TPACK Newsletter, Issue #33: June 2017

Welcome to the thirty-third 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 Research

"The world is but a school of research. The question is not who shall hit the ring, but who shall run the best course."
- Michel Eyquem de Montaigne

In This Issue

1. TPACK Newsletter Update

The TPACK Newsletter has been published via the tpack.news email list since January 2009. It has 1169 subscribers currently. Subscription numbers have held steady (+ or – 1% to 3%) since October 2011.

Below are recent TPACK publications that we know about: 32 articles, 2 chapters, and 40 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 and Chapters

Articles

Altun, T., & Akyildiz, S. (2017). Investigating student teachers' technological pedagogical content knowledge (TPACK) levels based on some variables. *European Journal of Education Studies, 3*(5), 467-485. Retrieved from http://oapub.org/edu/index.php/ejes/article/download/681/1916&hl

Abstract: "This study investigates pre-service teachers' Technological Pedagogical Content Knowledge (TPACK) levels based on different variables. A total of 609 final year student teachers who are trained in five different subject areas (elementary teaching, social science teaching, science teaching, mathematics, and Turkish Teaching) of an education faculty participated in the study. The study was carried out in the spring semester of the 2014-2015 academic year. An adapted Turkish version of the TPACK Scale was used as the data collection instrument. The data was analyzed using SPSS 20.0 software. An independent t-test, ANOVA, Mann Whitney-U, and Kruskal Wallis Tests for non-parametric data were used for statistical analysis. The results show, in the current state, participants have good levels of TPACK. It is also found that there are meaningful relationships and significant differences between some variables such as gender, program attended, having a personal computer and Internet connection, and sub-factors of the TPACK scale. It is suggested that more practical opportunities should be facilitated for pre-service teachers at education faculties to prepare them for 21st century schools."

Anderson, S., Grifith, R., & Crawford. L. (2017). TPACK in special education: Preservice teacher decision making while integrating iPads into instruction. *Contemporary Issues in Technology and Teacher Education, 17*(1). Retrieved from http://www.citejournal.org/volume-17/issue-1-17/general/tpack-in-special-education-preservice-teacher-decision-making-while-integrating-ipads-into-instruction

Abstract: "This study provides insight into preservice teachers' experiences with integrating technology into lessons with children who had mild learning disabilities. Participants included 14 junior early childhood education majors enrolled in a special education course with a fieldwork component. The researchers collected and analyzed lesson plans, journal entries, focus group interviews, and field notes. The findings illustrated preservice teachers' use of iPad apps during fieldwork, identified their technology-related instructional decisions, and determined how those choices exhibited emerging dimensions of technological, pedagogical, and content knowledge (TPACK). The preservice teachers combined their knowledge of pedagogy, student understanding of content, and emerging knowledge of iPad apps to effectively develop and conduct lessons in various content areas. Interviews with the students supported the social validity of the iPad implementation."

Augustin, R. R., & Liliasari, L. (2017). Investigating pre-service science teachers (PSTs)' technological pedagogical content knowledge through extended content representation

(CoRe). *Journal of Physics: Conference Series, 812*(012103). doi:10.1088/1742-6596/812/1/012103

Abstract: "The purpose of this study was to attain an insight into pre-service science teachers' technological pedagogical content knowledge (TPACK) as an integrative competency that is addressed by 21st century skills. The methods used in the study was descriptive. Nineteen pre-service science teachers (PSTs) of an educational university in Indonesia were involved in a semester long school science course. The course mainly develop students' pedagogical content knowledge (PCK) by utilizing content representation (CoRe) template. Furthermore an infusion of technological knowledge (TK) analysis led to the study of their TPACK by extending the template with a question in line to TK. The extended CoRe and self-reported survey were employed as instruments. The analysis of data used were quantitative and qualitative technique to obtain the insight into PSTs' PCK and TK. The results shows contrary value of PCK and TK identified by CoRe template to those measured by self-reported survey. However, the PSTs perceive their TPACK much higher, that, is 74.74%. Further investigation regarding PSTs ability to compose lesson plan was recommended for further research to capture more comprehensive insight into PSTs' TPACK."

Avidov-Ungar, O., & Shamir-Inbal, T. (2017). ICT coordinators' TPACK-based leadership knowledge in their roles as agents of change. *Journal of Information Technology Education: Research, 16,* 169-188. Retrieved from http://www.informingscience.org/Publications/3699

Abstract:
"**Aim/Purpose** The aim of the study is to examine what ICT coordinators perceive as the main elements of knowledge needed to implement ICT successfully into school culture.
Background For the past few years, Israel's Ministry of Education has been running a national program of adapting the education system to the 21st century skills. Key teachers have been appointed as ICT coordinators. Their role was to implement technology in schools.
Methodology The participants in this study were 130 ICT coordinators in Israeli Hebrew and Arabic schools. Those ICT coordinators had to attend a special in-service 60- hour course throughout an entire school year. The research tool was the reflection of the ICT coordinators who were asked to complete at the end of the inservice course. Narrative analysis was chosen as the main approach to data analysis.
Contribution We claim that ICT coordinators maintain a complex perception of their role, based on broad personal and professional knowledge that enables them to lead the needed changes.
Findings Based on the findings the coordinators revealed primary successful elements of their work: (a) technological aspects, (b) pedagogical aspects, (c) the organizational aspects, and (d) the ICT coordinator as a leader of systemic change. The first two elements already appear in the TPACK construct, while the others constitute organizational knowledge (OK) and leadership knowledge (LK) that enables the coordinators to facilitate ICT implementation in schools, and these are the unique elements of this study.
Recommendations for Practitioners We recommend that when choosing ICT coordinators or ICT implementation leaders at school, one should check not only that they possess the familiar

TPACK knowledge, but also organizational knowledge and leadership knowledge that was found essential to successful completion of the coordinators' role.

Impact on Society This study has shed light on the nature and significance of leadership knowledge (LK) and its function as an additional expression of TPACK.

Future Research We suggest that future research about educational technology leaders' TPACK be drawn from these results."

Baturay, M., Gokcearslan, S., & Sahin, S. (2017). Associations among teachers' attitudes towards computer-assisted education and TPACK competencies. *Informatics in Education, 16*(1), 1-23. doi:10.15388/infedu.2017.01 Retrieved from https://www.mii.lt/informatics_in_education/htm/infedu.2017.01.htm

Abstract: "The current study investigates the attitudes of teachers towards Computer-Assisted Education (CAE) and their knowledge of technology, pedagogy and content via TPACK model that assesses the competencies for developing and implementing successful teaching. There were 280 participants in the study. The results of the study indicate that teachers' attitudes towards CAE scores are much higher than their TPACK scores. There is a low level positive correlation between their TPACK competencies and their attitudes towards CAE. Particularly, teachers' competencies of Technology Knowledge (TK) and Technological Pedagogical Knowledge (TPK) have much higher relationship with their attitude towards CAE when compared to other competencies. Attitude toward CAE is observed to differ by gender. As for TPACK competencies, TK and Technological Content Knowledge (TCK) differ by gender. The TPACK framework explains 20% of attitudes towards CAE. TK is the construct having the highest effect in explaining the attitude towards using CAE."

Bibi, S., & Khan, S. H. (2017). TPACK in action: A study of a teacher educator's thoughts when planning to use ICT. *Australasian Journal of Educational Technology, 33*(4), 70-87. doi:10.14742/ajet.3071

Abstract: "In this paper, we discuss how a university lecturer (pseudonym: James) drew on his technological pedagogical and content knowledge (TPACK) when planning to integrate technology in teaching. The main purpose of the study was to use real-life planning observations to understand James's TPACK. The data were obtained through think-aloud sessions in which James planned a course that is offered to undergraduate initial teacher education (ITE) students in a research-intensive Australian university. Chi's (1997) verbal analysis method was used to analyse verbal qualitative data. The results indicate that a different set of knowledge domains underpinned James's decisions in each different episode of his planning sessions giving his TPACK a dynamic and context-sensitive nature. We suggest observations of teachers when making actual planning decisions as one of the preferred methods to understand the nature of their TPACK. The study introduces a new approach in understanding how this teacher's TPACK looks when he drew on various domains of knowledge, by visually presenting the combinations made among knowledge domains."

Bustamante, C. (2017). TPACK and teachers of Spanish: Development of a theory-based joint display in a mixed methods research case study. *Journal of Mixed Methods Research.* Advance online publication. doi:10.1177/1558689817712119

Abstract: "This article describes the development of a joint display in a mixed methods research case study, using a theoretical framework as the start point. A case study of professional development on Web 2.0 technologies for teachers of Spanish illustrates how the qualitative results from interviews, observations, and documents, and quantitative results from pre, post, and follow-up surveys were integrated via a joint display using the TPACK model. The discussion focuses on the role of joint displays in data merging and how they facilitate the representation of fit of data integration, enriching the results in convergent designs."

Celik, I., Sahin, I, & Akturk, A. O. (2014). Analysis of the relations among the components of technological pedagogical and content knowledge (TPACK): A structural equation model. *Journal of Educational Computing Research, 51*(1), 1-22. doi:10.2190/EC.51.1.a

Abstract: "In the current study, the model of technological pedagogical and content knowledge (TPACK) is used as the theoretical framework in the process of data collection and interpretation of the results. This study analyzes the perceptions of 744 undergraduate students regarding their TPACK levels measured by responses to a survey developed by Sahin (2011). The survey contains seven subscales: Technology knowledge (TK), pedagogy knowledge (PK), content knowledge (CK), technological pedagogy knowledge (TPK), technological content knowledge (TCK), pedagogical content knowledge (PCK), and technological pedagogical and content knowledge (TPACK). These seven subscales form the seven variables of the study. The findings show that teacher candidates with more technology knowledge will have more knowledge in pedagogy and content. Also, pedagogy seems as the only variable that is significantly related to all of the variables presented in the TPACK model. This result suggests that pedagogy is the core knowledge of the TPACK. In the study, technology and content knowledge domains influence the TPACK indirectly. Moreover, only the dyadic knowledge components including the content knowledge are related the TPACK."

Chaemchoy, S. (2017). An investigation of Thai principals' technology leadership and understanding of mobile technology in education: Apply the TPACK framework. *Advanced Science Letters, 23*(2), 1134-1139. Doi: 10.1166/asl.2017.7518

Abstract: "The purposes of this study were to (1) investigate Thai principals' understanding of mobile technology in education and (2) investigate Thai principals' technology leadership. The on-line questionnaire was used to collect data from 363 principals. Data analysis included frequency, Mean, Standard Deviation, t-test and One-way ANOVA. The results of this study found that: (1) Thai principals' understanding of mobile technological knowledge (mTK) was at medium level whereas content knowledge (CK), pedagogical knowledge (PK), pedagogical content knowledge (PCK), mobile technological content knowledge (mTCK), mobile technological pedagogical knowledge (mTPK) and mobile technological pedagogical and content knowledge (mTPACK) were at high level. (2) Thai principals' understanding of mobile

technology in education was statistically significantly different at 0.05 level in the score of gender, school location area, school size, region, years of administrator experience and highest level of education. (3) Thai principals' technology leadership was at high level. (4) Thai principals' technology leadership was statistically significantly different at 0.05 level in the score of area of school located."

Dalal, M., Archambault, L., & Shelton, C. (2017). Professional development for international teachers: Examining TPACK and technology integration decision making. *Journal of Research on Technology in Education.* Advance online publication. doi:10.1080/15391523.2017.1314780

Abstract: "This mixed-methods study explored the impacts of a semester-long technology professional development for secondary school international teachers from developing nations around the world. We used (a) a survey approach to examine international teachers' perceived technology integration abilities using the technological pedagogical content knowledge (TPACK) framework and (b) a design task to understand their rationale behind technology integration decisions. As a group (N = 16), international teachers reported increased abilities in all TPACK domains. Qualitative analysis of their rationales revealed that though teachers learned to consider the affordances of technology, technology access issues were pivotal in their choice and use of technology in instruction planning. With education becoming increasingly global, the study has implications for the motivation and design of technology professional development programs for international teachers."

Gonzalez, M. J., & González-Ruiz, I. (2017). Behavioural intention and pre-service mathematics teachers' technological pedagogical content knowledge. *Eurasia Journal of Mathematics, Science & Technology Education*, *13*(3), 601-620. doi:10.12973/eurasia.2017.00635a

Abstract: "Teachers' beliefs, together with sound technological pedagogical content knowledge (TPACK), are directly related to the effective integration of technology in mathematics teaching. This study explored the relationship between pre-service teachers' behavioural intention to use technology to teach mathematics and their TPACK. A case-study analysis was conducted to determine whether six pre-service teachers' behavioural intention to use technology in their classroom delivery was associated with a predominance of TPACK (the TPACK model component) in their choice of technology-supported mathematical tasks. The findings showed a considerable disconnect between pre-service teachers' behavioural intention and their technological pedagogical content knowledge. Even where they expressed favourable intentions, the type of knowledge they called into play when selecting technology-supported tasks was unrelated to TPACK and did not suffice to identify the educational potential of technology. An emphasis on TPACK, in conjunction with the development of favourable attitudes toward the use of technology, is therefore believed to be indispensable in pre-service teacher education programmes."

Graziano, K. J., Herring, M., C., Carpenter, J. P., Smaldino, S., & Finsness, E. S. (2017). A TPACK diagnostic tool for teacher education leaders. *TechTrends*. Advance online publication. doi:10.1007/s11528-017-0171-7

Abstract: "Teacher education faculty must incorporate and model effective use of Technological, Pedagogical, and Content Knowledge (TPACK) in the classroom and across the curriculum. Teacher education leaders have a responsibility to set direction, develop people, and redesign their teacher preparation programs into TPACK ready environments. As such, a change process may occur that may be challenging and difficult for some leaders and their faculty. In this article, the authors examine the process and product of creating a TPACK leadership diagnostic tool that provides leaders in teacher education with support and guidance for the process of developing TPACK ready teacher preparation programs. Suggestions for further development and usage of the diagnostic tool are discussed."

Hassan, N. F., & Saifullizam, P. (2017). A survey of technology enabled active learning in teaching and learning practices to enhance the quality of engineering students. *Advanced Science Letters, 23*(2), 1104-1108. doi:10.1166/asl.2017.7509

Abstract: "In this study, a survey was carried out on the use of Technology Enabled Active Learning (TEAL) in teaching and learning practices to enhance the quality of engineering students. TEAL is one of the new learning formats that involve the use of simulations, hands-on experiments and lectures in the curriculum or learning process; a variety of technologies are applied to achieve learning goals. The application of TEAL encompasses five elements, namely: online learning, hands-on experiment, blended learning, collaborative learning and lab activities. This study implemented TEAL in practicing teaching and learning technology, pedagogy and content (TPACK) to enhance the quality and employability of engineering students through the improved curriculum of education. With the help of technologies in the learning process, students are poised to meet the need of the industry as professionals and excellent workers upon their graduation. For this purpose, final year students in the course of Bachelor of Engineering at Technical University Network (MTUN), a leading technical university network specialising in technological skills, were involved in this study. In this survey of TEAL, quantitative research methods were used to collect the relevant data."

