TPACK Newsletter, Issue #10: May 2011

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

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

Gratuitous Quote About Technology

"Do you realize if it weren't for Edison we'd be watching TV by candlelight?"
- Al Boliska

In This Issue

1. TPACK Newsletter Update

The TPACK newsletter currently has 1104 subscribers! This represents a 3% increase during the last three months and a 56% increase since March 2010.

2. Recent TPACK Publications

Below are recent TPACK publications that we know about. If you know of others that were published within the past several months, please let us know (tpack.news.editors@wm.edu).

Articles

Akkoc, H. (2011). Investigating the development of prospective mathematics teachers' technological pedagogical content knowledge with regard to student difficulties: The case of radian concept. *Research in Mathematics Education, 13*(1), 75-76. doi: 10.1080/14794802.2011.550729 Retrieved from www.bsrlm.org.uk/IPs/ip30-3/BSRLM-IP-30-3-01.pdf

Abstract:

"This study investigates how two prospective mathematics teachers integrate technology into their lessons to address student difficulties. Prospective teachers took part in a teacher preparation program which aims to develop technological pedagogical content knowledge (TPCK). As part of this program, prospective teachers participated in workshops which aimed to develop TPCK of derivative and function concepts. Following these workshops, prospective teachers conducted their own workshops during which they discussed student difficulties with various mathematical concepts such as limit, continuity, definite integral, probability and radian with their peers. They also discussed how these difficulties could be addressed during a lesson using technological tools. This paper particularly focuses on radian concept and investigates the development of two prospective mathematics teachers throughout the course in integrating technology into their lessons to address student difficulties with radian concept."

Allan, W. C., Erickson, J. L., Brookhouse, P., & and Johnson, J. L. (2010). Teacher professional development through a collaborative curriculum project – an example of TPACK in Maine. *TechTrends, 54*(6), 36-43, doi: 10.1007/s11528-010-0452-x

Abstract:

"Maine's one-to-one laptop program provides an ideal opportunity to explore conditions that optimize teacher integration of technology-focused curriculum into the classroom. EcoScienceWorks (ESW) is an ecology curriculum that includes targeted simulations and a code block programming challenge developed through an NSF-ITEST grant. The project was designed as a collaboration that included simulation software developers; middle school science teachers; the Maine laptop program; environmental educators; an external evaluator; and a lead organization experienced in teacher guided curriculum development. Thus, each of the elements of TPACK (technology, pedagogy, and content knowledge) worked together to produce the final ecology simulation-centered curriculum. In 2008-2009, the ESW curriculum became available statewide through the Maine laptop program. Partner teachers have transitioned their classrooms to more learning-centered environments through the use of technology and have become teacher leaders. The collaborative approach to technology focused curriculum development used in this project is a model for TPACK professional development."

Banasa, J.R. (2010). Teachers' attitudes toward technology: Considerations for designing preservice and practicing teacher instruction. *Community & Junior College Libraries, 16*(2), 114-127. doi: 10.1080/02763911003707552

Abstract:

"To best design technological pedagogical content knowledge (TPCK) related instruction for preservice teachers or for practicing teachers, community college

librarians must have an accurate assessment of their audience's attitudes towards technology. A summary, analysis, and excerpts from 225 student responses to a course reflection regarding attitude toward technology are shared. The course, Learning with Technology, was a required course in an online master in education degree program. Students were practicing teachers or certified education professionals. Results indicated the majority, 52%, had positive feelings about and were integrating technology into instruction, 28% had positive feelings but cited obstacles to integration, 13% were fully integrating technology, and 7% were not integrating technology at all. Common obstacles to technology integration included knowledge/skills, confidence, access, and time. Based on the findings, implications of and suggestions for the design of TPCK related instruction are shared."

Banister, S., & Reinhart, R. V. (2011). TPCK for impact: Classroom teaching practices that promote social justice and narrow the digital divide in an urban middle school. *Computers in the Schools, 28*(1), 5-26. doi: 10.1080/07380569.2011.551086 Retrieved from http://www.bgsu.edu/downloads/edhd/file91663.pdf

Abstract:

"U.S. schools have long struggled with what has been identified as the "achievement gap." While the debate ensues in regard to an explicit definition for this phenomenon, research overwhelmingly demonstrates that students of marginalized populations remain on the lower end of most measures of school success. Accordingly, advocates of social justice point to the disparities of resources, including quality teachers, for students in poverty. As a part of this movement, access to appropriate technological resources in schools has become an issue, commonly labeled the "digital divide." This study reviews evidence of teaching for social justice and impacting the digital divide through the analysis of classroom observations in one year at an urban middle school participating in school reform efforts."

Chai, C. S., Koh, J. H. L., Tsai, C-C., & Tan, L. L. W. (2011). Modeling primary school pre-service teachers' Technological Pedagogical Content Knowledge (TPACK) for meaningful learning with information and communication technology (ICT). *Computers & Education, 57*(1), 1184-1193. doi: 10.1016/j.compedu.2011.01.007

Abstract:

"Within the field of educational technology, Technological Pedagogical Content Knowledge (TPACK) has been theorized as a seven-factor construct to describe teacher's integration of information and communication technology (ICT) in their teaching. However, this framework has yet to be successfully validated through survey instruments. This paper examines the construct validity of a TPACK survey that was contextualized for the pedagogical approaches employed in a 12-week ICT course designed with reference to the TPACK framework for

Singaporean primary school pre-service teachers. Using this framework, the researchers were able to uncover five of the seven TPACK constructs which were a better model fit as compared with several extant studies of TPACK surveys. Using these results, pre and post-course structural equation models were constructed to explain the relationships amongst the different constructs of teachers' TPACK perceptions. It was found that pedagogical knowledge had a direct impact on TPACK at the beginning of the course. As teachers made connections between their technological knowledge and pedagogical knowledge to form technological pedagogical knowledge during the course, the direct relation between pedagogical knowledge and TPACK became insignificant where as the relations between pedagogical knowledge and technological pedagogical knowledge, and technological pedagogical knowledge and TPACK were strengthened. The comparison between the pre and post-course models also revealed that the pre-service teachers' perceived relations between content knowledge and TPACK changes from insignificant to significant. The implications of these findings and suggestions to improve the construct validation of the TPACK framework are discussed in this paper."

