TPACK Publications, 2007 - 2008

Journal Articles

1. Title: Epistemological and methodological issues for the conceptualization, development, and assessment of ICT–TPCK: Advances in technological pedagogical content knowledge (TPCK)

Authors: Charoula Angeli and Nicos Valanides

Journal: *Computers & Education*

Publication Information: Angeli, C. & Valanides, N. (2009). Epistemological and methodological issues for the conceptualization, development, and assessment of ICT–TPCK: Advances in technological pedagogical content knowledge (TPCK). *Computers & Education*, *52*(1), 154-168.

Abstract: "In this paper, several issues regarding the epistemology of technological pedagogical content knowledge (TPCK) are first raised for the purpose of clarifying the construct. Specifically, the transformative and integrative views are juxtaposed for exploring the epistemology of TPCK, and, at the end, the transformative view is adopted concluding that TPCK is a unique body of knowledge that is constructed from the interaction of its individual contributing knowledge bases. Then, ICT–TPCK is introduced as a strand of TPCK, and is described as the ways knowledge about tools and their affordances, pedagogy, content, learners, and context are synthesized into an understanding of how particular topics that are difficult to be understood by learners or difficult to be represented by teachers can be transformed and taught more effectively with technology in ways that signify its added value. One model for the development and another for the assessment of ICT–TPCK are then discussed. Technology Mapping is proposed as a situative methodology for the development of ICT–TPCK, and three forms of assessment, namely, expert assessment, peer assessment, and self-assessment are proposed for assessing teachers' competencies to teach with technology. The paper also reports on the empirical findings of a study that was undertaken to investigate the impact of the proposed models on student learning within the context of two design tasks in a pre-service primary teacher education course. Repeated measures within-subject effects were tested and the results indicated that ICT–TPCK competency significantly improved over the course of a semester. The results of this study clearly show that the theoretical models proposed herein can positively impact the development of ICT–TPCK. Lastly, these results can be used as baseline data in future studies that may be conducted to further validate or improve the proposed models in different contexts."

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2. Title: Realizing technology potential through TPACK

Authors: Arlene Borthwick, Mike Charles, Melissa Pierson, Ann Thompson, John Park, Mike Searson, and Glen Bull

Journal: *Learning & Leading with Technology*

Publication Information: Borthwick, A., Charles, M., Pierson, M., Thompson, A., Park, J., Searson, M., & Bull, G. (2008). Realizing technology potential through TPACK. *Learning & Leading with Technology*, *36*(2), 23-26.

Abstract: "The article provides information related to technology, pedagogy, and content knowledge (TPACK). …People are becoming aware that [technology, pedagogy, and content] are equally important in making connections to instructional objectives in school. Each year, a coalition of educational associates … meet for the annual National Technology Leadership Summit (NTLS). NTLS provides an opportunity for leaders from ISTE's Special Interest Group for Teacher Educators (SIGTE) to meet with their counterparts from teacher education content area associations."

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3. Title: Connecting informal and formal learning experiences in the age of participatory media

Authors: Glen Bull, Ann Thompson, Mike Searson, Joe Garofalo, John Park, Carl Young, and John Lee

Journal: *Contemporary Issues in Technology and Teacher Education*

Publication Information: Bull, G., Thompson, A., Searson, M., Garofalo, J., Park, J., Young, C., & Lee, J (2008). Connecting informal and formal learning: Experiences in the age of participatory media. *Contemporary Issues in Technology and Teacher Education*, *8*, 2. Retrieved October 20, 2008, from http://www.citejournal.org/vol8/iss2/editorial/article1.cfm

Abstract: "Social media are changing the world in ways not yet understood. The effects are rippling through news, business, entertainment, and the political arena. A new generation of students is significantly more active in the way that they create and interact with one another.

One effect on schools and schooling is apparent. The next generation will live in a world that is very different from the previous generation. The current generation of educators is not well equipped to serve as guides in this process – we are all learning together as new media technologies emerge. In fact, teens are often more experienced in use of these technologies than other demographic groups.

The informal learning that occurs in the context of participatory media offers significant opportunities for increased student engagement in formal learning settings. The experience with communication technologies that teenagers today possess must be tapped by educators and connected to pedagogy and content, however, in order to address learning objectives in schools. Teacher education faculty members are experienced in this arena. We are currently at a moment in time in which the current and next generation of educators each can make a genuine contribution by working together."

