TPACK Newsletter, Issue #31: December 2016

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

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

Gratuitous Quote About Knowledge

"The outcome of any serious research can only be to make two questions grow where only one grew before."
- Thorstein Veblen

In This Issue

1. TPACK Newsletter Update

The TPACK Newsletter has been published via the tpack.news email list since January 2009. It has 1154 subscribers currently. Subscription numbers have held steady (+ or – 1% to 3%) since October 2011.

Below are recent TPACK publications that we know about: 28 articles, 8 chapters, 1 book, and 10 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

Alqurashi, E., Gokbel, E. N., & Carbonara, D. (2016). Teachers' knowledge in content, pedagogy and technology integration: A comparative analysis between teachers in Saudi Arabia and United States. *British Journal of Educational Technology.* Advance online publication. doi:10.1111/bjet.12514

Abstract: "Teachers' technological pedagogical content knowledge (TPACK) involves an awareness of instructional approaches, methods, and knowledge of building on technology to enhance students' learning. The purpose of this study was to evaluate the TPACK of teachers in Saudi Arabia and USA, and then describe the factors affecting teachers' TPACK through an analysis of covariance that incorporates age, teaching experience, and education level as covariates, and the seven levels of TPACK as dependent variables. Differences found between teachers in the US and Saudi Arabia in terms of TPK, and TPCK. The analysis of variance indicated that teachers' from the US and Saudi Arabia differ in their perceived TPACK when controlled by years of teaching experience, and educational levels. Teachers in both the US and Saudi Arabia had higher rating of their knowledge in content and pedagogy than technology knowledge. Teachers in Saudi Arabia, however, had higher TK, TCK, TPK and TPCK than teachers in the US."

Bueno-Alastuey, M. C., & Esteban, S. G. (2016). Telecollaboration to improve CLIL and TPACK knowledge: Aid or hindrance? *Estudios Sobre Educacion, 31*, 117-138. doi:10.15581/004.31.117-138

Abstract: "This paper reports on a pilot study on the use of telecollaboration to develop TPACK through the joint analysis of CLIL units created by groups of teacher trainees. The instruments to collect the data were a questionnaire, chat transcripts and a voice re-cording. Quantitative and qualitative data were analysed to explore type of TPACK episodes taking place, type of telecollaboration, changes or suggestions for improvement of CLIL units, and perceived advantages and constraints of the telecollaboration. Results suggest students' attention focused on technology while talking about the telecollaboration, but on pedagogy and content when talking about the unit."

Canbolat, N., Erdogan, A., & Yazlik, D. O. (2016). Examining the relationship between thinking styles and technological pedagogical content knowledge of the candidate mathematics teachers. *Journal of Education and Training Studies, 4*(11), 39-48. doi:10.11114/jets.v4i11.1819

Abstract: "The aim of this research is measuring the technological pedagogical content knowledge of the candidate elementary mathematics teachers, identifying the thinking styles of the same candidates and finding out that whether there is a correlation or not. The research

has the characteristics of a basic research to add new information to the scientific literature by examining the correlation. The study was carried out on 288 students from the Elementary Mathematics Teaching Department of the Education Faculty of Selcuk University at 2010-2011 academic years. As data collection tool, "Technological Pedagogical Content Knowledge Scale" was used for technological pedagogical content knowledge and "Sternberg-Wagner Thinking Styles Scale" was used for thinking styles. The SPSS program is used for the data analysis that gathered from the scales. According to the findings obtained at the end of the study; judicial, liberal and hierarchic thinking styles has a meaningful relationship with the sub-dimensions of technological pedagogical content knowledge according to the other thinking styles."

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/view/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."

Gash, H., & McCloughlin, T. (2015). Embedding technology in pedagogy. *Constructivist Foundations, 10*(3), 297-298.

Abstract: "The article discusses comments on professor Karen Brennan's article on strategies related to embedding technology in pedagogy. Topics discussed include use of computer program Scratch-based application by teachers in their classrooms, the Constructivist Learning Environment Survey (CLES) designed by professionals Peter Taylor and Barry Fraser to assess the difference with use of constructivist practices, and information and communications technological pedagogical content knowledge (ICT-TPCK)."

Hallissy, M. (2016). Sharing professional practice – Tutors have their say. *Irish Journal of Technology Enhanced Learning, 2*(1), 17-28. Retrieved from http://journal.ilta.ie/index.php/telji/article/view/12

Abstract: "This paper analyses the theoretical construct of professional practice knowledge; the 'tacit knowledge' that all teachers use when engaging with digital technologies. To reach this end and to gather the views of tutors, a framework developed by Mishra and Koehler –

Technological Pedagogical and Content Framework (TPACK) – was employed. This was used in parallel with the Flanders Interaction Analysis Category (FIAC) Framework to collect semi-structured interview and interaction analysis data. This paper will present a selection of the data gathered and analysed using the TPACK framework.

The research found that faculty need ongoing training opportunities where they can develop their professional practice in order to use Synchronous Computer Mediated Conferencing (SCMC) tools to design interactive sessions that are not teacher dominated. The paper recommends that HE institutions design a signature pedagogy for academic staff and students on how SCMC technology can be used within specific online interactive programmes.

It also found that there is a need for academic staff to capture their own professional practice; to sit back and ask, what is going on here? Having reflected on their practice, tutors should then be encouraged to share their own experiences, or their tacit knowledge, with their peers. Institutions can then begin to capture and reflect on this 'hot action' around the use of SCMC technologies. Ultimately this information may help faculty to design learning experiences that will improve student-learning."

Harvey, D. M., & Caro, R. (2016). Building TPACK in preservice teachers through explicit course design. *TechTrends.* Advance online publication. doi:10.1007/s11528-016-0120-x

Abstract: "The authors of this study utilized the TPACK (Technological, Pedagogical, and Content Knowledge) framework in developing and assessing these skills within an advanced technology integration course for preservice teachers. The research contributes to the use of TPACK as a metric for measuring technology integration of pre-service teachers. Two groups of students enrolled in an undergraduate teaching certification program, at a medium size liberal arts university participated in this study. One group was explicitly taught the TPACK framework while the other group was not. Both groups then completed a pre/post TPACK assessment. Analysis of the pre/post TPACK assessment instrument and fieldwork reflections revealed positive results in explicitly using the TPACK framework in developing these skills in preservice teachers. However, the positive results were not as evident when analyzing the student lesson plans."

Henriksen, D., Mishra, P., & Fisser, P. (2016). Infusing creativity and technology in 21st century education: A systemic view for change. *Educational Technology & Society, 19*(3), 27–37.

Abstract: "In this article, we explore creativity alongside educational technology, as fundamental constructs of 21st century education. Creativity has becoming increasingly important, as one of the most important and noted skills for success in the 21st century. We offer a definition of creativity; and draw upon a systems model of creativity, to suggest creativity emerges and exists within a system, rather than only at the level of individual processes. We suggest that effective infusion of creativity and technology in education must be considered in a three-fold systemic manner: at the levels of teacher education, assessment and educational policy. We provide research and practical implications with broad

recommendations across these three areas, to build discourse around infusion of creative thinking and technology in 21st century educational systems."

Hosseini, Z. (2016). The potential of directed instruction to teach effectively technology usage. *World Journal on Educational Technology, 8*(3), 172-179. doi:10.18844/wjet.v8i3.553.g914

Abstract: "Currently, teacher educational systems tend to develop their teacher's knowledge to effectively integrate technology in teaching. Consequently, numerous studies have attempted to describe strategies, models and approaches to develop teachers' knowledge for teaching with technology. However, most teachers are still following their traditional teaching methods regarding their cultural, individual and situational conditions. While teaching technology in traditional form and separated from pedagogy and content has already shown its failure in many studies, this study suggests an advanced directed instruction teaching model for preparing teachers for teaching with technology. In this study, directed instruction teaching model offers a step-by-step process *to individually guide pre-service teachers how* to infuse the appropriate technology for teaching the selected content. Subsequently, Technological Pedagogical Content Knowledge (TPACK) is selected to define and measure technology integration. The result of this study demonstrated that participating teachers learned technology integration in the new directed setting as well as a constructivist setting. In particular, this study pointed out how the suggested directed instructional teaching model could be easily situated in the traditional setting and helped non-constructivist teacher educators in collaborative or individual learning."

