



TPACK Newsletter, Issue #32: March 2017

Welcome to the thirty-second edition of the (approximately bimonthly) TPACK Newsletter, and HAPPY 8th BIRTHDAY to this publication! 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

“Technology feeds on itself. Technology makes more technology possible.”

- Alvin Toffler

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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 1155 subscribers currently. Subscription numbers have held steady (+ or – 1% to 4%) since October 2011.

Below are recent TPACK publications that we know about: 34 [articles](#), 4 [chapters](#), and 9 [dissertations or theses](#) 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: tpacknews.editors@wm.edu. (You can check to see if a particular TPACK publication has

already appeared in previous issues of this publication by viewing past TPACK Newsletters here: <http://activitytypes.wm.edu/TPACKNewsletters/index.html>.)

2. Recent TPACK Articles, Chapters, and Book

Articles

Aguinaldo, B. E. (2017). Developing and applying technological pedagogical and content knowledge (TPACK) for a blended learning environment: A rural higher education experience in the Philippines. *Countryside Development Research Journal*, 4(1), 27-35. Retrieved from <http://www.ssu.edu.ph/subdomains/ojs/index.php/CDRJ/article/view/63/60>

Abstract: “This study presents the development and application of Technological Pedagogical and Content Knowledge (TPACK) for blended learning environment (BLE) to a university located in rural area of the Philippines with limited technological resources for online learning. Each element of TPACK model was used as a guide in the development of teaching plan for blended learning environment. A randomized pretest and posttest quasi-experimental research design was used in this experiment to determine the significant difference on the posttest scores of the experimental and control group in terms of their achievement test in Computer Fundamentals. Participants of the study consisted 90 freshmen Bachelor of Science in Information Technology students, 45 students each comprising the experimental and control group. An item-analyzed multiple-choice achievement test floated before and after the experiment. Result revealed successful integration of technology in a technology-deprived university using TPACK model for BLE. In terms of student learning, results revealed that both the experimental and control group slightly increased their mean score using the blended learning approach and traditional teaching inside the classroom which concludes that there is no significant difference between the experimental and control group after the TPACK experiment as compared to the control group exposed to the traditional approach of teaching, hence it is recommended to continuously focus on PCK to further improve the TPACK model for BLE for school in rural areas.”

Akmal, A. (2017). Local culture and morality attachment to TPACK framework of pre-service English teachers within the challenge of the 21st century skills. *International Journal of Education*, 9(2), 113-119. doi:10.17509/ije.v9i2.5465.g3752

Abstract: “In 2045, Indonesia is determined to have a golden generation in order to improve the nation's competitiveness. However, in reality the condition of teenagers today is very alarming. The data show about 93 out of 100 elementary school students have already consumed pornography; about 21 out of 100 young women have abortions; some 135 teenagers become victims of violence every day; 5 out of 100 adolescents contract sexually transmitted diseases; 63 out of 100 teens have sex before marriage. School teachers should take active roles in minimizing such unhappy figure and prepare the golden generation. This article proposes local culture and local moral to complete the Technological Pedagogical

Content Knowledge (TPCK+) within the challenge of the 21st century skills. The objectives are to provide pre-service English Teachers at Universitas PGRI Semarang and pre-service English teachers in general with the ability to develop English course content in the students' cultural context as well as local characters and to equip the pre-service teachers with the 21st century skills. The subjects were 345 pre-service English Teachers who took the TEFL, Teaching Media, and ESP Courses during the academic year of 2015/2016 and 2016/2017. The data were collected through observation, teaching practice, and self-evaluation. The results show 84.92% of the students were included under the category of "good" and "very good" in pedagogical skills, 77.38 % in pedagogical content knowledge, and 87.53 % in cultural and local wisdom context in content development, but only 51.58% in technological knowledge. For improving technological knowledge of the pre-service students, there should be more training on the use of technology before and during the process of teaching and learning of pre-service English teachers."

Batiibwe, M. S. K., & Bakkabulindi, F. E. K. (2016). Technological pedagogical content knowledge (TPACK) as a theory on factors of the use of ICT in pedagogy: A review of literature. *International Journal of Education and Research*, 4(11), 123-138. Retrieved from <http://www.ijern.com/journal/2016/November-2016/11.pdf>

Abstract: "The use of ICT in pedagogy has a positive impact on the teaching and learning process. While ICT in pedagogy is an undertaking involving stakeholders like teachers, administrators and students, teachers are considered to play a core role in the use of ICT in pedagogy. What factors will then make the teachers use ICT in pedagogy? In deriving the factors affecting the adoption of an innovation, such as ICT in pedagogy, several frameworks are available. Of these frameworks, we review some of the traditional innovation adoption frameworks namely, the Innovation Diffusion Theory (IDT), the Technology Acceptance Model (TAM), the Technology-Organization Environment (TOE) framework, and the Unified Theory of Acceptance and Use of Technology (UTAUT). We find that all the above models have been widely employed in guiding innovation adoption studies. We notably argue that the Technological Pedagogical Content Knowledge (TPACK) framework can be included on the list of innovation adoption models. Thirdly, we review past studies on TPACK and isolate pertinent gaps. Hence we develop a framework basing on TPACK, and derive hypotheses to guide further studies on the factors related to the use of ICT in pedagogy by teachers and call for a paradigm shift to have large scale quantitative studies testing whether the TPACK constructs relate to the levels of use of ICT in pedagogy."

Batiibwe, M. S. K., Bakkabulindi, F. E. K., & Mango, J. M. (2016). Application of the technological, pedagogical, and content knowledge framework in a positivist study on the use of ICT in pedagogy by teachers of mathematical disciplines at Makerere University: A conceptual paper. *Makerere Journal of Higher Education*, 8(2). Abstract retrieved from <http://www.ajol.info/index.php/majohe/article/view/150884>

Abstract: "ICT provides an array of powerful tools that induce transformation from a teacher-centred to a student-focused and interactive knowledge environment. The use of ICT in

pedagogy opens up opportunities for learning because it enables learners to access, extend, transform and share ideas and information in multi-modal communication styles and formats. Therefore, all efforts to enhance it should be expended. One way of enhancing the use of ICT in pedagogy is to isolate the factors that underpin it. It is with this understanding that, basing on the Technological, Pedagogical, and Content Knowledge (TPACK) framework, this paper proposes a positivist study to examine the extent to which knowledge relates with the use of ICT in pedagogy among teachers of mathematical disciplines at Makerere University.”

Cabus, S. J., Haelermans, C., & Franken, S. (2017). SMART in mathematics? Exploring the effects of in-class-level differentiation using SMARTboard on math proficiency. *British Journal of Educational Technology*, 48(1), 145-161. doi:10.1111/bjet.12350

Abstract: “This paper explored the effects of in-class-level differentiation by making innovative use of an interactive whiteboard (SMARTboard) on math proficiency. Therefore, this paper evaluates the use of SMARTboard in class, in combination with teacher training, using a randomized field experiment among 199 pre-vocational students in seventh grade in the Netherlands. During 6 weeks, students in the intervention group participated in math classes in which the SMARTboard was used to apply level differentiation. The teachers of these classes received a specific training (Technological Pedagogical and Content Knowledge [TPACK]) in using the SMARTboard in class. Control classes were taught by teachers without the training, who did not use the SMARTboard in class. The results showed that level differentiation in class, which was possible because of the efficient use of the SMARTboard, significantly increased math proficiency with 0.25 points.”

Can, S., Dogru, S., & Bayir, G. (2017). Determination of pre-service classroom teachers’ technological pedagogical content knowledge. *Journal of Education and Training Studies*, 5(2), 160-166. doi:10.11114/jets.v5i2.2083

Abstract: “It seems to be a must for teachers and pre-service teachers to have information and skills necessary for the use of technology in education. This requires effective planning of how technology should be integrated into the teacher training curriculums of education faculties and continuous revision of this plan. In this regard, the purpose of the current study is to investigate the pre-service classroom teachers’ technological pedagogical content knowledge in relation to grade level and gender variables. The current study employing the survey model was conducted on 136 first and third year students from the Classroom Teacher Education Department of the Education Faculty at Mugla Sitki Kocman University in the fall term of 2015-2016 academic year. As a data collection tool, a 47-item, 7-factor and five-point Likert type Technological Pedagogical Content Knowledge Scale was used. The collected data were analyzed with independent samples t-test. The findings of the test revealed that the pre-service classroom teachers’ technological pedagogical content knowledge and opinions about the sub-factors do not vary significantly depending on gender and grade level; however, their opinions about the sub-factor of technological knowledge vary significantly depending on grade level.”

Ching, Y.-H., Yang, D., Baek, Y., & Baldwin, S. (2016). Enhancing graduate students' reflection in e-portfolios using the TPACK framework. *Australasian Journal of Educational Technology*, 32(5), 108-122. doi:10.14742/ajet.2830

Abstract: "When electronic portfolios (e-portfolios) are employed as summative assessments for degree granting programs, it is imperative that graduate students demonstrate their knowledge in the field to showcase learning growth and achievement of the program learning outcomes. This study examined the extent master's degree students in the field of educational technology demonstrated their technological pedagogical content knowledge (TPACK) related elements in their e-portfolio reflection, when they were guided by TPACK framework grounded instruction. Using content analysis technique and open-ended survey responses, the findings show that graduate students were able to demonstrate their interconnected technological pedagogical knowledge in their reflection to justify their competencies. In addition, graduate students had positive reactions to the opportunity to reflect through writing the reflection paper. This study contributes to the eportfolio literature by signifying the importance of providing a discipline-specific framework to guide students' reflection of learning. The TPACK grounded instruction helped graduate students stay focused on their reflection. This study also contributes to the TPACK literature by demonstrating the extent to which graduate students presented their integrated knowledge of TPACK at the end of a program driven to developing students' technology integration expertise."

