK), pedagogy knowledge (PK) and pedagogical content knowledge (PCK). Yet, when this knowledge relates to technology, they feel reluctant. Nevertheless, results indicate that teachers express positive attitudes towards ICT integration. Further, Pearson correlation analysis revealed that all of the TPACK constructs (except for PCK) were significantly and positively correlated with teachers' attitude of ICT integration. Among these, only constructs TCK, TPK and TPACK had a strong positive correlation with attitude of ICT integration. As a result of these findings several suggestions are made in order to provide some ideas and guidance to policy makers, program planners and school administrators with a better understanding of secondary school special education (hearing impairment) teachers' TPACK and their attitudes toward ICT integration."

Willermark, S., Pareto, L., & Hashemi, S. S. (2016, May). *Didactical designs in use: Exploring technological, pedagogical and content knowledge*. Paper presented at the 5th

International Designs for Learning Conference, Copenhagen, Denmark. Retrieved from http://vbn.aau.dk/files/233636459/Proceedings_of_the_5th_International_Conference_on_Designs_for_Learning.pdf#page=255

Abstract: “In this article we operationalize the Technological Pedagogical and Content Knowledge (TPACK) model as an analytic lens to trace progression in teaching practice. We explore teacher development by studying didactical designs. Didactical design refers to the design of teaching sequences within a particular subject, and includes a pre-planned sequence of lessons, with a detailed teaching plan of how to implement the task in the classrooms. We report from a three-year school development project which involved 48 teachers and over 1000 students in elementary school. An in-depth analysis of 14 didactical designs in the subject of mathematics respectively 13 didactical designs in mother tongue was conducted. The analysis was based on classroom observations, video recordings, chat logs, online forums, interviews and participation in teachers’ daily work. Our position is that our approach can serve as an effective way to categorize, analyze and evaluate didactical designs.”

5. Recent TPACK-related Blog Entry

Guhlin, M. (2015, November 10). Time to stand out. [Web log post]. Retrieved from <http://www.mguhlin.org/2015/11/time-to-stand-out.html>

Excerpt:

“Now, what happens when you think of technology, pedagogy and content? If we were to personify those 3 areas, it would be easy to imagine technology as the child who is constantly being told to “fit in,” right? Think about the conversation:

Pedagogy says, “You *can't* do nothing without me, baby!”
Content cries out, “You ain't got *nothing* without me, honey!” and
Technology replies, “I guess that must be true.”

A quote from a recent MyNotes article really has stuck with me, and I'm going to share it again: ‘Digital design is, neither learning *about* technology nor learning *with* technology, but learning creativity and innovation *through* technology.’

...

When people ask, *where does technology fit into the grand scheme of teaching, learning and leadership?* We have to step back and ask ourselves, do we really want technology to “fit in,” or do we want to find that sweet spot, unleash the coiled energy that lies at the base of the relationship between Pedagogy, Content, and Technology?”

6. Recent TPACK-Related Video

Common Sense Media (Producer). (2016). Introduction to the TPACK model [online video]. Retrieved from <https://www.commonsensemedia.org/videos/introduction-to-the-tpack-model>

“TPACK, or Technological Pedagogical Content Knowledge, is a model that helps teachers consider how their knowledge domains intersect in order to effectively teach and engage students with technology. Learn more about TPACK and how you can combine your knowledge of content, pedagogy, and technology for innovative teaching and learning.”

This “Introduction to the TPACK Model” professional development video (5 minutes 37 seconds in length) was posted by [Common Sense Education](#).

7. Recent TPACK-Related News Item

TPACK was discussed in an editorial entitled “[Why Schools Shouldn’t Approach Technology Like Businesses Once Did](#),” written by Craig Blewett at the University of KwaZulu-Natal, and published in *The Conversation* on May 30, 2016.

It was then reprinted in *US News & World Report* on May 31, 2016, with the title “[Schools Shouldn’t Approach Technology Like Businesses Once Did: Efficiencies Should not be the Objective of Successful Teaching](#).”

8. TPACK Newsletter Suggested Citation

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

Harris, J., & Rodriguez, K. (Eds.). (2016, July 7). TPACK newsletter issue #29: July 2016 [Electronic mailing list message]. Retrieved from <http://bit.ly/TPACKNewslettersArchive>

9. Learning and Doing More with TPACK

Interested in learning more about TPACK or getting more involved in the TPACK community? Here are a few ideas:

- Visit the TPACK wiki at: <http://tpack.org/>
- Join the TPACK SIG at: <http://site.aace.org/sigs/tpack-sig.htm>
- Subscribe to the tpack.research, tpack.teaching, tpack.grants and/or tpack.future discussion lists at: <http://site.aace.org/sigs/tpack-sig.htm>
- Access the TPACK Learning Activity Types taxonomies at: <http://activitytypes.wm.edu/>

- Access three tested TPACK performance assessment instruments at <http://activitytypes.wm.edu/Assessments>

Please feel free to forward this newsletter to anyone who might be interested in its contents. Even better, have them subscribe to the TPACK newsletter by sending a blank email to sympa@lists.wm.edu, with the following text in the subject line: subscribe tpack.news FirstName LastName (of course, substituting their own first and last names for 'FirstName' and 'LastName' — unless their name happens to be FirstName LastName, in which case they can just leave it as is).

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

Standard End-Matter

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

- Judi & Kim

...for the SITE TPACK SIG leadership:

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