Hosseini, Z. (2016). The usage of constructivism to enhance technology integration knowledge. *Journal of Technology and Education, 10*(2), 155-164. Retrieved from http://en.journals.sid.ir/ViewPaper.aspx?ID=514208

Abstract: "This study was conducted to find the effect of constructivism on technology integration knowledge in student-teachers. Technological Pedagogical Content Knowledge (TPACK) as a framework was selected to study and measure technology integration knowledge. The research sample included 22 student-teachers who were studying in the field of instructional technology in Islamic Azad University. The sample was selected from 174 students using a non-random sample selection method. In order to answer the research questions, a mixed method study was designed and the data were collected through multiple tools including TPACK questionnaire, interview, observation and note documents for the project. The data were analyzed using both quantitative and qualitative methods. The results of t-student test analysis showed a significant increase of TPACK in the participants. In addition, the findings that emerged from the qualitative data clarified in detail how constructivism activities enhanced the components of TPACK. Inter and intra group interactions among students and teacher along with the received feedback were found to be the most important activities to enhance TPACK, while learning by doing was found to be an effective activity that equips student-teachers for integrating technology in their teaching."

Kaitbanditkul, N., & Wongwanich, S. (2015). Effects of teacher education programs on instructional design knowledge with student teachers' self-efficacy perception and TPACK framework knowledge. *Thammasat Review, 18*(1), 163-176. Retrieved from https://www.tci-thaijo.org/index.php/tureview/article/view/47227/39124

Abstract: "This research has two main objectives. Firstly, to develop a causal model of teacher-education programs affecting the instructional design knowledge (and verification of the selected model for fitness for purpose). Secondly, to analyze the nature of direct effect on the mediation of teacher-education programs on instructional design knowledge, as well as the indirect effect mediation of TPACK framework knowledge with self-efficacy perception in the design of teaching programs. The samples consisted of 517 fifth-year student-teachers from universities within the Bangkok catchment area, drawn from a random sampling. The questionnaire for the design of teaching programs became the research instrument and the data were analyzed by Descriptive Statistics, Structural Equation Modeling Analysis (using LISREL Program). The findings included the following: 1) the model was appropriate for empirical data with Chi-Square value distribution ($\chi2$ = 5.44; df = 8; p-value = .709) (which was statistically insignificant). Goo dness-of-Fit Index (GFI) value was .997 and the Adjusted Goodness-of-Fit Index (AGFI) value was .988, indicating that the model was consistent with empirical data; 2) Causal Model of teacher-training programs affecting the design of instructional knowledge is the partial mediating research model. The design of instructional knowledge benefited directly from the experience gained through teacher-training programs (.34) and indirectly through the involvement of self-efficacy perception and TPACK framework knowledge (.54). All values are at .05 statistical significance level."

Kapıcı, H.Ö., Akçay, H., & İnaltekin, T. (2015). The impact of technology based learning on the beliefs and attitudes of pre-service teachers. *International Journal of Humanities and Education, 1*(2), 154-167. Retrieved from http://www.ijhe.org/Published/201510_002_1_002.pdf

Abstract: "The purpose of study is to examine the effectiveness of the computer and internet-supported science lesson in terms of pre-service science teachers' attitudes toward computer and internet-based learning. Participants were forty-seven pre-service science teachers who were enrolled in the Computer class. The computer attitude scale and the attitude scale toward internet-based learning were used as data sources. The instruments were administrated to the pre-service science teachers at the beginning of the semester as pre-tests and again at the end of the semester as post-tests. Data gathered from pre-and post-administration were analyzed for each of the instruments. The results indicate that such learning experiences have positive effects on pre-service science teachers regarding enhancing more positive attitudes toward computer and internet-based learning and teaching."

Karakaya, F., & Avgin, S. S. (2016). Investigation of teacher science discipline self-confidence about their technological pedagogical content knowledge (TPACK). *European Journal of Education Studies, 2*(9), 1-20. doi:10/zenodo.165850

Abstract: "The aim of this study is to determine about the Technological Pedagogical Content Knowledge (TPACK) self confidence level of physics, chemistry, biology and science teachers and to analyze if the level of self–confidence changes according to gender, joining to a technological education before, branch, education level, worked institution and service period. Scanning method is used for the research. Working group of this research consists of 87 teachers from different institutions and branches. For data collection, Technological Pedagogical Content Knowledge Self–Confidence Scale (TPACKSC), which is adapted to Turkish from original scale by Graham, Burgoyne, Cantrell, Smith & Harris (2009) and tested for validity and reliability by Timur & Tasar (2011), is preferred. As a result of the study, it is stated that teachers' TPACK level is very high. On the other hand, it is seen that self-confidence level of teachers joined to research does not have a statically logical ($p > 0.05$) difference according to their sex, worked institution, joining to a technological education before and they have a statistical logical ($p < .05$) difference related with the branch, service period, and education level."

Kiray, S. A. (2016). Development of a TPACK self-efficacy scale for preservice science teachers. *International Journal of Research in Education and Science, 2*(2), 527-541. doi: 10.21890/ijres.64750. Abstract retrieved from http://www.ijres.net/article/viewFile/5000194544/5000171324

Abstract: "Today, it is of great importance that teachers have pedagogical and technological knowledge in addition to content knowledge. For this reason, the present study aims to develop a TPACK self-efficacy scale for preservice science teachers by following the theoretical framework of technological pedagogical and content knowledge (TPACK), as suggested by Koehler and Mishra (2006). The scale consists of seven subscales, which are technology knowledge (TK), pedagogy knowledge (PK), content knowledge (CK), technological pedagogical knowledge (TPK), technological content knowledge (TCK), pedagogical content knowledge (PCK), and technological pedagogical content knowledge (TPCK) with a total of 55 items. A total of 467 preservice science teachers from four different universities in Turkey participated in the study. The Cronbach's alpha reliability coefficient of the scale was calculated as 0.969. Following the modification suggestions, confirmatory factor analyses showed that the model fit the scale adequately. The study found significant differences between the bottom and top groups; this shows the sufficiency of the items' discriminatory powers. As the result of these analyses, it was found out that the scale had the necessary properties required for measuring the TPACK self-efficacy perceptions of preservice science teachers."

Liu, S. H., Tsai, H. C., & Huang, Y. T. (2015). Collaborative professional development of mentor teachers and pre-service teachers in relation to technology integration. *Educational Technology & Society, 18*(3), 161–172.

Abstract: "This study examines the collaborative professional development (CPD) of three pairs of mentor teachers and pre-service teachers in a junior high school. Of particular focus is the integration of technology into instruction, by using technological pedagogical and content knowledge (TPACK) to evaluate professional development. A qualitative research method based

on classroom observations and focus group interviews (FGIs) is adopted. Additionally, data obtained from instructional plans, video-recorded classroom observations and FGIs are analyzed using a constant-comparison analysis method. Analysis results indicate that mentor teachers adjust their instruction methods when they receive the support of pre-service teachers specifically by moving from presenting technological content knowledge (TCK) to constructing various TCK bases. The pre-service teachers constantly apply TCK and technological pedagogical knowledge (TPK) to develop professionally, especially in TPACK-related technology integration concepts. Notably, the CPD program benefits pre-service teachers more than mentor teachers because the former actively seek more opportunities to apply TPACK than the latter, who simply exchange digital instructional materials."

Long, T., Cummins, J., & Waugh, M. (2016). Use of the flipped classroom instructional model in higher education: Instructors' perspectives. *Journal of Computing in Higher Education*. Advance online publication. doi:10.1007/s12528-016-9119-8

Abstract: "The flipped classroom model is an instructional model in which students learn basic subject matter knowledge prior to in-class meetings, then come to the classroom for active learning experiences. Previous research has shown that the flipped classroom model can motivate students towards active learning, can improve their higher-order thinking skills, and can improve their collaborative learning skills. However, most current studies focus on students' experiences with flipped classroom learning. Because so few studies address the instructor's perspective, and instructors' perspectives on technology integration can directly influence their practice of incorporating technology in instruction, this study sought to focus on instructors. This paper is a qualitative case study that reveals instructors' experiences and perspectives on using the flipped classroom model in instruction. Structured interviews were conducted with eight faculty members who either previously had used or planned to use the flipped classroom model. Findings include instructors' perceived definitions of the flipped classroom, how they improved teaching and learning by using the flipped classroom model, their perceived benefits and challenges of the flipped classroom, and perceived approaches of using it in an effective way. The participants also recommended peer assistance among instructors as valuable support to implement the flipped classroom model in instruction successfully."

Lye, S.-Y., Wee, L.-K., Kwek, Y.-C., Abas, S., & Tay, L.-Y. (2014). Design, customization and implementation of energy simulation with 5e model in elementary classroom. *Educational Technology & Society, 17*(3), 121–137.