Donnelly, D., McGarra, O. & O'Reilly, J. (2011). A framework for teachers' integration of ICT into their classroom practice. *Computers & Education, 57*(2), 1469-1483. doi:10.1016/j.compedu.2011.02.014

Abstract:

"When attempting to integrate any Information and Communications Technology (ICT) based resource into Post-Primary Schools (High Schools) many potential barriers must be considered. Importantly, many of these barriers revolve around the individual teacher and hence they are an important starting point in understanding the change process in schools. This work describes attempts to integrate an ICT-based resource (a Virtual Chemistry Laboratory) into some science teachers' practice within the Irish education system. From these experiences a working framework has been developed to describe teachers' level of ICT integration into their practice and the factors underpinning this. The framework raises important questions of how teachers may be effectively supported to move between descriptions within the framework. It also highlights the need for change attempts to incorporate mixed strategies for mixed teacher stances on ICT integration."

Doukakis, S., Koilias, C.,& Chionidou-Moskofoglou, M. (2011). An undergraduate primary education teaching practicum design and undergraduate primary teachers' satisfaction on developing technological, pedagogical and mathematical knowledge. *International Journal of Teaching and Case Studies, 3*(2-4), 180-195. Retrieved from http://www.mendeley.com/profiles/spyros-doukakis/document/4152213042/

Abstract:

“During the 2008-2009 spring semester, 25 fourth-year undergraduate primary teachers attended the compulsory course 'Teaching Mathematics-Practicum Phase'. The course was organised so as to incorporate ICT and special mathematical scenarios in the teaching approaches of undergraduate primary teachers. This article presents this course's satisfaction of participants as found in the research study. A set of powerful ordinal regression methods has been applied on a survey database. The most important results focus on the determination of the course's weak and strong points, according to the MUSA methodology. The results show a high satisfaction level from the course. The global satisfaction level reaches 98% whereas partial (per criterion) satisfaction levels range from 90% to 97%, the lowest rate corresponding to the theoretical component of the course. These findings raise a number of research questions regarding ICT integration in undergraduate primary teachers' teaching practice.”

Jang, S.-J., & Chen, K.-C. (2010). From PCK to TPACK: Developing a transformative model for pre-service science teachers. *Journal of Science Education and Technology, 19*(6), 553-564. doi: 10.1007/s10956-010-9222-y Retrieved from http://wenku.baidu.com/view/f821fdffc8d376eeaeaa3113.html

Abstract:

“New science teachers should be equipped with the ability to integrate and design the curriculum and technology for innovative teaching. How to integrate technology into pre-service science teachers’ pedagogical content knowledge is the important issue. This study examined the impact on a transformative model of integrating technology and peer coaching for developing technological pedagogical and content knowledge (TPACK) of pre-service science teachers. A transformative model and an online system were designed to restructure science teacher education courses. Participants of this study included an instructor and 12 pre-service teachers. The main sources of data included written assignments, online data, reflective journals, videotapes and interviews. This study expanded four views, namely, the comprehensive, imitative, transformative and integrative views to explore the impact of TPACK. The model could help pre-service teachers develop technological pedagogical methods and strategies of integrating subject-matter knowledge into science lessons, and further enhanced their TPACK.”

Koh, J. H. L., & Divaharan, S. (2011). Developing pre-service teachers' technology integration expertise through the TPACK-Developing Instructional Model. *Journal of Educational Computing Research, 44*(1), 35-58. doi: 10.2190/EC.44.1.c

Abstract:

“This study describes the TPACK-Developing Instructional Model which prescribes an instructional process for developing pre-service teachers'

Technological Pedagogical Content Knowledge (TPACK) during …instruction [for using] information and communication technology (ICT) tools. This model proposes three phases for developing teachers' TPACK through ICT instruction. The phases are: fostering teachers' acceptance and technical proficiency; pedagogical modeling; and pedagogical application. An ICT instructional intervention designed with this model as its framework and its effects on the TPACK development of 74 pre-service teachers were examined. Qualitative analyses of their course reflection comments found that they predominantly developed Technological Knowledge and Technological Pedagogical Knowledge. More emphasis on subject-focused pedagogical modeling, product critique, and peer sharing may better develop their Technological Content Knowledge and TPACK. Future developments of the TPACK-Developing Instructional model are discussed."

