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Professional Development in Higher Education: A Model for Meaningful Technology Integration

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Abstract

While many institutions provide centralized technology support for faculty, there is a lack of centralized professional development opportunities that focus on simultaneously developing instructors' technological, pedagogical, and content knowledge (TPACK) in higher education. Additionally, there are few professional development opportunities for faculty that continue throughout the practice of teaching with technology. We propose a model of continuing professional development that provides instructors with the ability to meaningfully integrate technology into their teaching practices through centralized support for developing TPACK. In doing so, we draw upon several theoretical frameworks and evidence based practices.

Keywords: professional development, higher education, technology integration, TPACK.

Introduction

The need to assist faculty in developing higher levels of both the technical literacy necessary to select technological tools as well as pedagogical approaches to use those tools effectively to teach is a primary concern in many institutions of higher education (Grajek & Rotman, 2014). Faculty have a growing interest in incorporating technology into teaching, but many administrators in higher education have concerns that faculty lack the skills necessary to implement e-learning (Bichsel, 2013).

Institutions often rely on professional development opportunities to prepare instructors to effectively teach with technology. But research shows technology related professional development opportunities often lack important information related to pedagogy and content and are not structured in a way that effectively supports instructors (Schlager & Fusco, 2003).

The Technological, Pedagogical, and Content Knowledge (TPACK) framework can be used as an approach to build instructors' ability to integrate technology with the pedagogical strategies that best serve the content they are teaching (Koehler & Mishra, 2009). While this framework has been used extensively to prepare K-12 instructors to teach effectively with technology, it is employed at a considerably smaller scale in institutions of higher education. Scaling content-specific pedagogical and technological support to a

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wide variety of disciplines in institutions where support structures are often centrally located can be a significant challenge.

Here we will propose a model of professional development that meets this challenge by drawing upon theoretical frameworks and research-based methods that have been shown to be effective for developing TPACK in educators in highly specialized contexts. This conceptual model describes how theory- and research-based strategies can be applied by centralized support structures to create more comprehensive professional development for instructors.

Literature Review

Issues with Centralized Teaching Support

Expertise in one's own discipline is often considered the most valuable attribute of an instructor in higher education (Postareff, Lindblom-Ylänne, & Nevgi, 2007). As a result, faculty enter into teaching at the university or college level as experts in their discipline, but do not always have experience with pedagogical techniques or technological tools. Instructors' pedagogical beliefs are formed through a process of enculturation and social construction (Pajares, 1992). Instructors in higher education often emulate the practices of those who taught them, practices that generally did not involve effective uses of technology. Ertmer and Ottenbreit-Leftwich (2010) suggest two reasons instructors are hesitant to integrate technology into their classes are due to a lack of relevant knowledge and a lack of self-efficacy. Both of these issues can be addressed by developing instructors' technological, pedagogical, and content knowledge through a well-designed, comprehensive professional development program.

For institutions where faculty development is provided through centralized units, such as a centralized Information Technology (IT) department or center for teaching excellence, developing comprehensive professional development programs that meet the individual needs of faculty teaching in a wide range of disciplines can be a challenge. Educause's recent ECAR report on educational technology and faculty development in higher education (Dahlstrom, 2015) suggested most centralized support units find success in providing services or training related to things that scale well, such as basic technology or pedagogy training, and recommend that specialized or personalized services are better offered as a shared service or by individual academic units. This suggestion conflicts somewhat with Koehler and Mishra's TPACK theoretical framework, which posits that successful integration of technology into teaching relies on an instructor successfully being able to balance technological knowledge, pedagogical knowledge, and content knowledge, and understanding how each of these areas "interact, constrain, and afford each other" (Koehler, Mishra, Kereluik, Shin, & Graham, 2014, pg. 102). Training that isolates each of these types of knowledge, such as workshops about a specific technology or pedagogical strategy, often fail to adequately cultivate the specialized knowledge of how technology and pedagogy interact with each other and within specific content areas. To accomplish this, workshops should provide meaningful and relevant activities in a contextualized environment.