4. Title: An investigation of the use of real-time, authentic geospatial data in the K-12 classroom

Author: Aaron Doering

Journal: *Journal of Geography*

Publication Information: Doering, A. (2007). An investigation of the use of real-time, authentic geospatial data in the K-12 classroom. *Journal of Geography,* 106, 217-225.

Abstract: "This article situates geospatial technologies as a constructivist tool in the K-12 classroom and examines student experiences with real-time authentic geospatial data provided through a hybrid adventure learning environment. Qualitative data from seven student focus groups demonstrate the effectiveness of using real-time authentic data, peer collaboration, and geospatial technologies in learning geography. We conclude with recommendations about geospatial technology curricula, geospatial lesson design, providing preservice teachers with geographic technological pedagogical content knowledge, and encouraging further research to investigate the impact, affordances, and pedagogical implications of geospatial technologies and data in the K-12 classroom."

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5. Title: Assessing technologies for teaching and learning: understanding the importance of technological pedagogical content knowledge.

Authors: Richard E. Ferdig

Journal: *British Journal of Educational Technology*

Publication Information: Ferdig, R.E. (2006). Assessing technologies for teaching and learning: understanding the importance of technological pedagogical content knowledge. *British Journal of Educational Technology*, 37, 749-760.

Abstract: "Past and present research has provided evidence to support the claim that technologies for teaching and learning must be pedagogically sound. However, educational technologies are also part of a complex process involving the people in the implementation of the innovation. In this paper, I review existing research and explain what both of those claims entail for educational technology. In the remainder of the paper, I discuss the research agenda related to the need to provide evidence that technology innovations are successful in the implementation process. Implications of this three-part model as well as a discussion of the importance of technological pedagogical content knowledge conclude the paper."

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6. Title: Examining teachers' beliefs about ICT in education: implications of a teacher preparation programme

Author: Athanassios Jimoyiannis and Vassilis Komis

Journal: *Teacher Development*

Publication Information: Jimoyiannis, A. & Komis, V. (2007). Examining teachers' beliefs about ICT in education: implications of teacher preparartion programme. *Teacher Development, 11,* 149 – 173.

Abstract: "The survey presented in this article examines current teachers' beliefs and attitudes towards information and communication technologies (ICT) in education. A total of 1165 primary and secondary education teachers participated in the study, immediately after following a training programme on basic ICT skills. The authors' results showed that the majority of the teachers in the sample have positive attitudes towards the training programme they attended, the general role that ICT can play in education and the integration of ICT in the educational process. The authors' findings also revealed some parameters that interfere negatively, thus making many teachers cautious of or sceptical about ICT integration in educational practice. Multivariate analysis identified three groups of teachers that exhibited a consistent approach: a group of teachers having positive attitudes towards the items of the research, a second group with negative attitudes and a third one with neutral beliefs about ICT in education. Moreover, the authors' analysis extracted significant information on the profile of the teachers within each of the three groups. They found that personal factors (subject matter, teaching experience and gender) are strongly associated with the beliefs and perceptions teachers hold about ICT in education."

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7. Title: When curriculum and technology meet: Technology integration in methods courses.

Authors: Christy Keeler

Journal: *Journal of Computing in Teacher Education*

Publication Information: Keeler, C.G. (2008). When curriculum and technology meet: Technology integration in methods courses. *Journal of Computing in Teacher Education, 25*(1), 23-30.

Abstract: "Reporting on the results of an action research study, this manuscript provides examples of strategies used to integrate technology into a content methods course. The study used reflective teaching of a social studies methods course at a major Southwestern university in 10 course sections over a four-semester period. In alignment with the research question, the original course design used technology-rich instructional approaches. Throughout the study period, elements of those strategies altered to better meet the needs of preservice teachers and take advantage of technological innovations. The result is a description of technology

productivity and instructional strategies applicable in a variety of content-specific preservice teacher education courses."

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8. Title: Toward technology integration in mathematics education: A technology-integration course planning assignment

Authors: Gladis Kersaint

Journal: *Contemporary Issues in Technology & Teacher Education*

Publication Information: Kersaint, G. (2007). Toward technology integration in mathematics education: A technology-integration course planning assignment. *Contemporary Issues in Technology & Teacher Education, 7*(4), 256-278.