Jones, D., Hollas, V., & Klepsis, M. (2016). The presentation of technology for teaching and learning mathematics in textbooks: Content courses for elementary teachers. *Contemporary Issues in Technology & Teacher Education, 17*(1). Retrieved from http://www.citejournal.org/volume-17/issue-1-17/mathematics/the-presentation-of-technology-for-teaching-and-learning-mathematics-in-textbooks-content-courses-for-elementary-teachers

Abstract: "This article presents an overview of the ways technology is presented in textbooks written for mathematics content courses for prospective elementary teachers. Six popular textbooks comprising a total of more than 5,000 pages were examined, and 1,055 distinct references to technology were identified. These references are coded according to location

within the textbook, role of technology, and type of technology. The treatment of technology varied across the textbooks in the sample. The number of references to technology ranged from 71 to 451. Two textbooks mentioned technology on less than 10% of the pages, while one mentioned technology on over one fourth of the pages. For each textbook, the majority of references were to mathematical action technologies. Across the sample, calculators, websites, and e-manipulatives were most frequently mentioned. Examples of textbook activities that may influence the development of technological pedagogical content knowledge in prospective elementary teachers are provided. Recommendations are made for future directions in curriculum development and research to address the challenge of preparing teachers to effectively teach mathematics in the digital age."

Karatas, F. I, & Tutak, F. A. (2017). An examination of in-service secondary mathematics teachers' technological pedagogical content knowledge and their technology integration self-efficacy. *Mustafa Kemal University Journal of Graduate School of Social Sciences, 14*(37), 180-198. Retrieved from http://sbed.mku.edu.tr/article/view/5000197505

Abstract: "The aim of this study was to identify perceived technological pedagogical content knowledge (TPACK) and technology integration self-efficacy (TISE) of secondary mathematics teachers in Fatih Project Schools. Moreover, gender, age, years of experience and taking inservice training diversities related to TPACK and TISE were examined. The research conducted with 138 secondary mathematics teachers from 28 different FATIH project schools in six districts of Istanbul. Quantitative research method was used in this study. Turkish translated versions of TPACK-M and TISE scales were used to collect data. The results indicated that secondary mathematics teachers' perception of TPACK and their TISE are moderate level. According to demographic results, there was no significant difference in TPACK perception of male and female mathematics teachers while there was significant difference in TISE of mathematics teachers in favor of males. Also, small negative correlation was found between age and mathematics teachers' TPACK perception though strong negative correlation was found between age and mathematics teachers' TISE. Furthermore, there was no significant difference in TPACK perception and teaching experience of secondary mathematics teachers. However, there was significant difference in TISE and teaching experience of secondary mathematics teachers. More experienced mathematics teachers recorded lowest mean score for TISE."

Koh, J. H. L., Sing, C. C., & Lim, W. Y. (2017). Teacher professional development for TPACK-21CL. *Journal of Educational Computing Research, 55*(2), 172-196. doi:10.1177/0735633116656848

Abstract: "This article explicates the conception and evaluation of an information and communications technologies (ICT) professional development process for developing teachers' technological pedagogical content knowledge for 21st century learning. The process emphasizes teachers' prolonged engagement with peers and researchers in design teams. Supported by technological pedagogical content knowledge rubrics and technological pedagogical content knowledge design heuristics, the process enabled teachers to assess their

current ICT lessons, set design goals, redesign, implement, and evaluate student learning outcomes, as well as reflect on their pedagogical practices. A year-long implementation study conducted with 37 teachers from a Singapore primary school who were organized into seven lesson design teams found that the process had positive effects on teachers' confidence for technological pedagogical content knowledge for 21st century learning and lesson design practices. Five of the seven design teams were able to make pedagogical changes toward 21st century learning, and six of the teams realized improvement in student learning outcomes. The implications for teacher ICT professional development are discussed."

Korucu, A. T. (2017). Teachers' technology acceptance and usage situations and the evaluation of web pedagogic content knowledge in terms of different variations and the determination of the relationship between these. *International Education Studies, 10*(3), 54-75. doi:10.5539/ies.v10n3p54

Abstract: "The goal of this study is to analyze the situations of teachers' technology acceptance and usage (TAU) and web pedagogy content knowledge (WPACK) in terms of different variations and to determine of the relationship between these two. The study group of this research consists of 96 teachers in total having different variations such as different branches, different professional seniorities, different ages and different educational levels they work in. Data collection tools comprising of 3 open-ended questions which are developed and structured by researchers and two different scales measuring technology acceptance and usage and web pedagogical content knowledge are utilized in this study. The scales and structured forms are applied through random sampling with screening model. In the results of the research, teachers' technology acceptance and usage situations, web pedagogical content knowledge situations and their sexes and web 2.0 technologies usage situations don't differ in terms of the dimensions and the entirety of the scales. The following are established according to the results; there are differences among teachers' TAU situations, there aren't any differences among their WPACK in terms of their branches; there aren't any differences among their TAU situations and there are differences among their WPACK situations in terms of their ages; TAU and WPACK situations are not reasonable statistically in terms of their professional seniorities and educational levels they work in. Furthermore, it is also determined that web applications usage durations are not reasonable in terms of their TAU situations but they are reasonable in terms of WPACK. The answers which teachers provided towards open-ended questions are established to be categorized as education, technology, interaction, visuality, source and development. Additionally, it is settled that there is a low correlation between TAU and WPACK situations but it is possible to form a model between them. From the point of view of the findings of this study, it is suggested that knowledge and information regarding technology integration is provided experimentally to teachers in in-service seminars."

Limbong, E. (2016). Designing and developing supplemental technology and PACI model materials through blended learning methods. *Journal of Culture, English Language Teaching & Literature*, *16*(2), 271-304. Retrieved from http://journal.unika.ac.id/index.php/celt/article/view/771/pdf_13

Abstract: "The 21st century English teachers and lecturers are required to have competencies in translating Content Knowledge (CK), integrating various Pedagogical Knowledge (PK) and implementing Technological Knowledge (TK) in order to produce effective and efficient teaching. This research reveals and describes researcher's efforts and pre-service EFL teachers' (Pre-service EFL teachers) roles in designing and developing the supplemental teaching and learning materials with PowerPoint, Audacity, Camtasia and Internet (PACI) model. To transform researcher roles and model to introduce and implement Technological, Pedagogical, and Content Knowledge (TPACK) framework, this research implemented blended learning: traditional face to face and Facebook closed-group discussion based on Project-Based Learning. This research employed the qualitative autobiography narrative of self-study from the researcher's experiences to implement blended learning. Semi-structured interviews were conducted with four Pre-service EFL teachers of group A and five Pre-service EFL teachers of group B to seek the Pre-service EFL teachers' experiences in designing and developing PACI model. The results suggested that blended learning could effectively and efficiently integrate and implement the design and development of a PACI model. Most importantly both researcher and two groups realized that in integration of TPACK during a Computer Literacy course, the subject matter may be shaped by the application of technology; teaching as well as learning might be changed by the use of technology and the way to represent and communicate specific lessons to students."

Lopez-Vargas, O., Duarte-Suarez, L., & Ibañez-Ibañez, J. (2017). Teacher's computer self-efficacy and its relationship with cognitive style and TPACK. *Improving schools*. Advance online publication. doi: 10.1177/1365480217704263

Abstract: "The research reviews the existing relationship between teachers' computer self-efficacy, cognitive style in the field dependence–independence (FDI) dimension, and technological pedagogical content knowledge (TPACK). It also inquired into the influence of teachers' performance area on self-efficacy and TPACK. In total, 208 teachers from a public education institution in Valle de Tenza, Boyacá, Colombia, participated in the study. The Embedded Figures Test (EFT), self-efficacy, and TPACK tests were applied. A correlations analysis and an analysis of variance (ANOVA) were performed. The results showed significant associations between cognitive style, self-efficacy, technological knowledge, and TPACK. In addition, they evidenced the existence of significant differences in self-efficacy, technological knowledge, and TPACK, according to the performance area and cognitive style."

MacKinnon, G. R. (2017). Highlighting the importance of context in the TPACK model: Three cases of non-traditional settings. *UAiR: Issues and Trends in Educational Technology, 5*(1). Retrieved from https://journals.uair.arizona.edu/index.php/itet/article/view/19424

Abstract: "This paper presents three cases of technology intervention in classrooms where the TPACK model seemingly falls short of a due consideration of context. The argument is made that context can drive pedagogy, technology and content independently whilst the established interactions of each continues to occur. The analysis suggests that contextual factors of culture,

learning challenges and second language study present additional complexity to the teaching and learning environment especially as technology is employed to empower learning."

McKenney, S., & Voogt, J. (2017). Expert views on TPACK for early literacy: Priorities for teacher education. *Australasian Journal of Educational Technology, 33*(5), 1-14. doi:10.14742/ajet.2502

Abstract: "Technology applications can make important contributions to improving learning outcomes in the domain of early literacy. However, to fully exploit the potential of educational technologies, teachers must have specific knowledge and skills. This study aimed to articulate the technological pedagogical content knowledge teachers need to make effective use of technology for early literacy. Through three rounds of *expert* consultation using a Delphi study approach, key priorities for the education of lower primary school teachers, especially those teaching kindergarten, were articulated. The results of the Delphi study show expert consensus on the importance of educating pre-service teachers about: electronic books and educative television; explicit goals and task-focused instructions using specific tools; how to shape technology-rich classroom interactions; and how to integrate computer activities in language teaching. Experts stress the importance of developing age-appropriate teaching skills and critical consideration of the value of technologies for specific learning goals. When this critical stance is lacking (e.g., using technology for entertainment, or substitution of existing activities), they recommend against technology use in kindergarten. These findings can help teacher education programs offer pre-service teachers adequate opportunities to develop the technological, pedagogical, and content knowledge needed for effectively using technology in the domain of early literacy."

Mei, B., Brown, G. T. L., & Teo, T. (2017). Toward an understanding of preservice English as a foreign language teachers' acceptance of computer-assisted language learning 2.0 in the People's Republic of China. *Journal of Educational Computing Research.* Advance online publication. doi:10.1177/0735633117700144

Abstract: "Despite the rapid proliferation of information and communication technologies, there exists a paucity of empirical research on the causes of the current low acceptance of computer-assisted language learning (CALL) by English as a foreign language (EFL) teachers in the People's Republic of China (PRC). This study aims to remedy this situation through the identification of factors influencing preservice EFL teachers' intention to adopt Web 2.0 technologies for language learning purposes in the PRC. Based on the technology acceptance model and the technological pedagogical content knowledge model, a hypothesized seven-factor model was tested via structural equation modeling with data obtained from 295 preservice EFL teachers in the PRC. The results revealed that intention to use CALL 2.0 was predicted most strongly by facilitating conditions. This finding can help stakeholders to make informed decisions about various aspects of facilitating conditions to effectively enhance preservice EFL teachers' acceptance of CALL 2.0 in the PRC."

Norton, M., Creghan, C., Creghan, K. A., & Maninger, R. (2017). Professional development and effective technology integration. *Journal of Multidisciplinary Graduate Research, 3*(1), 1-17. Retrieved from http://www.shsu.edu/academics/education/journal-of-multidisciplinary-graduate-research/documents/2017/Article%201%20-%202017%20-%20CREGHAN.pdf

Abstract: "Technology drives our society and plays a crucial role in classrooms today. Technology is being purchased and put into classrooms at an alarming rate. While the impact on learning has not reached its potential; educators need to explore how we go about integrating technology so that it positively impacts educational processes and learning outcomes. This research study explored both teacher and administrator perceptions of technology integration and professional development with the intent of finding ways administrators can support teachers with integrating technology in the classroom in order to impact learning. Teachers and administrators in the Archdiocese of Galveston-Houston were surveyed and their responses were used to develop a second survey. This survey was given to a focus group of teachers at Christ the Redeemer Catholic School in Houston, Texas. The study revealed differences between: how administrators and teachers define technology integration; ways in which teachers want to learn about technology integration; ways in which administrators plan on presenting that information; and between what teachers want to learn about technology integration and what administrators are teaching during technology-related professional development."

Padmavathi, M. (2017). Preparing teachers for technology-based teaching-learning using TPACK. *i-manager's Journal on School Educational Technology, 12*(3), 1-9.

Abstract: "Technological Pedagogical Content Knowledge (TPACK) is a conceptual framework for teachers to teach effectively using technology. This framework originates from the opinion that use of technology in educational context would be effective only if content, pedagogy and technology are aligned carefully. It implies that for teachers to use technology in their teaching, they need to be competent in all three domains. This present paper is an attempt to understand the assumptions and components of Technological Pedagogical and Content Knowledge (TPACK) as a conceptual framework. Further, the paper addresses the issues and challenges in preparing teachers with TPACK capabilities, apart from emphasizing the role of teacher educators, pre-service, and in-service teachers in understanding TPACK for effective classroom teaching and learning. Suggestions for developing TPACK competencies among teacher educators, inservice teachers, and preservice teachers were discussed. Recommendation for restructuring curriculum of teacher training programmes was also included."

Prabawa, H. W. (2017). A review of gamification in technological pedagogical content knowledge. *Journal of Physics: Conference Series, 812*(012019), 1-4. doi:10.1088/1742-6596/812/1/012019

Abstract: "This paper review 10 papers that relating to gamification adoption in developing technological pedagogical content knowledge (TPACK) framework. Technological developments lately led to the trend of increased use of ICT in the learning process, one of which is gamification. Gamification is the concept of applying game mechanics and game design techniques to engage and motivate people to achieve their goals. Gamification in education as an intersection of learning and fun. The problem is that not all game's attributes suitable for use in presents a teaching material. TPACK is a framework for the teacher that described a complex interaction among three bodies of knowledge: content, pedagogy and technology. TPACK engagement has an impact on the teacher mastery in dimension of teaching material content, in addition to improve teachers skill in developing technology in classroom learning."