Abstract: "Science simulations are popular among educators as such simulations afford for multiple visual representation and interactivity. Despite the popularity and abundance on the internet, our literature review suggested little research has been conducted on the use of simulation in elementary school. Thus, an exploratory pilot case study was conducted to address this research gap. In this study, an open source energy simulation was remixed for use in elementary school targeted at the Grade 4 & 5 students as an after-school enrichment program. We proposed 3 stages: design, customization and implementation, to provide useful

insights with the aim to allow other educators to conduct their own remixed simulation lessons. The simulation design principles (e.g., learning outcomes and colour coding) with the corresponding TPACK construct that emerged from the design and customization stages were reported. Such simulation design principles would be useful to interested educators and researchers who wish to adapt and use simulation or teach others how to remix simulation. Data from the multiple sources (e.g., field observations, surveys, design notes and existing simulations) indicated that students enjoyed learning with the remixed energy simulation."

Michalsky, T. & Kramarski, B. (2015). Prompting reflections for integrating self-regulation into teacher technology education. *Teachers College Record, 117*(5), 1-38.

Abstract: "**Background:** Technology represents a major topic in educational research. Nevertheless, a gap in the research remains concerning how teachers can bring technology into the classroom. This study focuses on the technological pedagogical content knowledge (TPCK) framework, which aims to consolidate the multidisciplinary professional knowledge related to technology, pedagogy, and content that teachers need so that they can teach and students can learn effectively using technology tools. **Purpose:** The goal of the present study was to investigate the value of modification reflection prompts ("think ahead") as a complementary reflective framework during the teacher preparatory program, beyond the more traditional judgment reflection prompts ("think back"). In particular, we examined how preservice science teachers may capitalize on learning from modification prompts versus judgment prompts versus both ("think back" and "think ahead"), compared with learning from generic prompts ("stop and think") based on the IMPROVE model oriented to TPCK. We examined these four treatments' effects on preservice teacher' actual design of science lessons and development of their own self-reflection abilities. **Participants:** Participants were 199 first-year preservice science teachers in their preparatory programs at a university in central Israel. **Research Design:** We created a quasi-experimental opportunity for four groups of preservice science teachers to systematically contemplate ready-made TPCK-oriented lesson designs. Each used one of four different reflective methods (the independent variable): modification, judgment, combined modification + judgment, or generic prompts. Then we examined the differential contribution of these treatment methods to the two dependent variables: (1) preservice teachers' skills for designing actual science lessons and (2) their judgment-type and modification-type self-reflection ability regarding the planning, monitoring, and evaluation phases of their lesson-design process. **Data Collection and Analysis:** Data were scored by coding schemes and were analyzed by multivariate analysis of variance and follow-up analyses of variance with repeated measures. **Findings:** Results indicated that preservice teachers who con templated a combination of both judgment and modification reflections in treatment improved more in their lesson-design skills and in their self-reflection ability (of both types at the three phases), compared with preservice teachers who contemplated only a single type of reflective prompt (generic or only judgment or modification). Lasting effects (after a semester without the IMPROVE model, prompts, or TPCK focus) revealed that the combined approach continued to significantly outperform the single approaches. **Recommendations:** The current study reinterprets the instructional-reflective framework of teacher education programs to

include modification reflection too as a means of developing preservice teachers' capacity to integrate technology in their lesson designs. "

Moore-Adams, B. L., Jones, W. M., & Cohen, J. (2016). Learning to teach online: a systematic review of the literature on K-12 teacher preparation for teaching online. *Distance Education. 37*(3), 333-348. doi: 10.1080/01587919.2016.1232158

Abstract: "There is a growing need for qualified online instructors to teach the expanding population of online K-12 students. To meet this need, teachers must be provided learning opportunities to acquire the specific types of knowledge and skills necessary to teach online. In this systematic review of the literature, we utilize the TPACK framework to aggregate the types of knowledge and skills required to teach online and examine both the extent to which these elements are addressed in existing programs and are based on empirical research. Findings suggest that the types of knowledge and skills based on empirical research originate from few studies and that most programs address only a small subset of knowledge and skills, varying greatly without uniformity in content or learning experiences."

Mustafa, M. E. I. (2016). The impact of experiencing 5E learning cycle on developing science teachers' technological pedagogical content knowledge (TPACK). *Universal Journal of Educational Research, 4*(10), 2244-2267. doi:10.13189/ujer.2016.041003

Abstract: "This study investigated the conditions and situations offered by Experiencing Inquiry Model (EIM) for developing science teacher's Technological Pedagogical Content Knowledge (TPACK). Also, the study explored the opportunities offered by EIM strategy in enhancing science teacher's abilities to design technology-based inquiry activities for science learning. Situated Cognitive Theory is used as a theoretical framework for learning, and TPACK is adapted to conceptualized technology integration. 17 science teachers from two schools participated in the study. The study employed a mixed method of quantitative and qualitative evidence. A paired sample t-Test was conducted on the participants' pre- and post-Pathfinder networks. Concurrently, the qualitative evidence was collected from researcher's logbook, participants' written documents, and interviews. The participants' abilities to design technology-based inquiry activity for science learning were examined via Technology Integration Assessment Rubric (TIAR). The analysis of the Pathfinder networks showed that there were significant developments in the participants' knowledge components embodied in TPACK. Nevertheless, the TIAR analysis suggested that the participants' designs lacked connecting curriculum goals with technology, and compatibility with curriculum goals and instruction. The study suggested that science teachers should be given ample time to develop TPACK within their instructional contexts."

Nakashima, R. H. R. & Piconez, S. C. B. (2016). Technological Pedagogical Content Knowledge (TPACK): Modelo explicativo da ação docente. *Revista Eletrônica de Educação, 10*(3), 231-250. doi: http://dx.doi.org/10.14244/198271991605

Abstract: "This article includes reflections derived from exploratory research in databases, international journals on education and technology and book chapters that discuss the inter-relationship of different types of teachers knowledge. The goal was to understand the contributions and challenges of TPACK as an explanatory model of teacher action in decisions about the integration of technology in teaching practices. Among the contributions of the studies were highlighted research and experimentation supported by TPACK; TPACK as conductor of the initial and permanent education of teachers and the TPACK related with other theoretical models. The model TPACK was considered knowledge base for teaching the integration of technologies in educational contexts, from alignment with pedagogical approaches and teaching specific content. However, some challenges were identified by the studies, such as the difficulty of consensus to define each construct of the model; the need to define the types of technologies embraced by TPACK and fragility in the process of measuring TPACK. The expectation of this article is to propose weightings and reflections that can mobilize the continuity and development of the subject investigated."

Shaffer, S. (2016). One high school English teacher on his way to a flipped classroom. *Journal of Adolescent & Adult Literacy, 59*(5), 563-573. doi:10.1002/jaal.473

Abstract: "This article examines changes in approaches to planning, uses of technology, and use of classroom time as an ELA teacher constructed a flipped unit on *The Great Gatsby* by F. Scott Fitzgerald."

Szeto, E., & Cheng, A. Y. N. (2016). Pedagogies across subjects: What are preservice teachers' TPACK patterns of integrating technology in practice? *Journal of Educational Computing Research*. Advance online publication. doi:10.1177/0735633116667370

Abstract: "This case study examines preservice teachers' integration of technology in teaching various subject domains. It aims to gain in-depth understandings of preservice teachers' pedagogical patterns for teaching through the theoretical lens of technological pedagogical and content knowledge. Multiple data sources were collected in a teacher education institution in Hong Kong. The teachers' pedagogical patterns vary depending on their instructional decisions affected by individual preferences, various subject cultures, and individual school settings. The patterns reflected various forms of technological pedagogical and content knowledge development in teaching different subjects. Implications for preparation of preservice teachers' pedagogy, teacher preparation, and development are also discussed."

