Supporting Faculty Development in Technology-Enhanced Accounting and Business Education: A TPACK-Powered, Competence-in-Action Framework

Marina Thomas
Western Sydney University

Valeri Chukhlomin
SUNY Empire State College

The purpose of this paper is to develop a conceptual framework of teacher competence in technology-enhanced learning environments in higher education that can be used for evaluating teaching effectiveness and guiding faculty development in accounting and business education. Using perspectives from pedagogical content knowledge theory, educational production function theory, and the competence-in-action theory, the paper draws on the teacher competence framework that has been previously used for modelling teacher competences of pre-service accounting teachers and proposes two modifications of it that will allow to include in-service teachers within higher education. The authors argue that by incorporating a set of TPACK constructs the proposed conceptual model can capture and structure the essential types of teacher knowledge for effective technology integration and, therefore, is well-suited for evaluating teaching effectiveness and setting faculty professional learning goals. This paper is an extended and updated version of an earlier paper that was originally presented at the 31st annual conference of the Society for Information Technology and Teacher Education (CITE) in New Orleans, LA.

Keywords: Accounting and Business Education, teacher competence, teaching effectiveness, competence-in-action, technology-enhanced learning environments, TPACK, faculty development, technology integration

INTRODUCTION

Technology-enhanced learning environments are increasingly replacing traditional classrooms in accounting and business education (Ahiadiat, 2008; Guthrie & Evans, 2013; Morris et al., 2015; Watty et al., 2016). To improve teaching effectiveness, provide students with new opportunities, and promote lifelong learning accreditation agencies and accounting professional bodies call for educational institutions and faculty to embrace digital technologies and enhance technology integration (The Association to Advance Collegiate Schools of Business [AACSB], n.d.; Islam, 2017). While developing a capacity for integrating content knowledge with new educational technologies and digital pedagogies is critically important for today's accounting educators (O'Connell et al., 2015), learning about effective teaching with technology has typically not been part of their professional education and preparation for the teaching job (Ellington, 2017; Swain & Stout, 2000; Zajkowski at al., 2007). To develop a set of specific competencies for technology integration, accounting and business faculty rely on experiential learning, shared best

practices, and - at times - professional development (Albrecht & Sack, 2000; Senik & Broad, 2011; Tourna at al., 2006; Wygal et al., 2014). To be effective, those activities should be systematic, well-informed, and guided by a relevant theory and a potent competency framework (Tigelaar et al., 2004). Despite a growing body of international research on technology integration (Kimmons & Hall, 2016), very little of it is specific to teaching accounting and business courses within higher education. In addition, competencies required for effective teaching in technology-enhanced learning environments in accounting and business education are not well defined and understood (Watty et al., 2016).

The purpose of this paper is to develop a conceptual framework of teacher competence in technology-enhanced learning environments within higher education that can be used for future research and practical purposes, such as evaluating teaching effectiveness and guiding faculty development in accounting and business education. We begin the paper with a short review of accounting and business education literature and reveal a gap in knowledge about faculty competencies regarding effective teaching with technology. Then we discuss how teaching effectiveness in accounting and business education is connected with teacher competence and review two streams of educational literature dealing with teacher professional competence and technology integration. Later in this article we attempt to synthesize the literature and come up with a generic conceptual framework of teacher competence-in-action that is applicable for theoretical and practical use in technology-enhanced learning environments within higher education. In the end, we will discuss limitations and provide directions for future research. The preliminary results of this paper have been presented at the 2020 Annual SITE Conference (Thomas & Chukhlomin, 2020).