Chukwuemeka, E. J., & Iscioglu, E. (2016). An examination of lecturers' technological pedagogical content knowledge perceptions at the faculty of education in EMU in Cyprus. *Croatian Journal of Education*, 18(4), 999-1034. doi: 10.15516/cje.v18i4.1845

Abstract: "The use of technology in instruction has brought about different perceptions. The need to know how teachers integrate technology in instruction has brought about different views. Therefore, this study mainly seeks to understand these views on lecturers' technological pedagogical content knowledge (TPACK) perceptions, as it examines how their views differ according to gender, employment status, department and the state of in-service training oriented towards the use of technology. In order to achieve the above stated aim, the researcher statistically examined Eastern Mediterranean University (EMU) Faculty of Education lecturers' TPACK perceptions. In this research, a TPACK survey instrument was administered to 53 lecturers, and a questionnaire was used to ascertain their perception levels across the seven TPACK dimensions. Mean, standard deviation, percentage, frequency and non-parametric tests (Mann-Whitney U test and Kruskal-Wallis test) were used for data analysis. The study reveals that lecturers' perceptions of TPACK were significantly high across all knowledge dimensions and there were statistically significant differences on how lecturers viewed TPACK according to the above listed variables. These differences occurred in Technological Knowledge (TK) and Pedagogical Content Knowledge (PCK) according to gender; Technological Knowledge (TK) and Technological Pedagogical Knowledge (TPK) according to employment status; Technological Knowledge (TK), Technological Pedagogical Knowledge (TPK), and Technological Pedagogical Content Knowledge (TPACK) according to department, and Pedagogical Content Knowledge (PCK) according to in-service training."

Çoklar, A. N., & Özbek, A. (2017). Analyzing of relationship between teachers' individual innovativeness levels and their TPACK self-efficacies. *Journal of Human Sciences*, 14(1), 427-440. doi:10.14687/jhs.v14i1.4413

Abstract: "Individual characteristics of people such as approach to technology, knowledge level and perceptions come into prominence. Rogers is classified individuals in five different categories (innovators, early adapters, early majority, late majority, laggards) in terms of their innovation characteristics and states them as individual innovativeness. Having an individual innovativeness level is a factor which not only may influence people's skills concerning use of technology but also may influence teachers' technological integration level in the class. This study aims to determine the effect of teachers' individual innovativeness level on technological integration process. In line with this purpose, TPACK self-efficacies scale and individual innovativeness scale have been applied to 421 teachers employed in Turkey in 2013-2014 education years. Teachers' individual innovativeness levels, TPACK skill conditions and predictive power level of individual innovativeness on TPACK skills have been researched. As a result of this research, it has been understood that a great majority of teachers consider themselves as early majority and early adapters as well as being advanced level in terms of TPACK skills. In addition it has been concluded that there is a positive and important relationship between individual innovativeness and TPACK, while individual innovativeness becomes an important predictor of TPACK skills."

Farah, M., Ireson, G., & Richards, R. (2016). A content, pedagogy and technology [CPT] approach to TPACK. *Imperial Journal of Interdisciplinary Research*, 2(12), 1162-1170. Retrieved from <http://www.imperialjournals.com/index.php/IJIR/article/viewFile/2985/2847>

Abstract: "TPACK is a framework for the learning process in which educators combine Technological, Pedagogical and Content Knowledge to deliver the learning experience. Therefore, TPACK can be defined as a complex interaction between the technology, pedagogy and content. TPACK expresses the overlap between these factors in a two dimensional space, placing TPACK at the centre. Educators can place their teaching episode within this space and ask, if I place my delivery at this point is it the best point in the TPACK space? Secondly educators may ask how can the best point within the space be determined? The CPT model proposes an attempt to address these questions by recasting TPACK as a three dimensional pseudo-vector space allowing expected outcomes and observed outcomes to be analysed. For the study presented here our null hypothesis is: H_0 = there is no significant difference between the observed and expected outcomes."

Getenet, S. T. (2016). Adapting technological pedagogical content knowledge framework to teach mathematics. *Education and Information Technologies*. Advance online publication. doi:10.1007/s10639-016-9566-x

Abstract: “The technological pedagogical content knowledge framework is increasingly in use by educational technology researcher as a generic description of the knowledge requirements for teachers using technology in all subjects. This study describes the development of a mathematics specific variety of the technological pedagogical content knowledge framework. The paper showed how a particular conception of the knowledge required to teach mathematics can be integrated with the technological pedagogical content knowledge framework as the basis for understanding technology integrated mathematics teaching. The resulting framework provides a sharper lens than the generic technological pedagogical content knowledge framework alone and a better understanding of the knowledge required for teachers of mathematics to use technology in their teaching. The study illustrated how the framework may be useful for analysing the knowledge demands of particular mathematics teaching tasks, and for planning appropriate professional development for integrating technology in the teaching of mathematics.”

Gill, L., & Dalgarno, B. (2017). A qualitative analysis of pre-service primary school teachers’ TPACK development over the four years of their teacher preparation programme. *Technology, Pedagogy, and Education*. Advance online publication. doi: 10.1080/1475939X.2017.1287124

Abstract: “This article reports on a qualitative case study which examined the development of six Australian pre-service teachers’ Technological Pedagogical and Content Knowledge (TPACK), through a series of six semi-structured interviews, over the duration of their four-year teacher preparation programme. Consistent with the research design employed, detailed description is used to provide an insightful picture of the knowledge and skills gained. The results indicate a clear progression in the development of TPACK in these pre-service teachers. For some this was more pronounced than for others, a range of identified aspects of their preparation experience impacting on their development. The extent of ICT use on professional placement, expectations and practice of supervising teachers, school culture and resourcing were major identified influences. A range of aspects of university preparation including an ICT skill and pedagogy subject, assignments and lecturer modelling also had an evident effect on the growth of the pre-service teachers’ TPACK.”

Hsu, C.-Y., Tsai, M.-J., Chang, Y.-H., & Liang, J.-C. (2017). Surveying In-Service Teachers’ Beliefs about Game-Based Learning and Perceptions of Technological Pedagogical and Content Knowledge of Games. *Educational Technology & Society*, 20(1), 134–143.

Abstract: “Using the Game-based-learning Teaching Belief Scale (GTBS) and the Technological Pedagogical Content Knowledge—Games questionnaire (TPACK-G), this study investigated 316 Taiwanese in-service teachers’ teaching beliefs about game-based learning and their perceptions of game-based pedagogical content knowledge (GPCK). Both t-tests and ANOVA analyses were used to examine the differences due to their demographic backgrounds. Correlation and regression analyses were used to examine the predicting variables of the teachers’ GPCK. The results showed that, among the factors of GTBS and TPACK-G, GPK plays the most critical role in predicting GPCK. In addition, the elementary school teachers had

stronger Belief, Confidence and Motivation for using game-based teaching approaches, and had higher GPK and GPCK than middle school teachers. A gender difference only existed in GK. Younger teachers had better GK and GCK than older teachers. Compared with experienced teachers, novice teachers tended to believe that digital games can assist learning and instruction, and perceived higher self-efficacy in their TPACK-G.”

Karakaya, F., & Yazici, M. (2017). Examination of technological pedagogical content knowledge (TPACK) self-efficacy for pre-service science teachers on material development. *European Journal of Education Studies*, 3(3), 252-270. doi: 10.5281/zenodo.290617

Abstract: “In this research aimed at determining the TPACK self-efficacy for pre-service science teachers on material development, the relational screening model was used. The research was carried out with a total of 141 pre-service science teachers from Kahramanmaraş Sütcü Imam University in 2016-2017 fall academic years. The data were collected by using the "Technological pedagogical content knowledge (TPACK) self-efficacy scale for pre-service science teachers on material development" developed by Balçın and Ergün (2016). Independent-t test, one way variance analysis (ANOVA) and Tukey analysis were used in the statistical evaluation of the obtained data. Also, data are evaluated on 0.05 level relevance and its percentage, frequency, average and standard deviation levels are calculated. According to the findings obtained in the research, it was determined that the variables of grade level and teaching technologies and material development courses were influenced by TPACK self-efficacy for preservice science teachers on material development ($p < 0.05$). However, it was determined that gender, level of academic achievement and intensity of technology use did not affect the TPACK self-efficacy for pre-service science teachers on material development.”

Koehler, M., Greenhalgh, S., Rosenberg, J., & Keenan, S. (2017). What the tech is going on with teachers? Digital teaching portfolios? Using the TPACK framework to analyze teacher? Technological understanding. *Journal of Technology and Teacher Education*, 25(1), 31-59. Abstract retrieved from <http://learntechlib.org/p/173346>

Abstract: “Despite the growing popularity of digital teaching portfolios, research has remained focused on outcomes associated with making digital teaching portfolios instead of examining the ways in which they can effectively assess what teachers know, especially when it comes to educational technology. One barrier to using portfolios as a means of assessing teachers’ knowledge of technology is the lack of a guiding framework for characterizing teachers’ technology knowledge. In this paper, we propose that the Technological Pedagogical Content Knowledge (TPACK) framework is well-suited to study the knowledge (including technological knowledge) teachers represent in their digital teaching portfolios. We exemplify how the TPACK framework can guide a content analysis of digital teaching portfolios by analyzing 589 online portfolios created by teachers as the culminating assessment in their master's studies. We conclude that the TPACK framework is helpful for analyzing the types of technological knowledge teachers may represent in portfolios but also acknowledge several important challenges.”