Psycharis, G., & Kalogeria, E. (2017). Studying the process of becoming a teacher educator in technology-enhanced mathematics. *Journal of Mathematics Teacher Education*. Advance online publication. doi:10.1007/s10857-017-9371-5

Abstract: "In this paper, we explore the process of becoming a teacher educator in the pedagogical use of digital tools in mathematics teaching. The study took place in the context of an in-service program during the trainees' engagement in their practicum fieldwork activities including the process observation–reflection–design–implementation–reflection. We explored the features of this context that facilitated the trainees' transition from the level of trainee educator to the level of teacher educator as well as the nature of the trainees' documentation work for teachers. The results showed that observation of other teacher educators' teaching in conjunction with reflection during the program's respective sessions facilitated the trainees' transition to the professional level. The identified operational invariants underlying the trainees' designs concerned the focus of their observation in teacher education classrooms, the importance they attributed to the constraints and opportunities provided by the wider educational context and epistemological issues regarding the teaching and learning of mathematics with technology. The analysis of trainees' designs revealed three kinds of documents ('explanatory,' 'instructive' and "facilitative") and corresponding roles of trainees during the implementation. These documents targeted different aspects of TPACK depending on the trainees' conceptualizations of teachers' roles either 'as students' or 'of students.'"

Scherer, R., Tondeur, J., Siddiq, F. (2017). On the quest for validity: Testing the factor structure and measurement invariance of the technology-dimensions in the technological, pedagogical, and content knowledge (TPACK) model. *Computers & Education, 112*, 1-17. doi:10.1016/j.compedu.2017.04.012

Abstract: "The Technological, Pedagogical, and Content Knowledge (TPACK) framework – a framework which proposes a set of knowledge domains that are essential for effective teaching with technology – has gained considerable attention in the domain of education and technology. With the efforts to conceptualize these knowledge domains comes the question to what extent they can be distinguished empirically. Hence, the present study examines a measure that assesses pre-service teachers' self-efficacy in the technology-related TPACK

dimensions ("T-dimensions"). In pursuit of crafting a validity argument, we investigated its factor structure and tested it for measurement invariance across gender and educational tracks, two subgroups that may indicate considerable differences. By means of multi-group confirmatory factor analysis, the data of N = 665 pre-service teachers in 18 teacher training institutions in Flanders (Belgium) revealed a nested factor structure of the TPACK measure, which comprised a general factor and a specific factor of pre-service teachers' technological knowledge. This factor structure was fully invariant across gender and educational tracks. Mean differences between educational tracks did not occur; yet, substantial differences were found across gender in favor of male pre-service teachers. This study sheds light on critical aspects of crafting a validity argument for the measurement of the T-dimensions in the TPACK framework and reports relevant subgroup differences."

Silva, P. (2017). Scaffolding assignments: Analysis of AssignMentor as a tool to support first year students' academic writing skills. *E-Learning and DIgital Media, 14*(1-2), 86-97. doi:10.1177/2042753017695652

Abstract: "There are several technological tools which aim to support first year students' challenges, especially when it comes to academic writing. This paper analyses one of these tools, Wiley's AssignMentor. The Technological Pedagogical Content Knowledge framework was used to systematise this analysis. The paper showed an alignment between the tools' features, and the content, pedagogical and technological requirements. In particular, the paper highlighted that the tool provided an online scaffolding tool, which guides students during their writing process. Additionally, some limitations of the software were identified, which could be addressed by using a blended learning approach."

Su, X., Huang, X., Zhou, C., & Chang, M. (2017). A technological pedagogical content knowledge (TPACK) scale for geography teachers in senior high school. *Egitim ve Bilim, 42*(190), 325-341. doi:10.15390/EB.2017.6849

Abstract: "With information technology being employed extensively in school education，the TPACK (Technological Pedagogical Content Knowledge) theoretical framework is adopted by a growing number of researchers to study, assess and advance teachers' ability to integrate IT into course teaching. However, there is no measurement instrument designed specifically to assess Geography teachers' TPACK competences in Mainland China so far. In this study, based on the currently available TPACK measurement instruments, we attempt to develop, following the 7- factor TPACK model, a measurement scale for senior high school Geography teachers in Mainland China. Invitation emails were sent to target teachers and a total of 869 valid responses were received from 9 Mainland provinces. Confirmatory factor analysis was administered on the collected data to attest convergent validity and discriminant validity of the scale, as well as the 7-factor TPACK model. As demonstrated with our research findings, the TPACK knowledge structure of senior high school Geography teachers in Mainland China accords with the 7-factor model, with factor loadings of the 37 measured variables all distributed between 0.57 and 0.94, and composite validity values of each factor ranging between 0.87 and 0.93, which indicates the scale has good convergent validity; after the seven

factors being paired with each other, the chi-square value differences between constrained and unconstrained models all reach the significant level of 0.05, which indicates the scale has good discriminant validity."

Suseela, R. J., & Jabamani, V. J. (2017). Techno-pedagogical practices (TPACK) of the UG level English language teachers: Prospects and concerns. *Shanlax International Journal of Education, 5*(1), 120-124. Retrieved from http://www.shanlaxjournals.in/pdf/spl_issue/Thiagarajar-College-Volume-2.pdf#page=129

Abstract: None

Yerdelen-Damar, S., Boz, Y., &Aydin-Günbatar, S. (2017). Mediated effects of technology competencies and experiences on relations among attitudes towards technology use, technology ownership, and self-efficacy about technological pedagogical content knowledge. *Journal of Science Education and Technology*. Advance online publication. doi:10.1007/s10956-017-9687-z

Abstract: "This study examined the relations of preservice science teachers' attitudes towards technology use, technology ownership, technology competencies, and experiences to their self-efficacy beliefs about technological pedagogical content knowledge (TPACK). The present study also investigated interrelations among preservice teachers' attitudes towards technology use, technology ownership, technology competencies, and experiences. The participants of study were 665 elementary preservice science teachers (467 females, 198 males) from 7 colleges in Turkey. The proposed model based on educational technology literature was tested using structural equation modeling. The model testing results revealed that preservice teachers' technology competencies and experiences mediated the relation of technology ownership to their TPACK self efficacy beliefs. The direct relation of their possession of technology to their TPACK self efficacy beliefs was insignificant while the indirect relation through their technology competencies and experiences was significant. The results also indicated there were significant direct effects of preservice teachers' attitudes towards technology use, technology competencies, and experiences on their TPACK self efficacy beliefs."

Zoch, M., Myers, J., & Belcher, J. (2016). Teachers' engagement with new literacies: Support for implementing technology in the English/language arts classroom. *Contemporary Issues in Technology and Teacher Education, 17*(1). Retrieved from http://www.citejournal.org/volume-17/issue-1-17/english-language-arts/teachers-engagement-with-new-literacies-support-for-implementing-technology-in-the-englishlanguage-arts-classroom/

Abstract: "This qualitative study examined in-service teachers who were enrolled in a graduate level course that focused on new literacies and the integration of technology with literacy. They also taught children enrolled in a summer writing camp as part of the course. The authors

followed the teachers into their classrooms once the graduate course ended to see if and how they were integrating technology. The primary focus of this article is on ways some of the teachers began to integrate technology into their instruction. An additional finding was that testing was perceived to be an especially challenging barrier to technology integration."

Chapters

Bayes, A. S., Meletiou-Mavrotheris, M., & Paparistodemou, E. (2017). A study on statistical technological and pedagogical content knowledge on an innovative course on quantitative research methods. In G. Aldon, F. Hitt, L. Bazzini, & U. Gellert (Eds.), *Mathematics and technology* (pp. 467-494). New York: Springer. doi:10.1007/978-3-319-51380-5_22

Abstract: "This chapter is part of a main study, which aimed to (a) analyse the affordances of a Quantitative Research Methods course towards developing students' Statistical Technological and Pedagogical Content Knowledge (STPACK), and (b) apply the STPACK model to investigate its effects in graduate Educational Studies. In particular, the chapter provides an example of raising teachers' awareness of statistical content and pedagogy about models and modelling through exploiting the model building affordances provided by a technological learning environment like TinkerPlots2 ®(Konold and Miller 2011). The model was applied in a Quantitative Educational Research Methods course with nineteen (n=19) Cypriot participants with different academic backgrounds."

Yu, C., & Franz, D. P. (2017). Visiting technological pedagogical and content knowledge (TPACK): Issues and challenges for teachers' professional development. In T. Kidd & L. Morris, Jr. (Eds.), *Handbook of research on instructional systems and educational technology* (pp. 380-391). New York: Routledge. doi:10.4018/978-1-5225-2399-4

Abstract: "The TPACK framework has been widely discussed for effective technology integration, and the literature has also indicated TPACK has significant implications for teacher education and professional development. The purpose of this chapter is to examine interconnectedness of TPACK and teacher professional development. This chapter reviews the research on TPACK and the extensive literature on quality professional development for teachers. In addition, the chapter highlights how various content areas have addressed pedagogical content knowledge and implications for practice in technology and teacher development. The chapter seeks to contribute knowledge about the structure of professional development initiatives that involve instructional technology and integration into various content knowledge disciplines."

3. Recent TPACK-Related Dissertations and Theses

<u>Editors' Note</u>: The TPACK-related dissertations and theses listed below that were published in 2015 and 2016 were inadvertently omitted from previous issues of the TPACK eNewsletter. We apologize for not including these citations earlier.

Allblaihed, M. A. (2016). *Saudi Arabian science and mathematics pre-service teachers' perceptions and practices of the integration of technology in the classroom* (Doctoral dissertation). Available from ProQuest Dissertations and Theses Global database. (UMI No. 10596053)

Abstract: "This study was conducted to explore the Saudi Arabian science and mathematics primary school pre-service teachers' perceptions and practices of the integration of technology in the classroom. As their practice takes place within two different institutions (University and school) each has its own policy and agenda, the complexity of their practice environment rises and the context might become problematic. Thus, both personal and contextual factors within these two institutions were explored to draw a whole picture of the issue according to the sociocultural theory as the theoretical framework of the study. Case study was adopted as the research methodology using Technological Pedagogical Content Knowledge (TPACK) questionnaire, classroom observation and semi-structured interviews to collect both quantitative and qualitative data. The sample consisted of 15 participants; seven primary school pre-service teachers (science and mathematics), four university tutors and four head teachers. Two different categories of the pre-service teachers were identified; users and non-users of technology. Interestingly, those who used technology were found to adopt traditional transmission strategy of teaching. They perceived strong agency assuming that their role is to transfer knowledge to passive learners through visual technology. In contrast, those who did not use technology assumed more active role by the pupils. Therefore, they thought visual technologies are not appropriate tools for a learner-centred strategy of teaching showing less awareness about the affordances that this type of technology could provide. Accessing guidance during teaching practice was found to be a significant element that could allow pre-service teachers to learn properly within their zone of proximal development and contribute considerably to their pedagogical identity development and their understanding of agency in the classroom. Moreover, teaching subject was found to be an important factor in shaping the pre-service teachers' identity and practice."

Alqallaf, N. (2016). *Mathematical teachers' perception: Mobile learning and constructing 21st century collaborative cloud-computing environments in elementary public schools in the state of Kuwait* (Doctoral dissertation). Available from ProQuest Dissertations and Theses Global database. (UMI No. 10113607)

Abstract: "The purpose of this study was to examine Kuwaiti mathematical elementary teachers' perceptions about their ability to integrate M-learning (mobile learning) into their current teaching practices and the major barriers hindering teachers' ability to create an M-learning environment. Furthermore, this study sought to understand teachers' perceptions

about their ability to create a collaborative cloud-computing learning environment that corresponds with the 21st century skills and possibly explain their readiness for future reformation of education in Kuwait.

Using an Internet-based format to this study quantitative and qualitative data, the Technological Pedagogical Content Knowledge (TPACK) and barriers survey gleaned quantitative information about how mathematics teachers and a head of a mathematics department (n = 562) viewed use of technology as well as the barriers they faced in integrating it into the classroom. Also, qualitative data were collected using a survey of open-ended questions to provide context to survey answers and better understand the barriers and affordance experienced by the participants. Moreover, a 21st century open-ended questionnaire was employed to collect qualitative information from mathematics teachers and head of the departments (n = 21) in regard to their ability to construct a 21st century learning environment based on collaboration and constructivist perspective utilizing a cloud-computing technology.

Quantitative analysis was utilized to examine elementary mathematics teachers' perceptions using the TPACK survey, and the validity and reliability of the TPACK subscales were computed by administering the confirmatory factor analysis. Factors that were elicited were specified as: all seven subscales encompassed in the TPACK survey significantly fit model of factor structures, and the TPACK survey was reliable and valid. In addition, descriptive analysis such as the TPACK subscale means and standard deviations were computed via the SPSS software.

Qualitative content analysis was used to understand teachers' perceptions about their ability to integrate mobile technology, perceptions of the primary barriers and affordance that limited their ability, and their perceptions of their ability to integrate collaborative cloud computing and create a 21st century learning environment based on the constructivist perspective. When analyzed, the self-reported open-ended survey yielded the following specific themes: (a) teachers perceived themselves high in their ability to integrate mobile technology; (b) the primary barriers based on teachers' perceptions were budget constraints, IT limitations, time constraints, and administrative support; and (c) teachers perceived themselves high in their ability to integrate collaborative cloud computing to construct a 21st century learning environment based on the constructivist perspective. This study finding could be implemented to create a new modern mathematics elementary curriculum that resolves the current curriculum issues. Future research is recommended in the direction of creating a new mathematical curriculum based on administrators', parents', and students' perspectives."

Bradex, M. A. (2016). *Blended learning: A case study using ALEKS and small group instruction to increase math literacy of English learners* (Doctoral dissertation). Available from ProQuest Dissertations and Theses Global database. (UMI No. 10256546)

Abstract: "There is a continuous increase in the English Language Learner (ELL) population in the United States contributing to a growing achievement gap. The ELL population in California is higher than the rest of the nation but California ELL students continue to underperform. This

study argues that second language acquisition teaching strategies and methods must change to meet growing demand particularly in the areas of Language Arts and Mathematics. The theoretical framework for this study was Technological Pedagogical Content Knowledge (TPCK) and Sociocultural Learning. To achieve the three dimensions of TPCK, educators utilized hybrid teaching methods. A California school district with a high population of ELLs agreed to employ this study's prescribed curriculum for mathematics in random classrooms. The imposed approach for blended learning had multiple facets. The tool used to demonstrate the technological knowledge of TPCK was the ALEKS mathematics computer program. Simultaneously, teachers engaged students in small groups to achieve pedagogical knowledge . The final area of content knowledge aligned with Common Core State Standards. The researcher used mixed methods sequential explanatory research design and established that blended learning works. Using paired sample t-tests and focus groups, this study found statistically significant data of increased mathematical academic achievement of the ELLs in the test classrooms where blended learning was utilized."