TECHNOLOGY-ENHANCED LEARNING ENVIRONMENTS IN ACCOUNTING AND BUSINESS EDUCATION

The use of educational technology in accounting and business education has been on the rise (Ahiadiat, 2008; Howieson, 2003). Various technology has been described in the literature, for example, using Pinterest in managerial accounting (Homes et al., 2018), developing an Android "Go Accounting" game (Saputri et al., 2020), using Kahoot! (Nkhoma et al., 2018) and vodcasting (de Castro et al., 2020). The array of educational technology typically employed by accounting instructors include both hardware and software tools such as tablets, mobile phones, spreadsheets, accounting & tax programs, online databases, social media, flowcharting and auditing software, learning management systems, and online teaching and learning resources (Blankley et al., 2018; Dunn et al., 2016). As a result, traditional chalk-and-talk accounting classrooms have morphed into present-day technology-enhanced learning environments (Guthrie & Evans, 2013; McVay et al., 2008). The three powerful forces that drive this change and force accounting faculty to increasingly adopt digital technologies are: 1) the industry demand for tech-savvy, 21st century workforce (Albrecht & Sack, 2000; AICPA, 2014; Pincus et al., 2017); 2) the emergence of digitally native learners that are looking for anytime, anywhere learning opportunities (Morris et al., 2015; Watty et al., 2016); 3) the push for efficiency by educational institutions competing in the evolving online marketplace (Guthrie and Evans, 2013).

As discussed in the literature, the process of technology adoption and its further integration in accounting and business education is not an easy one (Albrecht & Sack, 2000). For example, Watty et al. (2016) reported an Australian study where 93% of academic interviewees "pointed to accounting educator resistance as a key barrier to technology adoption and use" (p.1). According to Senik and Broad (2011), typical barriers for technology adoption in accounting education include time, lack of resources and technical support, insufficient institutional support, lack of interest and reluctance to change teaching methods. A comprehensive study of the accounting education reform in the U.S. conducted by the Pathways Commission (2012) revealed that impediments for modernization of accounting education exist at institutional, program/department, and individual levels. Among other factors, difficulties in implementing effective practices in pedagogy are caused by "lack of experience, knowledge and development opportunities" (the Pathway Commission, 2012, p. 14-15).

On the individual level, lacking enthusiasm for technology integration may be a symptom of a larger problem, namely, that accounting faculty generally feel unprepared for a teaching job (Swain & Stout,

2000). As described by Ellington (2017), accounting academics are primarily trained as accountants and/or researchers, with very little or no prior teacher training. Zajkowski et al. (2007) reported that when planning their professional development efforts accounting academics tend to focus on maintaining professional competency and credibility of their industry qualifications. However, Tourna et al. (2006) demonstrated how accounting faculty can use continuing professional development for improving teaching effectiveness. Based on the insights from a national study of exemplary cases in Australian universities, Watty et al. (2016) discussed the need for a better technology integration in technology-enhanced accounting education. One of the principal conclusions of the study is "that faculty do not have the competencies required to utilize new technologies… Without the capacity, faculty are often uncomfortable using technology" (p. 11).

To better inform professional development of accounting and business academics in technology-enhanced learning environments, it is necessary to have an *adequate framework of teaching competencies* that is adjusted to modern approaches to *teaching with technology* and can be used for evaluating *teaching effectiveness* and setting faculty *professional learning goals* (Tigelaar et al., 2004).

TEACHING EFFECTIVENESS AND TEACHER COMPETENCE

From an accounting and business educator's perspective, it is natural to broadly think of *teaching effectiveness* as educational productivity where various "production factors", such as teacher's preparation and motivation, student readiness and effort, specific institutional settings, and other environmental and contextual components, jointly contribute to the learning "product" (student achievement). For example, Standard 7 of the "2020 Standards for AACSB Business Accreditation" (AACSB, 2020, p. 48) describes teaching effectiveness in terms of both input ("faculty credentials", "teaching awards and certifications", "quality of teaching") and output (teaching impact on learners through their "success and satisfaction"). While the definitions in the Standard are valid for both institutions/departments and individuals, in this paper we will mainly focus on teaching effectiveness of *individual* academics.

Drawing on the educational production function theory (Hanushek, 1979; Rivkin et al., 2005; Walberg, 1981), we conceptualize *teaching effectiveness* of an individual instructor as student learning progress (Baumert & Kunter, 2013) attributed to the instructor's preparation and her/his quality of teaching.