The ECAR report showed centralized support units provide instructors with a wide range of technology support and opportunities to learn to build technological proficiency, but few institutions provide centralized teaching support that includes expertise in effectively teaching with technology (Dahlstrom, 2015). Muwanga-Zake (2008) notes that extensive literature exists regarding the potential for communications technology in education, but this literature is accompanied by a dearth of practical examples that are accessible and easy for instructors to integrate into their teaching practice. The majority of the centralized support that is offered to instructors focuses on successful technology use in the classroom, not on providing ongoing pedagogical support for instructors as they implement educational technologies. Institutions have support structures in

place to offer a variety of opportunities for instructors to develop technological knowledge while designing and delivering courses, via technology workshops and classroom technology support. But these structures often rely on staff with only technological expertise assisting instructors with making decisions about teaching with the technology (Muwanga-Zake, 2008).

A mechanism for providing ongoing development of technological, pedagogical, and content knowledge throughout the process of teaching is seemingly absent in many institutions. But this type of faculty development is critical, as without it, instructors' use will be limited to using technology for disseminating information, rather than being challenged to use it in ways that assists students in building knowledge (Muwanga-Zake, 2008). Ertmer (2005) notes that incremental, first-order uses of technology are becoming increasingly more common in instruction, but these uses do not emulate the constructivist, more student-centered uses that have been deemed as best practices by literature.

Centralized support units can improve professional development opportunities for instructors by providing relevant and meaningful activities for instructors that cultivate instructors' technological, pedagogical, and content knowledge in tandem with one another and by providing ongoing opportunities for them to continue developing professionally while they are in the process of teaching with technology.

TPACK Framework

The three knowledge domains that are the basis of the TPACK framework intersect to form four unique domains as illustrated in Figure 1: Technological Pedagogical Knowledge (TPK), Technological Content Knowledge (TCK), Pedagogical Content Knowledge (PCK), and finally Technological Pedagogical Content Knowledge (TPACK). Each of these areas represents a knowledge set required by instructors to achieve effective technology integration into teaching (Koehler & Mishra, 2009). While teachers in the K-12 environment sometimes encounter opportunities to develop TPACK during pre-service teacher training (Koehler et al., 2014), instructors in higher education have not always been exposed to formal training on technological or pedagogical practices prior to entering the field.

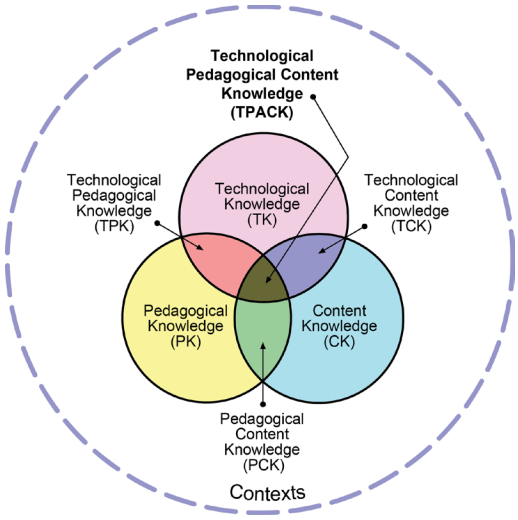

Figure 1: TPACK Framework.
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A common approach used in higher education to address effective technology integration concentrates on developing instructors' technological pedagogical knowledge (TPK) independent of the content being taught and allowing instructors to apply TPK to their content areas on their own

(Koehler et al., 2014). Professional development workshops or courses are often led by instructional technologists who have limited understanding of the subject matter participants are teaching. As a result, the focus of professional development is usually on how technology can facilitate general pedagogical strategies, rather than applying technology to teach specific content (Koehler et al., 2014). As a result of this limited approach on building only TPK, instructors are often left to work independently to apply the TPK to their disciplines, which can leave them struggling to grasp how this newfound technological and pedagogical knowledge can transfer to their particular course content. As a result, the impact that technology, pedagogy, and content have on each other may not be fully appreciated or realized.