Bretscher, N. (2015). *Mathematical knowledge for teaching using technology* (Doctoral dissertation). Available from ProQuest Dissertations and Theses Global database. (UMI No. 10094362)

Abstract: "The focus of this PhD study is teachers' knowledge and how it is involved in interacting with technology to produce the mathematical knowledge made available in the classroom. Contrasting connectionist and transmissionist teachers' use of technology provides a means of making such knowledge visible, allowing an exploration of the nature and content of mathematical knowledge for teaching using technology. In addition, this study examines how and to what extent the mathematical knowledge made available through a teacher's interaction with technology is distributed across the teacher and technology. The first, quantitative phase of the project surveyed English secondary mathematics teachers' use of technology (n=183). Using Rasch analysis to construct a transmissionist measure of self-reported pedagogic practice, a surprising association is found between frequent use of teacher-centred software and a more connectionist orientation. The survey data also suggests that 'teacher-centred' practices involving ICT may instead be construed as 'dominant' practices, since they are most frequently occurring across all teachers. In the second, qualitative phase of the project, two connectionist and two transmissionist teachers were selected as case studies on the basis of their responses to the survey instrument. Data collection involved a semi-structured interview based around a GeoGebra file on circle theorems, two classroom observations and postobservation interviews. Data analysis using the TPACK framework suggests the nature of mathematical knowledge for teaching using technology as abstract, mathematical knowledge and yet simultaneously as mathematical knowledge situated in the context of teaching using technology. Using the Knowledge Quartet, a conceptualisation of the content of mathematical knowledge for teaching using technology in relation to the topic of circle theorems is developed, demonstrating the highly complex nature of such knowledge. Ameliorating this complexity, this study provides indications of how a distributed view of cognition might offer potential strategies for facilitating teacher interaction with technology."

Champion, R. (2017). *Digitally sound? Teachers' use of digital literacies in predominantly African American classrooms in a low-SES urban school setting* (Doctoral dissertation). Retrieved from http://scholarworks.gsu.edu/ece_diss/30

Abstract: "While digital technologies have been recognized as a necessary part of school learning, a digital divide persists between those who have technological access and those without technological access. African American children in impoverished, urban areas may lack the same opportunities to use technology as children in higher socioeconomic status (SES) areas. Research demonstrates that schools may serve as an equalizer in bridging this digital divide. Thus, students who attend schools in low SES comminuties can benefit from the integration of Digital Literacies (DL) during literacy instruction. This qualitative study examined how teachers in an urban, low SES school struggled to utilize DL in ways that challenged traditional literacy practices. To understand these struggles, this study examined how elementary teachers within this demographic used DL in response to the demands for technology during literacy instruction. Guiding questions included: a) What pedagogical practices do teachers of African American children in urban, low SES classrooms use when integrating digital tools during their literacy instruction? b) How do these teachers' perceptions of Digital Literacies's usefulness impact the ways they use Digital Literacies during their literacy instruction? c) What challenges do the teachers face and how do they respond to these challenges as they integrate Digital Literacies in their classrooms? Data collected included observations of teachers during Digital Literacies lessons, individual and focus group interviews, audio-journals entires, curriculum maps, and lesson plans. Data were analyzed using a constant comparative method to allow themes to emerge. Results from this qualitative study revealed that teachers exhibited three levels of Implementation of DL, including Limited, Moderate, and Full Implementation. Examination of teachers' pedagogical practices using the TPACK rubric and the SAMR model of integration revealed that a teachers's willingness to implement DL is dependent upon variations in the level of DL knowledge and intangible variables such as a teacher's beliefs toward technology, a teachers' comfort level, and the teacher's response to challenges that occur. This study's aimed to provide valuable information to the existing body of research on DL for teachers of African American students."

Clarke, A.-M. (2016). *A digital narrative inquiry with teachers developing instructional digital stories: Opportunities and challenges* (Unpublished doctoral thesis). Queen's University Belfast, Belfast, Ireland. Abstract retrieved from http://ethos.bl.uk/OrderDetails.do?uin=uk.bl.ethos.706290

Abstract: "Technology was highlighted by the Organisation for Economic Co-operation Development and the United Nations Educational Organisation as an important feature in teacher professional development. Both Organisations stressed the importance of teachers having pedagogical understanding of its uses rather than simply being trained to integrate it into classroom practice. The Teaching Council of Ireland responded to this by developing policy on the Continuum of Teacher Education (CPD), aimed at enabling teachers to develop innovative methodologies including technology integration. This inquiry builds on in-school CPD using a framework known as Technology, Pedagogy and Content Knowledge (TPACK) within a

situational learning environment. The methodological approach is positioned within digital narrative inquiry concentrating on the narration of four teachers across the curriculum. The design comprises two forms of story by each teacher as data. The first is an instructional digital story for use in a curriculum lesson, while the second is a reflection on the experience of creating and using the instructional digital story. Each teacher's narrative is presented after using a thematic analysis in relation to the TPACK framework, challenges and opportunities. The findings indicate professional development of learning a new technology tool such as Digital Story depends on a teachers ability to see a clear connection between the technology and content as well as its pedagogical uses. The style of instructional story created by each teacher is influenced by personal belief in the value of storytelling for instruction and the appropriateness of its use in certain areas of the curriculum. Common challenges focused on time needed to create, use of personal voice recordings and image selection. Rewards indicated increased self efficacy, greater student engagement and acceleration of learning. The situational learning environment developed enthusiasm to create future Digital Stories and aroused interest from other teachers in the school."

Cumbee, C. M. V. (2017). *Elementary teachers' use of technology for teaching and parent communication in low socio-economic classrooms: A case study* (Doctoral dissertation). Available from ProQuest Dissertations and Theses Global database. (UMI No. 10263560)

Abstract: "Rural areas have less technology access due to an inadequate amount of income and limited internet bandwidth availabilities, perpetuating the digital gap between rural schools and schools in urban or suburban locations. The problem addressed in this study is that U.S. legislation requires all public school students to be prepared to function in a technology-driven society, yet socio-economically disadvantaged students and parents are less likely to have technology access outside of school. The purpose of this qualitative case study was two-fold, and sought to investigate rural elementary teachers' experiences of: 1) utilizing technology to teach low socio-economic students with diverse needs and little or no technology access outside of school; and, 2) using technology in parent-teacher conferences with parents who have limited or no technology in the home. The sample included ten teacher participants. All participants are certified teachers currently employed at the rural school study site teaching in grades first through fifth. Participants completed an open-ended, qualitative, online questionnaire about technology practices in the classroom. Findings revealed that there were barriers with the quality, rather than the quantity of technology used in rural, low-income schools, which included slower internet speeds and technology delivery issues. Barriers to communication with families included family's lack of cell phone access and affordability. Despite technology barriers, it was found that technology increased student engagement and motivation in learning. One suggestion for future research is to conduct a quantitative study to assess technology usage in rural schools within low income communities in the state where this study was conducted and in rural areas across America."

Depew, R. W. (2015). *Investigating the technological pedagogical content knowledge (TPACK) and technology leadership capacities of K-12 public school principals* (Doctoral

dissertation). Available from ProQuest Dissertations and Theses Global database. (UMI No. 3734106)

Abstract: "It is understood that principals play a key role the integration of computer technology their schools, however there have been limited studies exploring the level of technology knowledge and technology leadership skills possessed by school principals and how these measures relate to each other. Technological pedagogical content knowledge (TPACK) is a popular framework for understanding the teacher knowledge required for effective technology integration. This framework has been used to study a number of different populations including pre-service and in-service teachers in a variety of grade levels, subject areas, and pedagogical contexts. This is the first time this framework has been applied to school principals. Technology leadership capacity for this study was defined by the ISTE Standards for Administrators, which define the skills school leaders need to support the successful use and integration of computer technology.

The purpose of this study was to adapt and apply the TPACK framework to school principals, to measure the technology leadership skills of those principals, and to identify whether a relationship exists between the measures. This study employed two distinct survey instruments that were delivered online. The Principal TPACK Survey used in this study was adapted from an existing TPACK survey by Schmidt et al. (2009). The Technology Leadership Inventory (TLI) is an original instrument developed to align with and measure the leadership skills represented in the ISTE Standards for Administrators.

In addition to providing baseline data for principal TPACK and principal technology leadership capacities, results indicate a strong positive correlation between TPACK and their technology leadership capacities. Additionally, results indicate principals are more knowledgeable of more traditional, non-technological conceptions of pedagogy and content. Finally, because of the strong correlation between the two measures, it is recommended that in order to improve the technology leadership ability of principals, special consideration should be given to building knowledge emphasizing the connection between technology, pedagogy, and content that is specific to classroom contexts rather than more managerial applications."

Dillon, P. A. (2017). *How deeper learning and 21st century skills influenced one suburban district's transition to 1:1 student technology* (Doctoral dissertation). Available from ProQuest Dissertations and Theses Global database. (UMI No. 10261930)

Abstract: "The purpose of this study was to examine administrator, student, and teacher perceptions of organizational structures, systems, and supports implemented to aid technology integration, and the potential for that technology integration to achieve 21st century skill acquisition and deeper learning in a 1:1 environment. The Diffusion of Innovation Theoretical Framework guided the design and analysis of this study. Further, a literature review of the integration of technology into content and pedagogy informed this study. The overarching research question for this study asked how teachers, students, and administrators perceive the implementation of a 1:1 district-wide implementation initiative, and its impact on 21st century

skill acquisition and deeper learning. As such, the study sought to answer the following questions: (1) How has the district organized itself to support technology integration by teachers with the specific intent of fostering deeper learning and 21st century skills? and (2) How do administrators, teachers, and students perceive the implementation of 1:1 and its impact on 21st century skills and deeper learning? An instrumental case study approach was used to explore and describe the perceptions of administrators, students and teachers using richdescription of their experiences. It is evident that the purposeful integration of technology in the 1:1 environment led to student acquisition of 21st century skills and deeper learning at the study site. In addition, the study revealed structures and supports necessary to facilitate 1:1 programs to foster deeper learning and 21st century skills including strong communication, robust infrastructure, long-range planning, stakeholder engagement, professional learning, collaboration and time. The findings of this study, along with the identification and analysis of related themes, have the potential to inform similar districts as they embark on the implementation of 1:1 programs to foster 21st century skills and deeper learning competencies."

Duncan, P. (2015). *An evaluation for how the innovator, innovation, and context affect technology innovations in a K-5 setting* (Doctoral dissertation). Available from ProQuest Dissertations and Theses Global database. (UMI No. 3738651)

Abstract: "There are a variety of factors that can facilitate or constrain technology use in classrooms (Hew & Brush, 2006). Using a modified version of the framework for Conditions for Classroom Technology Innovations (Zhao et al., 2002), this study explored how the innovator, innovation, and context impact technology use in four K-5 elementary schools. The TPACK framework was used to analyze teacher knowledge and support structures (Mishra & Koehler, 2006). Research has called for more contextualized studies in schools, that include stakeholders like teachers and administrators, and that focus on supports like vision, access to technology, training, collaboration, and technical support. Of particular importance is not just the availability of these supports but how well they flexibly and responsively meet the needs of teachers (Granger et al., 2002; Rutkowski et al., 2011).

Therefore, the purpose of this study was to conduct a program evaluation to determine the needs of teachers using the framework so the district could improve context supports to better meet teacher needs and improve teaching practices. Study participants included fifty-eight teachers who participated in a survey—twenty of whom also participated in focus groups. Other relevant stakeholders included technology coaches, principals, tech support personnel, and central office administrators who participated in interviews or focus groups.

The findings established a wide variety of needs that could benefit from greater responsiveness from the supports the district has established. The innovators demonstrated a need for more ongoing, detailed training for basic technical knowledge before widespread integration at the level of TPACK could be established. With increased access to a variety of technologies, "easy and efficient" use is needed if teachers are going to be able to properly integrate the number of tools that are becoming available to them due to decreased costs for new technology. Also

important were underlying beliefs that were hindering greater technology integration, particularly with decentralizing the classroom for more student-centered practices. Teachers had a variety of "distances" between themselves and technology, and between the desired technology practices and their current practices.

The implications call for the district to more purposely use teachers' needs to drive the flexible supports it already has in place. This includes articulating a short-term vision and improving the coordination of support structures to help all teachers meet the vision. Those supports would involve ongoing discussions about teacher pedagogical beliefs, increased coaching during the school day, structured collaboration to meet the vision, and more ongoing training for basic technical knowledge. This study shows the importance of using all relevant stakeholders to evaluate a program for improved practices and to use teacher needs to coordinate improved context supports."

Ellis, J. A. (2015). *Develop, discuss, and decide: How new science teachers use technologies to advance their practice* (Doctoral dissertation). Available from ProQuest Dissertations and Theses Global database. (UMI No. 3727953)

Abstract: "For decades, there has been a nationwide demand to increase the number of science teachers in K-12 education (National Commission on Excellence in Education, 1983; National Research Council [NRC], 2007). This demand is in large part due to increases in state science graduation requirements. Teacher preparation programs have been preparing new science teachers on pace with the resulting increase in demand (Ingersoll & Merrill, 2010), however, shortages have continued as up to 50% of these new teachers leave the profession within their first five years of teaching (Smith & Ingersoll, 2004), creating a "revolving door" phenomenon as districts scramble to address this early attrition with yet more beginning teachers. We need to address what Ingersoll (2012) describes as the "greening" of the teaching force: the fact that an increasingly large segment of the teaching force is comprised of beginning teachers who are at a high risk of leaving the profession.

The three related studies that comprise this dissertation focus on the role of technological interventions for in-service and pre-service science teachers. The context for the first two studies is TIN, an online induction program for beginning secondary science teachers. These two studies consider the impact of technological supports on the reflective practice of participating teachers. The design interventions included VideoANT (an online video annotation tool) and Teachers as Leaders roles (a structured response protocol) for the Venture/Vexation online forum activity. The context for the third study is T3-S, a university licensure course for pre-service science teachers designed to explore technology integration in secondary science classrooms. This study investigated the impact of pre-service teacher participation in the creation of an Adventure Learning (AL) environment (Doering, 2006) on their understanding of technological, pedagogical, and content knowledge (TPACK) and its role in their future science instruction. The supporting interventions took the form of three separate groups of pre-service teachers, each tasked with a specific role in the creation of the AL environment.

Findings from the first two studies indicate that specific, explicit supports for teacher discourse in TIN activities is needed in order to foster the reflective practice that course designers and instructor-facilitators desire. The third study reveals that pre-service teacher participation in the creation of an AL environment supported their understanding of the nature of TPACK and allowed them to define their content-based technology pedagogy for future science instruction."