Abstract: "This article describes a technology integration course planning assignment that was developed to enhance preservice teachers' technological pedagogical content knowledge (TPCK). This assignment required preservice teachers work with peers to integrate various technological tools (e.g., graphing calculators, web based mathematics applets, etc) in a secondary level mathematics course (e.g., Algebra 2). A description of the context and the course in which this assignment is given is provided and lessons learned from several years of implementation are discussed."

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9. Title: Tracing the development of teacher knowledge in a design seminar: Integrating content, pedagogy and technology

Authors: Matthew J. Koehler, Punya Mishra and Kurnia Yahya

Journal: *Computers & Education*

Publication Information: Koehler, M.J., Mishra, P., & Yahya, K. (2007). Tracing the development of teacher knowledge in a design seminar: Integrating content, pedagogy and technology. *Computers & Education, 49,* 740-762.

Abstract: "We report the results of a semester-long investigation of the development of TPCK during a faculty development design seminar, whereby faculty members worked together with master's students to develop online courses. Qualitative discourse analysis of 15 weeks of field notes for two of the design teams show participants moved from considering technology, pedagogy and content as being independent constructs towards a richer conception that emphasized connections among the three knowledge bases. Our analyses suggest that developing TPCK is a multigenerational process, involving the development of deeper understandings of the complex web of relationships [among] content, pedagogy and technology and the contexts in which they function. Pedagogic, pragmatic, theoretical, and methodological contributions are discussed."

10. Title: Integration of cultural diversity and technology: Learning by design

Authors: Judy Lambert and Tony Sanchez

Journal: *Meridian: A Middle School Computer Technologies Journal*

Publication Information: Lambert, J. & Sanchez, T. (2007). Integration of cultural diversity and technology: Learning by design. *Meridian: A Middle School Computer Technologies Journal*, *1*(1). Retrieved November 25, 2008, from http://www.ncsu.edu/meridian/win2007/pinballs/index.htm

Abstract: "Using principles from both the technological pedagogical content knowledge design approach (TPCK) and Chisholm's six-element framework (1998), a technology expert and several teachers designed a middle school videoconferencing project that proved effective in deepening students' understanding and appreciation for culturally sensitive behavior. The use of technology provided students with added engagement and an authentic experience for applying their understanding of cultural sensitivity. By the explicit act of design, teachers learned that achieving instructional goals is the real purpose for employing technology. This account illustrates that teachers can learn to integrate technology effectively when they participate in the design of a project that centers on a curriculum-based instructional problem. Videoconferencing technology can be particularly useful when helping students internalize and apply an abstract concept such as cultural diversity."

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11. Title: School-wide technology integration

Author: Anita McAnear

Journal: *Learning & Leading with Technology*

Publication Information: McAnear, A. (2008). School-wide technology integration. *Learning & Learning with Technology, 35*(5), 5.

Abstract: "The article focuses on the framework for integrating technological pedagogical content knowledge (TPCK) in the teacher education community. TPCK highlights the importance of knowing how technology affects technological content knowledge and how technology adds to pedagogical knowledge. The success of technology integration into teaching and learning requires an understanding of the presentation of concepts using technologies, the knowledge of what makes concepts difficult or easy to learn, and the knowledge of how technologies can be used to build on and strengthen existing knowledge."

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12. Title: Teachers and teacher educators learning from new literacies and new technologies

Authors: Mary B. McVee, Nancy M. Bailey and Lynn E. Shanahan

Journal: *Teaching Education*

Publication Information: McVee, M.B., Bailey, N.M., & Shanahan, L. E. (2008). Teachers and teacher educators learning from new literacies and new technologies. *Teaching Education, 19,* 197 – 210.

Abstract: "While many teachers and teacher educators agree that it is important to integrate new literacies and technologies into their teaching, educators are often perplexed about how to begin thinking about this task. Research reveals that educators use technologies for personal and communicative purposes, but teachers, for the most part, have not yet applied these technologies in their classroom teaching and learning. Given these challenges, the current study was undertaken as an instance of teacher research carried out in the context of a teacher education course in new literacies and technologies wherein teacher educators attempted to take up new literacies practices. Study participants were pre- and in-service teachers. Findings indicate that teacher educators must foster environments to share problem-solving and distributed learning, to support design and multimodal redesign of texts, and to explore literacy and technology as transactional processes. Whereas both teachers and teacher educators may be tempted to wait until they are technologically adept before attempting to integrate new literacies and new technologies into their teaching, this study suggests that the learning environment, approach to learning, knowledge about multimodal text design, and stance toward literacy and technology may be far more important than the technologies that teachers use to enact their instructional plans."