A barrier to providing content-specific technological and pedagogical training is scaling to the entire institution's community of educators. Watson (2001) notes that integrating technology into the curriculum is complex and will differ based an individual instructor's personal teaching preferences. Employing a cadre of instructional technologists who cater to discipline-specific needs is also unrealistic, especially in this time of increased scrutiny on administrative costs that impact the affordability of obtaining a college degree. Centralized support units in higher education need to establish a means of providing instructors with pedagogical and technological professional development opportunities that are directly applicable, meaningful, and relevant to each individual discipline and which each instructor can make their own.

While the TPACK framework can be used as an approach to design professional development aimed at building instructors' capability to effectively integrate technology into education, it does not serve as a checklist of activities that need to occur to develop technological, pedagogical, and content knowledge. Practice-based professional development (Ball & Cohen, 1999) can serve as a means to enable development of TPACK by providing instructors with opportunities to build self-efficacy and knowledge of effective technology integration practices. Practice-based professional development is a comprehensive approach that gives instructors hands-on practice in an authentic, reflective, and low-risk environment.

Practice-Based Professional Development

Ball and Cohen (1999) suggested that a comprehensive approach to professional development is needed for K-12 teachers and that it should be practice-based. They emphasized the need for practitioners to directly experience relevant tasks they will encounter while practicing within the context they will be teaching. Situating instructors' learning in the sorts of practice that is being encouraged is a key element toward their professional development (Ball & Cohen, 1999). Ball and Cohen's theory is evident in frameworks for continuing professional development (CPD) for academics in higher education as well, which suggests the need for continued development must originate out of practice and the problems created by practice (Elton, 2009). For CPD to be effective, it must encourage instructors to reflect on the problems they encounter while teaching and attempt to find solutions to these problems (Elton, 2009).

Evaluations of teacher professional development opportunities regularly find these programs to be disconnected from practice, fragmented, and tend to be misaligned with the needs of instructors (Corcoran, Shields, & Zucker, 1998; Garet, Porter, Desimone, Birman, & Yoon, 2001). Those who facilitate the professional development do not have adequate resources to provide ongoing support or the ability to address all stages of personal development for an instructor (Schlager & Fusco, 2003). When dispersed support units, such as technology support groups and teaching excellence centers, provide separate professional development opportunities but do not coordinate their programming, gaps in an instructors' knowledge are not addressed and some redundancies may occur (Schlager & Fusco, 2003), creating inefficient programming that does not address the intersection of technology, pedagogy, and the practice that occurs in that instructor's content area.

Professional development opportunities should go beyond individual workshops where technology experts introduce a new tool or where pedagogy experts introduce a new teaching strategy to instructors, in isolation of one another. Professional development should include a variety of opportunities where instructors are given a chance to experience what it's like to learn from these tools and strategies in tandem, to fully experience the constraints and affordances of each. They should be supported in their efforts to design a course that integrates these tools and strategies into their specific content, and this support should continue as they implement the tools and strategies in practice with students. Delivering an hour-long workshop on the importance of active learning entirely through lecture does little to allow instructors to experience how a more student-centered activity can contribute to learning or give them experience choosing and implementing an appropriate strategy or tool for their course. While we are encouraging instructors to move away from these types of practices, we are emulating and perpetuating them in our professional development activities. By modeling both good technological and pedagogical practices as part of the professional development and allowing instructors to experience what it's like to use them in practice, we are, in essence, practicing what we preach.