Lefebvre, S., Samson, G., Gareau, A., & Brouillette, N. (2017). TPACK in elementary and high school teachers' self-reported classroom practices with the interactive whiteboard (IWB). *Canadian Journal of Learning and Technology*, 42(5), 1-17. doi:10.21432/T2JK63

Abstract: "The interactive whiteboard (IWB) is increasingly used for teaching and learning in the classroom. Nevertheless, the ways that teachers incorporate this tool within their teaching practices remain poorly understood. This paper examines elementary and high school teachers' self-reported practices with the IWB. The conceptual framework centers on teachers' self-reported practices as well as the Technological Pedagogical Content Knowledge (TPACK) model, a framework for successful integration of technology into teaching. Data were collected from discussion groups with 30 teachers. Overall, the results show a predominance of technological pedagogical knowledge (TPK) and technological knowledge (TK) regardless of grade level, gender, or years of teaching experience."

Oskay, Ö.Ö, & Odabasi, Z. (2016). Determination of self-efficacy perception levels of teachers' attending an online course toward web pedagogical content knowledge. *Universal Journal of Educational Research*, 4(11), 2651-2655. doi:10.13189/ujer.2016.041119

Abstract: "The effects of technological developments occurred new requirements in educational area. Today's teachers should know the content knowledge they teach, have pedagogical knowledge about teaching and learning methods and besides should use the technological tools effectively. Depending on these, new concepts such as Technological Pedagogical Content Knowledge, Web Pedagogical Content Knowledge occurred. With this study it was aimed to determine self-efficacy perception levels of 250 teachers attending an online chemistry course preparing teachers for an examination to be a teacher in the public schools named as KPSS (Public Personnel Examination), toward web pedagogical content knowledge. Web Pedagogical Content Knowledge Scale developed by Lee, Tsai and Chang [1] and adapted to Turkish by Horzum [2] was used as data collection tool."

Oyanagi, W., & Satake, Y. (2016). Capacity building in technological pedagogical content knowledge for preservice teacher. *International Journal for Educational Media and Technology*, 10(1), 33-44. Retrieved from http://jaems.jp/contents/icomelj/vol10/5_oyanagi.pdf

Abstract: "This study explored the pattern of changes in the "Technological Pedagogical Content Knowledge (TPACK)" of preservice teacher students during practicum as well as methods for analyzing and assessing such changes. It aimed at identifying the terms and environment that would benefit including TPACK in the guidance programs of teaching practice (practicum) for preservice teacher students. This study had three significant findings: 1) If TPACK is deliberately taught in practical instruction, what was previously learned of TPACK in certain forms (lecture, etc.) could be further examined in practice; 2) When giving instruction recognizing the TPACK framework, MindMap can be considered as capable of recognizing TPACK and can be a tool to visualize changes for both instructors and preservice teachers; and

3) If mentioned in the conditions and environment causing transformation, opportunities to encourage visualization of knowledge and thinking are important to both instructors and preservice teachers.”

Pamuk, S. (2012). The need for pedagogical change in online adult learning: A distance education case in a traditional university. *University of Gaziantep Journal of Social Sciences*, 11(2), 389-405. Retrieved from <http://dergipark.gov.tr/download/article-file/223342>

Abstract: “The need for providing opportunities for those who seek for advancing his or her knowledge and skills on different subjects while they are away from campus has been a requirement of the era we live in. Thus, the diffusion of distance education concept among educators and use of related technologies in many campuses has been growing. Although different advanced technologies are available for preparing and delivering content online, the important question on how to use these technologies still remains unanswered. Literature on the subject recommends that having access to technology itself does not produce desired outcome, unless it is supported with appropriate pedagogical approaches. This study, therefore, was designed to investigate pedagogy of teaching and learning online from adult students' perspectives. Specifically, to understand pedagogical factors that impact student understanding of the content online, how adult students in an online program assess pedagogical approaches represented by course instructors, weaknesses they have experienced and ideas what would be done in terms of pedagogical approach so that adult learners learn better in online environments. Participants stressed on the importance of pedagogical planning and implementation strategies. Among those issues, planning before teaching, social presence through interactions, and feedback mechanism are mostly indicated issues necessary for effective teaching and learning online.”

Resbiantoro, G. (2016). Self-efficacies of prospective mathematic teachers' technological pedagogical content knowledge (TPACK). *Jurnal Varidika*. Retrieved from <http://journals.ums.ac.id/index.php/varidika/article/view/2735>

Abstract: “The purpose of this research was to describe the general self-efficacies of prospective teachers about TPACK; based on gender and the types of internship school. This study was conducted to 55 prospective teachers that had finished their internship program at 18 schools, junior high schools, senior high schools, and vocational high schools. Data were collected through questionnaires, observations, and interviews. Questionnaires consist of statements on each TPACK component with the rating scale of 0-10. The result showed that self-efficacies of each TPACK component are 6,97 for TK, 5,71 for CK; 6,49 for PK; 6,95 for PCK; 6,38 for TCK; 6,05 for TPK; and 5,90 for TPACK; there are significant differences self-efficacies at TK and PCK component between male and female of prospective teachers, with the female one have a higher self-efficacies than the male one; there are significant difference self-efficacies at CK and TPACK component between the prospective teacher that have done an internship program at junior high schools, senior high schools, and vocational high schools.”

Saraç, H., & Özarıslan, M. (2016). The investigation of relation between the attitude of students towards interactive whiteboard in education process and technological, pedagogical and content knowledge of teachers. *Journal of Instructional Technology and Teacher Education*, 5(3), 108-117. Retrieved from <http://www.jitte.org/article/view/5000209764/5000177483>

Abstract: “The aim of this study is to indicate the relationship between teachers’ technologic pedagogical content knowledge level and students’ attitudes towards the usage of interactive whiteboards. The research was carried out with 45 teachers who were working in a private school attached to National Education Ministry and 632 elementary and secondary school students who were studying in the same school in the education year between 2015-2016 Spring terms. The research is a correlational study. As a correlational tool, “Technologic Pedagogical Content Knowledge Scale” was applied to teachers and “Interactive Board Attitude Scale” was used for students. While analysis of the data obtained from applied scales was being carried out, descriptive statistics, independent groups t-test, single direction variance and correlation analyses were utilized. As a result of the research, it was determined that students’ attitudes towards interactive whiteboards are high; female students’ attitudes are meaningfully higher than male ones’ statistically; students’ attitudes towards interactive white boards do not alter in accordance with class grades and also teachers’ technologic pedagogical content knowledge level is high. It is also indicated that there is not any encountered meaningful relationship statistically between points of students’ attitudes towards interactive white board and teachers’ technologic pedagogical content knowledge.”

Saritepeci, M., & Durak, H. (2016). Examining different variables of TPACK level of teachers attending the FATIH project interactive classroom management course. *Participatory Educational Research, Special Issue 2016(IV)*, 161-170. Retrieved from http://www.partedres.com/archieve/spi_16_4/per_16_spi_4_21.pdf

Abstract: ““Pedagogical Content Knowledge” term came out by combining “content knowledge” dimension that teachers need to have and pedagogical knowledge dimension. Nowadays “technological pedagogical content knowledge” term is created by adding “technology” dimension to “pedagogical content knowledge”. Within the scope of this study, it is aimed to determine TPACK level of teachers from different branches attending the FATIH Project Interactive Classroom Management course and examine TPACK level of them in terms of different variables. Study group of the research in which experimental design is used consists of 25 teachers from different branches who attended the FATIH Project Interactive Classroom Management course and work in a secondary school in Ankara where the FATIH Project is conducted during 2015-2016 school year. According to findings, it is concluded that training has an effect on improvement of “Pedagogical Knowledge” and “Technological Pedagogical Knowledge”. Despite the effect occurring on these two sub-dimensions, it is determined that there is no significant effect of the training on TPACK improvement of the teachers.”

Scrabis-Fletcher, K., Juniu, S., & Zullo, E. (2016). Preservice physical education teachers' technological pedagogical content knowledge. *The Physical Educator*, 73(4), 704-718. doi:10.18666/TPE-2016-V73-I4-6818

Abstract: "Effective technology integration within all areas of education is an objective in most schools given the amount of time students are using technology personally and at school. PE teachers have been challenged to find innovative ways to integrate technology to enhance student learning. A specific type of knowledge is necessary for integration entitled technological pedagogical content knowledge (TPACK; Koehler & Mishra, 2008). TPACK provides the theoretical framework for this study and defines the type of knowledge PETE candidates must possess to be prepared to meet the needs of their students and national and state standards. Online instrumentation of a modified version of Pre-Service Teachers' Knowledge of Teaching and Technology (Semiz & Ince, 2012) was completed by 91 preservice PETE candidates from several universities in the Northeast. A 5-point Likert-type scaling technique and open-ended responses were used on the 39-item inventory to assess the seven types of knowledge that PETE candidates may possess, along with specific open-ended questions regarding modeling of technology by professors, cooperating teachers, and what the PETE candidates have used thus far."