Ferrari, K. A. (2016). *Examining the design and implementation of a professional development program on the use of writing software in a school for the deaf* (Doctoral dissertation). Available from ProQuest Dissertations and Theses Global database. (UMI No. 10247074)

Abstract: "Nikolaraizi, Verkiri and Easterbrooks (2013) documented how deaf learners can benefit from the use of visual supports in the classroom. Technology provides the tools to create a robust visual learning environment (Smith & Okolo, 2010). For teachers to facilitate learning in a technology rich environment, they themselves must be comfortable with the tools and understand how to effectively integrate their use into curricular delivery.

This project examines the design, implementation and evaluation of a professional development program that was created to educate deaf education teachers about the use of the educational software, Clicker6. The Clicker6 Professional Development program was designed specifically to integrate the use of technology with the newly adapted bilingual curricular approach to teaching English Language Arts (ELA).

The Clicker6 Professional Development Program consists of four teacher improvement goals: (1) to build competency in the use of the Clicker6 software; (2) to promote understanding of the connection among Clicker6 software, literacy content and pedagogy; (3) to provide time to create instructional classroom materials in Clicker6 directly aligned to teachers' curriculum goal; (4) to support teachers' continuing training as they implement Clicker6 in the classroom.

Following teacher participation in the program, an investigation was conducted to understand and characterize the impact of the program on teacher learning. Specifically, this effort focused on three key questions: (1) What impact did the Clicker6 professional development program have on the teachers' technical ability to operate the software?; (2) How did participation in the Clicker6 training influence teachers' use of the software in relation to English Language Arts (ELA) curricular content in the classroom?; and (3) What were the teachers' perceptions of the Clicker6 professional development program?

Fifteen English language arts (ELA) teachers participated in the Clicker6 professional development program. Four sessions of training were offered during a single in-service day, and focused upon use of Clicker6 software as a classroom instructional tool. The program continued the following week with an in-class support session in which the facilitator offered assistance while the teacher used the technology in the classroom. Approximately two weeks after the initial professional development sessions, the teachers met together with the facilitator for 45 minutes of support follow-up. Data were collected through surveys, observations, and interviews. Survey data examined changes in Technological Pedagogical Content Knowledge

(TPACK) among teachers before and after their participation in the professional development. Observation rubrics were used to assess the teachers' demonstrated ability in the use of the software as a result of the professional development. Finally, interviews were used to collect qualitative data regarding teachers' perceptions of the professional development program.

Findings indicated that teachers were positive regarding the Clicker6 professional development offering. Further, findings suggested an increase in teachers' capacity to technically operate the Clicker6 software and integrate it into their curriculum following the training.

Recommendations were made in regard to planning and design of future technology-related professional development with the goal of improving its effectiveness. These include: (a) provide multiple sections of training based on teachers' technology competency; (b) schedule sessions over the course of a school year; (c) provide monthly email communication with tips and tutorials; (d) schedule teacher-to-teacher observations of the use of Clicker6 in the classroom setting; (e) expand professional development for other subject areas; (f) add a session on managing student use of the software; and (g) add a session on technical trouble shooting."

Fitzgerald, A. T. (2015). *Supporting teachers' integration of technology with e-learning* (Doctoral dissertation). Available from ProQuest Dissertations and Theses Global database. (UMI No. 1603340)

Abstract: "Teachers need training to integrate technology into classroom curriculum, activities, and pedagogy. The adoption of the Common Core State Standards and statewide computer based assessments, coupled with technology's rapid rate of innovation and change, has only increased the need to help support teachers' development of these necessary skills. The purpose of this project was to create an online-based e-learning professional development training module for teachers to develop their technological, pedagogical, and content knowledge (TPACK) and skills. The design of the training module incorporated e-learning design principles, adult learning principles, and current research on developing teachers' TPACK. To provide feedback on the design, teachers from two middle schools in Southern California were invited to use the training module, and were surveyed regarding their experiences. Results of the survey indicate participants gained knowledge and skills for using their school computer lab, integrating technology into their classroom instruction, and overall, were pleased with the e-learning training module."

Garbo, L. M. (2016). *Technology integration: A mixed methods study of veteran secondary teachers' beliefs, attitudes, and classroom practices* (Doctoral dissertation). Available from ProQuest Dissertations and Theses Global database. (UMI No. 10255704)

Abstract: "The veteran secondary teacher is a valuable asset in the educational field, yet has not been the focus of predominant research studies in regard to attitudes, beliefs, and experiences with technology integration. This study utilized the Explanatory Sequential Mixed Methods Design, which was implemented in two phases. The research was designed to investigate how veteran secondary teachers in a Southwest Florida public school district are

being affected by the pedagogical movement concerning the integration of educational technology. In phase one of the study, quantitative data was collected from 97 veteran secondary teachers at five secondary schools utilizing the online Teachers' Use and Perceptions Survey (TUPS), developed by the Florida Center for Instructional Technology at the University of South Florida. In phase two, convenience sampling was used to select 10 teachers from the veteran secondary teachers who participated in the survey. Qualitative data was collected during face-to-face interviews which utilized open-ended interview questions that were developed following an analysis of the survey results. Overall, veteran secondary teachers' perceptions were positive; they believe that technology enhances their teaching, perceive the benefits of technology in terms of supporting their classroom instruction, and feel strongly that student use of technology enhances students' performance. Most veteran secondary teachers indicated they feel comfortable using technology in their teaching and believe they use technology effectively in their teaching for instructional delivery, as a communication tool, and for students' independent learning. These teachers also indicated a need for comprehensive technology training, a supportive learning network, opportunities to explore technology applications, and time to plan for technology integration as a pedagogical strategy."

Glazer, K. (2015). *Imagining a constructionist game-based pedagogical model: Using tabletop role-playing game creation to enhance literature education in high school English classes* (Doctoral dissertation). Available from ProQuest Dissertations and Theses Global database. (UMI No. 3731117)

Abstract: "In today's K-12 educational environment with the newly adopted Common Core State Standards (CCSS), improving student literacy as a foundational skill to obtain success in all other subject areas is one of the most important goals. Unfortunately, many literature curricula suffer from a lack of innovative pedagogy despite the introduction of various educational technologies meant to aid student learning. This study focused on developing a new game-based constructionist pedagogical model for literature education using tabletop role-playing game creation. Using Shulman's (1987) Pedagogical Content Knowledge (PCK) that eventually evolved into Mishra and Kohler's (2006) Technological Pedagogical Content Knowledge (TPACK) as the main theoretical framework, this design-based research showed how tabletop role-playing game creation as a constructionist pedagogical strategy successfully helped high school students to receive the benefits of high quality literature education."

Gonzalez, M. D. (2016). *Understanding the technological, pedagogical, and mathematical issues that emerge as secondary mathematics teachers design lessons that integrate technology* (Doctoral dissertation). Available from ProQuest Dissertations and Theses Global database. (UMI No. 10583408)

Abstract: "This multiple case study examines four groups of secondary mathematics teachers engaged in a Lesson Study approach to professional development where they planned and taught lessons that integrate technology. Informed by current literature, a framework was developed to focus on the dimensions of teacher's knowledge to teach mathematics with technology that appear to influence teacher's decisions during lesson planning. These

dimensions of teacher's knowledge include knowledge of mathematics, knowledge of pedagogy, knowledge of technology, and other types of knowledge that are developed by the interactions of those.

At the beginning and end of the Lesson Study, quantitative data was collected using a pre-post survey to measure changes in teacher's self-perceptions of the knowledge to teach mathematics with technology. Qualitative data was collected as the groups engaged in designing a mathematical lesson, as a volunteer teacher from each group implemented that lesson, and as a group reflected in the planning and implementation of the lesson. This includes audio recordings, video recordings, and field notes.

Results of this study demonstrate that when teachers are engaged in professional development activities that are focused on having teachers plan thoughtful and detailed lessons that integrate technology, their self-perceptions of their mathematical knowledge (MK), technological knowledge (TK), and technological, pedagogical, and mathematical knowledge (TPACK) increases significantly. Finding suggests that professional development opportunities where teachers collaborate with colleagues could motivate the integration of technology tools into teaching, and could stimulate changes to pedagogical approaches. Findings also suggest that when teachers exhibit appropriate mathematical knowledge, and have in-depth discussions about the pedagogical approach to take, the integration of technology seemed to flow naturally. Findings also suggest that when teachers seemed to lack mathematical understanding of the topic being taught, and are not willing or motivated to change their pedagogical approaches, they do not use technology in ways that can potentially impact students' engagement with mathematical ideas."

Grosser, D. A. (2017). *A multiple case study of co-teachers' technology integration knowledge: How it is held, built, and shared* (Doctoral dissertation). Available from ProQuest Dissertations and Theses Global database. (UMI No. 10268083)

Abstract: "This multiple case study explored how secondary-level co-teachers hold, build, and share knowledge related to technology integration. Co-teaching, a special education service delivery model, involves a general and special educator who share responsibility for planning, delivering, and assessing instruction (Friend, 2014). Through the lens of the Technological Pedagogical Content Knowledge (TPACK) framework (Mishra & Koehler, 2006), I explored the perspectives and experiences of four co-teaching pairs who regularly integrated technology into instruction. Study results suggested that these teachers held knowledge, beliefs, and values that influenced their classroom practices. The micro-level contextual elements in the teachers' workplaces, along with meso-levels supports, influenced how the teachers built and shared knowledge with and from each other. Their collaborative relationships, which were based upon parity, respect, and communication, supported a professional work environment of sharing and learning. As these teachers engaged in dialogue within their teaching and learning partnerships, individually-held knowledge (TPACK) was distributed between the co-teachers. Content-, grade-, and school-level collaborations addressing technology integration also resulted in the distribution of TPACK school-wide. Implications of these results include recommendations for

how school leaders may support effective co-teaching, which can enhance teachers' professional learning related to technology integration and encourage the development of distributed knowledge."

Heintzelman, S.C. (2017). *Integrating technology to engage students with EBD: A case study of school leader support* (Doctoral dissertation). doi: 10.13023/ETD.2017.155 Retrieved from http://uknowledge.uky.edu/cgi/viewcontent.cgi?article=1030&context=edsc_etds

Abstract: "The purpose of the study was to examine the role of leadership and school culture on the integration of technology to support instruction for students with emotional and behavioral disorders (EBD). A multiple embedded case study design was used to describe how a school leadership team supports a school culture for technology integration within classrooms where special education teachers integrate technology to engage students with EBD. The primary case of school culture includes a comprehensive description of how the school leadership team supports a culture for technology integration within classrooms. Embedded cases within the primary case describe how special education teachers integrate technology to engage students with EBD in classroom instruction. Technological Pedagogical Content Knowledge (TPACK) (Koehler & Mishra, 2005) is part of the conceptual framework to theoretically undergird the study. The findings of this study describe a school that serves students with EBD where there is a strong school culture and leaders support teachers who integrate technology to engage students. Patterns from the analysis indicate school leaders plan for staff development, participate in staff development sessions with teachers, observe teachers, provide feedback about teacher performance, and praise and encourage teachers to integrate technology. Teachers and leaders engage in formal and informal staff development opportunities to learn how to integrate technology into classroom lessons. As a result of these trainings and school leader support, teachers provide clear expectations for students while integrating technology to engage students, provide direct instruction, choices, and visual representation of content."

Henton, M. C. (2016). *Technology integration practices of faculty in the Louisiana Community and Technical College System* (Doctoral dissertation). Available from ProQuest Dissertations and Theses Global database. (UMI No. 10307801)

Abstract:
"Purpose and Method of Study
This study analyzed the technology integration practices of faculty in the Louisiana Community and Technical College System using a conceptual framework that considers expertise in technology, pedagogy, and content knowledge. In this quantitative descriptive study, the TPACK Confidence survey was administered to 225 faculty in 11 community and technical colleges in Louisiana. The instrument included attitudinal questions and two demographic questions.

Findings and Conclusions
Faculty reported that they were very interested in using information and communications technology (ICT) in teaching and learning, but they were not very confident in using ICT to

enhance their teaching. It was also indicated that faculty had positive attitudes toward using ICT in teaching and learning, but they were only somewhat confident in using it in instruction to transform their teaching and learning activities. Faculty also reported that they were confident in their digital technology knowledge and the foundational competencies measured by the TPACK Vocational Self-efficacy scale. In addition, they indicated high levels of access to basic forms of ICT, but only limited access to the newer forms of ICT. Faculty expressed competence in using common applications such as word processing, desktop publishing, presentation software, spreadsheets, and email. However, significant differences were found between departments for the use of ICT to enhance teaching and learning, to transform teaching and learning, interests and attitudes toward using ICT, access to different forms of ICT, digital technology knowledge, and competence in using some ICT applications. The study concluded that technology training for faculty should be discipline specific."

Lugar, D. J. (2017). *Identifying professional development needs of high school teachers tasked with online course design* (Doctoral dissertation). Available from ProQuest Dissertations and Theses Global database. (UMI No. 10259148)

Abstract: "To satisfy demand for online learning opportunities at the high school level, 3 school districts in the northeast United States established a consortium to share resources to develop and deliver online courses. High school teachers who volunteered to develop courses for the consortium attempted the task without previous training in online course design and facilitation. High school students enrolled in the courses often did not successfully complete them, which obstructed the mission of the consortium. The purpose of this qualitative single critical case study was to explore teachers' experiences with and perceptions of designing and developing online courses without accompanying professional development. The iNACOL National Standards for Quality Online Courses (v2) and technological, pedagogical, content knowledge (TPACK) served as the conceptual frameworks for the study. Five teachers who developed and facilitated an online course for the consortium, without companion professional development, volunteered to be interviewed. Data were reduced using NVivo software and analyzed using a priori codes based on NACOL standards then open-coded for emerging themes. Results indicated that other than content expertise, teachers did not believe they had sufficient competencies in any of the areas identified in the iNACOL standards. Based on these results, an online professional development course for teachers was designed to provide introductory training and to model elements of quality online course design using the Moodle learning management system. Positive social change may be achieved if teachers have the knowledge and skills required to develop high-caliber, innovative, and convenient education opportunities that encourage students' course completion which leads to learning and academic success."