A Conceptual Model for Comprehensive, Ongoing Support for Instructors

Consider what a practice-based approach would look like when applied to professional development programs aimed at integrating technology into teaching. This requires those who lead professional development programs to model the practices that are being recommended, both technological and pedagogical, and to provide the resources and guidance needed to accomplish tasks in a practice-based environment while designing curriculum-specific integrations of technology. It also entails creating an environment where instructors can practice making design decisions that can be directly applied to what they are teaching and offering ongoing support to instructors as they teach and evaluate the effectiveness of these new technological tools. And finally, it involves providing a forum for faculty to share their experiences with others after they have integrated technology into their teaching environment, to not only share the experience of what worked and what did not, but also to gain feedback and perpetuate the culture of learning through and with others in a community of practice. In this sense, we view the practice of teaching as three distinct phases: while designing instruction; while teaching a course; and beyond teaching, while reflecting upon and improving practices. Research-based methods can be applied to each of these three distinct phases to create ongoing professional development and support for instructors throughout the process of teaching (Figure 2).

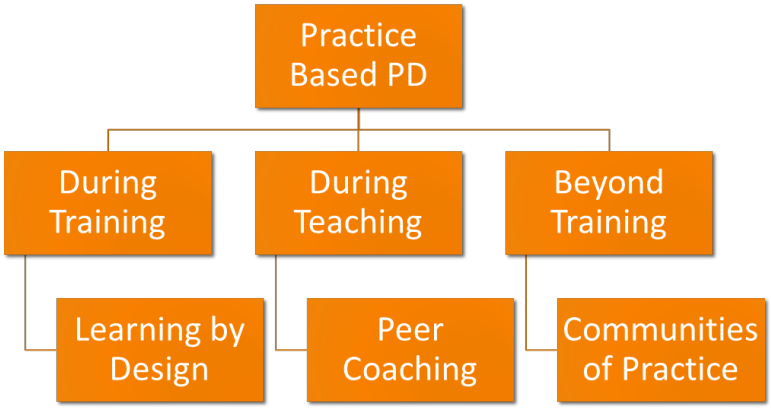

Figure 2: Conceptual Model Visual

Application of Research-Based Strategies

There are a number of strategies that can be used to take a holistic approach to practice-based professional development in developing TPACK in instructors, but we suggest a model that draws from three: learning by design, peer-coaching, and communities of practice (see Figure 2). These three research-based practices are based upon the phases instructors go through to effectively integrate technology and transform their teaching practices (Keengwe, Kidd, & Kyei-Blankson, 2009). Learning by design can be used to directly reinforce the practice-based principles throughout the design of a course. As instructors move beyond the design phase, peer-coaching bridges the concepts practiced in training with practice as instructors begin implementing these concepts into their teaching. To aid instructors as they reorient themselves to teaching with technology in their content area without the assistance of a peer mentor, communities of practice serve as an embedded ongoing support system to provide the level of support defined by the level of interest of the instructor.

Learning by Design

The learning by design approach can successfully develop TPACK in educators (Mishra & Koehler, 2006) and, to some extent, satisfies the need for practice-based professional development. This method involves instructors participating in authentic and meaningful design experiences that reflect the complexity of the real world in which they are practicing (Marx, Blumenfeld, Krajcik, & Soloway, 1997). The entire professional development experience is based around this design process, where instructors learn by participating in a relevant design task. The professional development facilitators serve as guides for the instructors while they are exploring and problem solving. Throughout this process, instructors are able to gain real-life experience integrating pedagogical strategies or technology to facilitate learning in their content area.

As content experts, faculty understand the relationships that are important within their discipline, and the role of the professional development is to provide a means to think about how to teach in their discipline and the potential amplifying effects of technology. By providing training that is relevant, authentic, and meaningful, faculty are well positioned for successful implementation that needs to be sustained beyond the training event.