Tafli, T., & Atici, T. (2016). The opinions of pre-service biology teachers' about the context of teachers' skills in technological pedagogical content knowledge. *European Journal of Education Studies, 2*(9), 21-36. doi:10.5281/zenodo.165861

Abstract: "In recent years, the concept of Technological Pedagogical Content Knowledge has emerged as a result of changes taking place in the process of teaching by the introduction of technological tools and equipment. The idea of this was described by Mishra and Koehler and builds on the core of Shulman's Pedagogical Content Knowledge through the inclusion of

technology. The framework negotiates the relationships between technology, pedagogy and content. Accordingly, the purpose of this study is to describe the opinions of pre-service biology teachers' about the context of teachers' skills in technological pedagogical content knowledge. It is very important that teachers understand how content, pedagogy and technology interrelate with each other and create a new form of knowledge in our 21st century. Qualitative research method was applied in this study. The data were collected via semi-structured interview form from 60 pre-service teachers and analyzed by utilizing the NVivo 9.0 package program employing the content analysis. As a result of this analysis the data were organized by these groups: Technological Knowledge, Content Knowledge, Pedagogical Knowledge, Pedagogical Content Knowledge, Technological Content Knowledge and Technological Pedagogical Knowledge."

Tarling, I., & Ng'Ambi, D. (2016). Teachers pedagogical change framework: A diagnostic tool for changing teachers' uses of emerging technologies. *British Journal of Educational Technology, 47*(3), 554-572. doi:10.1111/bjet.12454

Abstract: "One of the challenges facing education systems in general and the South African education system in particular is how to understand ways that teachers change from nonusers of technologies to becoming transformative teachers with technology. Despite numerous initiatives, not limited to training, workshops and so forth, to bring about sustained and wide-spread teacher change, transmission/delivery-based pedagogies and chalk-and-talk methods continue to dominate. While policy directives and professional development programmes aim to effect change in teachers' practice, they tend to fail to create sustainable change in teachers' practice of using emerging technologies (ETs). This paper reports on a study that sought to understand how teachers change their pedagogy of teaching with ETs. Using a Design-Based Research approach, the paper reports on the teachers' pedagogical change framework (Teaching Change Frame -TCF) as a diagnostic tool for locating and mapping how teachers' change. The TCF maps teachers' existing pedagogies and ET uses, and designs a pathway of a change process to affect the desired change. The TCF was tested and refined using data from 325 teachers drawn from rural, resource-constrained schools, urban, well-resourced schools and from preservice teaching students in a decontextualized environment. Following three iterations it was found that teachers' use of ETs in regulated, restrictive ways correlate with transmission pedagogies, unregulated, dispersed ways correlate with transformative pedagogies. The use of TCF not only located teaching pedagogies but also provide different pathways to ensure sustainable change. Findings emphasize the need for teachers to encourage learners to build/create/construct with ETs and for increased interaction in fostering nonregulated dispersed use of ETs."

Weiss, M. P., Evmenova, A. S., Kennedy, M. J., & Duke, J. M. (2016). Creating content acquisition podcasts (CAPs) for vocabulary: The intersection of content, pedagogy, and technology. *Journal of Special Education Technology.* Advance online publication. doi:10.1177/0162643416673916

Abstract: "Mastering content vocabulary is critical to the success of students with high-incidence disabilities in the general education curriculum. General education classrooms often do not offer the opportunities necessary for these students to master important vocabulary. Teachers often look to technology to help. Several studies have indicated that content acquisition podcasts (CAPs) may have an impact on the vocabulary learning of secondary students with high-incidence disabilities. In this study, 37 in-service teachers enrolled in a master's program in special education were taught to create CAPs for vocabulary terms in a course focused on methods for secondary-level instruction. Teacher-created podcasts were assessed on the presence of Mayer's instructional design principles as well as evidence-based practices for vocabulary instruction. Although teachers were able to include many instructional design principles related to technology in their CAPs, their use of instructional principles and evidence-based practices was inconsistent. Implications are discussed."

Yeh, Y.-F., Hsu, Y.-S., Wu, H.-K., & Chien, S.-P. (2016). Exploring the structure of TPACK with video-embedded and discipline-focused assessments. *Computers & Education*. Advance online publication. doi:10.1016/j.compedu.2016.10.006

Abstract: "The appropriate selection and implementation of technology in instruction is made possible by teachers' Technological Pedagogical Content Knowledge (TPACK). The TPACK that inservice teachers develop is practitioner-based and can be continuously transformed with teaching experiences. In this study, we constructed video-embedded and discipline-focused questionnaires to measure science teachers' TPACK. Item sets were generic across four disciplines and designed to investigate teachers' TPACK at different levels of the cognitive process. Each questionnaire was embedded with three instructional clips in which preservice teachers demonstrated their previously-prepared lessons on selected topics in biology, chemistry, earth science, and physics. Through exploratory factor analysis, four factors (i.e., *evaluation*, *evaluation/synthesis*, *application/analysis*, and *knowledge/comprehension*) emerged from the data. The presumed hierarchical interrelationships among these cognitive processes were investigated through a path analysis. The findings indicated that teachers' TPACK at the *knowledge/comprehension* level made significant loadings to TPACK at higher levels, but this was not the case for *application/analysis*. The disconnect for *application/analysis* within the simple-to-complex cognitive process hierarchy suggests that it should be viewed as different from the other three constructs that incorporate more instructional reasoning. The designs for the questionnaire items and embedded instructional clips that were used to elicit practical knowledge and prompt teachers to respond are presented herein."

Zhou, G., Xu, J., & Martinovic, D. (2016). Developing pre-service teachers' capacity in teaching science with technology through microteaching lesson study approach. *Eurasia Journal of Mathematics, Science and Technology Education, 13*(1), 85-103. doi:10.12973/eurasia.2017.00605a

Abstract: "In order to effectively use technology in teaching, teacher candidates need to develop technology related pedagogical content knowledge through being engaged in a process

of discussion, modeling, practice, and reflection. Based on the examination of teacher candidates' lesson plan assignments, observations of their microteaching performance, and their reflective journals, our study found that Microteaching Lesson Study in methods courses provides teacher candidates a great opportunity to learn how to teach with technology. Its significance lies in the opportunity of practice, collaborative refection, instant feedback, and learning from each other."

Chapters

Dobozy, E., & Campbell, C. (2016). The complementary nature of learning design and TPACK. In J. Dalziel (Ed.), *Learning design: conceptualizing a framework for teaching and learning online* (pp. 96-116). New York: Routledge.

Abstract: "This chapter explores the concepts of Learning Design (LD) and Technological Pedagogical and Content Knowledge (TPACK) in an attempt to contribute greater clarity about their epistemological and conceptual similarities and differences. Drawing on LD and TPACK research, we present a conceptual framework that helps to analyze LD and TPACK philosophy and application, specifically targeting designers of teaching and learning activities, educational researchers and administrators. A key goal of this chapter is to illustrate that, although the concepts operate in different paradigms and are designed for a different target audience, they are complementary. The LD construct based on the Learning Design Framework (LD-F) introduced in the Larnaca Declaration is focusing on pedagogical design and is underpinned by the ideas of interdisciplinary, general applicability and flexibility in epistemology and ontology, whereas TPACK is specifically targeted to the education of schoolteachers, providing a framework that illustrates the relationship between the three components of TPACK. Understanding their complementary nature will assist designers of learning and teaching to make better-informed decisions about technology-enhanced learning and teaching provisions."

Hennessey, S., Olofson, M. W., Swallow, M. J. C., & Downes, J. (2016). Evolving pedagogy and practice: The 1:1 mathematics classroom through a TPACK lens. In Information Resources Management Association (Ed.), *Educational leadership and administration: Concepts, methodologies, tools, and applications* (Vol. 4, pp. 2005-2033). Hershey, PA: IGI Global. doi:10.4018/978-1-5225-1624-8.ch092

Abstract: "This chapter presents qualitative research describing the pedagogy of middle grades mathematics teachers who participated in professional development in conjunction with classroom integration of 1:1 technology. Through a multiple-case study design, the expression and development of teacher pedagogy that occurred as teachers created self-designed action research projects grounded in pedagogical goals is illustrated. The use of action research in these four case studies as a vehicle for professional growth and as a reflective evaluation tool is discussed. When viewed through the lens of the TPACK framework (Mishra & Koehler, 2006), data suggest a technology-mediated shift in pedagogy in the area of differentiation in instruction and assessment in mathematics classrooms. Future implications regarding

technology integration, professional development programs, and the use of the TPACK as a descriptive tool are considered."

Jang, J. E., & Lei, J. (2016). The impact of video self-analysis on the development of preservice teachers technological pedagogical content knowledge (TPACK). In Information Resources Management Association (Ed.), *Educational leadership and administration: Concepts, methodologies, tools, and applications* (Vol. 4, pp. 1103-1119). Hershey, PA: IGI Global. doi:10.4018/978-1-5225-1624-8.ch052

Abstract: "Teachers often teach on their own in their individual classrooms and thus have to mostly rely on themselves to reflect on their teaching practices and make improvements. This study explores the potential of using a video self-analysis component in an undergraduate technology integration course to help preservice teachers effectively integrate technology into instruction. Specifically, this study explores the impact of video self-analysis on developing preservice teachers Technological Pedagogical Content Knowledge (TPACK). Results reveal video self-analysis was beneficial in helping preservice teachers facilitate their TPACK development. However, participants TPACK development varied within the six TPACK knowledge domains."