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13. Title: Digital storytelling: A powerful technology tool for the 21st century classroom.

Author: Bernard R. Robin

Journal: *Theory Into Practice*

Publication Information: Robin, B.R. (2008). Digital storytelling: A powerful technology tool for the 21st century classroom. *Theory Into Practice*, 47, 220-228.

Abstract: "Digital storytelling has emerged over the last few years as a powerful teaching and learning tool that engages both teachers and their students. However, until recently, little attention has been paid to a theoretical framework that could be employed to increase the effectiveness of technology as a tool in a classroom environment. A discussion of the history of digital storytelling and how it is being used educationally is presented in this article. The theoretical framework, technological pedagogical content knowledge (TPCK), is described, along with a discussion of how this model might be used with digital storytelling."

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14. Title: Learning to teach with technology through an apprenticeship model

Authors: Kathryn G. Shafer

Journal: *Contemporary Issues in Technology & Teacher Education*

Publication Information: Shafer, K.G. (2008). Learning to teach with technology through an apprenticeship model. *Contemporary Issues in Technology & Teacher Education, 8,* 27-44.

Abstract: "This paper reports the results of a doctoral research pilot study that paired a researcher with an experienced classroom teacher for a 12-week time span with the goal of effectively integrating the use of Geometer's Sketchpad (GSP) into the classroom teacher's practice. Using a teacher development experiment, the researcher created an apprenticeship model to foster the transmission of the knowledge to the classroom teacher required to successfully teach with Geometer's Sketchpad. Specific results indicate a positive change in the facilitation of mathematical communication and inquiry-based instructions in the classroom teacher's practice as well as sustained use of GSP beyond the time span of the pilot study. General results include the development of the constructors of technological knowledge (TK) technological pedagogical knowledge (TPK) and technological pedagogical content knowledge (TPCK). "

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15. Title: Digital video in the classroom: Integrating theory and practice

Author: John Sweeder

Journal: *Contemporary Issues in Technology and Teacher Education*

Publication Information: Sweeder, J. (2007). Digital video in the classroom: Integrating theory and practice. *Contemporary Issues in Technology and Teacher Education*, *7*, 107-128.

Abstract: "This article is intended to help teacher educators, classroom teachers, and administrators interested in educational technology acquire a firm theoretical as well as practical foundation upon which to introduce nonlinear digital video into their undergraduate or graduate instruction; discover a time-tested, step-by-step process for introducing creative hands-on videography projects into their respective teacher preparation programs or classrooms; and recognize why it is critically important for preservice and in-service teachers to establish a personal underlying pedagogical philosophy for infusing video technology into classroom instruction."

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16. Title: TPCK: A new direction for technology in teacher education programs

Author: Ann D. Thompson

Journal: *Journal of Computing in Teacher Education*

Publication Information: Thompson, A.D. (2007). TPCK: A new direction for technology in teacher education programs. *Journal of Computing in Teacher Education, 23*(3)*,* 78-104.

Abstract: "The article reviews the book "The Handbook of Technological Pedagogical Content Knowledge for Teaching and Teacher Educators."

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17. Title: Breaking news: TPCK becomes TPACK!

Author: Ann D. Thompson & Punya Mishra

Journal: *Journal of Computing in Teacher Education*

Publication Information: Thompson, A.D., & Mishra, P. (2007-2008). Breaking news: TPCK becomes TPACK! *Journal of Computing in Teacher Education, 24*(2)*,* 38, 64.

Abstract: "For those of us interested in the construct Technological Pedagogical Content Knowledge and the clarity it brings to our work with preservice and inservice teachers, the acronym TPCK has been somewhat problematic."

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18. Title: Developing and evaluating a game-based software engineering educational system.

Authors: Wen-Hsiung Wu, Wei-Fan Chen, Tsung-Li Wang, and Chung-Ho Su

Journal: *International Journal of Engineering Education*

Publication Information: Wu, W.-H., Chen, W.-F., Wang, T.-L., & Su, C.-H. (2008). Developing and evaluating a game-based software engineering educational system. *International Journal of Engineering Education*, *24,* 681-688.