Kramarski, B., & Michalsky, T. (2009). Three metacognitive approaches to training pre-service teachers in different learning phases of technological pedagogical content knowledge. *Educational Research and Evaluation, 15*(5), 465-485. doi: 10.1080/13803610903444550

Abstract:

"Our study investigated 3 metacognitive approaches provided during different phases of learning technological pedagogical content knowledge (TPCK) in a Web-based learning environment. These metacognitive approaches were based on self-question prompts (Kramarski & Mevarech, 2003) which appeared in pop-up screens and fostered the Self-Regulated Learning (SRL) of pre-service teachers (n = 144) through 1 of the 3 learning phases (Zimmerman, 2000): "planning," "action and performance," and "evaluation." Four measures (pre/post) were administered in the study: SRL self-report questionnaires in the contexts of pedagogical learning and teaching and TPCK in the comprehension and design lessons. Mixed quantitative and qualitative analyses showed that fostering students' SRL through the "evaluation" phase was the most effective for the pre-service teachers' perceived SRL in both the learning and teaching contexts and for their TPCK (comprehension and design lessons). Furthermore, students from the planning approach outperformed the students from the action approach in most of the SRL and TPCK measures."

Martin, O. (2011). Handbook of technological pedagogical content knowledge (TPCK) for educators [Review]. *Learning, Media & Technology, 36*(1), 91-93. doi: 10.1080/17439884.2011.549829

Abstract: None

Mishra, P., Koehler, M., & Henriksen, D. (2011). The seven trans-disciplinary habits of mind: Extending the TPACK framework towards 21st century learning. *Educational Technology, 51*(2), 22-28.

Abstract:

“This article examines the concept of transformative learning, with a focus on the importance of trans-disciplinary thinking (cognitive skills that cross disciplines) and new technologies in creating 21st century learning and transformative teaching. The article introduces the Technological Pedagogical Content Knowledge (TPACK) framework as a way to develop the specialized knowledge, skills, and understanding that teachers must have to become effective classroom constructors of transformative learning experiences. The authors note seven cognitive tools needed for success in the new millennium, within this TPACK framework. To illustrate and describe these skills, they offer examples of how teachers can repurpose digital technologies to use these thinking skills toward building exciting transformative learning experiences, across a variety of subject matters. The authors explore the implications for research and practice.”

Polly, D. (2011). Examining teachers’ enactment of technological pedagogical and content knowledge (TPACK) in their mathematics teaching after technology integration professional development. *Journal of Computers in Mathematics and Science Teaching, 30*(1), 37-59. Retrieved from http://www.editlib.org/p/34610

Abstract:

“Technological pedagogical and content knowledge (TPACK) has been advanced as a construct to describe teachers’ understandings related to effectively teaching with technology. This study examined the development of TPACK of two teachers during their mathematics teaching after participating in a learner-centered professional development (LCPD) project designed to support technology integration. Inductive analyses of classroom observations and interviews indicate that both teachers were able to enact aspects of TPACK in their classroom. However, teachers’ use of technology only developed students’ higher-order thinking skills and conceptual understanding in limited ways. Implications for future professional development projects and the TPACK model are also discussed.”

Polly, D., McGee, J. R. & Sullivan, C. (2010). Employing technology-rich mathematical tasks to develop teachers’ Technological, Pedagogical, and Content Knowledge (TPACK). *Journal of Computers in Mathematics and Science Teaching, 29*(4), 455-472. Retrieved from http://www.editlib.org/p/33276.

Abstract:

“While technology has potential to improve the teaching and learning of mathematics, research indicates that teachers struggle in their efforts to implement technology-rich mathematical tasks in their classrooms. Effective technology integration in mathematics requires teachers to be able to apply their classroom knowledge related to mathematics content, pedagogies, educational technologies and the interplay between those aspects of knowledge. In recent

years, Technological and Pedagogical Content Knowledge (TPACK) has emerged as a construct to describe teachers' knowledge related to effectively integrating technology. In this paper, we use the framework to consider how professional development programs can develop teachers' TPACK through the exploration of technology-rich mathematical tasks."

Salvado, D. F., Rolando, L. G. R., & Rolando, R. F. R. (2010). Aplicação do modelo de conhecimento tecnológico, pedagógico do conteúdo (TPCK) em um programa on-line de formação continuada de professores de Ciências e Biolog. *Revista Electrónica de Investigación en Educación en Ciencias, 5*(2), 31-43. Retrieved from http://www.doaj.org/doaj?func=abstract&id=689101

Abstract:

"This paper presents a description with quantitative results of the profile and participation of teachers in the online program for Biology teachers at CECIERJ Foundation in the state of Rio de Janeiro. Our main focus is to show the recurring pattern of teachers who participated in the different course models within the possibilities of technological, pedagogical content knowledge (TPCK), used integrated with or isolated from different courses. In addition, discuss the use of this knowledge base in teacher training programs in the areas of Sciences and Biology. In 2008 and 2009, there was a significant increase in the number of the participants who concluded and were approved and a decrease of 14.1% in the dropout rate. The reason for the increase in the participation rate is related to the changes implemented in the virtual environment of the courses. The approaches of pedagogical content knowledge (PCK) and technological, pedagogical content knowledge (TPCK) probably attracted more teachers to participate. In contrast, just the pedagogical knowledge (PK) and content knowledge (PCK) models had a lower dropout rate. Although the TPCK model attracted more [teachers' participation] (60.2%), it had a higher rate of dropout, probably because it requires teachers to learn in a knowledge base that is different from what they are used to or have been trained in initially. The combined approach of technological, pedagogical content knowledge (TPCK) has a strong theoretical background in international literature and demonstrates an importance in building a focused curriculum for the initial and continuing training of teachers."