Luna, A. (2015). *Embracing the challenge of growing the "T" in STEM and its role in teaching and learning: A case study* (Doctoral dissertation). Available from ProQuest Dissertations and Theses Global database. (UMI No. 3722882)

Abstract: "Education is constantly evolving, facing new demands from changing standards in a competitive global society. California K–12 schools are now navigating greater demands for technology integration from the Common Core State Standards and NGSS to develop students' 21st-century skills and improve learning outcomes. The focus of this case study was to identify the decisions, actions, and leadership taken by one school to embrace technology as a tool for instruction. Multiple data collection methods were implemented, including a staff survey, participant interviews, observations, and review of documents for triangulation. The study used the TPACK framework as a conceptual model to guide the investigation. The results from this qualitative case study indicated that key factors to creating a school that embraces technology include: collaboration among teachers, administration, and the district; a shared vision; having the right people on board; continuous and effective technology professional development; building teacher capacity; and having a strong collaborative leadership team. In addition, the findings suggested that technology implementation can be led by the school district when all stakeholders are taken into consideration with each decision and action for dissemination of resources and professional development (PD). This case study seeks to further practitioners' and policymakers' understanding of what the technology implementation process looks like in transforming teacher instruction and student learning."

Malik, K. D. (2015). *A case study on how teaching in a one-go-one setting with the iPad is aligned with the TPACK framework* (Doctoral dissertation). Available from ProQuest Dissertations and Theses Global database. (UMI No. 10145126)

Abstract: "This mixed-method multiple-case study explores the ways successful teaching with the iPad in a one-to-one classroom setting is aligned with the TPACK framework. The research was conducted at a college-preparatory high school with a two-year history of teaching and learning with the iPad. A teacher was selected from each of the following content areas: English, mathematics, history and biology. Data collection included semi-structured interviews, lesson plan documents, direct classroom observations, and a survey. The qualitative data was analyzed using the Atlas.ti software and the quantitative data using the methods of descriptive statistics. In the cross-case analysis both qualitative and quantitative data were compared and contrasted with the theoretical TPACK framework and the findings of other research studies measuring the TPACK construct."

Markle, R. S. (2016). *Exploring teacher readiness: What features of professional development enhance motivation to implement technology innovations?* (Doctoral dissertation). Available from ProQuest Dissertations and Theses Global database. (UMI No. 10194879)

Abstract: "Several studies suggest that if evidence-based school innovations are to be successful, schools must possess adequate capacity to implement them with quality. This paper utilizes a framework of organizational readiness called R=MC2 , positing that readiness to implement with quality consists of three components: general capacities, innovation-specific capacities, and motivation. Specifically, this paper investigates whether certain key characteristics of professional development (active learning, integration, time for practice, collaboration, tailoring, coaching, and provision of feedback) can impact teacher motivation to

implement novel educational practices. The paper answers two major research questions: 1) Which characteristics of quality professional development (PD) are related to each of the components of motivation described in the R=MC2 model? and 2) Is motivation a significant mediator of the relation between quality professional development and teacher implementation of new practices? Data for this study were collected from a district-wide one-to-one computing initiative in a Southeastern school district. The purpose of the initiative was to provide each student in grades 3-12 with a personal laptop or tablet, with the goal of increasing personalized, authentic, collaborative, and tech-integrated (PAC-Tech) learning in the district. Data were collected from two sources: 1,509 teachers completed a survey relating to PD at their school, their motivation to implement the initiative, and their use of PAC-Tech learning in the classroom. In addition, four district-level Technology Integration Specialists (TIS) provided data concerning PD quality at each of the district's schools as a secondary source of data. Mediation analyses revealed that motivation was a significant mediator of the relation between PD quality and teacher implementation quality. Using multi-level regression, analyses suggest that the most influential characteristics of PD on motivation are 1) integration of new ideas with teachers' existing knowledge, 2) tailoring PD to teachers' individual needs and preferences, 3) providing opportunities for collaboration among teachers, and 4) providing consistent feedback to teachers. Thus, the present results predict that schools that design PD that integrates new and familiar concepts to make it easy for teachers to learn a new practice, that allow teachers to work together in learning that practice, that provide feedback to teachers during the learning process, and that survey teachers about their specific needs, preferences, and learning styles are more likely to secure buy-in and support from teachers for a particular innovation. Further, this buy-in is subsequently related to the likelihood and quality of teacher implementation of that innovation. These results are likely to be of interest to schools and school districts seeking to enhance implementation of educational innovations and increase teacher buy-in for using novel, evidence-based strategies."

Matty, J.A. (2016). *High-stake testing as a barrier to technology integration* (Doctoral dissertation). Available from ProQuest Dissertations and Theses Global database. (UMI No. 3728077)

Abstract: "The purpose of this study was to analyze the lesson plans of high school teachers for technology integration in high-stake tested and non-tested contexts. The aim of this research was to provide information and recommendations to educators of the district concerning the planning of lessons and integration of technology in high-stake subject contexts. The data collected provided information regarding a teacher's planning of lessons that integrated technology in high-stake tested and non-tested subjects. A TPACK- Based Technology Integration Assessment Rubric was used to evaluate the lesson planning of 435 teachers in English and Science subjects in either a high-stake tested or non-tested context. ANOVA testing was completed to measure statistically the differences among the lesson planning within the same subject area and context while t-tests were completed for comparison between high-stake tested and non-tested subjects for Science and English. The results of the study indicated that technology integration was influenced by context when comparing high-stake tested Biology with non-tested Science subjects. In contrast, results between high-stake tested and

non-tested English subjects did not support the hypothesis that a high-stake tested context was a barrier to technology integration. Based on these results, a Six-Step Growth Design Process was developed to further investigate the influence of subject and individual teacher planning habitus upon the high-stake context barrier to technology integration. The Six-Step Growth Design Process will be implemented to increase technology integration in the classroom and improve its use in different contexts. The process will allow educators to examine the application of technology and reflect upon instruction."

McCusker, L. (2017). *Professional development recognizing technology integration modeled after the TPACK framework* (Doctoral dissertation). Available from ProQuest Dissertations and Theses Global database. (UMI No. 10265301)

Abstract: "Public school teachers within a Pennsylvania intermediate unitare receiving inadequate job-embedded professional development that recognizes knowledge of content, pedagogy, and technology integration, as outlined by Mishra and Koehler's Technological Pedagogical Content Knowledge (TPACK) framework (2006). A school environment where teachers are expected to educate themselves on how to integrate technology into the classroom will not adequately produce students for today's digital world. The purpose of this study was to relate differences in the technology integration of K-12 public school teachers to the adoption of the TPACK framework into a school district's professional development model. This mixed methods constructivist/interpretivist case study assessed the efficacy of professional development of K-12 public school teachers on their practice of integrating the TPACK framework. The proposed research explained how the technology integration of individual teachers is affected by professional development offered, measured how the teachers' practice of integrating the TPACK framework relates to the professional development offered, and identified best practices for professional development."

Miller, S. B. (2017). *Teachers' use of instructional moves during technology-based mathematical activities* (Doctoral dissertation). Available from ProQuest Dissertations and Theses Global database. (UMI No. 10270262)

Abstract: "This study investigates instructional moves by teachers in mathematics classrooms in which technology-based activities (i.e., student-oriented simulations) and features of those simulations influence classroom practices. Four teachers were studied over the course of a year as an exploratory study to build interpretive cases that described instructional practices in technology-based lessons. Teachers developed lessons using PhET simulations designed to support algebraic reasoning. Data sources included teachers' process of selecting and designing lessons, observations of teachers' non-technology and technology-based mathematical activities, and teacher interviews and reflections.

This work was based on a conceptual framework blending the ideas of Mathematical Tasks (Stein, Smith, Henningsen, & Silver, 1998), Mathematical Pedagogical Content Knowledge (Ball, Thames, & Phelps, 2008), and Technological Pedagogical Content Knowledge (Mishra & Koehler, 2006), in which teachers' instructional practices are determined by teachers'

mathematical pedagogical content knowledge, task selection and design, and use of technology.

Results indicated that teachers see simulations as having significant benefits in the classroom. Teachers leveraged these opportunities by increasing class discussions, engaging in higher levels of thinking and reasoning, and focusing on mathematical representations. When teachers used simulations, the teachers spent less time in direct instruction, focused more on the mathematics, and focused more on investigations rather than drill-oriented tasks.

Technology in the classroom, however, was problematic for some teachers. The very nature of students working independently with their own devices meant that student-student interactions decreased in some lessons. Furthermore, teachers' discomfort in managing technology seems to limit ongoing use.

Specific features of the simulations that prompted instructional moves included the ability to support conceptual understanding and build student engagement. Simulations also provided a 'low floor, high ceiling,' supporting differentiation, and a dynamic responsiveness, facilitating connections between representations. On the other hand, teachers raised concerns that some features of the simulation could do the math for the students. Furthermore, the perception of simulations as being a game may impact how and when simulations are used.

The emergent use of technology in math classrooms is under-supported. For simulations to be used in a more extensive fashion in mathematics classes, professional development and curricular materials are needed to support implementation."

Morquin, D. (2016). *Teachers' perceptions regarding the use of Google Classroom and Google Docs and their impact on student engagement* (Doctoral dissertation). Available from ProQuest Dissertations and Theses Global database. (UMI No. 10127995)

Abstract: "The International Society for Technology in Education (ISTE) Standards, in correlation with the 21st Century Learning skills, emphasizes the importance of developing creativity and innovation, promoting communication and collaboration, stimulating decision making and leadership, stressing digital citizenship, and experiencing a digital learning culture. Google Classroom in combination with Google Docs has been adopted by many school districts to meet ISTE standards. Using the Technology Pedagogical Content Knowledge (TPACK) Model as a framework, this study explored teachers' perceptions as they use Google Classroom and Google Docs and their impact on student engagement. The results obtained from this research provide school districts with information to assist them in the decision to adopt Google Apps for Education (GAFE) and Google Classroom as a cloud-based learning environment to reach ISTE Standards."

Mroziak, J. (2017). *Exiles on main street: A pedagogy of popular music through technology & aesthetic education* (Doctoral dissertation). Available from ProQuest Dissertations and Theses Global database. (UMI No. 10260014)

Abstract: "This dissertation investigates the application of instructional technology within the specific context of popular music education. Synthesizing the work of Mishra & Koehler (2006) and Bauer (2014), this dissertation operationalizes a broader, more contemporary definition of instructional technology that goes beyond the traditional conception of mere instructional tool towards one that is more protean, unstable, and opaque. Research questions about technology's impact on music education are central to this curriculum study and evolve into considerations on how the relationship of popular music and instructional technology shape a pedagogy for popular music education. Making use of principles rooted in aesthetic education, critical pedagogy, and TPACK, the curriculum created fulfills the requirements of an undergraduate program in music education mapped onto the National Association of Schools of Music standards. Presented along with a standards map are course overviews, syllabi, and lesson plans that specifically make use of the theoretical backgrounds discussed."

Rae, G. (2017). *BYOD (Bring Your Own Device) and its impact on teacher pedagogy: A New Zealand case study* (Master's thesis). Retrieved from https://ir.canterbury.ac.nz/handle/10092/13427

Abstract: "The practice of students bringing their own device to school BYOD (Bring Your Own Device) has now become reasonably common in New Zealand primary schools after being first introduced in the late 1990s. It has become a strategy that schools can use to provide 21st century learning opportunities for students without having to provide school‑‑‑owned devices. This study raises important questions for teachers and schools to ask themselves before implementing BYOD.

This study explores the experiences of three New Zealand primary school teachers as they introduce BYOD into their classrooms. The case study sought to understand what factors impacted on their ability to implement new pedagogical practices and how professional learning might help support teachers with BYOD.

The literature review examines national and international literature on the implementation and impact of BYOD. It discusses how and why teachers do or do not engage with ICT in classrooms and how BYOD impacts on their practice. This case study utilises SAMR (Puentedura, 2006) and TPACK (Mishra & Koehler, 2006) in order to analyse the data and discuss the findings. The findings suggest that, in order for teachers to maximise the potential of BYOD, professional learning and technical support is essential. The teachers experienced a number of challenges as they introduced BYOD, yet all managed to persevere and remain positive as they trialled new teaching methods, and utilised new programs and applications.

The study concludes by making a number of pertinent recommendations that can be actioned by schools in order to ensure implementation is smooth and successful. It is very important that teachers are supported adequately by the school and are given opportunities to engage in relevant and timely professional learning."

Ritter, D.S. (2012). *Teachers' planning process: TPACK, professional development, and the purposeful integration of technology* (Master's thesis). Retrieved from http://scholarworks.montana.edu/xmlui/handle/1/2135

Abstract: "Technology is becoming quite pervasive in society at large. Its integration into secondary schools and its use with curriculum requires a unique knowledge of its purposeful articulation as it relates to curriculum goals and student outcomes. Therefore, this study will focus on how an educator's decision-making process determines how technology will be integrated within the planning process of secondary educators, and how these decisions may be affected by an educator's technological pedagogical content knowledge, otherwise known as TPACK.

Qualitative analysis was then used to evaluate a Technology Integration Rationale (TIR) that was produced by members of a rural professional development cohort. Qualitative analysis was also conducted on transcribed face-to-face semi-structured interviews. The TIR and the interviews involved a cohort representing a rural school district who attended a professional development course that was facilitated by a University in the Rocky Mountain West. The TIR was then scored using a valid rubric to measure an educator's TPACK score. Face-to-face semi-structured interviews were transcribed by hand to gain a sense of an educator's understanding of the TPACK framework as it relates to the purposeful use of technology in lesson decision-making.

The study found that one's growing familiarity with the use of a specific technology could affect an educator's self-assessed TPACK score. Once an educator understood how to use a specific technology its familiarity made it transparent or simply just another piece of the curriculum. The study also found that barriers can have a significant effect on an educators' decision making when deciding to use technology, and as a result affects an educator's self-assessed TPACK score.

Recommendations for further study include examining how the familiarity or transparent nature of technology can affect curricular decision-making, future professional development regarding the TPACK framework, and educator beliefs or efficacy as it relates to integrating technology."