Sen, S., & Temel, S. (2016). The effect of different metacognitive skill levels on preservice chemistry teachers' confidence in technological pedagogical content knowledge. *Participatory Educational Research, Special issue 2016(III)*, 45-52. Retrieved from http://www.partedres.com/archieve/spi_16_3/per_16_spi_3_6.pdf

Abstract: "The aim of the study was to determine the metacognitive skill levels of preservice chemistry teachers and to investigate the effect of different metacognitive skill levels on their confidence in technological pedagogical content knowledge. In the study, survey method which is one of the quantitative research methods was used to determine the effect of different metacognitive skill levels on confidence in technological pedagogical content knowledge. The study was conducted during 2015-2016 fall semester. A total of 75 preservice chemistry teachers participated in the study. The participants of the study were comprised of preservice chemistry teachers attending the Faculty of Education in a public university. As a data collection tool, The Metacognitive Activities Inventory (MCA-I) which was developed by Cooper and Sandi-Urena (2009) and adapted into Turkish by Temel, Dinçol and Yılmaz (2011) was applied to determine preservice chemistry teachers' metacognitive skill levels. Also, the Technological Pedagogical Content Knowledge Confidence Survey (TPACKCS) developed by Graham, Burgoyne, Cantrell, Smith, and Harris (2009) and adapted into Turkish by Timur and Taşar (2011) was used to determine preservice chemistry teachers' confidence in technological pedagogical content knowledge. Firstly, the data obtained from MCA-I was analyzed. Three groups were formed by using the grouping method developed by Cooper, SandiUrena and Stevens (2008). Then, one-way MANOVA test was employed in determining the effects of preservice chemistry teachers' metacognitive skill levels on their technological pedagogical content knowledge, technological pedagogical knowledge, technological content knowledge,

and technological knowledge. At the end of the study, the obtained one-way MANOVA test results were presented and interpreted.”

Tatli, Z., & Altinisik, H. (2016). The impact of web 2.0 tools on pre-service teachers' self-confidence levels about TPCK. *Turkish Journal of Computer and Mathematics Education*, 7(3), 659-678. doi:10.16949/turkbilmat.277878

Abstract: “The purpose of this study is to enable pre-service teachers from various fields to develop materials in their fields through practices introduced to enhance the use of web 2.0 tools for educational purposes, and to investigate the impact of the training on the TPCK self-confidence levels of the pre-service teachers. The study group is composed of a total of 46 pre-service teachers in 13 distinct fields, enrolled in the fourth year of KTÜ Fatih Faculty of Education in the fall semester of the academic year 2015-2016. The study employed an experimental method, namely the pre-test / post-test pattern used with a single group. The data used in the study were gathered through an opinion survey regarding the effectiveness of the use of Web 2.0 technologies for education purposes, and the technological pedagogical content knowledge self-confidence (TPCKSC) scale. The TPCKSC scale was developed originally by Graham et. al. (2009) and was adopted into Turkish by Timur and Taşar (2011). At the end of the study, a significant increase ($t(45)=4,24, p<0,05$) on TPCK self confidence level of pre-service teacher was determined. The pre-service teachers who took part in the study reported a preference for Powtoon, quiz maker and edraw max applications, as well as an intention to use them in their professional lives.”

Üçüncü, G., Sakiz, G., & Ada, S. (2016). A task development process: The case of fourth grade introduction to matter unit. *The Turkish Online Journal of Educational Technology, Special Issue 2016*, 155-164. Retrieved from https://www.researchgate.net/profile/Gonul_Sakiz/publication/311614935_A_Task_Development_Process_The_Case_of_Fourth_Grade_Introduction_to_Matter_Unit/links/5853dbc008ae0c0f3224ee1b/A-Task-Development-Process-The-Case-of-Fourth-Grade-Introduction-to-Matter-Unit.pdf

Abstract: “Learning is affected from individual characteristics, learning objectives, and appropriate construction of learning environments. Learning tasks that are designed in educational environments play influential roles on students' learning. The purpose of the current study was to develop fourth-grade science class tasks for Introduction to Matter Unit, using brain-based learning model and evaluate those tasks in the framework of brain-based learning principles. First, based on the learning objectives of the selected unit, several tasks were prepared. Then, those tasks were presented to the experts in the field of education to obtain information related to the utilities of each task in terms of learning objectives, developmental appropriateness, prior knowledge, time management efficiency, classroom organization, teacher-student roles, task difficulty, and material appropriateness. The procedural information provided by the experts was evaluated using Lawshe (1975) technique. The tasks were also implemented in a fourth-grade classroom. The results showed that the tasks are valid and compatible with the task design principles. The procedures used in this study

are expected to contribute to the task development procedures in science lessons and other branches. It is also expected that the developed tasks will be in use of the researchers in the field of science education as well as the science and elementary school teachers.”

Yalçın, H., & Yayla, K. (2016). Scientometric analysis of the researches about technological pedagogical content knowledge and scholarly communication. *Education and Science*, 41(188), 291-307. doi:10.15390/EB.2016.6746

Abstract: “The technological integration issue in education is examined in educational researches with its different aspects and especially in recent years, comes into a more important position all over the world. Technological Pedagogical Content Knowledge (TPACK) studies, which we confront frequently in this context, increase scientific accumulation of knowledge for using technology effectively in teaching different subject areas and provide teacher training a new dimension. In addition to the researches that contribute to form theoretic framework, application oriented studies also attract the attention. This study aims to reveal the scholarly communication of the researchers, to specify the documents and authors efficient in the field and to reveal extensive conclusions in the context of document and author by examining the researches that are conducted about TPACK. In this sense, it is thought that this study will reveal the current situation on this subject and contribute to the planning of future researches. The study is conducted with 543 documents in total which are books, reviews and researches about TPACK that are acquired from Web of Science (WoS) and Scopus databases. By using bibliometrical method, the scholarly communication pattern in TPACK area is tackled in the context of author and document and the prominent authors and documents on yearly basis and is presented with scientific mapping method by visualizing. Thus, extensive conclusions are revealed about the documents about this subject and the authors of these documents.”

Yang, M.-S., Cho, Y.-S., & Kim, J.-S. (2016). Factors related to technological pedagogical content knowledge (TPACK) of college instructors: Focusing on the epistemological beliefs and the social support. *Digital Convergence*, 14(11), 1-12. Retrieved from http://www.educationalrev.us.edu.pl/dok/volumes/tner_4_2016.pdf#page=163

Abstract: “Rapid growth of information and communication technology and changes in college student characteristics require instructional improvement efforts. Technological Pedagogical Content Knowledge (TPACK) is a capacity-based instructional design based on integrated technology. This study explores the importance of awareness of TPACK and its relationship with epistemological beliefs and social support. The study has shown that there is a significant difference between college instructors' awareness of the importance of TPACK and their awareness of its performance. In addition, TPACK has been shown to have significant impacts on the social support, and it has been shown that significant influences are observed from the emotional support of TPACK and the informational support of TPACK. These results provide fundamental data for measures to develop and support TPACK's capacity for college instructors.”

Yet, T. S. (2017). The use of ICT among pre-service English language teachers. *International Journal of English Language Education*, 5(1), 100-112. doi:10.5296/ijele.v5i1.10779

Abstract: “Information Communications and Technology (ICT) was first introduced through the Smart School project in 1997. Results from past studies on teachers’ use of ICT were mixed whereby their confidence in using ICT and their use and integration of ICT in their classroom practice were incoherent. Hence, this study intends to investigate the confidence level and skills of current pre-service teachers in teaching the English language through the use of ICT. Forty six pre-service English language teachers were selected purposively from a local university and a teacher training college, based on these few criteria set within the limitations of this study. This study adopted and adapted the questionnaires from the ICT Integration Survey (Spazak, 2010) and Technological Pedagogical and Content Knowledge (TPACK) by Mishra and Koehler (2006). These questionnaires are adopted for the purpose of understanding the pre-service teachers’ technological skills, as well as their content and pedagogical knowledge of English language teaching at the point in time when the data was collected. The data collected were analysed using the Statistical Packet for the Social Sciences (SPSS). Results showed that pre-service English language teachers are confident users of ICT, both for their own personal interests and to integrate ICT in their teaching. However, it is also found that pre-service teachers are skilled in ICT because they have been exposed to it since young. Further results that have emerged from this study revealed that there is no relationship between the time used in ICT and the confidence or skills in using ICT.”

Yigit, N., Alev, N., Yurt, Ö., & Mazlum, E. (2017). Examination of technological and pedagogical properties in short film designs. *Turkish Online Journal of Qualitative Inquiry*, 8(1), 122-140. doi:10.17569/tojqi.288859

Abstract: “Establishment of technology assisted environments suitable for new teaching programs has become more of an issue each passing day. From this aspect, Teaching Technologies and Material Design (TTMD) course comes first as applied courses modeling the knowledge generation in pre-service teacher education. One of the teaching activities within the scope of this course is the activities of pre-service teachers for short film preparation and application. Ministry of National Education (MEB) encourages the short film designs through Education Informatics Network (EBA). Integration of technological and pedagogical knowledge that pre-service teachers have within the frame of content knowledge to be taught has been aimed with this kind of activities. This study includes the examination of technological and pedagogical properties of scripts of early childhood pre-service teachers in short film designs. In this research that has been performed with pre-service teachers in KTÜ (Karadeniz Technical University) Fatih Faculty of Education, Early Childhood Education Department, short film production towards the suitable ones for the zones of development and objectives within the MEB Early Childhood Education Program (2013) was asked from groups of four. 5 films selected by criterion sampling method from educational short films prepared, were examined in terms of technical skills, suitability for pedagogical learning objectives and child development, varieties of representation, and knowledge of learner (pre-conceptions and learning disability characteristics). Results refer to that short film contents are suitable for zones of development

with pedagogical learning objectives indicators in this type of scripting beside the film preparation skills in terms of technical skills, It has been seen that even if a variety of representation in terms of early childhood education was provided, there are not enough applications characterizing the pre-conceptions in short film contents.”