Tee, M. Y. & Lee, S. S. (2011). From socialisation to internalisation: Cultivating technological pedagogical content knowledge through problem-based learning. *Australasian Journal of Educational Technology, 27*(1), 89-104. Retrieved from http://www.ascilite.org.au/ajet/ajet27/tee.pdf

Abstract:

"Recent studies on technology have shifted from the emphasis on technology skills alone to integrating pedagogy and content with technology – what Mishra and Koehler (2005) call technological pedagogical content knowledge (TPACK). Deeper understanding on how TPACK can be cultivated is needed. This design-

based research explored how an improvised, problem-based learning approach guided by the SECI framework (socialisation, externalisation, combination, internalisation) can help in-service teachers to cultivate TPACK. Data were collected via self-progress surveys, reflections by the in-service teachers, student produced artifacts, records of overall course design, and log entries by the instructor. Based on the survey data, teachers believed that they had developed TPACK. By comparing the qualitative data from two groups, it was discovered that teachers became better positioned to use TPACK more fruitfully after their mental models moved towards Biggs's Level 2 and 3 approaches in teaching. The course created critical but safe opportunities for teachers to better understand that technology in itself is not likely to improve ineffective teaching practices; and, in selecting technology, teachers may have to reevaluate their teaching practices and to rethink the nature of the subject that they teach."

Chapters

Spires, H., Zheng, M., & Pruden, M. (in press). New technologies, new horizons: Graduate student views on creating their technological pedagogical content knowledge (TPACK). In K. Moyle & G. Wijngaards (Eds.), *Student reactions to learning with technologies: Perceptions and outcomes.* Hershey, PA: IGI Global. Retrieved from http://www.fi.ncsu.edu/assets/research_papers/new-literacies-collaborative/new-technologies-new-horizons-graduate-student-views-on-creating-their-technological-pedagogical-content-knowledge-tpack.pdf

Abstract:

"The purpose of this chapter is to present graduate students' views of their Technological Pedagogical Content Knowledge (TPACK) development. These graduate students are also teachers. Data was collected using a mixed method approach founded on the TPACK Framework and social network analysis. Koehler and Mishra (2006) claim that effective teaching with technology requires TPACK, or an ability to integrate content, pedagogy and technology flexibly during the act of teaching. As part of a graduate course on new literacies and media, participants were required to design and implement lessons that incorporated a range of technologies, produce written reflections about their experiences, and engage in online interactions with participants in the class. Qualitative results from participants' written reflections revealed four themes relative to TPACK. Additionally, a social network analysis demonstrated a positive relationship between participants' views on their TPACK development and their interaction patterns within the online learning environment. This study shows that the TPACK framework can be a useful tool, giving educators a productive way to think about technology integration as they navigate the rapid changes prompted by emerging technologies."

Wentworth, N., Graham, C. R., & Monroe, E. E. (2009). TPACK development in a teacher education program. In L. T. W. Hin & R. Subramaniam (Eds.),

Handbook of research on new media literacy at the K-12 level: Issues and challenges (pp. 823-838). Hershey, PA: IGI Global. Retrieved from http://www.igi-global.com/bookstore/chapter.aspx?titleid=35953

Abstract:

"The teacher education program at Brigham Young University (BYU) includes three stages of development in technological pedagogical content knowledge (TPACK) (Thompson & Mishra, 2007). The first stage consists of experience in a technology course with sections specific to early childhood education, elementary education, and secondary content areas. The next stage includes a series of methods courses in which instructors expand on the work of the introductory technology course. The third stage of technology development occurs during the final field experience. The candidates complete a Teacher Work Sample (TWS) (Renaissance Partnership for Improving Teacher Quality, 2001) that must have a technology component. At each stage our candidates have consistent criteria for how technology should be appropriately used in active learning. These criteria are key to the lessons candidates develop that incorporate technology. This chapter describes each stage and how our program has worked to improve technology understanding of our candidates."

3. Recent TPACK Presentations

Barrett, A. (2010, October). *Patterns of technological pedagogical knowledge and self-efficacy in preservice teachers.* Paper presented at the 2010 Association for Educational Communications and Technology (AECT) International Convention, Anaheim, California.

Abstract:

"If perceived Technological Pedagogical Knowledge (TPK) is not accompanied by actual TPK, educational practice can be negatively impacted. This study measured preservice teachers' (N=97) TPK and associated self-efficacy. Responses were analyzed using MAPSAT (Frick, 1990) to find the frequency of relevant patterns. Preservice teachers early in their program were found to be over twice as likely to be overconfident in their TPK ability (high self-efficacy, low knowledge) than were those late in their program."

Carbonara, D. (2010, October). *Cyber learning: A curriculum development doctoral course using the TPCK model.* Paper presented at the 2010 Association for Educational Communications and Technology (AECT) International Convention, Anaheim, California.

Abstract:

"This presentation documents TPCK in a Cyber Learning environment. It explains the use of TPCK to Design, Develop and Implement a doctoral course in curriculum development. It articulates the use of AECT standards as the Content

of the course and the use of a LMS to teach about that Content. This non-trivial presentation of TPCK in a Cyber Learning environment helps to illuminate the use of TPCK in higher education teacher preparation and formation programs."