Rubadeau, Z. K. (2016). *An exploration of English language teacher educators' cognitions and practices in relation to the pedagogical purposes and efficacies of 21st-century digital technologies* (Doctoral dissertation). Available from ProQuest Dissertations and Theses Global database. (UMI No. 10175482)

Abstract: "This multiple case study investigates English language (EL) teacher educators' cognitions and practices related to pedagogical technology integration. The focus concerns five native-English speaking teacher educators (TEs) within a teaching English to speakers of other languages (TESOL) training program at a South Korean university. The goal was to determine 1) TESOL-TEs' cognitions regarding the pedagogical purposes and efficacies of 21st–century digital technologies, 2) TESOL-TEs' uses of such technologies in their practice, and 3) factors related to TESOL-TEs' decisions of whether and how to integrate technologies into their praxis. Data collected over twenty weeks in 2013 included four rounds of semi-structured interviews and two sets of classroom observations for each of the five focal participants, interviews with program administrators, written reflections, field notes, photographs, and document review. Data were coded using King's (2004) template analysis method. Categories were based on

constructs from the technological, pedagogical, and content knowledge (TPACK) framework (Mishra and Koehler, 2006) and the Unified Theory of Acceptance and Use of Technology (UTAUT, Venkatesh et al., 2003) and UTAUT 2 (Venkatesh et al., 2012). The focal participants displayed high levels of TPACK and used Web 2.0 applications extensively to facilitate interactions in their roles as teacher educators. It was found that UTAUT factors guided TEs' decisions and use behaviour to varying degrees, but that the mediating factor of age did not relate to TEs' decisions in the manner predicted by the UTAUT. TEs' cognitions both coincided with and diverged from their practices. This study contributes to research gaps on the roles, cognitions, and technology-related practices of TESOL-TEs in South Korea. Research on TEs in different contexts is recommended to gain further insights into the connections among these factors. TESOL program administrators and TEs will particularly benefit from the light shed on teacher educator cognitions and practices in this study."

Schneider, B. (2017). *Virtual civic engagement: Exploring technology, secondary social studies, and problem based learning with TPACK* (Doctoral dissertation). Available from ProQuest Dissertations and Theses Global database. (UMI No. 10254590)

Abstract: "Sociological and cultural analysts have noted the reticence of public secondary schooling to recognize and build academic activities around the participatory culture in which adolescents are so readily involved (Jenkins, Purushotma, Weigel, Clinton & Robison, 2009). Despite the Common Core State Standards having required students to demonstrate they can maximize technology to perform a range of skills involving targeted specialized research, organized writing, and visually intentional presentation (National Governors Association Center for Best Practices [NGA], Council of Chief State School Officers [CCSSO], 2010), very few classrooms have followed through. The avoidance and or failure of these educational technology integrations in secondary subject content classes raised questions. A survey of the literature showcases the many ways in which technologies were not fully matched to the tasks, expectations, or teacher skills. The mystery of epic technological classroom can be resolved if we apply the lens of Technology, Pedagogy, and Content Knowledge (Shulman, 1986; Mishra & Koehler, 2006) which speaks about the interactions and alignment tensions among these three areas. When one has applied this TPACK lens we can best understand a range of surveyed literature that speaks to disconnect among technology affordances, teacher pedagogies, and requirements of content knowledge. Among a range of TPACK research emerges a sub-set that advocates for the value of cognitive scaffolding through hard scaffolds and soft scaffolds (Saye & Brush, 2002). Previous research has suggested the hard scaffolds can offer a built pedagogy filled with student project expectations and that soft scaffolds can provide specific practices support that is customized and relevant for participants. This research study engages in design-based research to refine hard and soft scaffolds to support high school social studies students through a multi-phase oral history project. Engaging 2 sections of students at a progressive public high school, the researcher engaged in a two-iteration cycle of design activities between November 2014 and March 2015. A student work digital portfolio was turned in after students used the first iteration scaffolds. After a teacher-provided analysis of student work using the researchers provided rubric, tweaks were made to the scaffolds. A post-interview with participant teachers provided further refinement."

Seamster, C. L. (2016). *Approaching authentic assessment: Using virtual school teachers'*
expertise to develop an understanding of full time K-8 virtual school teacher practices
(Doctoral dissertation). Available from ProQuest Dissertations and Theses Global
database. (UMI No. 10583070)

Abstract: "According to Molnar (2014), full time virtual school education lacks a measurement
tool that accurately measures effective virtual teacher practice. Using both qualitative and
quantitative methods, the current study sought to understand the common practices among
full time K-8 virtual school teachers, the extent to which teachers believed such practices
impacted student learning, as well as the methods in which current standards,
recommendations and practices were implemented in the full time K-8 virtual school setting.
The relationship between virtual school teacher practices and their Technological Pedagogical
and Content Knowledge (TPACK) was also explored. Using the standards, practices and
recommendations developed for online learning from International Association for K–12 Online
Learning (iNACOL), National Education Association (NEA), Southern Regional Education Board
(SREB), and the International Society for Technology in Education (ISTE) a team of focus group
members gave input on the common practices for teaching students in the full time K-8 virtual
school environment. The results included 11 general virtual school teacher practices, 12 teacher
practices relating to evaluation and three practices relating to special needs and diverse
learners. Qualitative and quantitative findings indicated that teachers most frequently meet the
established practices through the following strategies: phone conferences, live sessions with
students, feedback on assessments, webmail communication, professional development,
collaborating with peers/teacher collaboration, professional learning communities, curriculum
based assessments on the phone, communicating with family stakeholders, and determining
students in the bottom quartile. A framework for K-8 full time virtual school pedagogy which
includes evaluating student learning and individualizing instruction through technology tools
and collaborative methods was developed.

Finally, the quantitative findings indicated that of the three virtual school teacher practice
categories (teacher practice, evaluation and special needs and diverse learners), evaluation was
the leading predictor of teacher TPACK scores. Specifically, collaboration, having an online voice
and presence, and using data from assessments to modify instruction were found to
significantly predict a teacher's Technological Pedagogical and Content Knowledge. Using
virtual school teachers' expertise on the practices which most impact student learning and the
methods for implementing virtual school teacher practices, the researcher created a draft full
time K-8 virtual school teacher evaluation rubric."

Sintema, E. J. (2017). *Pre-service primary teachers' TPACK profiles and attitudes toward*
integration of ICT in mathematics teaching (Master's thesis, University of Valladolid,
Castile and Leon, Spain). Abstract retrieved from
http://uvadoc.uva.es/handle/10324/23187

Abstract: "Teachers' information and communication technology (ICT) competences are a key variable to integrate such resources into the teaching-learning process. While the TPACK framework has been employed in many studies associated with use of technology in the classrooms, reports on the pre-service teachers' development of TPACK-Math are inadequate to provide comprehensive description. With the aim to investigate the changes in pre-service primary teachers' perceptions regarding the use of technology subsequent to their university training in mathematics teaching, this study employed cluster analysis to categorize teachers into groups based on their self-reported TPACK-Math profiles. The study also employed the one-way Analysis of Variance (ANOVA) to check and identify the TPACK-Math profile differences of the pre-service primary teachers based on their year of study and multiple regression analysis to find out which of the TPACK-Math domains had a significant influence on pre-service primary teachers' attitudes towards integration of ICT in mathematics instruction. For this purpose, quantitative data analysis had been made with data from a single survey design study on pre-service primary teachers' attitudes toward integration of ICT in instruction that collected information from a sample of 166 male and female pre-service primary teachers. Cluster analysis revealed three categories of pre-service teachers' TPACK-Math profiles. ANOVA revealed significant TPACK-Math profile differences of the pre-service primary teachers based on their year of study and multiple regression analysis revealed that contextual knowledge and technological knowledge have the most significant influence on preservice primary teachers' attitudes toward integration of ICT in instruction for this sample."

Teague, H. L. (2017). *A mixed methods study of online course facilitators' perceptions of mobile technology, design, and TPaCK affordances* (Doctoral dissertation). Available from ProQuest Dissertations and Theses Global database. (UMI No. 10590840)

Abstract: "The increase in mobile technology options for students in post-secondary, continuing education influences how instructors design and implement courses, specifically online courses (Sözcü, İpek, & Kinay, 2016). Much of the current research addresses technological, pedagogical, and content knowledge (TPaCK), course design, and/or mobile technology as separate topics. There is limited research addressing the combination of TPaCK, design, and mobile technology from the course instructors' perspective. The mixed methods study addressed design for online, mobile learning with a new layer of the TPaCK instructional framework in three phases.

Phase 1 involved a pilot study of a survey that measured TPaCK, lesson design practices, and design perceptions. The pilot study responses informed Phase 2. In Phase 2, the survey was given to 33 current online course facilitators from PBS TeacherLine, an online continuing education course provider. Responses were gathered. In Phase 3, a qualitative interview designed to understand online course instructors' perceptions of their use of mobile technology, design decisions, and the TPaCK, instructional framework was conducted with a random sample of twelve people from the survey participant pool. The threefold data collection process allowed for a triangulation of the findings, which heightened construct validity and comprehensive understanding.

In Finding 1, 100% of the online continuing education course facilitators integrated TPaCK in their courses through the use of mobile and digital tools. In Finding 2, 100% of the online continuing education course facilitators made dynamic and innovative mobile and digital design decisions through the creation of supplemental course content. In Finding 3, 92% of online continuing education course facilitators utilized mobile technology in their online courses through an innovative inclusion of both mobile devices and mobile apps. Five conclusions resulted from the study and are discussed. The study contributes to existing literature by [sic]"

Wang, W. (2016). *Development of technological pedagogical content knowledge (TPACK) in preK-6 teacher preparation programs* (Doctoral dissertation). Available from ProQuest Dissertations and Theses Global database. (UMI No. 10167845)

"This dissertation investigates whether preservice teachers majoring in elementary education, in the context of a teacher preparation program at a higher education institution, develop technological pedagogical content knowledge (TPACK) with the goal of having the capacity to successfully integrate technology while planning instruction and teaching in PreK-6 classrooms. The dissertation is presented in a non-traditional format including an introduction, three manuscripts prepared for journal publication, and a concluding chapter.

The three journal articles tapped into the essential components surrounding the dissertation's focus of preK-6 preservice teachers' TPACK development during their teacher preparation program. The first article provided an extensive literature review examining the development of TPACK framework with a specific focus on assessing preservice teachers' TPACK development via five different research methods (self-report, open-ended questionnaire, performance assessment, interview, and observation). The second article actively explored preK-6 preservice teachers' development of technological pedagogical content knowledge (TPACK) through triangulated assessments after completing a series of required content methodology courses. The third article utilized case study approach to investigate how prepared a preservice teacher is to use technology within literacy content instruction during a practicum experience.

The three articles provided an analysis of the relevant literature and thoroughly explored the research questions that were posed. A thorough data analysis provided evidence regarding the impact of teacher preparation program experience on preservice teachers' TPACK development. In general, main conclusions can be drawn from this study. These include the following: technology integration modeling or scaffolding from teacher preparation program instructors and field instructors can enhance preservice teachers' overall TPACK development, the need of continuing longitudinal study to keep track of preservice teachers' TPACK development during teacher preparation program, and close relationship of pedagogical-related knowledge development and methodology courses. Method courses provide the opportunity for preservice teachers to learn more about content-specific pedagogical approaches and teach in real classrooms."

Wang, X. (2016). *Faculty's knowledge, pedagogy, and integration levels in the implementation of iPads as an instructional tool* (Doctoral dissertation). Available from ProQuest Dissertations and Theses Global database. (UMI No. 10247802)

"Current literature showed there is a need to help faculty improve their iPad integration practices. Using a sequential mixed-methods design, the researcher explored the relationship among faculty's iPad integration levels, their teachers' knowledge (TPACK), and pedagogy among faculty members who had integrated iPads into their teaching for at least two semesters. The data were collected with a cross-section questionnaire, follow-up interviews and artifacts. Responses were collected respectively with the three sections of the questionnaire: iPad Usage (N=160), TPACK (N=151), and demographics (N=147). Eight participants were interviewed after the survey. The results indicated TPACK and learning-centered pedagogy were necessary but insufficient conditions for the transformation levels of iPad integration. Technology itself might not bring a pedagogical shift. Learning to teach with technology could be a catalyst that triggers changes in teaching practices. However, the teacher must act as the agent for these changes. The results of this study could be informative to faculty who hope to improve their own iPad integration levels, or faculty developers and administrators to determine more effective ways to support iPad integration in their institutions."

Wiggins, L. R. (2016). *Successful district online teachers' perspectives of professional development* (Doctoral dissertation). Available from ProQuest Dissertations and Theses Global database. (UMI No. 10410574)

"The development of high quality online teachers within a Florida school district is critical given the exponential growth of virtual district programs, the lack of experienced online teachers, and the lack of infrastructure to develop online teachers transitioning from brick and mortar settings. The skills required for teaching in an online setting is significantly different than teaching in a physical classroom due to the fact that students are separated by time and space (Storandt, Dossin, & Lacher, 2012). Online teachers need to understand how to facilitate teaching and learning through the use of technology to engage and motivate learners that are separated by time and space.

My research examined the perspectives of six successful online teachers from a Florida district virtual instruction program about their development in becoming online teachers. The research questions guiding this study were: What professional learning experiences shaped the development of successful online instructors within a district virtual instruction program? What supports and professional learning experiences do successful online instructors within a district virtual instruction program believe that future novice online teachers need?

In this qualitative research study I conducted three semi-structured interviews with each of six successful virtual teachers. The term successful was defined in this context as high percentage of completion rates and highly effective rating on the teacher evaluation system. The participants articulated the importance of both the type professional learning and the content

for improving their online practices. Participants' recommendations for professional learning for novice online teachers differed slightly, but had the same large categories of online technology, online pedagogy, and online content knowledge, which align with Mirsha and Koehler's (2006) Technological Pedagogical Content Knowledge (TPCK) framework. Their insights will assist with understanding the needs of novice virtual teachers as they transition from a brick and mortar setting."

Woodward, L. (2016). *An examination of teachers' planning processes as they seek to integrate technology into literacy instruction* (Doctoral dissertation). Available from ProQuest Dissertations and Theses Global database. (UMI No. 10126705)

"This study examined the processes used by literacy teachers when planning to integrate technology into their instruction and the usefulness of the Technology Integration Planning Cycle (TIPC; Hutchison & Woodward, 2014a) for framing teachers' planning processes. Three participants from a larger technology integration project completed a think-aloud session as they planned an upcoming literacy lesson in which they anticipated using technology. This study was designed as a think-aloud study (Pressley & Afflerbach, 1995; Cho & Woodward, 2014) with extensive complementary data (Cho, 2014; Coiro & Dobler, 2007; Zhang & Duke, 2011). In addition to concurrent and retrospective verbal protocols, data sources included: interviews, surveys and questionnaires, observations, and documents and photos. Analysis of data collected from these sources was conducted in two cycles, open-ended coding (Corbin & Strauss, 2008) then hypothesis coding (Saldaña, 2016). Findings indicated that participants utilized pedagogical content knowledge and technological pedagogical content knowledge in different ways when planning. Notably, misunderstandings about content knowledge may be somewhat accommodated by integrating technology into literacy instruction. Further, teachers each had different stances towards integrating technology that influenced their planned instruction. Finally, while most elements of the TIPC were found in the participants' planning, teachers varied in their ability to focus on the instructional goal. Conceptual, methodological, and instructional implications are discussed."