Following the Standard, we assume that a higher level of "teaching effectiveness results in [a positive] impact through demonstrated learner success and satisfaction" (AACSB, 2020, p. 48).. We also assume that any individual instructor devoted to effective teaching has an ability to obtain an optimum level of teaching effectiveness (Wetzstein & Broder, 1985). But what are the characteristics that make a difference in teaching effectiveness of accounting and business academics, particularly in technology-enhanced learning environments?

In a study of teaching excellence in accounting education, Wygal et al. (2014) examined self-reports conducted by exemplar accounting instructors and concluded that individual differences in teaching effectiveness can be attributed to differing levels of faculty preparation, skills, and commitment to and motivation for teaching. To capture and to structure individual differences in performance, the human resource management literature recommends using specific theoretical constructs, such as *competence* (McClelland, 1973, Boyatzis, 2008) or *capability* (Cairns, 2000). As defined by Klemp (1980), competence is "an underlying characteristic of a person which results in effective and/or superior performance on the job" (p. 21). According to Sadler (2013), competence is a large-scale characteristic of a professional worker representing a mastery of a complex field. For example, "a competent professional (such as an engineer, dentist or accountant) is characterized by [overall] competence in the corresponding field" (p. 14). When professional competence is put into practice, numerous smaller-scale, underlying *competencies* are ordinarily involved (Sadler, 2013). In their "Iceberg Model", Spencer and Spencer (1993) identified visible (knowledge and skills) and invisible elements (motives, personality traits, and self-concept) of competence. Unlike cognitive ability or personality traits, the observable elements of competence are teachable and learnable (Kunter et al., 2013). As a person's capability "to do as well as to know… [competence] is judged by some level or standard of performance… and can be improved" (Shavelson, 2010, p. 44). We therefore assume that: 1) accounting faculty *teacher competence* is the capability of a given instructor to provide

effective teaching in the field of instruction; 2) the overall teacher competence resides in a plethora of underlying knowledge, skills, attitudes, motives, and traits; 3) the underlying knowledge bases and skills are teachable and learnable; 4) accounting instructors can improve teaching effectiveness by focusing their professional development efforts on mastering teaching competence.

In the educational literature, the concept of teacher competence has been long associated with the notion of *professional teacher* (Carr, 1993). According to Shulman (1998), education has all necessary characteristics to be considered a professional field. *Professional competence* (Weinert, 2001) is the specific ability of a professional teacher to cope with work-related demands. Therefore, when considering a competency-based model for increasing teaching effectiveness of accounting academics, we shall refer to them as professional accounting *teachers*, rather than accounting *researchers,* or teaching *accountants* (Smith & Emerson, 2017). Of particular interest is a series of research projects recently undertaken in Germany where researchers introduced the concept of *teacher professional competence* and used it for modelling the effects of pre-service teachers' training including those in accounting and business education (Baumert & Kunter, 2013; Bouley et al., 2015; Seifried & Wuttke, 2017).

In this paper, we draw on the teacher professional competence framework (Baumert & Kunter, 2013) and – as shown in the following sections – attempt to modify it in two important dimensions by: 1) extending the area of its use to include teaching faculty in higher education; 2) incorporating a set of theoretical constructs representing effective technology integration. Then, we present the resultant hybrid schema and discuss its intended use as both a conceptual framework for future research, as well as a competency-based model to guide faculty professional development in technology-enhanced learning environments including accounting and business education.