Hu, C., & Fyfe, V. (2010, December). *Impact of a new curriculum on pre-service teachers' Technical, Pedagogical and Content Knowledge (TPACK).* Paper presented at Ascilite 2010 Conference, Sydney, Australia. Retrieved from: http://www.ascilite.org.au/conferences/sydney10/Ascilite%20conference%20proceedings%202010/Chun_Hu-concise.pdf

Abstract:

"This paper reports some preliminary findings of a formative evaluation on the impact of a new curriculum on pre-service teachers‟ technical, pedagogical and content knowledge (TPACK). It discusses the design principles employed and its implementation process. A survey adapted from Schmidt et al. (2009) was administered at the beginning and completion of the course. The post-course survey showed increase in pre-service teachers‟ self-reported ratings in technology, pedagogy and content knowledge. Implications are discussed."

Jang, S.-J. (2011, April). *Developing the TPACK of secondary science teachers using the interactive whiteboard and peer coaching.* Paper presented at the National Association for Research in Science Teaching (NARST) Annual International Conference, Orlando, Florida.

Abstract:

"Many studies related to the use of interactive whiteboards (IWBs) in educational settings have shown that IWB technology can result in enhanced presentations and in the development of student motivation and student performance. However, the relationship between the use of IWBs and Technological Pedagogical Content and Knowledge (TPACK) by teachers is yet to be fully investigated and understood. The purpose of this study was to integrate IWB technology and peer coaching to develop the TPACK of secondary science teachers in real classrooms. An IWB-based peer coaching model was developed. Participants of this study included four in-service science teachers. Sources of data included written assignments, reflective journals and interviews. The results displayed three major findings. First, science teachers used IWBs as instructional tools to share their subject matter knowledge and to express students' understanding. Second, the IWBs helped the science teachers who encountered teaching difficulties in the traditional classroom better implement their representational repertoires and instructional strategies. Finally, the proposed model of integrating IWBs and peer coaching can develop the TPACK of science teachers. The research implications of this study are provided along with suggestions."

Kaya, Z., Kaya, O. N., Yilayaz, O., Aydemir, S., & Karakaya, D. (2011, April). *Exploring the pre-service science and technology teachers' Technological Pedagogical Content Knowledge (TPCK) and classroom practices involving the topic of photosynthesis and cellular respiration.* Paper presented at the National Association for Research in Science Teaching (NARST) Annual International Conference, Orlando, Florida.

Abstract:

"The purpose of this study was to explore the Pre-service Science and Technology Teachers' (PSTs) Technological Pedagogical Content Knowledge (TPCK) and their teaching practices in real classroom settings involving the topic of photosynthesis and cellular respiration. This study also investigated the relationships among the components of PSTs' TPCK and practical knowledge in middle school classrooms. 41 randomly selected PSTs (19 females and 22 males) in their final semester in a science teacher education program participated in the study. Data were collected from multiple sources, including open-ended questionnaires, semi-structured interviews, lesson plans, drawings for the PSTs' TPCK and classroom observation protocol, video records and field notes for the PSTs' teaching practices in middle school science classrooms. After exploring the PSTs' TPCK, teaching practices of the PSTs in science classrooms in four public middle schools were investigated. Findings obtained from the data showed that PSTs were lack of sufficient conceptual knowledge and views on nature of science and hold general alternative conceptions. It was found that PSTs' understandings of students' learning difficulties and topic-specific technological knowledge were very low. Data related to the PSTs' teaching practices in the middle school science classrooms indicated a success rate of about 42% - 57%."

Roberts, P. (2011, March). *Technological Pedagogical Content Knowledge in history education.* Paper presented at the Building Bridges for Historical Learning: Connecting Teacher Education and Museum Education Symposium, University of Canberra, Australian Capital Territory, Australia. Retrieved from http://vimeo.com/18980418

Abstract: None

Robertshaw, M. B. (2010, October). *Teacher professional development: describing teacher Technological Pedagogical Content Knowledge through the use of a rubric*. Paper presented at the 2010 Association for Educational Communications and Technology (AECT) International Convention, Anaheim, California.

Abstract:

"Technological pedagogical content knowledge (TPACK) is a framework to describe the knowledge teachers use when teaching with technology. Professional development workshops that help teachers to better teach with

technology should aim to develop this knowledge, but in order to do there must be a way to measure TPACK. This paper describes a rubric developed to describe teachers' TPACK in the context of a workshop that helps teachers to teach with online learning resources."

At the annual meeting of the Society for Information Technology in Teacher Education (SITE) in March 2011, the SITE TPACK SIG presented the first annual Thompson TPACK Paper Awards, named to honor Ann Thompson of Iowa State University. (More information about the award is online here: http://ctlt.iastate.edu/spotlight/?p=107)

Awardees included:
Aaron Doering, Charles Miller, & Cassie Scharber
University of Minnesota, Minneapolis, MN
"Designing with and for Technological Pedagogical Content Knowledge: The Evolution of GeoThentic"

Candace Figg and Kamini Jaipal
Brock University, St. Catharine's, Ontario
"Developing a Survey from a Taxonomy of Characteristics for TK, TCK, and TPK to Assess Teacher Candidates' Knowledge of TPACK"

Mark Hofer, College of William & Mary,
Neal Grandgenett, University of Nebraska-Omaha,
Judi Harris, College of William & Mary,
Kathy Swan, University of Kentucky
"Testing a TPACK-Based Technology Integration Observation Instrument"

Karsten Krauskopf, Carmen Zahn, & Friedrich Hesse
Knowledge Media Research Center, Tuebingen, Germany
"Leveraging the Affordances of YouTube: Pedagogical Knowledge and Mental Models of Technology Affordances as Predictors for Pre-Service Teachers' Planning for Technology Integration"

Irina Lyublinskaya & Nelly Tournaki,
CUNY College of Staten Island, NY
"The Effects of Teacher Content Authoring on TPACK and on Student Achievement in Algebra: Research on Instruction with the TI-Nspire Handheld"

Maggie Niess, Emily van Zee, Henry Gillow-Wiles, & Nancy Staus
Oregon State University, Corvalis, OR
"Advancing K-8 Teachers' STEM Education for Teaching Interdisciplinary Science and Mathematics Teaching With Technologies"

The professional development company Powerful Learning Practice facilitated a series of online PD sessions for teachers and administrators about TPACK in multiple content areas called TPACK Fridays.