Abstract: "Research in software engineering education has, in recent years, attempted to achieve the equilibrium between academia and practice. The software engineering education research community has obtained a number of valuable outcomes in the areas of content curriculum, pedagogy, and technology, respectively. However, very few studies have successfully integrated these three dimensions into a single learning environment. This study developed and evaluated a Game-Based Software Engineering Educational System (GBSEES) for software engineering education. GBSEES adopted a role-playing strategy using a digital game-based learning model. This game-based system was based on the educational theory of Technological Pedagogical Content Knowledge, which integrates pedagogical knowledge, content knowledge, and technological knowledge. In the game-based learning system, students learned about the process

of software development in a team-based environment by using a role-playing gaming strategy. The study also investigated the effect of the GBSEES on the students' attitude to learning."

Dissertations & Theses

1. Title: Developing technological pedagogical content knowledge in preservice teachers through microteaching lesson study

Author: Rose M. Cavin

University: The Florida State University, College of Education, Fall Semester, 2007

Publication Information: Cavin, R.M. (2007). Developing technological pedagogical content knowledge in preservice teachers through microteaching lesson study (Doctoral dissertation, Florida State University, 2007). *Dissertation Abstracts International, 69* (02)*,* 569.

Abstract: "This research study was conducted to explore the development of technological pedagogical content knowledge (TPCK) in preservice teachers as they participated in microteaching lesson study (MLS). Participants were six preservice teachers enrolled in the required technology course for mathematics and science teacher education at a small rural college. The researcher was also the instructor for the course. The TPCK framework, modeled by Mishra and Koehler (2006) as three overlapping circles, focuses on the interrelationships between the three components of technology, pedagogy and content, and involves an awareness of the effectiveness of incorporating a technological tool in a content lesson. In microteaching lesson study (M. Fernández, 2005), preservice teachers worked in small groups through repetitive cycles of teaching, reflecting, and modifying a group lesson. Teaching to a group of students enrolled in a college mathematics class provided a situated learning environment for the preservice teachers to experience teaching with technology. Data were collected qualitatively via audio and video recordings, observations, interviews, and course documents. Data analysis was conducted using the TPCK framework in conjunction with various state and national standards related to the three components of TPCK. Findings indicate that the preservice teachers developed an awareness of the nuances of teaching with technology in a student-centered learning environment, recognizing that traditional "methods" of teaching such as sequencing, pacing and written directions took on special characteristics when technology was involved. Factors seen to have an influence on the preservice teachers' decisions related to the use of a technological tool included participation as students in modeled lessons, comfort level, and the preservice teachers' beliefs related to learning and teaching with technology. Preservice teachers also expanded their views on mathematical knowledge. Prior to the MLS process, the preservice teachers focused on technology used at a procedural level to "do the math faster," while post MLS data indicated a shift towards a more conceptual view of technology enhanced mathematics. One fringe benefit recognized by the preservice teachers was the experience of working with their peers in fine-tuning a lesson to maximize student learning, gaining practical experience applicable toward future school-based instruction."

2. Title: A conceptual analysis of technological pedagogical content knowledge

Author: Suzy Cox

University: Department of Instructional Psychology & Technology, Brigham Young University, July 2008

Publication Information: Cox, S. (2008). A conceptual analysis of technological pedagogical content knowledge (Doctoral dissertation, Brigham Young University, 2008). *Dissertation Abstracts International, 69* (06)*,* p. in press.

Abstract: "This dissertation reports the results of a conceptual analysis of the technological pedagogical content knowledge (TPACK) framework, particularly its component constructs of technological content knowledge (TCK), technological pedagogical knowledge (TPK), and TPACK (the central component of the framework listed earlier). First, a technical use analysis reveals how existing research has defined and exemplified the constructs. Next, interviews with leading TPACK researchers further refine the constructs. The dissertation then reports cases that illustrate each of the constructs and the boundaries between them. The conceptual analysis results in an elaborated model of the TPACK framework, focusing on the essential features of each construct to facilitate classification of future examples. The analysis also reveals that TCK, TPK, and TPACK do appear to be distinct constructs. The boundaries among constructs are elaborated through a discussion of the sliding nature of the framework and the nature of the instructional strategies that are enacted."

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3. Title: The development of pre-service teachers' technology specific pedagogy

Author: Rachel A. Harrington

University: Oregon State University, October 2008

Publication Information: Harrington, R.A. (2008). The development of pre-service teachers' technology specific pedagogy (Doctoral dissertation, Oregon State University, 2008). *Dissertation Abstracts International, 69* (03)*,* 914.