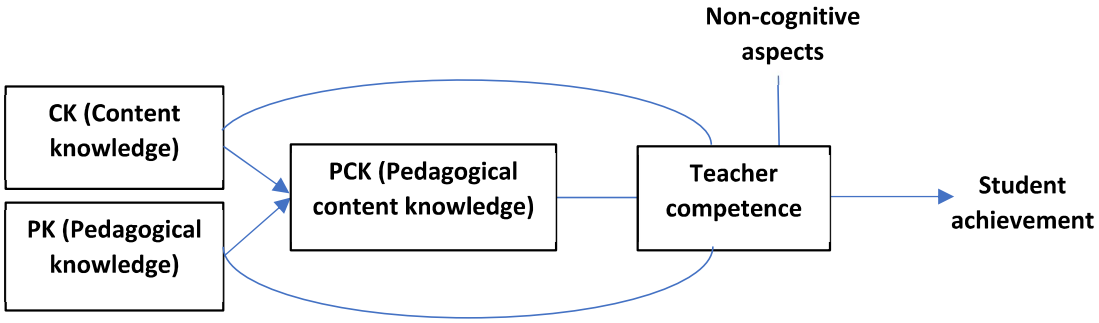
TEACHER PROFESSIONAL COMPETENCE AS THEORETICAL FRAMEWORK

Following the Shulman's (1986, 1987) approach to teacher knowledge, the co-developers of the COACTIV project in Germany (Baumert & Kunter, 2013) integrated various streams of literature on professionalism and competences and developed the *teacher professional competence framework*. The central concept of the framework, *teacher's professional competence* (or *teacher competence*), is defined by Kunter (2013) as "the skills, knowledge, attributes, and motivational variables that form the basis for mastery of specific situations " (p. 807). Teacher competence is a *multidimensional construct* (Klieme et al., 2008; Baumert & Kunter, 2013) that encompasses *domain-specific professional knowledge*, as well as non-domain-specific, so called *non-cognitive aspects* such as belief systems, self-efficacy, and self-regulation. When studying teacher competences of pre-service and in-service teachers in vocational education in Germany, Baumert and Kunter (2013) and their colleagues found empirical support for the model. For example, Bouley et al. (2015) examined teacher competence of pre-service accounting teachers and discovered that it includes both domain-specific professional knowledge, as well as non-cognitive aspects. These findings are consistent with the results of the above mentioned studies of teaching effectiveness in accounting education in Australian and U.S. institutions of higher education (Wygal et al., 2014) where, based on the self-reports of exemplar accounting academics, the authors concluded that motivational factors (commitment to teaching and student-centeredness) are of no less importance than the faculty's subject matter knowledge, skills, and expertise. We therefore propose to extend the scope of the multidimensional teacher professional competence framework and implement it within higher education so that, using the model, one can capture and study not only the components of professional knowledge, but also non-cognitive, motivational aspects of teacher competence including faculty belief systems, self-efficacy, and self-regulation.

In regard to the professional knowledge domain, the teacher competence literature follows Shulman (1986, 1987) in sub-dividing it into three distinctive bodies, namely *content knowledge* (CK), *pedagogical knowledge* (PK), and *pedagogical content knowledge* (PCK) where PK is "an interdisciplinary knowledge about teaching methods, learning strategies and classroom management" (Förtsch et al., p. 2), CK is knowledge about subject matter and its conceptual understanding (Shulman, 1986), and PCK is "the transformation of subject matter knowledge per se into subject matter for teaching" (Park & Oliver, 2008,

p. 262). PK, CK and PCK are *separate* knowledge dimensions (Förtsch et al., 2016). According to Park and Oliver (2008), PCK is highly *contextual*; it enables teachers help students "understand specific subject matter using multiple instructional strategies, representations, and assessments while working within the contextual, cultural, and social limitations in the learning environment" (p. 264). The relationship between the sub-domains of teacher professional knowledge and teaching competence in the teacher professional competence framework is illustrated in Fig. 1 (fragment, adapted from Kunter et al., 2013).