Sessions addressed TPACK and ISTE's NETS in specific content areas, and were scheduled between April 2010 and February 2011.

4. Recent TPACK-Related Dissertations

Guzey, S. S. (2011). *Science, technology, and pedagogy: Exploring secondary science teachers' effective uses of technology. Dissertation Abstracts International: Section A, 71*(10), (AAT 3422550).

Abstract:

"Technology has become a vital part of our professional and personal lives. Today we cannot imagine living without many technological tools such as computers. For the last two decades technology has become inseparable from several areas, such as science. However, it has not been fully integrated into the field of education. The integration of technology in teaching and learning is still challenging even though there has been a historical growth of Internet access and available technology tools in schools (U.S. Department of Education, National Center for Education Statistics, 2006). Most teachers have not incorporated technology into their teaching for various reasons such as lack of knowledge of educational technology tools and having unfavorable beliefs about the effectiveness of technology on student learning. In this study, three beginning science teachers who have achieved successful technology integration were followed to investigate how their beliefs, knowledge, and identity contribute to their uses of technology in their classroom instruction. Extensive classroom observations and interviews were conducted. The findings demonstrate that the participating teachers are all intrinsically motivated to use technology in their teaching and this motivation allows them to enjoy using technology in their instruction and keeps them engaged in technology use. These teachers use a variety of technology tools in their instruction while also allowing students to use them, and they posit a belief set in favor of technology. The major findings of the study are displayed in a model which indicates that teachers' use of technology in classroom instruction was constructed jointly by their technology, pedagogy, and content knowledge; identity; beliefs; and the resources that are available to them and that the internalization of the technology use comes from reflection. The study has implications for teachers, teacher educators, and school administrators for successful technology integration into science classrooms."

Hastings, T. A. (2010). *Factors that predict quality classroom technology use. Dissertation Abstracts International: Section A, 71*(02), (AAT 3393088).

Abstract:
“Despite technological advancements intended to enhance teaching and learning in the 21st century, numerous teacher and school factors continue to impede quality classroom technology use. Determining the effectiveness of educational technology is challenging and requires a detailed understanding of multifaceted, complex, contextual relationships. The purpose of this correlational study was to identify factors that predict quality classroom technology use and inform educators about effective technology integration.

The researcher analyzed both Technology-Related (Risk-taking Behaviors and Comfort with Technology, Perceived Benefits of Using Technology in the Classroom, Beliefs and Behaviors about Classroom Technology Use, Teacher Support for Technology Use, Teacher Technology Proficiency, and Technology-Related Professional Development) and Non-Technology-Related (Teacher Self-Efficacy, Teaching Philosophy, Teaching Professionalism: Hours Beyond Contract, and Teaching Professionalism: Years Teaching Experience) variables in regard to Teacher, Student, and Overall Technology Use. Five research questions were developed to investigate factors of quality classroom technology use.

This study relied primarily upon two frameworks to identify factors that predict and a method of measuring quality classroom technology use. Technological Pedagogical Content Knowledge (TPCK) is a conceptually-based theoretical framework for understanding the complex relationships between Technology, Pedagogy, and Content that pertain to classroom technology use. In addition, the study also utilized a framework, the Tiers of Technology Integration into the Classroom Indicators (TTICI), which was developed by the Washington State Technology Integration into the Curriculum Working Group (2005). The researcher applied the TTICI framework in order to generate technology integration scores, based upon levels (low, moderate, high) of quality classroom technology use.

Two online surveys were administered to 280 K-12 public school teachers in Northwest Ohio. Descriptive statistics were calculated for all five research questions and inferential statistics, including correlation and multiple regression, t-test of independent samples, and an ANOVA were calculated for research questions 3-5. The study revealed that Technology-Related factors generated better models in predicting technology use than Non-Technology-Related factors. The factors that best predict weighted technology use were: (1) Beliefs and Behaviors about Classroom Technology Use; (2) Technology Proficiency in Productivity Software, and (3) Perceived Benefits of Using Technology in the Classroom. A few, culminating themes have emerged from the literature review and data analysis of the results. The study concludes that: (1) teachers, in general, are still not using technology effectively; (2) technology-related professional development is essential to promoting quality technology use; (3) measuring classroom technology use is a complex, multifaceted process; and (4)

educators must become reflective practitioners in an effort to promote quality classroom technology use."

McCrory, M. R. (2010). *An exploration of initial certification candidates' TPACK and mathematics-based applications using touch device technology. Dissertation Abstracts International: Section A, 72*(05), (AAT 3447134).