Yilmaz-Ozden, S., Mouza, C. & Harlow Shinas, V. (2016). Teaching knowledge with curriculum-based technology: Development of a survey instrument for pre-service teachers. *Journal of Technology and Teacher Education*, 24(4), 471-499.

Abstract: “The purpose of this quantitative study was to develop and test a survey instrument to measure pre-service teachers’ Technological Pedagogical Content Knowledge (TPACK) framed by a transformative lens. The Survey of Teaching Knowledge with Curriculum-Based Technology was developed and administered to 124 pre-service teachers within the context of a required educational technology course taught at a large, Mid-Atlantic University. Survey data were analyzed using exploratory factor analysis (EFA). Results revealed evidence of two discrete domains: Knowledge of Technology and Knowledge of Teaching with Curriculum-Based Technology. The findings of this work provide support for a transformative approach to examining TPACK development. Findings have implications for researchers, educators, and teacher preparation programs.”

Young, J. R. (2016). Unpacking TPACK in mathematics education research: A systematic review of meta-analyses. *International Journal of Educational Methodology*, 2(1), 19-29. doi: 10.12973/ijem.2.1.19

Abstract: “Teaching with technology is considered a necessity in the U.S. mathematics classroom. However, few studies have established explicit considerations to support technology-enhanced student achievement. The purpose of this study was to characterize the effectiveness of technology in the mathematics classroom by systematically reviewing meta-analytic research. An exhaustive literature search was conducted. After applying *a priori* inclusion criteria the pool of 65 initial meta-analyses was reduce to 13 representative studies. Each study was reviewed and characteristics were coded in four categories: (1) sample, (2) measurement, (3) design, and (4) source. An inductive review of the coded studies produced five unique moderators that were the most salient across studies. Overall mean effect sizes were retrieved or calculated from available study data. Hedges g was used as the common effect size metric for comparison across studies. The Technological Pedagogical Content Knowledge (TPACK) framework was used to interpret the most salient moderators of effects across studies. Studies were categorized by didactical functionality and technology type. The results suggest that effects vary by didactical functionality from small to medium. The largest variations were observed for the didactical function of developing conceptual understanding. Implications for research and instructional praxis are provided.”

Zainal, N. F. (2016). TPACK development in teacher education programs: Malaysian context. *International Journal of Academic Research in Business and Social Sciences*, 6(12), 237-244. doi:10.6007/IJARBSS/v6-i12/2490

Abstract: “This paper reviews on the development of Technological Pedagogical and Content Knowledge (TPACK) in Teacher Education Programs from the perspective of Malaysian context. Through the findings of previous research, this paper discusses the current scenario of technology integration in Malaysia and issues related to technology integration in education. To conclude, Malaysia has future potential to further develop and establish technology integration using TPACK framework in the educational system.”

Zyad, H. (2016). The effects of pre-service training on ICT implementation in the classroom. *International Journal of Education and Development using ICT*, 12(3). Retrieved from <http://ijedict.dec.uwi.edu/viewarticle.php?id=2157>

Abstract: “This paper aims to explore practicing teachers’ perceptions of the approach adopted in their pre-service training programs with regard to educational technology. The paper also investigates the extent to which the teachers employ technology to accomplish pedagogical goals as well as the instructional methodology they embrace when they use ICT in the classroom. The thrust of the argument in the current study is that the way practicing teachers use educational technology is reflective of the inadequacy of the pre-service training programs that still insist on disentangling ICT from pedagogy and content. Informed by TPACK, a four-section, five-point Likert scale questionnaire was administered to 56 ELT practitioners in middle and secondary education in the province of El-Jadida. It was found that the integration of technology, pedagogy and content was left to the discretion of the teachers. This approach resulted in limited ICT implementation for instructional purposes and inconsistent interpretations of how ICT can best be used in the classroom. Although the teachers reported that they embraced a student-centered methodology while using ICT, they also fell back on teacher-centered instructional principles. On the basis of the results obtained, a number of implications will be offered for an effective ICT-oriented ELT teacher education.”

Chapters

Dragnic-Cindric, D., Barrow, E., & Anderson, J. L. (2017). Opportunity to start strong: Integration of technology in science lessons in the early elementary grades. In J. Keengwe, & P. Bull (Eds.), *Handbook of research on transformative digital content and learning technologies* (pp. 154-170). Hershey, PA: IGI Global. doi:10.4018/978-1-5225-2000-9.ch009

Abstract: “This chapter investigates challenges faced by educators in the early elementary grades as well as opportunities to transform science education in these critical, early years of schooling. We studied kindergarten teacher's first attempt to integrate one-to-one technology in an inquiry-based science lesson, drawing on works of Randi Engle to analyze the framing of the students and the activity, as well as on the works of Peggy Ertmer and colleagues to investigate barriers encountered in the implementation process. We employed Mishra and Koehler's (2006) Technological Pedagogical Content Knowledge (TPACK) framework to

understand the dynamic triad of teacher's pedagogy, content, and technology knowledge, need for successful technology implementation endeavors. While implementations of technology enhanced inquiry-based science lessons in early elementary grades present educators with some unique dilemmas, they also carry a potential for sparking the scientific curiosity of the youngest elementary school learners' and illuminating the years to come.”

Havard, B. & East, M., Prayaga, L. & Whiteside, A. (2016). Adaptable learning theory framework for technology enhanced learning. In E. Railean, G. Walker, L. Jackson, & A. Elci (Eds.), *Handbook of applied learning theory and design in modern education* (pp. 632-654). Hershey, PA: IGI Global. doi: 10.4018/978-1-4666-9634-1

Abstract: “The sheer volume of technological innovations with educational potential along with the myriad of instructional theories and models present quite the challenge for educators. A contemporary framework is needed to connect these components with learning theory and to ultimately serve as a guide to educators grappling with how to align the interrelated components of effective instruction when using educational technologies. The objective of this chapter is to present a viable contemporary framework to fulfill this need. The Adaptable Learning Theory Framework for Technology Enhanced Learning (AF-TEL) provides a framework based on the cognitive presence, social presence, and teaching presence tenets of the Community of Inquiry model (Garrison, Anderson, & Archer, 2003) to achieve desired educational outcomes. Professional Development for STEM Teachers using Discovery Labs (PDSTDL) is a format of teacher professional development that integrates AF-TEL to address the critical need of preparing effective STEM teachers.”

Kim, J. H., Foster, A., & Cho, M. (2017). Professional development for technology integration into differentiated math instruction. In J. Keengwe, & P. Bull (Eds.), *Handbook of research on transformative digital content and learning technologies* (pp. 1-24). Hershey, PA: IGI Global. doi:10.4018/978-1-5225-2000-9.ch001

Abstract: “To make a connection between pedagogy and technology in teaching, this chapter will explore whether or not a professional development design and practice, whose aim is to help teachers use technology for personal purposes, readily translates into the ability to effectively teach and learn with technology. Adopting a conceptual framework known as self-efficacy beliefs and TPACK, or technological pedagogical content knowledge (Mishra & Koehler, 2006), this chapter discusses the design of a professional development model, the goal of which is increasing the critical attribute of the successful professional development: self-efficacy. In an effort to provide empirical knowledge to support this design, this chapter further showcases a faculty member's approaches to connecting technology and pedagogy using the TPACK approach, while implementing a model designed to improve teachers' self-efficacy. Implications and guidelines for developing teachers' self-efficacy, through activities during the professional development workshop, are discussed.”

Taylan, R. D. (2017). Promoting active learning in mathematics teacher education: The flipped classroom method and use of video content. In J. Keengwe, & P. Bull (Eds.), *Handbook of*

research on transformative digital content and learning technologies (pp. 269-284). Hershey, PA: IGI Global. doi:10.4018/978-1-5225-2000-9.ch015

Abstract: “Teacher educators have a responsibility to help prospective teachers in their professional growth. It is important that teacher educators not only teach prospective teachers about benefits of active learning in student learning, but that they also prepare future teachers in using pedagogical methods aligned with active learning principles. This manuscript provides examples of how mathematics teacher educators can promote prospective teachers' active learning and professional growth by bringing together the Flipped Classroom method with video content on teaching and learning as well as workplace learning opportunities in a pedagogy course. The professional learning of prospective teachers is framed according to the components of the Pedagogical Content Knowledge (Park & Olive, 2008; Shulman, 1986). Implications for future trends in teacher education are provided.”

3. Recent TPACK-Related Dissertations and Theses

Braxton, P. H., III. (2016). *Elementary teachers' use of technology for student instruction: Barriers and strategies* (Doctoral dissertation). Available from ProQuest Dissertations & Theses Global database. (UMI No. 10249970).

Abstract: “The purpose of this research was to explore what is delaying the full adoption of technology as an instructional tool in education. Phase I of this mixed-methods study employed the use of a survey with upper elementary school teachers in a large urban school district in South Florida to establish an understanding of strategies elementary school teachers apply in overcoming intrinsic and extrinsic barriers while exploring their beliefs, attitudes and concerns about adopting technology for instructional purposes. Using the Technological Pedagogical Content Knowledge (TPACK) theoretical framework (Mishra & Koehler, 2006), this study explored the types of barriers most obstructive in teachers' efforts to implement technology and identified strategies applied by teachers effectively using technology. Survey participants self-identified as high or low users of technology and analyses revealed a significant difference in their attitudes, values and beliefs and their use of strategies in overcoming barriers in technology use. No significant difference was found in the extrinsic barriers to technology use which must be addressed. Phase II of the study included three focus groups from the same sample group, exploring the phenomena of adopting technology. The themes emerged focused on the need for professional development, the need for increased technical and administrative support and the need for more updated equipment (software and hardware). This research effectively captured the concerns and opinions of both high and low technology users and provided insight into how educational institutions might better prepare educators to more efficiently align instruction with the use of technology.”