FIGURE 1
THE SUB-DOMAINS OF TEACHER PROFESSIONAL KNOWLEDGE IN THE MULTIDIMENSIONAL TEACHER COMPETENCE MODEL

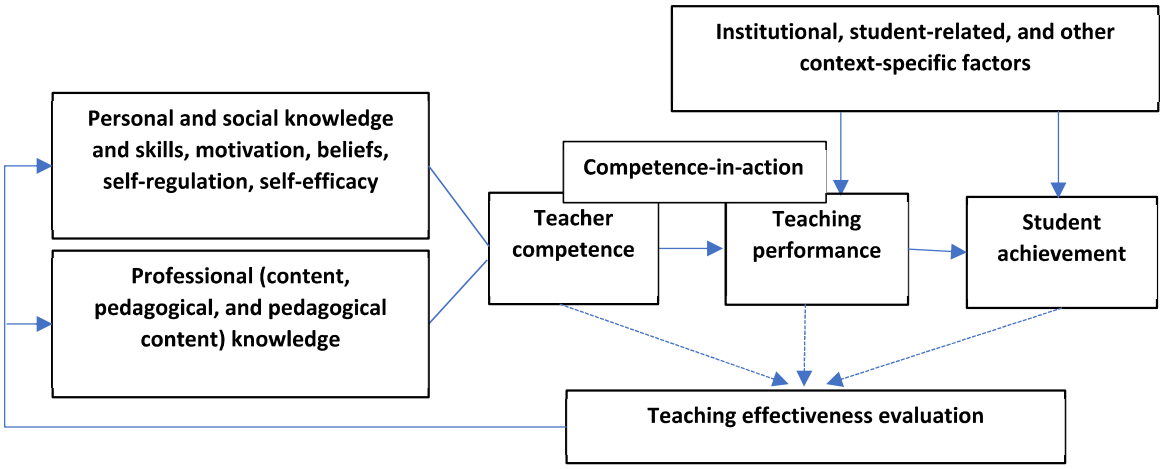


The role of PCK as a separate sub-domain of teacher professional knowledge is important, because, as reported by Förtsch et al., 2016, a higher level of teacher's PCK leads to a higher level of student achievement. There is also empirical evidence that it is the teachers' PCK (and not as much as their PK or CK) that is a main predictor for instructional quality and student achievement (Förtsch et al., 2016). The implication for accounting and business education is that by way of identifying and examining the "*constituent components of PCK*" (Park & Oliver, 2007, p. 264) accounting faculty, administrators, and educational researchers can better understand the process of teaching and learning in various accounting education contexts which may improve teaching effectiveness. The existing teaching competence literature (Blomeke et al., 2013; Bouley et al., 2015) has already reported some interesting findings related to the constituent components of PCK of pre-service accounting teachers. According to Bouley et al. (2015), those components include "knowledge of the teachers about students' cognition and typical accounting students' errors, knowledge of multiple representations and explanations of the subject matter, and knowledge of typical tasks as an instructional tool" (p. 493). However, the constituent components of PCK for accounting educators in higher education are yet to be determined and their impact on teaching performance and student achievement in specific contexts is yet to be established.

MODIFYING THE THEORETICAL FRAMEWORK FOR USE IN HIGHER EDUCATION

Drawing on the teacher professional competence framework (Baumert & Kunter, 2013; Förtsch et al., 2016) and in accordance with the generic educational production function theory (Rivkin et al., 2005), in Fig. 2 (adapted from Kunter et al, 2013) we compile a theoretical model of teacher competence and student achievement.

FIGURE 2
GENERIC TEACHER COMPETENCE-IN-ACTION FRAMEWORK



As shown, teacher competence is a theoretical construct (Shavelson, 2010) representing a person's capability for effective teaching. This capability is based on the individual instructor's professional knowledge and experience in the content, pedagogical, and pedagogical content sub-domains, as well as her generic (personal, social, motivational) attributes. For in-service teachers, teacher competence manifests itself in *teaching performance* in specific *contexts*. According to Pikkarainen (2014), for a given instructor, the underlying teacher "competence… is always a wholly invisible internal condition of the visible action as [teaching] performance" (p. 632). When enacted ("performed"), teacher competence has positive effect on student achievement (Schacter & Thum, 2004). Teacher competence can be combined with teaching performance under an umbrella term of "*competence-in-action*" (Chomsky, 1965; Greimas & Courtés, 1982). Jonnaert et al. (2007) advocated for the use of competence-in-action by stating that competence only has "meaning in action and in situation" (p. 195). As shown in Fig.2, teacher competence-in-action's (i.e., teaching competence through teaching performance) impact on student achievement is moderated by institutional, student-related, and other environmental and context-specific factors (Schneider & Preckel, 2017). Teaching effectiveness is the degree of student achievement attributed to the teacher competence-in-action. We assume that teaching effectiveness can be objectively assessed through student evaluations, peer observation, and self-assessment (Seidel & Shavelson, 2007). In addition, as recommended by Paulsen (2002), teaching effectiveness evaluation is to be used to obtain diagnostic data for developmental purposes.