Papazoi, E., Papanikolaou, K. A., Gouli, E., & Grigoriadou, M. (2016). How personalization may benefit the learning design process with LAMS. In P. Anastasiades & N. Zaranis (Eds.), *Research on e-learning and ICT in education: Technological, pedagogical and instructional perspectives* (pp. 119-130). Switzerland: Springer International. Abstract retrieved from http://link.springer.com/chapter/10.1007/978-3-319-34127-9_9

Abstract: "This study combines research in the area of adaptive learning environments with the LMS area by analyzing the design process of personalized courses in Learning Activity Management System (LAMS). Postgraduate students used LAMS to design and personalize courses. The way personalization is introduced in the courses is analyzed based on the *source of adaptation*, the *adaptation method*, and the *adaptability* opportunities. The added value of this process for the authors–designers is explored by analyzing students' artifacts based on criteria that match the various knowledge types proposed by the Technological Pedagogical Content Knowledge (TPACK) framework. Moreover, the appropriateness and adequacy of the available tools by which adaptation can be implemented in LAMS are evaluated. Results provide evidence about the potential of designing personalized lessons in cultivating various types of knowledge such as pedagogical and technological but also their combination, the technological pedagogical knowledge. This work also provided evidence about the potential of LAMS in supporting adaptivity and proposals about possible extensions of the environment."

Psillos, D. (2016). Development of a blended learning program and its pilot implementation for professional development of science teachers. In P. Anastasiades & N. Zaranis (Eds.), *Research on e-learning and ICT in education: Technological, pedagogical and instructional perspectives* (pp. 189-200). Switzerland: Springer International. Abstract retrieved from http://link.springer.com/chapter/10.1007/978-3-319-34127-9_14

Abstract: "Teachers' professional development (TPD) in the pedagogical and instructional use of ICT I Greece, known as B-Level, was implemented on a pilot basis with a blended learning program called Meikto which included a combination of face-to-face and distance sessions and activities. The distance part included synchronous sessions via Blackboard and non-synchronous activities using Moodle. This paper analyzes the basic design principles, structure, and content of the blended learning program Meikto for compulsory education secondary science teachers and presents selected results concerning the views of the trainees who attended its pilot implementation in two training centers. Trainee responses to a questionnaire after the program show considerable interest, acceptance, and positive response regarding the distant activities and their combination as well as the affordances regarding the development of their TPACK."

Psillos, D., & Paraskevas, A. (2016). Teachers' views of technological pedagogical content knowledge: The case of compulsory education science in-service teachers. In P. Anastasiades & N. Zaranis (Eds.), *Research on e-learning and ICT in education: Technological, pedagogical and instructional perspectives* (pp. 231-242). Switzerland: Springer International. Abstract retrieved from http://link.springer.com/chapter/10.1007/978-3-319-34127-9_17

Abstract: "This paper investigates the views of compulsory education science (PE04) teachers regarding the B-Level professional development programme (PDP) and what it offers in terms of Technological Pedagogical Content Knowledge, and their readiness to apply it in the classroom. The views of 59 teachers from 7 in-service teacher training centres were surveyed using specially developed Likert-type questionnaires, while semi-structured interviews with a sample group of 8 teachers provided supplementary in-depth data. The teachers' views were for the most part positive for aspects of the Technological Pedagogical Content Knowledge (TPACK) model that were provided by the professional development programme, while 17–30 % reported moderate satisfaction. Their views of the skills they acquired relating to the incorporation of ICT in teaching activities were roughly similar, with certain differences. Given the limitations of the research, these results indicate, in our view, that the structure and implementation of the B-Level programme for compulsory education science teachers promote the development of teachers' knowledge and skills and that there is still room for improvement."

Wright, V. H., & Davis, A. (2016). Integrating technology in nurse education: Tools for professional development, teaching, and clinical experiences. In Information Resources Management Association (Ed.), *Educational leadership and administration: Concepts, methodologies, tools, and applications* (Vol. 4, pp. 692-707) Hershey, PA: IGI Global. doi:10.4018/978-1-5225-1624-8.ch034

Abstract: "This chapter explores how nurse educators can better integrate technology in their professional development, teaching and learning, and clinical experiences in a purposeful and meaningful manner. The authors explore how and why nurse educators should be mindful of the intersection of technology, pedagogy, and content knowledge (TPACK) in developing

teaching and learning plans. The authors contend that nurse educators should consider and employ TPACK on a routine basis, so that using technology purposefully becomes the traditional approach in one's teaching. Examples of how technology can become more meaningful in three areas that nurse educators routinely work within are: professional development, teaching, and clinical experiences."

Yarnell, L., & Fusco, J. (2016). A framework for supporting in-service teachers to use domain-specific technologies for instruction. In Information Resources Management Association (Ed.), *Educational leadership and administration: Concepts, methodologies, tools, and applications* (Vol. 4, pp. 324-356) Hershey, PA: IGI Global. doi:10.4018/978-1-5225-1624-8.ch018

Abstract: "Domain-specific technologies, which are used for analysis, representation, and production in real-world contexts, differ from basic technologies, such as word processing software and Internet search tools. They cannot be used effectively without adequate command of fundamental domain-specific content knowledge. They can be used to deepen students' understanding of content, but these technologies bring distinct classroom-integration challenges. This chapter presents a framework for supporting in-service teachers to integrate these technologies. The research team derived this framework from data collected during an extended TPACK-style (Technological Pedagogical Content Knowledge) workshop that engaged 13 life science community college instructors in integrating bioinformatics technologies into courses. This chapter presents a case study about the challenges community college teachers faced in implementing these tools—and the strategies they used to address them. Challenges included activity translation, problem definition, implementation, and assessment."

Book

Niess, M. L. (2017). *Technological pedagogical content knowledge (TPACK) framework for K-12 teacher preparation: Emerging research and opportunities.* Hershey, PA: IGI Global. doi: 10.4018/978-1-5225-1621-7

Abstract: "Educational technologies are vastly becoming a common-place entity in classrooms as they provide more options and support for teachers and students. However, many teachers are finding these technologies difficult to use as they were never fully trained on how to utilize it or have received little instruction on how to effectively apply it in the classroom.

Technological Pedagogical Content Knowledge (TPACK) Framework for K-12 Teacher Preparation: Emerging Research and Opportunities features contemporary insights into a multi-year research effort that concluded with the design and development of an online TPACK learning trajectory. Highlighting how this development impacts the design of professional development coursework for educators, this publication is a critical work for in-service teachers, researchers, and online course developers."

3. Recent TPACK-Related Dissertations and Theses

Barger, A. (2016). *Teachers' perceptions of contextual influences on instructional decision-making regarding the use of educational technology in secondary social studies* (Doctoral dissertation). Retrieved from http://publish.wm.edu/cgi/viewcontent.cgi?article=1054&context=etd

Abstract: "This research study was designed to explore the potential connections between teachers' contexts and their instruction. Specifically, I explored how teachers perceived contextual influences on technology-related instructional decisions in secondary social studies classrooms. I defined teachers' contexts as comprised of curricular, interpersonal, and organizational or institutional factors existing on three organizational layers, described as macro, meso, and micro. Through a multiple case study design and interpretivist perspective, I studied three cases of individual social studies teachers working in the shared environment of one high school. I viewed the teachers as curricular-instructional gatekeepers (Thornton, 2005) working in a contested classroom space (Craig, 2009). Through this lens, data generation took place at the classroom level and included interviews, observations, and artifact analysis. Data analysis was structured by the Information Ecologies framework (Nardi & O'Day, 1999) to provide a consistent approach for analysis of teachers' decision-making within and across cases. Study findings revealed multiple contextual influences that varied in significance across cases depending on the educational orientation of each teacher. Teachers' contexts and individual educational orientations aligned to varying degrees and resulted in unique curricular-instructional gatekeeping in each case. Accordingly, instructional decision-making regarding the use of educational technology was inconsistent across cases despite the shared environment in which the three teachers worked."