Xiong, X. (2015). *Developing pre-service teachers' ICT in educatio competencies in a Chinese normal university: The role of curriculum leaders* (Doctoral dissertation). Available from ProQuest Dissertations and Theses Global database. (UMI No. 3734720)

"Looking at higher education in China, in addition to the political control of the central government, the top-down curriculum management system of the universities seems to support the effectiveness of teacher education programmes. Thus, the demand for information and communications technology (ICT) in teacher education not only affects the context and structure of teacher education programmes, but also challenges the role of curriculum leaders. As the core of all other leadership activities (Wiles, 2009), curriculum leadership is responsible for both the maintenance and improvement of teacher education programmes. Furthermore, in creating a meaningful learning context, it is vital for pre-service teachers to develop ICT in education competencies. Therefore, there are research gaps in the investigation of how curriculum leadership supports or hinders teacher education programmes in the development

of pre-service teachers' ICT in education competencies. This study is intended to fill in the research gaps. It poses the following guiding questions to explore the theme in greater depth. First, how do teacher education programmes affect the development of pre-service teachers' ICT in education competencies? Second, how does curriculum leadership shape teacher education programmes, and how do those programmes shape it in turn? Third, what are the roles of curriculum leaders in developing pre-service teachers' ICT in education competencies?

This study was conducted at Guangxi Normal University (GXNU), a provincial normal university in mainland China. Based on the theoretical and contextual background, its conceptual framework was contextualised in three top-down layers of administration, including the Ministry of Education (MOE), the Guangxi Provincial Department of Education and GXNU. The curriculum leaders at the university, subordinate school and classroom levels constitute the curriculum leadership system at GXNU. They play interactive roles in programme planning, implementation and evaluation to develop pre-service teachers' ICT in education competencies. This framework provided a general guide for the tools and parameters required for data collection and analysis in this study.

According to the research questions, this study adopted a mixed-methods research approach, sequentially integrating a quantitative survey with qualitative interviews and documentation analysis. As pre-service teachers' self-assessed perceptions of TPACK were likely to predict their ICT in education competencies, 211 pre-service teachers in the three programmes were surveyed to examine their TPACK perceptions. Valid data were analysed via statistical methods in SPSS 17.0. The interviewees included 13 curriculum leaders at the university, subordinate school and classroom levels, respectively, and 12 pre-service teachers were selected for focus group interviews. The qualitative data were analysed via open and axial coding. The findings from both methods were compared and combined.

The integrated findings clarify the role of curriculum leaders in developing pre-service teachers' ICT in education competencies. Curriculum leaders at the university level (e.g., the Vice-President (Academic)) provide support in the forms of policy formulation and resource allocation. Curriculum leaders at the subordinate school level (e.g., the Vice-Dean (Academic)) have a significant effect on the application of ICT to education curriculum structures, course objectives and academic credit management. Furthermore, curriculum leaders at the classroom level (e.g., course coordinators or lecturers) have a significant effect on course content and pedagogy.

The results of this study indicate the interactions between curriculum leadership and teacher education programmes. Curriculum leadership shapes teacher education programmes by providing supportive policies, planning or managing curricula and evaluating pre-service teachers' learning outcomes. The programmes may also shape the practices of curriculum leaders in terms of the changing educational system requirements and current curricula constraints. This finding may help to provide empirical evidence and achieve an understanding of the effectiveness of teacher education programmes.

This study also reveals that curriculum leaders are under pressure to acquire and use effective programme management strategies related to the use of ICT in education. In particular, this study highlights the importance of university senior management in supporting coordination and communication between curriculum leaders. This study also explains that pre-service teachers' teaching reflections and evaluations are of great importance for improving courses or programmes and informing the practices of curriculum leaders.

Beyond these findings, this study contributes to an important future direction for TPACK. It suggests that examining TPACK at the programme and course levels with a focus on curriculum leadership requires more research. The outcomes of the study are expected to expand the theoretical knowledge of curriculum leadership effects, especially in relation to the use of ICT in teacher education. The findings imply the need for consistent support, collaboration and commitment to programme improvement from all educational stakeholders.

Finally, the limitations of the study are highlighted, including its generalisation and methodological limitations and its small sample of interviewed curriculum leaders and surveyed pre-service teachers. (Abstract shortened by UMI.)"

4. Recent TPACK Presentations

Bhagat, K. K., Chang, C.-Y., & Huang, R. (2017, July). *Integrating GeoGebra with TPACK in improving pre-service mathematics teachers' professional development*. Paper to be presented at the 17th IEEE International Conference on Advanced Learning Technologies, Timisoara, Romania. Retrieved from https://www.researchgate.net/profile/Kaushal_Bhagat2/publication/315769113_Integrating_GeoGebra_with_TPACK_in_improving_Pre-service_Mathematics_Teachers'_Professional_Development/links/58f43258aca27289c21bd17e/Integrating-GeoGebra-with-TPACK-in-improving-Pre-service-Mathematics-Teachers-Professional-Development.pdf

Abstract: "The relationship between the use of Geogebra and Technological Pedagogical Content and Knowledge (TPACK) by teachers has not been fully investigated and understood. Therefore, the aim of this study was to integrate GeoGebra technology to develop the TPACK of secondary school pre-service mathematics teachers. The participants of this study were 60 Indian teachers. Data were collected through the administration of pre-post TPACK surveys using a Google Online survey. Results from the survey revealed that there were changes in teachers' TPACK after undergoing the Geogebra workshop. Practical implications are discussed regarding how to enhance pre-service teachers' TPACK using GeoGebra in mathematics teaching."

Craciun, D., & Bunoiu, M. (2017, April). Developing pre-service science teachers TPACK confidence through web-based comics. *Proceedings of the 13th International Scientific Conference on eLearning and Software for Education, 2*, 352-359. doi:10.12753/2066-026X-17-135

"The Technology Pedagogy and Content Knowledge (TPACK) framework used in the pre-service teacher training program requires new approaches to the effective integration of technology in science education, highlighting the intersection of the three main domains previously mentioned (technology, pedagogy and science content knowledge) in the training of prospective teachers. To develop the pre-service teacher's confidence in using TPACK we have chosen training activities built on web-based comics and mind/concept maps as our pedagogical methods. Web-based comics consist of fixed sequences of images and text created and viewed through dedicated online applications. In science   education, comics represent a creative alternative to present and explain a concept, phenomenon and/or a situation. Visual methods such as concept cartoons or concept maps can be used for learning new concepts or systemizing information. We have opted for these methods since communicating scientific concepts and knowledge through visual representations and using web 2.0 applications and gadgets are feature which characterize the current generation of students. In this paper we describe the way in which pre-service physics teachers enrolled in the Teacher Training Program at the West University of Timisoar between the years 2014 and 2016, have acquired and evaluated TPACK while participating in the design, management and analysis of learning activities based on visual representations developed for compulsory education. Our study reveals that they consider the integration of web based comics in their teaching activities to be beneficial for presenting, explaining and assessing the concepts and phenomena taught in class, as well as for identifying and correcting misconceptions. Furthermore, our study shows that the future physics teachers have developed TPACK since an efficient integration of comics and mind maps assumes a more profound understanding of the relationship between technology, pedagogical knowledge and the scientific content taught in class."

McKenna, K., Otieno, C., & Schulz, L. (2016, October). *Technology integration matrix: Benefits to the pre-service educator.* Paper presented at the Association for Educational Communications and Technology conference, Las Vegas, NV. Retrieved from http://www.aect.org/pdf/proceedings16/2016/16_16.pdf

Abstract: "The purpose of this research was to determine how use of the Technology Integration Matrix (TIM) influenced preservice educators' metacognition about technology integration into teaching and learning practices. The TIM addressed preservice educators' needs to develop awareness of, and abilities to, apply the International Society for Technology in Education (ISTE) Standards for Teachers and Students (ISTE, 2015). The TIM assisted preservice educators in connecting the ISTE standards to content standards and theories of teaching and learning by developing effective lessons. Through completion of TIMs, preservice educators not only connected ISTE standards and content standards, but also visualized the relationships to pedagogical models and theories. Findings from this study included an increase in preservice educators' awareness of today's learners, ISTE standards, connections to pedagogy, and increased abilities to transform learning experiences."

SITE

Editors' Note: Below are TPACK-related presentation links from the Society for Information Technology & Teacher Education (SITE) International Conference held in Austin, Texas in March 2017.

Alabbasi, D.
[Gamifying TPACK: The application of a design-based teaching strategy to enhance teachers' intrinsic motivation toward effective technology integration](#)

Barber, A., Williams, D., & Dolenc, N.
[Preservice teacher inquiry cycles in a technology in education course: Emerging maker dispositions toward an inquiry stance for education](#)

Corven, J., & Tomayko, M.
[TPACK radar diagrams – A visual quantitative representation for tracking growth of essential teacher knowledge](#)

Di Blas, N., & Paolini, P.
[Distributed and dynamic TPACK as an educational approach](#)

Figg, C., & Jaipal-Jamani, K.
[Developing TPACK in higher education faculty: An eLearning mentor strategy](#)

Harris, L.
[Investigating the effects of a technology integrated field experience on teaching using TPACK](#)

Hofer, M., & Harris, J.
[Differentiating TPACK-based learning materials for preservice and inservice teachers](#)

Kaplon-Schilis, A., & Lyublinskaya, I.
[Exploring independence of five TPACK domains TK, PK, CK math, CK science, and TPACK of pre-service special education teachers](#)

Kessler, A., Philips, M., Koehler, M., Mishra, P., Rosenberg, J., Schmidt-Crawford, D., Wang, W., Harris, J., Mouza, C., Mourlam, D., Foster, A., & Shah, M.
[The technological pedagogical content knowledge (TPACK) framework: Lineages of the first ten years of research: Part 1](#)

MacKinnon, G.
[The utility of TPACK in deconstructing the impact of an innovative STEM curriculum in a Chinese international school](#)

Mourlam, D., & Bleecker, H.
Early career teacher candidate TPACK development: Implementation of a learning activity types short course

Papendieck, A., Lune, N. J., Cotton, Pl, Mock, N., & Ndimurukundo, M.
Using technology and digital resources to enhance teaching, learning, and scholarly practices in Rwandan health sciences higher education

Semich, G., & Hineman, J.
Teacher education to workforce education: A TPACK-inspired workforce education program proposal

Semingson, P., Mason, M., & Keengwe, J.
The interactive online course-level orientation module: Fostering TPACK and an introduction to domain knowledge

Shah, M., Philips, M., Kessler, A., Rosenberg, J., Poitras, E., Fazeli, N., Barany, A., & Foster, A.
The development of technological pedagogical content knowledge (TPACK): Part 1

Sointu, E., Valtonen, T., Cutucache, C., Kukkonen, J., Lambert, M. C., & Mäkitalo-Siegl
Differences in preservice teachers' readiness to use ICT in education and development of TPACK

Tondeur, J., Siddiq, F., Scherer, R., & Baran, E.
Exploring the link between pre-service teachers' ICT-related profiles and their TPACK

Trocki, A.
Enhancing technological pedagogical content knowledge in a technology for teaching mathematics course

Valtonen, T., Kontkanen, S., Kukkonen, J., Sointu, E., & Pöntinen, S.
Insights into pre-service teachers' TPACK

Voogt, J., Valtonen, T., Sointu, E., Kontkanen, S., Kukkonen, J., Pöntinen, S., Tondeur, J., Siddiq, F., Scherer, R., Baran, E., Smits, A., Bruijn, R., La Roi, H., van Renssen, F., Vellekoop, H., van Velze, L., Zhang, L., & Rosenberg, J.
(Future) Teachers' Use of Technology and Development of TPACK: Insights from a global perspective

Wang, Y., Zhang, H., Xu, P., & Zhang, Z.
Chinese pre-service teachers' TPACK development and contextual factors

AERA

Editors' Note: Below are TPACK-related presentation links from the American Educational Research Association Conference held in San Antonio, Texas in April-May 2017.

Alemdag, E., Cevikbas, S., & Baran, E.
[The design and implementation of a technological pedagogical content knowledge (TPACK)-based teacher professional development program in a public education center](#)

Baran, E., & Ocak, C.
[Examining the observable indicators of science teachers' technological pedagogical content knowledge (TPACK) through video study](#)

Dreon, O., & Shettel, J.
[Instructional design for technological pedagogical content knowledge (TPACK) development in preservice teachers](#)

Gretter, S.
[Teacher and learning with technology: Preparing 21st-century educators](#)

Hawk, N. A., Lu, L., Kim, M. K., & Xie, K.
[Evaluating technology professional development in the teachers' pedagogical content knowledge (TPACK), technology beliefs, and leadership](#)

Heath, M.
[Technology integration, beliefs, and pedagogical practices in middle school social studies: A phenomenological case study](#)

Kaplon-Schilis, A. A., & Lyublinskaya, I.
[Preservice special education teachers' technological knowledge, pedagogical knowledge, content knowledge, and technological pedagogical content knowledge (TPACK)](#)

Kurban, K.
[In-service middle-grade mathematics teachers' technological pedagogical content knowledge (TPACK) in practice](#)

McBride, C.
[Developing digital pedagogues: Redesigning preservice teacher education with 21st-century literacies in mind](#)

Monroe-Ossi, H.
[Exploring the validity of a technological pedagogical content knowledge (TPACK) assessment tool](#)

Nelson, M. J.
[The contextual landscape of technological pedagogical content knowledge (TPACK) development research on in-service teachers](#)

Shah, M., & Foster, A.
[Game network analysis: A framework for making game-based learning and instruction accessible](#)

Shah, M., & Foster, A.
[Showcasing preservice and in-service teachers' knowledge of game-based learning](#)

Shah, M., & Ulrich, S.
[Exposure to enactment: Assessing preservice teachers' preparedness for technology integration](#)

Szeto, E. S. Y., & Cheng, A. Y. N.
[Understanding teaching knowledge: What pedagogies do preservice teachers practice across subjects?](#)

Vandeyar, T.
[Agents of change: Teachers' innovative information and communication technology pedagogical practices](#)

5. TPACK Newsletter Suggested Citation

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

Harris, J., & Rodriguez, K. (Eds.). (2017, June 4). TPACK newsletter issue #33: June 2017
      [Electronic mailing list message]. Retrieved from http://bit.ly/TPACKNewslettersArchive

6. 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:
Mamta Shah,	Co-Chair, Drexel University
Teresa Foulger,	Co-Chair, Arizona State University
Josh Rosenberg,	Camping Chair, Michigan State University
Petra Fisser,	Red-Blue Chair, SLO Expertise Center
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