The generic teacher professional competence-in-action framework depicted in Fig. 2 falls under the requirements for effective teaching competency frameworks as formulated by Tingelaar et al. (2004). Namely, it is an "integrated set of personal characteristics, knowledge, skills and attitudes that are needed for effective performance in various teaching contexts" (p. 255). Moreover, as a competency-based model, it is aligned with human resource competency frameworks widely utilized in business literature in general (McClelland, 1973; Boyatzis, 2008) and accounting in particular (AICPA, 2014). As such, it is well-positioned to be recommended for accounting professional bodies as a useful tool for continuing professional development of accounting educators.

However, neither the modified theoretical model depicted in Fig. 2, nor its parent teacher professional competence framework described in Baumert and Kunter (2013) include any specific theoretical constructs representing *technology integration*. Meanwhile, there is another influential stream of educational literature known as "*TPACK*" (Mishra & Koehler, 2006; Koehler & Mishra, 2009) which is methodologically close to the teacher professional competence literature and has been specifically created to capture and to structure the essential types of teacher professional knowledge for effective technology integration. Similar to the teacher professional competence framework, the TPACK framework is rooted in Shulman's (1986, 1987) work including the use of such theoretical constructs as content knowledge, pedagogical knowledge,

and pedagogical content knowledge. As shown below, the TPACK framework has a narrower scope than the teacher competence framework, as it only focuses on teacher professional knowledge, but in doing so it provides a much deeper insight into the facets of teachers' knowledge required for effective teaching with technology. In the following sections, we will review the TPACK framework and discuss its fit with the generic teacher professional competence-in-action framework. Then, we will attempt to synthesize the two theoretical frameworks (Turner, 1991) and present a hybrid conceptual model of faculty competence in technology-enhanced learning environments.

TECHNOLOGY INTEGRATION: LEARNING FROM TPACK

The **T**echnological **P**edagogical **A**nd **C**ontent **K**nowledge (TPACK) framework was introduced by Mishra and Koehler (2006) in response to "the lack of theoretical grounding for developing or understanding this process of [technology] integration" (p.1018). Mishra and Koehler (2006) critiqued a common, largely ineffective, one-size-fits-all approach to instructors' technology training by explaining that "context-neutral approaches are likely to fail because… merely knowing how to use technology is not the same as knowing how to teach with it" (p. 1033). Building on the notion of situated cognition (Lave, 1997), Mishra and Koehler (2006) proposed a new theoretical framework which extended the Shulman's (1986, 1987) model of professional teacher knowledge (content knowledge, pedagogical knowledge, pedagogical content knowledge) by adding to it a new independent sub-domain (technological knowledge), as well as three new composite sub-domains (technological content knowledge, technological pedagogical knowledge, and technological pedagogical content knowledge). Since then, the TPACK framework has been widely used as a theoretical lens towards understanding of the integration of technology and teaching (Reyes et al., 2017) by mostly pre-service, but also in-service teachers, as well as faculty in higher education (Handbook of TPACK for Educators, 2016). However, the amount of research on TPACK in the higher education context is limited (Rienties & Townsend, 2012) and almost non-existent in accounting and business education (Pereira et al., 2018).

Mishra and Koehler (2006) posited that the knowledge that teachers are required to possess to skillfully perform in the modern, technology-enabled classroom has complex structure and can be presented in the form of hierarchically organized and interlinked sub-domains. According to Mishra and Koehler (2006), these sub-domains are:

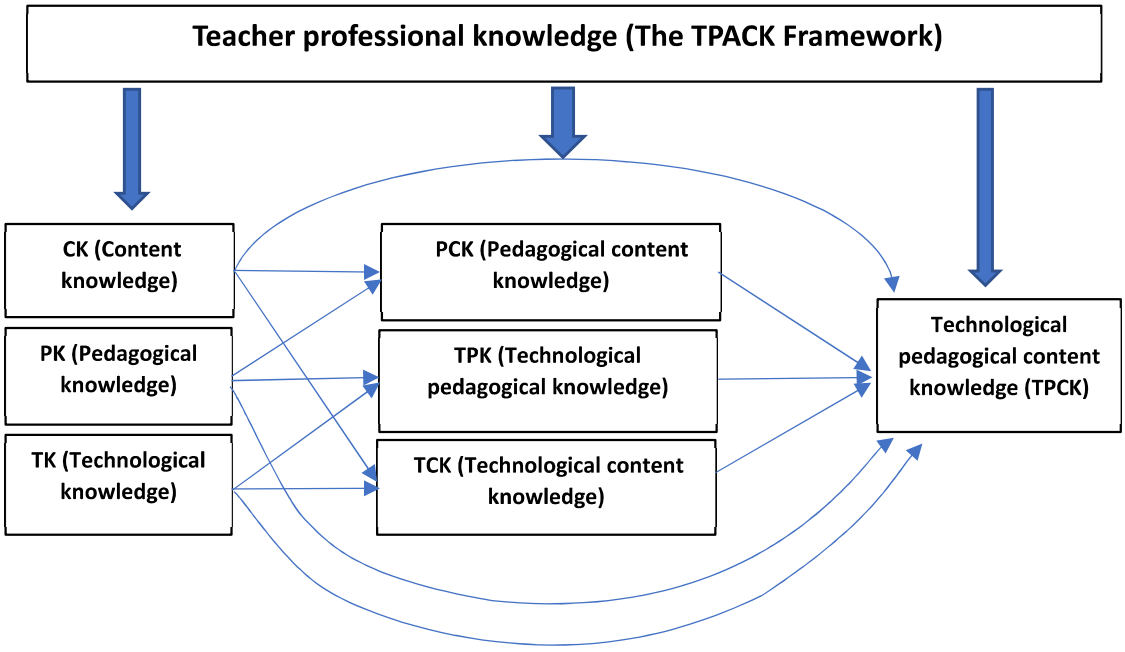
1) Content Knowledge (CK, knowledge of the subject matter);
2) Pedagogical Knowledge (PK, knowledge of learners; also, about effective methods of teaching and learning);
3) Pedagogical Content Knowledge (PCK, knowledge of effective teaching methods best suited for the subject matter);
4) Technological Knowledge (TK, knowledge of and ability to operate modern educational technologies and tools);
5) Technological Pedagogical Knowledge (TPK, knowledge about using technology in pedagogically sound ways);
6) Technological Content Knowledge (TCK, knowledge of how technologies represent and modify the subject matter);
7) Technological Pedagogical Content Knowledge (TPCK, knowledge of how content, technology, and pedagogy can fit together for effective learning).

Initially, Mishra and Koehler (2006) used the term "TPCK" and then they later changed it to a more easily pronounceable "TPACK" (Koehler & Mishra, 2009). In the TPACK literature, the term "TPACK" is commonly used for two different things, namely 1) the whole body of seven interrelated teacher knowledge sub-domains; 2) a distinct type of knowledge represented by the 7th sub-domain. In this article, we distinguish between the two of them and use the term "TPACK" for the total body of teacher knowledge sub-domains and "TPCK" for technological pedagogical content knowledge as a separate knowledge sub-domain.

The TPACK framework allows two interpretations, integrative and transformative, where the integrative perspective represents the TPACK sub-domains using a Venn diagram (Mishra & Koehler, 2006) and the transformative perspective uses a block diagram (Graham, 2011). In the integrative perspective view, each composite sub-domain is a "combination or mixture of the different types of knowledge" (Graham, 2011, p. 13). For example, pedagogical content knowledge, in this view, is a mixture of distinctly different content knowledge and pedagogical knowledge. In turn, the transformative perspective considers pedagogical content knowledge "as a new synthesized form of knowledge that cannot be explained as the sum of its parts" (p 13). As we can see, the transformative perspective is consistent with the original Shulman's (1986) definition of PCK which is also used in the teacher competence framework (Kunter, 2013). While the currently dominant representation of TPACK sub-domains in the TPACK literature uses the Venn diagram (www.tpack.org), the meaning of the definitions in Mishra and Koehler (2006) implies "a more transformative understanding of the constructs" (Graham, 2011, p. 13; also, see Angeli & Valanides, 2005).