Campbell, R. C. (2016). *Primary teachers' perspectives on iPad integration: Barriers, challenges, and successes* (Doctoral dissertation). Retrieved from http://scholarworks.waldenu.edu/dissertations/3024/

Abstract: "Despite the rapid expansion of mobile technologies in K-12 schools, recent research has shown that many teachers are ill prepared to take advantage of these new tools. This study was designed to address the problem of lack of effective iPad integration in primary classrooms at an international school in South Korea. The purpose of this case study was to examine primary teachers' perceptions of the implementation of an iPad initiative begun in 2012. Framed by Koehler and Mishra's technological pedagogical content knowledge model (TPACK), the study was guided by research questions that involved teachers' perceptions of the barriers, challenges, and successes regarding iPad implementation in the primary classroom. A purposeful sample of 5 K-2 teachers who use iPads in the classroom was chosen. The case study design entailed semi-structured interviews, classroom observations of each participant, and examination of teachers' lesson plans. Data were coded and analyzed using inductive analysis based on components of a conceptual logic model. Credibility and trustworthiness were ensured through member checking and triangulation of data. Results showed lack of experience, collegial support, and iPad-specific training as barriers and future preparation for

teachers as a challenge. Successes were demonstrated through formative assessments and digital portfolios. The resulting project was a comprehensive professional development plan to provide primary teachers with the knowledge and skills to implement technology in the classroom and ongoing support to develop a professional technology learning network. In terms of broad social change, this research and project might provide insight to better prepare educators to make the best use of integrated learning technologies for efficient and effective teaching and learning in classrooms."

Huffman, S. N. (2016). *Technology and preservice teacher education: A mixed-methods study of technology integration by arts and sciences faculty into secondary education content courses* (Doctoral dissertation). Available from ProQuest Dissertations and Theses Global database. (UMI No. 10162717)

Abstract: "In spite of initiatives design to address the integration of technology into teaching and the billions of dollars spent to fund these initiatives, there is still a gap in the research on the extent to which teacher education programs prepare preservice teachers to integrate technology into teaching (Kleiner et al, 2007; Abbitt & Klett, 2007). While Schools, Colleges, and Departments of Education are required to address technology integration for accreditation, how and when technology is address is left to the discretion of each institution. Because pre-service secondary education students typically take the majority of their courses outside of the College of Education, teacher preparation programs have a stake in technology use among Arts and Sciences faculty.

This mixed-methods study used the Higher Education-Technological, Pedagogical, and Content Knowledge (HE-TPACK) survey to examine perceptions of Arts and Sciences faculty who teach content courses for pre-service secondary education majors at a southeastern research university. The HE-TPACK addressed eight domains of technology training (TT), pedagogy knowledge (PK), technology knowledge (TK), content knowledge (CK), pedagogy content knowledge (PCK), technological pedagogical knowledge (TPK), technological content Knowledge (TCK), and technological, pedagogical, and content knowledge (TPACK). Interviews were conducted to create a more in depth picture of technology use in the teaching practices of Arts and Sciences faculty. Looking through a theoretical lens of transformative learning, interview participants were asked about their experiences with technology, opportunities they provide for their students to integrate technology through assignments, and any transformative experiences that caused them to view technology in a different way.

Based on the findings of this study, many faculty overestimate their HE-TPACK abilities. While many faculty still view technology as a production or communication skill, there were specific examples of transformative experiences that changed the way certain individuals address technology for student learning. This agrees with previous research that modeling technology integration helps teachers feel more comfortable and better prepared to teach with technology (Whipp, Schewiezer, & Dooley, 2001; Kayne-Chaplock, Whipp, & Schwiezer 2004). Because of their own transformative experiences, these faculty members were able to facilitate a transformative learning experience for their students (Jang & Chen, 2010)."

Jones, J. (2015). *Investigating the role and impact of learning designs within University teachers' design work* (Doctoral dissertation). Retrieved from http://ro.uow.edu.au/cgi/viewcontent.cgi?article=5722&context=theses

Abstract: "Universities are increasingly concerned with providing a high-quality student experience; good teaching is a key component. The area of Learning Design aims to provide effective, high-quality models to support university teachers in achieving this goal. Research to date on Learning Designs has focused on the development of tools, technical standards, potential needs, and attitudes towards use, with few studies investigating university teachers' actual use of Learning Designs. Little is known, therefore, about how teachers apply Learning Designs to real design problems.

The purpose of this study was to explore how university teachers use Learning Designs as part of their routine design work with real students in naturalistic design contexts throughout a full cycle of planning, implementation, and review. Through rich case accounts and analysis of university teachers' work, this study provides new insights into the nature of design work supported by Learning Designs. This research is important because building and developing Learning Designs requires an understanding of their effective integration into the design process.

A multiple case study approach was used to provide a holistic, rich description of eight university teachers' design work and Learning Designs use for a semester-long undergraduate unit. The study was underpinned by a theoretical framework that conceptualises teachers' design work using concepts from design thinking and the Technological Pedagogical Content Knowledge framework to conceptualise teacher knowledge. Data was collected before, during, and after the semester using interviews, documents, stimulated recall, and researcher observations to provide a detailed picture of university teachers' work with Learning Designs. Each of the cases was analysed in multiple, iterative phases, resulting in eight rich case descriptions that reveal the key phases of design work and Learning Designs use.

Additionally, cross-case analyses were conducted to identify key characteristics of design thinking and practice and Learning Designs use across each of the design phases; the relationships between Learning Designs use and key case attributes; and impacts on university teachers' design work in the areas of technology, pedagogy, and content. The findings show that the design processes using Learning Designs were student focused, multi-phased, iterative, and ongoing throughout implementation. Participants used Learning Designs in four key ways: to benchmark their pedagogical practice; model and stimulate pedagogical ideas; guide design steps; and document and communicate design plans. Learning Designs acted variously as a framework for thinking and making design thinking visible, particularly for those who created design artefacts using Learning Design ideas and conceptualisations. Learning Design use was also reported to result in a greater awareness of links between the areas of pedagogy, content and technology providing a pattern of evidence supporting pedagogical content

knowledge development for designers of new units and technological pedagogical content knowledge development for participants making changes to previously run units.

The results of this investigation provide new knowledge about university teachers' design work using Learning Designs, and their impacts before, during, and after teaching. The outcomes of this research provide evidence that can be used by university administrators, educational designers, university teachers, and Learning Designs tool developers. The complex and ongoing nature of participants' design work suggests that university teachers need tools to support design thinking throughout all stages of design work. This includes tools that will allow flexibility and openness for ongoing design work. The findings also point to a deeper role for Learning Designs in the support and development of university teachers' design thinking and knowledge integration than has previously been shown."

Kennah, M. (2016). *The use of ICT in the teaching and learning process in secondary schools: A case study of two Cameroonian schools* (Master's thesis). Retrieved from http://urn.fi/URN:NBN:fi:jyu-201611204685

Abstract: "This study examines the use of ICT by teachers Cameroonian secondary schools. This study explores the pedagogical use of ICT in the teaching and the learning process, the impact of its use and the role school principals and the community plays in enhancing ICT in the pedagogy. This is a qualitative case study of two public secondary schools in the South West Region of Cameroon consisting of interviews and observations. A total of 24 participants comprising of 20 teachers, two school principals and two parents responded to semi-structured interview questions. Also, observational study was also carried out to examine the various pedagogical practices of ICT in both schools. All the interview data were all transcribed and interpreted using the participants' quotes as examples and evidence of the findings. Pictures were used to analyse observational data whereby moments related to the pedagogic use of ICT in the classroom and other areas in the schools under study were captured and described to strengthen the findings. The TPACK model was used to examine the teacher's knowledge in the pedagogic use of ICT Findings in this study indicated that pedagogic use of ICT is still in its preliminary stages as 16 out of the 20 teachers were passively using ICT in their classroom and an additional two teachers were non-users of ICT in their pedagogic activities.Also, there were no significant changes in the teachers' position as a result of the pedagogic use of ICT in the classrooms. 2 out of the 18 teachers who considered themselves as active pedagogic users of ICT were still using the traditional instructional method of teaching even though ICT tools were present in the classrooms. Inadequate ICT training for teachers in their subject area acted as a major challenge for teachers from both schools to integrate ICT in their subject areas. Therefore ICT was still used as an add-on rather than an integrated tool in the teaching and learning process. The majority of the teachers acknowledge positive changes ICT had left in the teaching and learning process. Also, findings from this study reveal that the school principals and parents had little influence over the use of ICT in the pedagogy. It is evident from this study that for

teachers to successfully integrate ICT in their classrooms, the teacher pre-service and in-service courses have to technologically drive to ensure effective use of ICT in the pedagogy."