While implementing a learning by design model can provide relevant and situated professional development during the course design process, continuing practice-based professional development beyond the design phase and into the practice of teaching is necessary for successful continuing professional development. Supporting instructors throughout the course of teaching, as they encounter problems and need to find solutions, is necessary for sustained practice and development as a teaching practitioner (Elton, 2009). Additionally, due to the centralized support structure of many units that provide assistance for integration of technology and pedagogy, providing specific content area expertise to meet each department's needs would be incredibly costly for institutions. Peer coaching addresses the need for continuous professional development, while scaling beyond the reaches of the centralized support units.

Peer Coaching

The peer-coaching model provides a framework for instructors to work with peers who have experience teaching with technology in their area of subject matter expertise to help develop teaching skills and technology integration. This model was successful in developing TPACK in preservice science teachers (Jang, 2010; Jang & Chen, 2010). It has been suggested as a way to develop PCK in a way that is "deeply personal, highly contextualized, and influenced by teaching interaction and experience" (Jang, 2010, p. 112).

Peer coaching allows for sustained assistance throughout the process of development as instructors transition from novices to experts in teaching within their domain (Mulholland & Wallace, 2005). This sustained application is essential to developing PCK and continually reinforces practice-based professional development within their discipline. The approach provides both a realistic context for practice in addition to reinforcement needed for understanding.

A peer-coaching model based on Joyce and Showers' (1995) framework involves four clear steps. Instructors initially gain understanding of pedagogies effective for their specific discipline. They then observe instruction from an experienced peer mentor, and reflect on how the mentor is successfully integrating TPACK into his or her teaching. With guidance from the peer mentor and the support units facilitating the professional development, instructors should be prepared to then practice designing and implementing instruction that integrates technology and pedagogy effectively into teaching. And finally, throughout the process of teaching, instructors share their experience with their peer mentors and others to gain feedback and reflect on areas of success and improvement.

This model requires effort and content-specific support while developing TPACK in the initial set of mentors, but could rely on these mentors to sustain the development of content specific expertise for future instructors, similar to the concept of "training the trainer." As new instructors begin to develop TPACK in their content area, they become both potential future mentors and members of the community of practice. As they transition from novices to experts at teaching their content with technology, they can assume the role of mentors and assist with the TPACK development of less experienced instructors within their domain.

Communities of Practice

Just as instructors use assessment as an ongoing process to understand and improve student learning (Angelo, 1995), they should also regularly be evaluating, reflecting upon, and updating the technological tools and pedagogical strategies they use to teach course content. Maintaining ongoing formal support for all faculty beyond their first semester of teaching with technology is simply not sustainable for most institutions. Just as assistance with content-specific technology integration can be shifted to peer-mentors, support for instructors as they continue making iterative changes to courses where they have integrated technology can be shifted to a larger community of fellow instructors who teach with technology, or a community of practice.

Communities of practice are based around the fundamental concept that learning occurs through a process of social participation in a community where others are also engaged and share a sense of joint enterprise and identity (Wenger, 1999). These communities go beyond individuals simply having a shared technical knowledge or skill; members create relationships with others based around the creation of shared understanding and a repertoire of ideas that have significant meaning to these individuals (Wenger, 1999). By participating in a community of practice, instructors can develop their own expertise by talking about, engaging in, and observing other instructors in the practice of effectively teaching with technology.

Communities of practice have been used to successfully cultivate pedagogical content knowledge (PCK) in science instructors; instructors collaboratively construct an understanding of pedagogical strategies that can be used to teach a particular subject effectively (Jang & Chen, 2010). When applied to environments where technology is used for teaching, it stands to reason that TPACK can also continue to be developed through communities of practice. Jang and Chen (2010) suggest that as instructors work with more experienced mentors, they are already beginning to become enculturated into a community of practitioners who share TPACK in their particular area of expertise. The role of centralized support becomes less prominent, yet still exists, in this final phase of teaching.

Centralized support units can help facilitate the growth of and participation in the communities of practice by creating forums or opportunities in which members of the community can gather. Support professionals from centralized units can also contribute to the community of practice through regular participation. As instructors gain expertise in integrating technology into their teaching, in-depth support from centralized professional development should become less necessary and more specialized, similar to the removal of scaffolding from peers as learners move from novices to experts (Vygostsky, 1978).