Abstract:

"This qualitative research study employed a multiple-case study approach to describe the experiences of a group of Initial Certification Candidates (ICCs) as they participated in explorations of readings and third-party applications (apps) run on touch screen technology devices. The group of ICCs was comprised of two Undergraduate Teacher Candidates (UTCs) that were in the student teaching semester of the secondary education program and one Graduate Teacher Candidate (GTC) that was an alternate route teacher placed in a high-needs area as part of a graduate-level program. The explorations were designed to augment the ICCs' Technological Pedagogical Content Knowledge (TPACK) as they progressed through the six-week long study. The researcher found that each of the ICCs experienced some development of their TPACK even though their perceptions differed on whether the readings or the app explorations were most beneficial to their development. There were also differences in the experiences of the UTCs and the GTC as the GTC, a more experienced teacher, preferred the app explorations over the readings. Alternatively, the UTCs favored the readings and the pedagogical methods that the readings provided them. The ICCs also indicated that they would prefer to use touch technology in their classroom. Future directions for further research are given."

Scott, L. C. (2009). Through the wicked spot: A case study of professors' experiences teaching online. *Dissertation Abstracts International: Section A, 70*(11), (AAT 3379753).

Abstract:

"Due to the exponential growth in demand for online courses, there is a need to better understand how to prepare faculty to successfully teach in the online environment. Based on the Technological Pedagogical Content Knowledge (TPACK) framework, this study examined how two professors with different levels of online teaching experience integrated technology, pedagogy, and content into their online courses. In addition, connections between TPACK and the Concerns-Based Adoption Model were discovered. This two-case study included questionnaires, document analysis, and screen-capture elicitation--a new method for observing online courses. Extensive online teaching experience was not found to be necessary for achieving TPACK. A more important factor was professors' understanding of how to use the technology to support their content in the online environment."

Wells, E. C. (2009). *Michigan State University Extension educators' perceptions of the use of digital technology in their work. Dissertation Abstracts International: Section A, 71*(02), (AAT 3381427).

Abstract:

“This research study examined Michigan State University Extension educators' perceptions of the use of digital technology in their work. It used a mixed method of research which included a mailed survey and interviews of selected respondents. A census survey using Dillman's Total Design method was sent to 290 field staff of Michigan State University Extension. Of these, 272 completed and returned the survey instrument for a 94% rate of return. Semi structured interviews were conducted with 15 of the respondents to provide in-depth qualitative data to enrich the understanding of the issues for the researcher. The mailed survey instrument was examined for validity by a panel of experts and pilot tested on scale items to assess reliability. The mailed survey included questions on access to technology both at work and at home, preparation for the use of technology, actual use of technology, usefulness and ease of use, confidence and comfort in use and general and technical support for the use of technology. Low, medium and high total use respondent were compared and analyzed. Results show that although Extension Educators consider themselves to be well prepared to use technology and said it was highly useful to them in their work, most use of technology was limited to e-mail, word processing, file attachments and cell phones. Only a small minority use web technology, wikis or had published educational materials on a website or the MSUE portal. Staff sometimes furnished their own digital technology tools if they thought they were highly useful. Barriers to use of newer technologies were sited as lack of access, lack of support, lack of time to learn new technologies. Low users sometimes said they would only use technology if it was required and they preferred one-on-one tutoring to learn how to use technology. Low users recognized that they were themselves a barrier to the use of technology. Medium users said clientele preferred face-to-face education and would not use technology. They often viewed technology as "somebody else's problem". High users were the only group to use web based digital technology and they were able to integrate the three spheres of Mishra and Koehler's TPACK model of technology use; expertise in technology, pedagogy and content. High users were more apt to be self taught, client oriented and to have a grasp of the affordances of various technology applications. They preferred advanced classes on web page design, as well as photo and video editing and production. Recommendations were to provide local and regional training which includes practical ways to use technology to enhance programming, identify regional sources of support, integrate technology use into the MSUC culture and encourage the use of technology by highlighting creative solutions to use and providing opportunities for playful use. Better access must be provided and technology support should be easily accessible. Further research recommendations include case studies of individual counties, case studies of high users, research on difference by

programming area and the development of documented technology solution to programming needs which could be accessed by educators looking for ideas."

Wilson, M. (2011). *Teachers' professional growth: The blending of technology, pedagogy and content. Dissertation Abstracts International: Section A, 72*(05), (AAT 3444791).

Abstract:
"The integration of technology into content area teaching while taking into account state standards is a continuing challenge for secondary teachers. To address this challenge, six high school teachers participated in one-on-one tutoring sessions conducted by the researcher. The Technological Pedagogical Content Knowledge (TPACK), which posits that teachers add technology into their practice by blending it with content and pedagogy, served as the theoretical framework and guided implementation of the project. During the one-on-one tutoring sessions, which occurred weekly in hour-long sessions for a five- to eight-week period, teachers selected the focus of the training sessions. To assess teacher perceptions of efficacy quantitative data were gathered prior to and following the intervention using an on-line survey tool. Although pre- to post-intervention scores on the survey increased, the difference was not significant. With respect to the qualitative data four themes emerged. First, there were specific processes and patterns that emerged within the sessions related to the TPACK framework. Teachers selected either technology or content to initiate sessions. Teachers did not begin sessions with high yield pedagogical strategies as a focus. Second, one-on-one tutoring fostered an initial sense of community, and as the project progressed, a community of practice emerged. Third, challenges emerged related to technology and high yield pedagogical strategies. At times technology did not work or teachers expressed there was too much to grasp and apply to their practice. Additionally, the appropriate applications of high yield instructional strategies also presented challenges to participants. Fourth, based on their participation in the project, teachers expressed an increased sense of efficacy with respect to conducting their work. The discussion was focused on how teachers created a community of practice to support their professional growth, which influenced efficacy for teaching as they became increasingly effective in blending technology, pedagogy and content."