Martin, B. (2016). *Technology in teacher preparation* (Doctoral dissertation). Retrieved from http://ir.library.illinoisstate.edu/cgi/viewcontent.cgi?article=1584&context=etd

Abstract: "Due to the importance of technology to student learning, technology has become a vital part of teacher education programs across the country. In order to fully understand technology integration in teacher education, it is important to examine faculty perceptions of technology integration as well as current practices. This study examined faculty attitudes toward technology integration in one Midwestern university and how this faculty infused technology into their education courses in an effort to train teacher candidates to be successful digital educators."

Martin, J. G. (2016). *Exploring college instructors' integration of technology into their curriculum* (Doctoral dissertation). Retrieved from http://scholarworks.waldenu.edu/dissertations/2846/

Abstract: "Technology integration in the curriculum remains a challenge at different levels in the education system. In one Caribbean 4-year college, faculty are expected to prepare preservice teachers to integrate technology in classroom instruction. When preservice teachers are not prepared for technology integration, interventions are necessary to address this challenge of technology integration. The purpose of this qualitative bounded intrinsic case study was to gain an understanding of the process of technology integration by instructors at the research site. Davies' theory for understanding technological literacy and the technological, pedagogical, and content knowledge model conceptually framed this study. A purposeful sample of 13 instructors who integrated technology in their curricula and volunteered to participate were observed, interviewed, and provided documentation to explore how they integrated technology in their courses. Data were coded typologically using a priori codes and inductively to identify major themes regarding instructors' challenges and perceptions of technology integration. Instructors were consistent in their integration of technology, increased technology use when they held a positive view of technology, and did not use sufficient web-based tools. They expressed a need for additional technology integration training, because there is an absence of training opportunities offered in the area of technology integration. Based on these findings, a 3-day technology integration workshop was created for the instructors. These endeavors may contribute to positive social change by empowering instructors to adopt pedagogy that can transform the college classroom environment and can support instructors' teaching and learning, thus, preparing preservice teachers to embrace technology in their classrooms."

Martínez Buendía, J. (2016). *La educación para los medios integración del e-book enriquecido en educación primaria* (Doctoral dissertation). Retrieved from https://digitum.um.es/xmlui/handle/10201/51503

Abstract: "Media Education: Integration of Enriched e-book in Primary Education" has as main objective to incorporate the enriched e-book (e-book EC) in an integrative model of Media Education in sixth year of Primary Education, to improve understanding of information and the development of a critical attitude. The specific objectives are: designing, creating and incorporating didactic materials from enriched e-book following TPACK model; identifying the usefulness of enriched e-book in information processing and digital competence and, finally, assessing whether the enriched e-book improves the informative production in students. The methodological design used is a quasi-experimental pretest-posttest model combining the TPACK model to implement didactic units and activities about Media Education, through the educational use of the e-book EC resource. 53 students have participate from 11 to 12 years old, 11 teachers and 28 families from a public school. The instrument has been the questionnaire to collect information by Likert type with five intervals for 78 items numerically from 0 to 4 distributed in 14 dimensions through which we wanted to collect the assessment of learning level of the three main dimension: level of Media Literacy, level of collaborative learning and the assessment of the digital tool e-book EC. The main conclusions: 1. It has been able to design, to create and to incorporate the e-book EC in an integrative model of Media Education in Primary Education. 2. The e-book EC facilitates collaborative learning based on the creation of knowledge through the interaction and inter-individual, by managing digital resources focused on improving Media Education, which has facilitated the improvement in the autonomous and thoughtful development of students. 3. It is significant starting from low levels, the positive differential average pretest-posttest, of each of the three dimensions covering all its dimensions: Media Literacy 48.43%, 48.56% collaborative learning and evaluation of e-book EC 67.66%, because they show ourselves the absurdity not to develop this disciplinary field as soon as possible. 4. Among the outstanding limitations to solve, teacher training in design, with the possible risk of encouraging the use of digital instruments, a type of digital/ artificial socialization not without risks on the Net. 5. The results confirm that the e-book EC can provide to the educational community with a valuable instrument for the implementation of didactic units as a resource in the development of activities, because of collaborative learning and teaching as a guide provide significant achievements towards an optimal training in Media Education and development of Digital Literacy avoiding the mere instrumental use of ICT, for improving the understanding of information and the development of a critical attitude, making understandable its positive assessment because of being motivating and interesting by teachers and students' families. 6. Families value as uncomplicated ebook EC tool and students had facilities to use digital devices at home."

Mosia, M. S. (2016). *Improving teachers' technological pedagogical content knowledge for teaching Euclidean geometry using integrated information communication technologies software* (Doctoral dissertation). Retrieved from http://scholar.ufs.ac.za:8080/xmlui/handle/11660/4772

Abstract: "The study aimed at formulating a strategy to improve teachers' technological pedagogical content knowledge (TPACK) for teaching Euclidean geometry with the aid of integrated information and communication technology (ICT) software. TPACK refers to the interaction of three knowledge domains, which are, technology, pedagogy and content

knowledge. The three knowledge domains further intersect to form subsets, which are, technological content knowledge; technological pedagogical knowledge; and pedagogical content knowledge. The three knowledge domains, together with the subsets, were used to define knowledge needed for teaching with the aid of technology. Furthermore, in the context of this study, integrated ICT software tools that were employed in teaching Euclidean geometry as teaching aids were Geometer's Sketchpad, GeoGebra and HeyMath!. The study pursued the challenges that teachers face when they use ICT software as a teaching aid; these challenges included the following: Some teachers experience difficulties keeping up with rapidly advancing software knowledge; and the majority of teachers lack sufficient knowledge and skills to explore the potential of ICT software fully. In addition, part of the problem is that teachers found Euclidean geometry too abstract and difficult to teach. Thus, the study was geared to formulating a strategy to respond to these challenges. However, the challenge is that the knowledge needed for teaching is contextually bound and complex. Thus, the study adopted bricolage as a theoretical lens for the study, mainly due to its critical commitment to making meaning of complex objects of study in their contexts. In this study, bricolage enabled me to consider a theoretical stance from the eight historical moments of qualitative research. Through the multiplicity of theoretical lenses provided by bricolage I was able to unravel the multi-layered challenges and formulate a multi-layered strategy. The multi-layered strategy was made possible by people who came together, with diverse back stories, knowledge and skills. In this study mathematics teachers who are faced with the day-to-day challenges of teaching Euclidean geometry with the aid of ICT software embarked on research to solve their own challenges. Driven by its epistemological stance on knowledge production, participatory action research created a platform for teachers, academics, and a computer programmer to engage in knowledge production activities with equality and tolerance of contrasting views. Various data generation tools were employed, ranging from audio and video recordings, learners' scripts and data from their test scores. In order to deepen the meaning of spoken and written text, the study employed Van Dijk's critical discourse analysis at three levels, namely, text, discursive practices and social structures. Furthermore, learners' test scores were analysed using statistical techniques, such as boxplot, analysis of variance and statistical modelling. The study analysed the challenges experienced by teachers who teach Euclidean geometry with the aid of integrated ICT software. This was done for the purpose of proposing possible solutions and strategies that can be developed, adopted and adapted to address the challenges teachers experienced effectively. In addition, for the purpose of sustainability of the strategy formulated to improve teachers' TPACK during and beyond the duration of the study, the conditions conducive for the strategy were investigated. The study analysed threats and risks that were embedded or inherited in the setting, to prevent them from impeding the successful implementation of the strategy. The study is transformative in nature, which created the opportunity to operationalise and evaluate the success of the strategy prior to it being considered for recommendation. Finally, some of the major findings were that teachers work in silos; and that they do not prepare sufficiently when they use ICT software as a teaching aid."

Reichert, M. C. (2016). *iPadagogy: An examination of teaching practices in a 1:1 initiative* (Doctoral dissertation). Available from ProQuest Dissertations and Theses Global database. (UMI No. 10156580)

Abstract: "The literature indicates that when mobile devices are implemented in conjunction with content and sound pedagogical strategies, they can support flexibility and student choice, personalized and differentiated instruction, twenty-first century skills, and improved student outcomes. Research has yet to explore iPad integration given unlimited one-to-one access. The purpose of this study is to describe the pedagogical practices of teachers in a one-to-one iPad initiative in a private school for boys in the Mid-Atlantic region. Specifically, three questions are guiding this work: (1) To what degree are iPads integrated into the teaching and learning processes at Saint Edmond's Academy? (2) How did teachers integrate apps into their instruction, given long-term and unlimited access to iPads?, and (3) What are teachers' beliefs with regard to the benefits and drawbacks of using mobile technology in the classroom?