Curtis, K. (2016). *The effect of post-professional development services to help teachers integrate technology into the classroom and increase student achievement* (Master's thesis, Monmouth University). Retrieved from

https://www.researchgate.net/profile/Kevin_Curtis5/publication/311582953_the_effect_of_post-professional_development_services_to_help_teachers_integrate_technology_into_the_classroom_and_increase_student_achievement/links/584ee3cf08aed95c25099378.pdf

Abstract: “The researcher explored the effect of post-professional development on the use of iPads in the classroom at a diverse, private catholic high school. Using a mixed method study design, the researcher surveyed colleagues about their iPad use in the classroom, their experience with iPad integration and professional development training effectiveness. The researcher examined how students and teachers were using technology in the classroom and how professional development could assist educators in the integration of educational technology into the classroom. Educational technology was found to be linked to student achievement, in turn improving student retention of learned materials. Teachers were found to understand the importance and necessity of technology in the classroom, yet some digital immigrant teachers were resistant to full integration of technology for a number of reasons. The study revealed that professional development could improve the integration of technology, but ongoing support for the integration of technology into the classroom is lacking. The researcher found that the faculty and students would benefit from the introduction of an educational technology library, along with an Educational Technologist who could assist teachers in bridging the digital divide between themselves and their digital native students.”

Irish, S. J. (2017). *A teacher retrospective of a decade of one-to-one devices* (Doctoral dissertation, Walden University). Retrieved from <http://scholarworks.waldenu.edu/cgi/viewcontent.cgi?article=4405&context=dissertations>

Abstract: “One-to-one electronic devices have become commonplace in many educational settings across the globe, but it has been unclear how long-term teaching practices using such devices have evolved and how they relate to recognized best practices for using technology in the classroom. This study examined what a generation of teachers has over time identified as best applications of using these devices; their benefits, drawbacks, and challenges; and whether their use reflected previously identified best application of technologies in the classroom. This case study, conducted in one school system in New England, used the theories of Substitution, Augmentation, Modification and Redefinition (SAMR) and Technology, Pedagogy, and Content Analysis (TPACK) as a conceptual framework. Participants included two groups, one composed of four teachers who have taught only after implementation of one-on-one laptop use and one composed of four teachers who taught both before and after device implementation, selected to determine whether differences existed in attitudes and practices based on types of teaching experience. Data sources included interviews and observations. Results indicated both veteran and established teachers embraced the use of one-to-one devices in their teaching, but both groups lacked the knowledge of SAMR and TPACK theories to best apply them in the classroom. This study contributes to the field by including recommendations for stronger teacher technology implementation, including more in-depth training and support with application of TPACK and SAMR theories in classroom pedagogy.”

Kim, S. (2016). *Relationships between preservice secondary mathematics teachers' beliefs, knowledge, and technology use* (Doctoral dissertation, University of Georgia). Retrieved from https://getd.libs.uga.edu/pdfs/kim_somin_201605_phd.pdf

Abstract: “This multi-case study examines the relationships between preservice teachers’ beliefs and knowledge regarding teaching mathematics with technology. Based on the theoretical framework on teacher beliefs and Technology, Pedagogy, and Content Knowledge (TPACK), I investigated four preservice secondary mathematics teachers’ technological pedagogical content knowledge (TPCK) and their beliefs about the nature of mathematics, learning and teaching mathematics, and the use of technology in the mathematics classroom. Three semi-structured interviews (beliefs, task-based, and performance interviews) were used to collect data about the preservice teachers’ TPACK components, beliefs, and how to use a technology tool in their imaginary mathematics teaching. The findings of this study indicated that preservice teachers with sophisticated or student-centered beliefs about the nature of mathematics, learning mathematics, and technology use displayed higher levels of mathematical content knowledge, pedagogical content knowledge, and technological content knowledge, respectively, than preservice teachers with traditional or teacher-centered beliefs about mathematics, learning mathematics, and technology use. In addition, this study suggested that in order to effectively use technology to teach mathematics, preservice teachers should develop their beliefs and knowledge in all areas of mathematics, pedagogy, and technology. Understanding the relationships between preservice teachers’ TPACK and beliefs provides insights into how teacher education programs can support preservice teachers to develop TPACK and integrate technology into their future mathematics instruction.”

Mukhari, S. S. (2016). *Teachers' experience of information and communication technology use for teaching and learning in urban schools* (Doctoral dissertation, University of South Africa). Retrieved from http://uir.unisa.ac.za/bitstream/handle/10500/22045/thesis_mukhari_ss.pdf?sequence=1&isAllowed=y

Abstract: “The use of Information and Communication Technology (ICT) in teaching and learning is of significant importance to a country’s development and the social growth of individuals. As a result, ICT usage is gaining momentum in world schooling systems. Cognisant of the benefits of ICTs in teaching and learning, South African schools have introduced ICTs in schools and teachers are compelled to adopt and integrate technology to improve their pedagogic activities. The purpose of this research was to explore South African teachers’ experience in using ICT in the schooling system. This study was underpinned by the Network Society theoretical framework that endorses the use of ICTs in teaching and learning environments. The research method used in the study followed a qualitative interpretative approach and data collection methods included a literature study, non-participant observation and semi-structured interviews with a purposefully selected sample of teachers and school principals and analysis of documents on ICTs in teaching and learning. Findings indicated that ICT integration in teaching and learning is endorsed by teachers and principals who understand

the benefits of ICT in enabling better methodological strategies, greater collaboration among teachers, improved access to the required information and the ability to cater for learners with different potential and learning styles. However, a number of factors that hinder the successful ICT integration in urban schools were identified as inadequate ICT infrastructure, teachers' lack of ICT skills and low level of ICT proficiency, inadequate training, negative attitudes and poor teacher confidence. Other factors included lack of ICT leadership, funds and technical support. These findings indicated poor implementation of policy and a lack of connection between theory and practice. It was concluded that all education stakeholders, including parents, should work together in securing an ICT infrastructure that will accommodate all learners. It was recommended that more regular workshops which focus on the development of ICT skills in accordance with the proficiency levels required to effect successful integration of ICTs by teachers, be conducted. Moreover, principals should attend training workshops to learn about their responsibilities as ICT leaders at school. Technological pedagogical and content knowledge (PACK) together with CRAR3FS2 principles could provide a crucial framework for training South African teachers to overcome their ICT skill challenges. The ultimate goal of this study is to analyse factors that both hinder and enable the integration of ICTs into teaching practice in South Africa and to contribute to the body of literature on ICT integration in South African urban schools."

Piotrowski, A. (2016). *Flipped learning and 21st century literacies: Constructing preservice secondary English teachers' TPACK* (Doctoral dissertation). Available from ProQuest Dissertations & Theses Global database. (UMI No. 10161112)

Abstract: "This study examined how preservice English Language Arts teachers learn to teach and use their knowledge of content, pedagogy, and technology during an English education course focused on technology. Seeking to address a gap in the research, this study utilized a case study methodology to look at preservice teachers' learning about the flipped classroom and designing lessons integrating technology as a way for a teacher education course to facilitate preservice teachers' construction of their Technological Pedagogical Content Knowledge. The participants were preservice English teachers taking an online English education course during Summer 2015. The researcher used a survey to purposefully select nine individuals with a range of self-reported knowledge. Participants were then interviewed twice, had their course assignments collected and analyzed, and submitted three written reflections. The course that the participants took challenged preservice teachers to bring together their content knowledge, pedagogical knowledge, and technological knowledge to create flipped lessons videos and a series of lesson plans. The data showed that there was no pattern or stages of TPACK development. Participants saw potential for flipped learning to be useful in secondary English classes and that while participants wanted to use technology and teach digital literacies in their future classrooms, they also wanted their students to engage in traditional print literacy."

Singer, J. Z. (2017). *A Rasch analysis of a TPACK assessment instrument and online K-12 teachers in the United States* (Doctoral dissertation, University of Toledo). Available from https://etd.ohiolink.edu/pg_10?0::NO:10:P10_ACCESSION_NUM:toledo1457438475

Abstract: “TPACK, an extension of Pedagogical Content Knowledge, has the potential to provide a theoretical lens through which researchers can focus on the skills teachers need to meaningfully incorporate technology into instruction. To date, however, TPACK has been a challenge to measure because of imprecise definitions and confounded dimensions.

This study utilized Rasch modeling to assess an existing TPACK instrument, perceived TPACK knowledge of online teachers, and the TPACK theoretical framework itself. An analysis from a nationwide sample of 165 online teachers indicated that the instrument is producing valid and reliable measures. Participants rated their own knowledge highest in areas related to Content and Pedagogy, and lowest in the area of Technology. Significant differences were found across genders, ages, and years of service.

Data analysis also revealed that several of the component areas of TPACK were conflated by participants. Ultimately, this study could not validate the seven component theoretical structure of TPACK, and offers an alternate framework based on the Rasch analysis. Several topics for future research were also recommended.”

Stein, D. (2016). *Community college faculty perceptions of math MOOC remediation effectiveness*. Available from ProQuest Dissertations & Theses Global database. (UMI No. 10140007).