Abstract: "The purpose of this study was to document the development of pre-service teachers' Technology Specific Pedagogy as they learned to teach mathematics with technology during their initial licensure program. The study investigated the pre-service teachers' learning using both a social and a psychological perspective of teacher learning. Two research questions were used to guide the research: (1) What patterns of participation are displayed across learning contexts as pre-service teachers reason pedagogically about teaching mathematics with technology prior to their full-time student teaching? (2) In what ways do the Technology Partnership Project and its features facilitate pre-service mathematics teachers' development of TPCK? The pre-service teachers shared ideas that gave insight into their reasoning about

teaching with technology, their overarching conception of teaching mathematics with technology and their knowledge of students' understanding, thinking, and learning in mathematics with technology. Five pre-service teachers were followed during coursework and participation in the Technology Partnership Project field experience. Course participation, course assignments, team planning meetings, teaching observations, teaching artifacts, and interview transcripts were documented and analyzed as evidence of the development of pre-service teachers' Technology Specific Pedagogy. Three pre-service teachers were purposefully selected for in-depth case analysis. The study identified four patterns of participation as the three case participants reasoned about teaching with technology: Playing to Learn, Lesson Design, Student Control, and Equitable Access. The pre-service teachers also shared ideas that indicated their overarching conception of teaching mathematics with technology: Doing to the Technology versus Using the Technology, and Technology as an Extension/Simplifier versus Technology as Enhancer/Differentiator. Lastly, the pre-service teachers shared repeating ideas that indicated their knowledge of students' understandings, thinking, and learning with technology: Visualizing with Technology, Abstraction with Technology, and Motivation. Certain features of the Technology Partnership Project facilitated the development of the pre-service teachers' thinking, including: (1) opportunities to advocate for their own ideas and convince others of the validity of those ideas, (2) opportunities to teach using the ideas of their peers and the in-service teachers and to learn from those ideas, and (3) a way to connect preconceptions about the way students learn with actual examples of student learning."

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4. Title: Nurse educator's perceptions of learning technologies in an undergraduate nursing program

Author: Kerry Laurene Rusk

University: University of Alberta, 2007

Publication Information: Rusk, K.L. (2007). Nurse educator's perceptions of learning technologies in an undergraduate nursing program (Master's thesis, University of Alberta, 2007). *Masters Abstracts International, 46* (02)*,* 926.

Abstract: "The advent of technology has had a profound affect on nursing education (Chaffin & Maddux, 2004). This qualitative study used focus group and photo elicitation techniques to explore the perceptions and experiences of nurse educators with respect to the use of learning technologies in the context of their teaching practice. The findings of this study indicate nurse educators are active participants in the teaching and learning process, have a desire to use pedagogically sound teaching strategies to facilitate student learning, and perceive there to be a benefit of using learning technologies. However, nurse educators' identified time, resources, and training as significant factors that prevent them from increasing their integration of learning technologies into their teaching, a finding substantiated in the literature. To effectively integrate learning technologies, nurse educators require training that will help them to understand the relationship between technology, pedagogy, and content knowledge."

Book

Title: *Handbook of Technological Pedagogical Content Knowledge (TPCK) for Educators*

Editors: The AACTE Committee on Innovation and Technology

Publication Information: AACTE Committee on Innovation and Technology (Eds). (2008). *Handbook of Technological Pedagogical Content Knowledge (TPCK) for Educators:* New York: Routledge.

Abstract: "This handbook addresses the concept and implementation of technological pedagogical content knowledge -- the knowledge and skills that teachers need in order to meaningfully integrate technology into instruction in specific content areas. Recognizing, for example, that effective uses of technology in mathematics are quite different from effective uses of technology in social studies, teachers need specific preparation in using technology in each content area they will be teaching. Offering a series of chapters by scholars in different content areas who apply the technological pedagogical content knowledge framework to their individual content areas, the volume is structured around three themes: What is Technological Pedagogical Content Knowledge? Integrating Technological Pedagogical Content Knowledge into Specific Subject Areas Integrating Technological Pedagogical Content Knowledge into Teacher Education and Professional Development The Handbook of Technological Pedagogical Content Knowledge for Educators is simultaneously a mandate and a manifesto on the engagement of technology in classrooms based on consensus standards and rubrics for effectiveness. As the title of the concluding chapter declares, 'It's about time!'"