The study investigates how nine teachers in grades six through eight integrate the technology with their content and pedagogy. Each teacher participated in two rounds of data collection. Data were collected through written lesson plans, classroom observations and teacher interviews. Each piece of data collected assessed the teacher's Technological Pedagogical Content Knowledge (TPACK). Lesson plans submitted by the nine teachers were developed using the TPACK lesson plan template. Rubrics based on this framework were used to score lesson plans, classroom observations, and interviews.

Findings indicate that teachers in the one-to-one iPad Initiative understand how to plan for lessons that incorporate technology, content and pedagogy. The study also describes how teachers integrate more than eighteen different apps with the content and pedagogy of their lessons, develop students' 21st century skills, and use apps to support student flexibility and choice in a lesson. This study also found that teachers believe integrating the iPads enables them to create lessons that provide flexibility and choice, to give students instant access to information, and to allow teachers to take on a different role in the lesson.

This study provides valuable input that will serve as a resource when drawing further guidelines for continuing, improving or expanding iPad mobile learning initiatives."

4. Recent TPACK Presentations

Baran, E. (2013, September). *Mobile-TPACK: Developing preservice teachers' knowledge of effective mobile apps integration.* Paper presented at the 2013 European Educational Research Association, Istanbul, Turkey. Abstract retrieved from http://www.eera-ecer.de/ecer-programmes/conference/8/contribution/21352/

Abstract: "Europe needs to equip its young population with digital competence to gain and maintain its competitive advantage in the global economy. This need, as recognized by the European Commission, clearly requires a concerned research effort in preparing future teachers with necessary skills to integrate emerging ICTs into learning and teaching settings. This research aims to respond to the need for developing technological pedagogical content knowledge (TPACK) informed curriculum materials and research assessment instruments that

will be use by the teacher educators to develop and assess preservice teachers' knowledge of "effective mobile application integration"-defined as mobile-TPACK in this research. "

Batiibwe, M. S. K., & Bakkabulindi, F. E. K. (2016, September). *Technological pedagogical content knowledge (TPACK) as a theory on factors of the use of ICT in pedagogy: A review of literature.* Paper presented at the 2016 South Africa International Conference on Education, Pretoria, South Africa. Abstract retrieved from http://aa-rf.org/wp-content/uploads/2016/09/SAICEd2016-Proceedings.pdf#page=239

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.

Brill, A. S., Elliott, C. H., Listman, J. B., Milne, C. E., & Kapila, V. (2016, June). *Middle school teachers' evolution of TPACK understanding through professional development.* Paper presented at ASEE's 123rd Annual Conference & Exposition, New Orleans, LA. Retrieved from https://peer.asee.org/25720.pdf

Abstract: "In recent years, educational technologies have become an essential tool used to engage and improve student learning of science, technology, engineering, and math (STEM) content. The increasing use of technology in education to promote effective pedagogy of STEM content has led to the development of the conceptual framework of "technological, pedagogical, and content knowledge", also known as TPACK.[1] This framework emphasizes teachers' use of educational technologies to improve student understanding of content that imposes pedagogical challenges. The TPACK framework is derived from the interactions between three knowledge domains: technology-, pedagogy-, and content-knowledge. In the context of TPACK, technology encompasses technological products and the knowledge, skills, tools, and processes needed to design, build, and operate these products.[2,3] Pedagogy refers to principles and techniques of conducting and assessing effective teaching and learning. Finally, content refers to fundamental concepts, theoretical foundations, and knowledge connections and arrangements useful in classroom environment.[4] An *intentional* application of

the TPACK framework can facilitate effective pedagogy through technology integration by making use of the interactions among the three underlying knowledge domains. Thus, for teachers to make effective use of this framework, they require the knowledge of the disciplinary content, as well as an understanding of the educational technology and its practical applications in education."

Deere, R., Borukhovich, Y., & Wright, K. (2016, November). *Pedagogy, technology and content knowledge; How the three interrelate to provide positive learning experiences*. Paper to be presented at the 2016 Kentucky Convergence Conference, Bowling Green, KY. Abstract retrieved from http://digitalcommons.wku.edu/kcc/2016_Conference/Day_2/6/

Abstract: "This presentation will focus on the connection between pedagogy, technology and content knowledge. The presenters will show how each area (pedagogy, technology and content knowledge) are linked to the other to provide best practices through the development of e-learning modules such as e-books and mobile apps. The presenters will provide a demonstration of an e-book, mobile app and the accessibility features the eTextlink platform provides for the content. Also, a demonstration of how these teaching and learning strategies are incorporated into a traditional and online class will follow. Educational opportunities are enhanced through greater accessibility via online curricula and various e-Learning formats. While an instructor can teach using proper pedagogy, technology can be used to make learning accessible for all. It takes a collaboration of both worlds to make the learning experience truly great. By leveraging the right technology an instructor can make sure the content can be accessed by everyone who needs and wants it."

Ruiz Nakashima, R. H., & Bertholo Piconez, S. C. (2016, October). *Dialogia do conhecimento pedagógico dos recursos tecnológicos e demais saberes docentes* [*Discussion of technological pedagogical knowledge resources and other teacher knowledge*]. Paper to be presented at the 5th annual Congresso Brasiliero de Informatica na Educacao (CBIE – Brazilian Congress of Educational Informatics), Uberlandia, MG, Brazil. Retrieved from http://www.br-ie.org/pub/index.php/wie/article/download/6871/4749.

Abstract: "This article presents reflections on the use of Digital Information and Communication Technology from the theoretical perspective substantiated by Technological Pedagogical Content Knowledge (TPACK) in a course on Higher Education in blended learning mode. The data collected and analyzed confirm the existence of a pedagogical knowledge of technological resources that [is] known and articulated to other knowledge, recognize educational intentionality to new ways of learning and teaching, supported by technologies."

5. Recent TPACK-related Blog Entries

Chuter, A. (2016, August 24). *Why learn to code on a mobile device?* [Web log post]. Retrieved from https://ict4kids.ca/category/educational-technology/

Excerpt: "Connections and compatibility between the CSAM and TPACK and CSAM theories have been established (Power, 2013) by merging the affordances of the technology with sound pedagogy. These compatible models provide a powerful lens by which to analyze the pedagogy involved in utilizing mobile devices for learning to code and write programs for technological devices."

Mishra, P. (2016, December 7). Why theory: Or the TPACK story [Web log post]. Retrieved from http://www.punyamishra.com/2016/12/07/why-theory-or-the-tpack-story/

Excerpt: "I was recently invited to speak at the fall Doctoral Research Forum for the Mary Lou Fulton Teachers College on the ASU West campus...I thought it best to speak about the role of theory in research. This is something that troubles graduate students a lot as they move through the program...I contextualized the discussion within the history of the work that Matt Koehler and I did in developing the TPACK framework. This was a fun talk to create and share. I created a narrated video of the slides of the talk, embedded below."

Panna, C. (2016, November 6). *From chalkboards to TPACK: How did we get here?* [Web log post]. Retrieved from https://www.coetail.com/signorpanna/2016/11/06/from-chalkboards-to-tpack-how-did-we-get-here/

Excerpt: "I like the TPACK framework for its combination of three important teaching competencies. It's useful as a tool for discussion, self-assessment, and growth; but like any model it doesn't tell the whole story. Two recent experiences in my AP US History class highlight this for me:

- In one lesson, after discussing westward migration in the antebellum United States, students played the classic Oregon Trail video game. We ended by talking about the many risks of the westward journey and evaluating how accurately the game portrayed them. It was a lot of fun and a fairly successful mix of technology, content, and pedagogy.
- A few days earlier, as a review of antebellum society, students stepped into character for a "speed dating" activity. They held short conversations with other characters from the era and judged who would be their most likely friends among the group."

6. TPACK Newsletter Suggested Citation

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

Harris, J., & Rodriguez, K. (Eds.). (2016, December 10). TPACK newsletter issue #31: December 2016 [Electronic mailing list message]. Retrieved from http://bit.ly/TPACKNewslettersArchive

7. Learning and Doing More with TPACK

Interested in learning more about TPACK or getting more involved in the TPACK community? Here are a few ideas:
- Visit the TPACK wiki at: http://tpack.org/
- Join the TPACK SIG at: http://site.aace.org/sigs/tpack-sig/
- 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:

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