Abstract: “Underprepared college students take zero credit courses, extending their stay, and increase college debt which may lead to attrition (SUNY, 2015). President Obama’s Affordability Proposal reported on a college “cost crisis” created “by failing to use technology to its fullest effect” (Kelly and Carey, 2013). The non-profit Alliance for Excellence in Education, in 2006, reported that community colleges alone spent \$1.4 billion per year on remedial courses for recent high school graduates (Smydo, 2008). This quantitative study reports on the perceptions of NYS community college math faculty on the effectiveness of a math MOOC as a remediation strategy, use in remedial courses and as free online educational resource for the math college placement exam. After levels of Technology Pedagogical and Content Knowledge (TPACK), faculty MOOC Awareness (MA) and perceived Barriers to Technology Integration (BTI) were measured, faculty reviewed a sample math MOOC syllabus with a delivery system containing instructional videos, self-assessments and a dashboard of student math competencies and reported on Math MOOC Remediation Effectiveness (MMRE) and Faculty Interest in teaching with MOOC Remediation (FIMR). Faculty expressed their willingness to collaborate in MOOC creation. The electronic survey was juried and factor analyzed for content and construct validity. Results showed that community college math faculty had low familiarity with MOOCs as a remediation strategy. However after viewing a video intervention showing a free sample MOOC with tutorials, platform faculty perceived that Math MOOC Remediation may be an effective educational strategy to increase passing rates on math competency entrance tests and to increase passing rates in college remedial math courses. Significant differences were found within this study. Significant positional differences indicated that adjunct math faculty had greater interest in teaching a future math remedial course if a remedial math MOOC was

aligned to the college syllabus. Full-time math faculty was more aware of MOOCs as an educational strategy. This study found an inverse significant correlation which indicated that that older faculty with greater years of college teaching tended to have less interest in teaching with MOOC Remediation. Significant gender differences were found indicating that males teach more online courses than females.

Sullivan, D. D. (2016). *The common core learning standards and elementary teachers' math instructional practices, receptivity to change, instructional leadership and academic optimism*. Available from ProQuest Dissertations & Theses Global database. (UMI No. 10140006).

Abstract: “This study sought to identify the relationships among elementary teachers instructional practices in mathematics pre- and post-CCLS implementation in relation to technological and pedagogical content knowledge (TPACK), formative assessment, reflective practice, receptivity to change, academic optimism, and instructional leadership across age, years of experience, grade level taught, and college math credits taken in high and low needs schools. Teacher responses from low and high need schools (based on the Need/Resource Capacity Categories) across age, years of teaching experience, grade level taught, and college math credits taken were examined with the dimensions of mathematics instructional practices to see if any relationships exist among the variables.”

4. TPACK Ph.D. Scholarship Available

[Dr. Mike Phillips](#), the co-leader of the [Learning with New Media research group](#) in the [Faculty of Education at Monash University](#) in Victoria, Australia, is a TPACK researcher who is interested in the contextual influences shaping teachers' knowledge and decision-making. Mike is seeking applications from outstanding prospective Ph.D. students for a \$AUD40,000-per-year Ph.D. scholarship. This opportunity would suit students who are interested in researching teachers' decision-making in technology-rich contexts through a TPACK lens.

Further details can be found by going to bit.ly/2kNCsln or by contacting Mike directly at: michael.phillips@monash.edu.

The Faculty of Education at Monash University seeks to contribute to the multicultural society in which we live and to promote participation at all levels of education. We value research that is innovative, multidisciplinary, socially critical, and internationally scientifically significant. The faculty has a vibrant research culture that pursues educational research at the forefront of national and international scholarship, informed by pressing societal and economic needs in partnership with the world's best and most innovative. The Faculty has ranked in the top 20 in the world according to the QS world university rankings 2013 - 2016. Educational research at Monash has been ranked 'Above World Standard' in all Excellence in Research for Australia (ERA) exercises (2010, 2012 and 2015) and is internationally recognized as a leader in teacher

education and professional learning. The Learning with New Media research group comprises 21 research-active faculty academics whose interests coalesce around educational technology.

5. Recent TPACK Presentations

Baya'a, N., Daher, W., Anabousy, R., & Anabousy, A. (2017, February). *The development of pre-service teachers' TPACK in the use of digital tools*. Paper presented at the 10th Congress of European Research in Mathematics Education, Dublin. Retrieved from https://keynote.conference-services.net/resources/444/5118/pdf/CERME10_0113.pdf

Abstract: "The ministry of education is launching an overall project to implement the use of ICT in the Israeli education system. To prepare pre-service teachers with whom we work for this kind of implementation, we designed a model, which prepares them to use digital tools effectively while integrating particular pedagogy for teaching a specific mathematics or science content. The goal of the present research is to study the development of these pre-service teachers' TPACK (technological, pedagogical and content knowledge), attitudes toward computers and their ICT proficiency. For this purpose, we used questionnaires developed by the MOFET institute and by previous studies. The research results show significant improvement in the TPACK level and ICT proficiency, but no significant effect of the preparation on most of the components of the teachers' attitudes toward computers, being positively high before and after the preparation."

Bretscher, N. (2017, February). *Beyond a positive stance: Integrating technology is demanding on teachers' mathematical knowledge for teaching*. Paper presented at the 10th Congress of European Research in Mathematics Education, Dublin. Retrieved from https://keynote.conference-services.net/resources/444/5118/pdf/CERME10_0020.pdf

Abstract: "Research on technology in mathematics education highlights the importance of teachers having a positive stance towards technology for successful integration into classroom practice. However, such research has paid relatively little attention to teachers' knowledge of specific mathematical concepts in relation to technology. This paper examines the innovative use of technology by a teacher, Robert, as a critical case study, to argue that the significance of mathematical knowledge for teaching using technology should not be overlooked nor underestimated."

Cubeles, A., & Riu, D. (2016, November). *Teachers' use of technology in the university classroom*. Paper presented at the 4th International Conference on Technological Ecosystems for Enhancing Multiculturality, Salamanca, Spain. Abstract retrieved from <http://dl.acm.org/citation.cfm?id=3012591>

Abstract: "This study aims to explore the use of technology in the classroom for teaching purposes in a university environment. The research provides evidence both on the use of the technological tool and the instructive task performed with it. Based on a survey of 112

professors, the tools were classified into items of mobile and social media (SM), learning management systems (LMS) and graphic and dynamic visualizations (Graphic). Regarding the Faculty, the study collected a number of sociodemographic variables such as gender, age, discipline, academic background and experience in online teaching. Results show the limited use of technology in classroom, highlighting only those technologies related with graphic and dynamic presentations, while they do show correlation between the use of LMS tools and SM tools. However, significant differences in the use of technology in the classroom have been found between teachers from different disciplines, academic backgrounds and prior experience with online teaching, while no differences were detected in other variables. This investigation thus contributes to studies that aim to advance the effective integration of technology in teaching and learning by introducing relevant teacher variables.”

Karunanayaka, S. P., Naidu, S., & Menon, M. (2016, November). *Transformational change at the intersections of technology, education and design at the Open University of Sri Lanka*. Paper presented at the 8th Pan Commonwealth Forum, Kuala Lumpur, Malaysia. Retrieved from <http://oasis.col.org/bitstream/handle/11599/2513/PDF?sequence=4>

Abstract: “Technology, education and design are at the heart of any educational transaction. For optimum impact these need to be carefully choreographed and orchestrated. Despite acknowledgement and acceptance of technology, education and design as critical attributes of any successful educational transaction, bringing them together to ensure transformational change, both at the individual and at the institutional level, remains a serious challenge. This includes not only the development of the knowledge and understanding of the subject matter content, but also a rethink and reorientation of the essential value principles of education. This paper reports a case study of the experiences of the Open University of Sri Lanka in bringing about such transformational change in relation to the adoption of open educational practices (OEP) over the past decade. This is captured in the narratives of key participants involved in the projects. These achievements comprise: 1) the professional development of academic staff in the integration of OER; 2) a robust model for the integration of OER; and 3) a rigorous approach to the evaluation of the impacts of OER integration on a range of dependent variables including perceptions and practices of educators towards OEP.”

Koh, J. (2016, November). *TPACK concepts and practices*. Paper presented at the International Conference on Technics, Technologies and Education, Yambol, Bulgaria. Retrieved from http://ictte.fkip.uns.ac.id/wp-content/uploads/2016/11/ICTTE2016_TPACKconcepts_practices.pdf

Abstract: None

Melo, D., & Barbosa, G. (2016). *Digital educational resources and grammar teaching-TPACK reference contributions*. Minutes from the 4th Teaching and Learning with Creativity (3 to 12 years old) meeting, Lisbon, Portugal. Retrieved from <http://www.ipvc.pt/sites/default/files/Ensinar-aprender-matematica-2016-ATAS-CRIA2016.pdf#page=47>

Abstract (using Google Translate): “The effective use of digital educational resources (RED) in the Teaching of grammar presupposes that the teacher is in possession of a Knowledge, pedagogical, technological, (TPACK- Technological Pedagogical Content Knowledge) and Contexts (Mishra, Koehler & Harris, 2009). Within this framework a study that had as its objective to plan a didactic sequence based on the Reference TPACK and in the methodology of the grammar laboratory (Duarte, 2008). From a set of creative activities Dexter's lab "students of the 4th year of schooling were involved in Tasks of knowledge of grammatical contents: subject and predicate, Focusing on subject types. The study is based on a methodology Of a qualitative and interpretative nature, in an explanatory dimension. In this The purpose of this communication is to present the results of this study, focusing In the presentation of the stages of the grammar laboratory, in RED The tasks performed, and concluding that the enthusiasm of the Participation in activities, the understanding of the contents and the Lessons learned have allowed us to realize the importance of Intersection of the various knowledge implicit in the TPACK and the Of the same in the planning of a class with integration of RED.”