5. Other TPACK Resources

Claire Kilbane, an associate professor at Otterbein University in Westerville, Ohio (USA), created and posted a delightful video introducing TPACK entitled "TPACK 101" (http://vimeo.com/16291486).

A clever stop-motion video about TPACK was posted on YouTube by "YoNameTho" on May 16, 2011: http://www.youtube.com/watch?v=4hWulnjwdsc.

(If you are the creator of this piece, please message us at tpack.news.editors@wm.edu so that we can give you credit for your contribution in the next newsletter.)

An insightful and thought-provoking blog entry about TPACK and its future was posted by Ian Mergard, a preservice high school teacher studying at the University of Canberra in Australia.

As first announced in issue #8 of the TPACK Newsletter, Tae Shin at the University of Central Missouri and Punya Mishra & Matt Koehler at Michigan State University have spent considerable time and effort putting together a TPACK bibliography with about 250 entries – as Matt says, "not by any means complete, but a good start…and the most comprehensive TPACK bibliography out there" – and are hoping that their work might be of use to others.
http://mkoehler.educ.msu.edu/tpack/partial-bibliography-of-tpack-related-works/
http://www.mendeley.com/groups/522011/tpack/papers/

On the recommendation of the members of SITE's TPACK SIG, we have established four TPACK-related email discussion lists:

- tpack.research
- tpack.teaching
- tpack.grants
- tpack.future

Instructions for how to subscribe to these lists are on the SITE TPACK SIG's Web page: http://site.aace.org/sigs/tpack-sig.htm. (Please note that we will soon be retiring the TPACK Google Group, also in accordance with the decision made at the 2010 SITE TPACK SIG meeting.)

6. TPACK Work in Progress

Charoula Angeli and Nicos Valanides are currently "accepting manuscripts for potential publication in an upcoming special issue on Technological Pedagogical Content Knowledge in the Journal of Educational Computing Research. The call can be found here:
http://jrnledcompresearch.com/index.php/jecr/announcement/view/3
[They] would be happy to receive your manuscripts."

Teaching Teachers for the Future
http://www.altc.edu.au/ttf/
(See TPACK link near the top of the page.)

"This substantial and innovative $7.8m national Teaching Teachers for the Future (TTF) project, financed by DEEWR through the ICT Innovation Fund (ICTIF) under the Digital Strategy for Teachers and School Leaders strategy, specifically targets systematic change in the Information and Communication Technology in Education (ICTE) proficiency of graduate teachers across Australia.
The project team is led by the Australian Learning and Teaching Council (ALTC), and includes the Australian Council of Deans of Education (ACDE), the Australian Institute for Teaching and School Leadership (AITSL), Education Services Australia (ESA), the Australian Council for Computers in Education (ACCE), and the 39 Australian higher education institutions with pre-service teacher education programs as partners.

The project focuses on enabling pre-service teachers to achieve and demonstrate (upon graduation) competence in the effective and innovative use of ICT in education to improve student learning. It aims to achieve this through the systematic embedding of an ICTE dimension in:

- pre-service teacher education curriculum, pedagogies, assessment, professional experience,
- university classroom and self-study resources,
- the national program accreditation framework and the Graduate Teacher Standards, and
- national professional learning networks of ICT and curriculum methods experts within and across the Institutions."

“Henrico County Schools [in Virginia, USA have] adopted ...TPACK as the framework for professional development and 21st century learning in the Henrico County Schools System. Henrico County is one of the largest and earliest districts to pioneer and implement a one-to-one initiative. They have adopted this model as [a] conceptual framework to guide their progress towards ...21st century learning. The following video will set the stage to provide insight into how this school district uses technology for relevant and real-world learning."

Source:
“Using TPACK as a Framework for Tech PD, Integration and Assessment”
by Lisa Nielsen
http://theinnovativeeducator.blogspot.com/2011/03/using-tpack-as-framework-for-tech-pd.html
(From the Tech & Learning TL Advisor Blog)

The Instructional Technology Standards that were proposed by the Georgia Professional Standards Commission's Instructional Technology Task Force in December 2010 were based upon TPACK. See the proposed standards online here: http://www.gapsc.com/policies_guidelines/documents/Instructional_Technology_Standards.pdf

7. TPACK Newsletter Suggested Citation

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., & Hofer, M. (Eds.). (2011, May 21). TPACK newsletter issue #10: May 2011 [Electronic mailing list message]. Retrieved from http://punya.educ.msu.edu/research/tpck/newsletter-archive/

8. Learning and Doing More with TPACK

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

- Visit and contribute to the TPACK wiki at: http://tpack.org/
- Join the TPACK SIG at: http://site.aace.org/sigs/tpack-sig.htm
- Subscribe to the tpack.research, tpack.teaching, tpack.grants and/or tpack.future discussion lists at: http://site.aace.org/sigs/tpack-sig.htm
- Access the TPACK Learning Activity Types taxonomies at: http://activitytypes.wmwikis.net/
- Access two tested TPACK assessment instruments at: http://activitytypes.wmwikis.net/Assessments

Please feel free to forward this newsletter to anyone who might be interested in its contents.

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

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

Standard End-Matter

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 & Mark

…for the SITE TPACK SIG leadership:

Candace Figg, Co-Chair, Brock University
Mark Hofer, Co-Chair, College of William & Mary
Judi Harris, Wing Chair, College of William & Mary
Mario Kelly, Futon, Hunter College
Matt Koehler, Chaise Lounge, Michigan State University
Punya Mishra, Recliner, Michigan State University