Comprehensive Professional Development Model in Practice

By drawing from each of these frameworks and models, a more comprehensive approach to centralized professional development can be established. This approach involves ongoing development sessions for instructors, providing opportunities for instructors to balance the use of technological tools and pedagogical approaches with their specific content areas. The sessions are situated in instructors' authentic teaching practice, initially with designing an integration of technology into the content they teach, then into the implementation of the design through teaching, and finally in reflecting on the use of technology in the course. Facilitators from a university or college's centralized support units are available to provide technological and pedagogical support throughout the process, with peer mentors providing content area expertise, modeling practices that are effective in content areas, and providing suggestions for novice instructors throughout the process of implementing technology in a course.

For example, this approach could be applied to instructors initially preparing to teach online. Both authors' institutions integrate aspects of this approach in their respective professional development programs by providing opportunities for faculty to learn how to develop online courses following a practice-based approach. The centralized support systems in place provide expertise and assistance with technology and pedagogy, while experts in academic departments are involved to act as peer mentors and assist with integration into specific content areas. These peer mentors, who are familiar with the training program and have experience teaching effectively with technology in various subject areas can be identified to assist novice instructors early on in the professional development process. At the authors' institutions, little instruction in the professional development process focuses on specific technologies, with the exception of developing competency using the institutions' learning management system. It is up to instructors to determine, with guidance, which technologies are most appropriate to teach specific concepts. Faculty should be able to choose tools used by experts teaching in their discipline, technology they are most comfortable using, or work with facilitators and peer mentors to determine which technology will meet the pedagogical content needs. Using the learning by design approach, faculty are able to design in a low-risk environment that addresses concerns with comfort levels while increasing self-efficacy. The materials and content they design are used in the practice of teaching their online course, and instructors have opportunities to receive feedback from instructional designers and peer mentors throughout the design process. As a result of the symbiotic relationship, both faculty participating as peer mentors and those who are novice instructors can benefit from their respective roles throughout the teaching process.

Communities of practice are just beginning to be explored at the authors' institutions to continue the social relationship and learning beyond formalized mentoring. For example, at one author's institution, an internal, bi-annual teaching and learning conference is hosted to allow instructors to gather to share effective teaching practices. These events have evolved to include more conversations specifically addressing challenges and recommended practices around teaching with technology. At the other author's institution, faculty mentors work with the centralized support center to offer face-to-face and online conversations focused on areas of teaching with technology that arise during the professional development offerings. To help support this at a deeper level with

the subject matter, individual departments also facilitate subject matter specific discussions on teaching and learning with technology.

Conclusion

Technology has become a core competency within teaching in higher education, but many professional development programs focus on learning-specific technology applications and fall short of teaching faculty how to approach technology integration that is specific to their discipline. While the TPACK framework has made great inroads within K-12 teacher education programs, it also has great potential within higher education professional development programs. By following practice and design-based approaches to professional development, institutions can enable greater comfort and self-efficacy in their teaching with technology. Giving faculty the capacity to carry the training beyond a single event, through peer-coaching, allows for greater buy-in and integration within the faculty community. Creating an opportunity for less formal learning through communities of practice creates sustained learning capabilities throughout an instructor's career. Combining these approaches gives institutions great opportunities for effective technology integration through faculty professional development.

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Biographies

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Carl Weckerle currently serves as the Director of Instructional Technology and Online Learning at Macomb Community College. He received his Master of Education degree in Instructional Technology and his Bachelor of Science degree in Education, both from Wayne State University. He is currently pursuing a Ph.D. in Educational Psychology and Educational Technology at Michigan State University. Carl serves on a number of boards relating to effective practices in online education and instructional technology in higher education. His research interests are on effective teaching and learning in and out of the classroom in addition to faculty development and teacher education.