Park, E. (2016). *A case study exploring TPACK framework within the context of early childhood education*. Paper presented at the 2016 Korean Engineering Education Conference, Seoul, Korea. Abstract retrieved from <https://www.papersearch.net/thesis/article.asp?key=3449013>

Abstract: “The purpose of this exploratory single-case study was to investigate the affordances of iPads and how these affordances transpired within a technological, pedagogical content knowledge (TPACK) framework by four early childhood educators at a low-income family preschool in Honolulu, Hawaii. Early childhood education (ECE) will be defined as education from birth to age eight although this study focused primarily on educators for preschool age group that is from age three to five. The targeted participants included four preschool teachers with varying technological skills and knowledge. Methods of data collection were pre-survey, post-survey, follow-up survey, group interviews, follow-up interviews, classroom observations, and documentation of iPad workshops and other email correspondences. The data included existing data from a grant project completed at the end of 2013 and new data from follow-up interviews collected in May 2014. The data were analyzed using coding methods in two cycles. The three major findings were 1) the exploration of affordances provided by iPads showed common themes of efficiency and effectiveness in assessing, teaching, and learning. In addition, there were some affordances particular to teaching and learning; 2) the exploration in how participating teachers discovered the affordances of iPad over time indicated parallel progression in technological knowledge and change in their value system about the affordances of iPad; and 3) the exploration in the progression of technological knowledge and change in their value system about the affordances of iPad within the TPACK framework suggested that there was a close relationship between progression of technological knowledge (TK) towards TPACK and progression of affective-valuing (AV) towards affective-characterization by value system (AC).”

Peng, C.A, Soon, V. K. L., & Daud, S. M. (2016, December). *Teachers' beliefs and TPACK toward frog VLE integration in special education (hearing impairment) classroom*. Paper

presented at the 2016 International Conference on Teacher Learning and Development, Penang, Malaysia. Abstract retrieved from https://www.researchgate.net/publication/311101119_teachers'_beliefs_and_tpack_toward_frog_vle_integration_in_special_education_hearing_impairment_classroom

Abstract: “The expansion of Internet and Wi-Fi nowadays facilitated the use of cloud-based content creation such as Virtual Learning Environment (VLE), which had changed the current educational paradigm and ways of interaction between teachers and students. This paper attempts to shed light on the Special Education (hearing impairment) teachers' beliefs towards the educational potential and the integration of Frog VLE in T&L process. It also examined teachers' technological pedagogical content knowledge (TPACK) to teach in a virtual learning environments. The sample consisted of 40 secondary teachers drawn randomly from special education school in Penang. Overall, findings indicated that teachers believed the educational potential and expected value of Frog VLE in educational practices. Yet, teachers seems not confidence and uncertainty regarding their knowledge about pedagogical use of learning activities in practice. The results of TPACK towards Frog VLE integration showed that there is still some room for improvements, particularly technology related components. Furthermore, the Pearson Correlation analyses indicated that there were positively significant relationship between teachers' beliefs towards the educational potential and the integration of Frog VLE with their technological knowledge. It was concluded that in the realm of Frog VLE in the hearing impairment classroom, teachers' belief and knowledge of Frog VLE integration is important in order to establish a best learning environment for the hearing impairment students. Implications and recommendations are made in focusing professional development efforts to reinforce special education (hearing impairment) teachers' beliefs and facilitate their TPACK towards Frog VLE integration. Keywords: teachers' beliefs, technological pedagogical content knowledge (TPACK), special education (hearing impairment), virtual learning environment (VLE).”

Slough, S. (2016, November). *Re-imagining pedagogical content knowledge for the 21st century*. Paper presented at the World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education 2016, Washington, DC. Abstract retrieved from <http://learntechlib.org/p/174145>

Abstract: “Technological Pedagogical Content Knowledge (TPACK) is a theoretical framework that has enjoyed widespread applications as it applies to the integration of technology in the teaching and learning process. This paper reviews the background for TPACK, discusses some of its limitations, and reviews and introduces a new theoretical framework, 21st Century Pedagogical Content Knowledge (21st Century PCK), to clarify the discourse surrounding teaching and learning in an increasingly technological world.”

Teague, H., Wargo, F., Castro, R., King, J., Lara, V., & Tierney, J. (2016, November). *Online course facilitators describe what works in learner-centered feedback*. Paper presented at the World Conference on E-Learning in Corporate, Government, Healthcare, and Higher

Education 2016, Washington, DC. Abstract retrieved from <http://learntechlib.org/p/173948>

Abstract: “A four-point-effectiveness checklist for continued student engagement through personalized assessment feedback in online courses is described in this poster and accompanying paper. Designed for pre-service and in-service adult learners, the checklist reflects research in pedagogical practice of knowledge transfer, adult learning theory, and the TPACK instructional framework. Data sources include the feedback artifacts of current online course facilitators, who are also the co-writers of this paper. Post-course assessment data from adult learners validates the success of these methods in both current teaching practice and subsequent professional development through participation in online courses.”

Yi, S., Park, H. & Lee, Y. (2016, November). *Development of the TPACK-based curriculum with 3D printer for pre-service teachers*. Paper presented at the World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education 2016, Washington, DC. Abstract retrieved from <http://learntechlib.org/p/173978>

Abstract: “The purpose of this paper is to describe the development of TPACK-based curriculum on 3D printer use for preservice teachers. TPACK theory, 3D printing in education, and the ADDIE model of instructional design are explained. A TPACK-based curriculum for instructing preservice teachers on 3D printers and their use in educational settings is then outlined. The TPACK-based curriculum is structured to be delivered in five phases. The efficacy of the curriculum will be tested in a future study.”

6. Recent TPACK-related Blog Entries

Christensen, P. (2016, December 15). *What your TPACK is missing* [Web log post]. Retrieved from <http://www.hotlunchtray.com/what-your-tpack-is-missing/>

Excerpt: “The TPACK graphic is compelling. The complex relationship between the demands of teaching are well represented. And *ideally* balanced. The overlapping sweet spots are easily pictured by experienced educators.

- What happens when you neglect technological knowledge?
- Why do teachers neglect technological knowledge?
- What about training?”

McCabe, K. (2017, February 2). *Arizona State University to win AACTE award for infusing technology in methods courses* [Web log post]. Retrieved from <http://edprepmatters.net/2017/02/arizona-state-university-to-win-aacte-award-for-infusing-technology-in-methods-courses/>

Excerpt: “About 5 years ago, the college eliminated its stand-alone educational technology course and instead began infusing the tech content into methods courses. Because of the college’s large size, this undertaking required massive support and commitment among dozens of faculty and administrators... Over time, the college’s initiative has surmounted the challenges of large-scale implementation and won over students and faculty alike. Guided by the principles of technological pedagogical content knowledge (TPACK) and focused on developing both candidates’ and their instructors’ technology-integration skills, the initiative reached 75 sections of 18 methods courses last semester, taught by 59 instructors to over 2,000 students.”

National Financial Educators Council. (2017, February). *Using technology to teach financial education: Important first step in TPACK framework* [Web log post]. Retrieved from <https://www.financialeducatorsCouncil.org/teaching-financial-education-technology/>

Excerpt: “Effectively teaching financial literacy to students or clients of any age requires a solid educational framework. The National Financial Educators Council (NFEC) has adopted the TPACK scaffold as the foundation for its curriculum and instructor training programs. The TPACK acronym stands for Technology, Pedagogy, and Content Knowledge – the key components underpinning a successful financial education system. In this article, financial professionals weigh in on the first of those components: using technology in teaching financial literacy.”

Phillips, M., & Uni, M. (2017, February 6). *How virtual reality is changing the way students learn* [Web log post]. Retrieved from <https://www.gizmodo.com.au/2017/02/how-virtual-reality-is-changing-the-way-students-learn/>

Excerpt: “Over the past 18 months, I have been working on a different educational [augmented reality] application for use in the Royal Botanic Gardens in Melbourne. This work is grounded in considerations of the technological, pedagogical and content (TPACK) requirements of teachers.

Research on the TPACK concept argues that teachers integrate digital technologies most effectively when they consider the ways in which different platforms allow them to represent content in different ways. This means they can engage their students in more comprehensive learning activities.

My work at the Royal Botanic Gardens has been designed to use AR technology with a particular pedagogical approach (constructivism) and to represent particular content (environmental sustainability and Aboriginal and Torres Straight Islander histories and cultures) to students in ways that would be otherwise difficult to do.”

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., & Rodriguez, K. (Eds.). (2017, March 5). TPACK newsletter issue #32: March 2017 [Electronic mailing list message]. Retrieved from <http://bit.ly/TPACKNewslettersArchive>

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/>
- Read past issues of the newsletter at: <http://bit.ly/TPACKNewslettersArchive>
- Subscribe to the tpack.research, tpack.teaching, tpack.grants and/or tpack.future discussion lists at: <http://site.aace.org/sigs/tpack-sig/>
- Access the TPACK Learning Activity Types taxonomies at: <http://activitytypes.wm.edu/>
- Access three tested TPACK assessment instruments at: <http://activitytypes.wm.edu/Assessments>
- Access and/or adapt TPACK online short courses at: <http://activitytypes.wm.edu/shortcourse/>

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:

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