In Fig. 3 (adapted from Mishra & Koehler, 2006, Graham, 2011) we presented a hierarchy of TPACK sub-domains that falls under the transformative perspective.

FIGURE 3
THE TPACK FRAMEWORK OF TEACHER KNOWLEDGE



As shown in the diagram, to effectively integrate technology into teaching the subject matter, a competent instructor shall possess three kinds of foundational knowledge (i.e., knowledge about content, pedagogy, and educational technology), three kinds of operational knowledge (pedagogical content knowledge, technological content knowledge, and technological pedagogical knowledge); also, an additional sub-domain representing a specific knowledge (technological pedagogical content knowledge) about how to effectively utilize ("fit together") all kinds of foundational and operational knowledge for enhancing student learning outcomes as appropriate in the context.

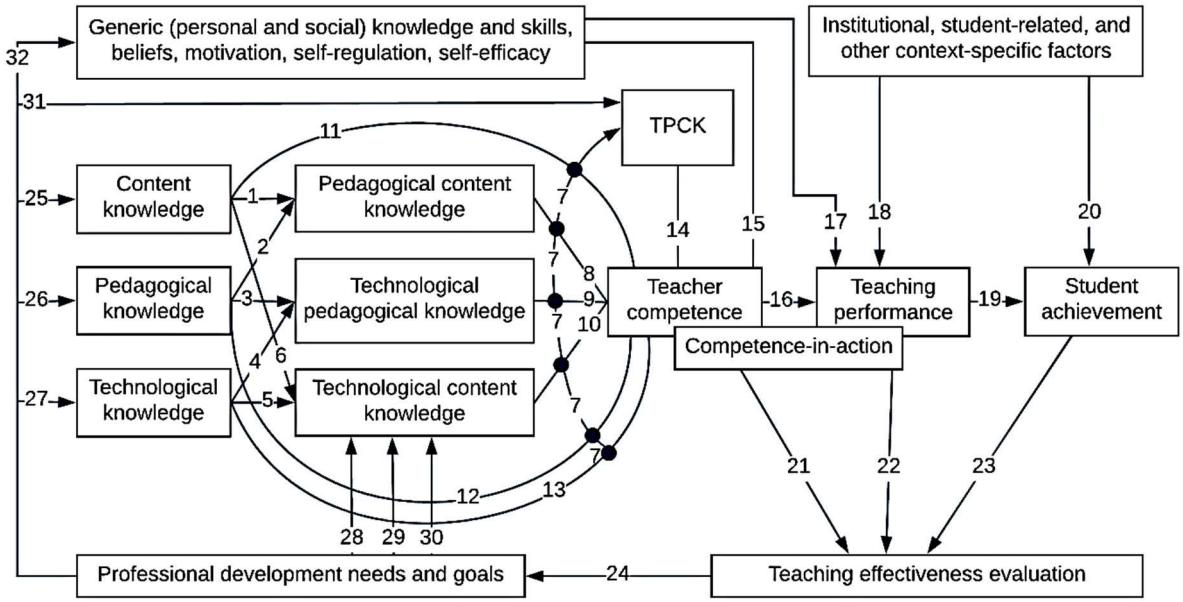
The TPACK framework was initially developed for and has been widely used in pre-service teacher's education, as it is based on the Shulman's (1986, 1987) pedagogical content knowledge which has been an important theoretical concept for teacher education (Polly et al., 2016). According to Herring et al. (2016), TPACK development has rarely been discussed outside of teacher education programs. In their review of

TPACK-related literature, Pereira et al. (2018) found only four articles focused on business education and concluded that "BE [business education] can benefit from existing TPACK studies conducted in other areas while contributing to expanding TPACK theory and findings" (p. 5). One way of utilizing TPACK in accounting and business education is to incorporate it in a more generic framework representing the impact of faculty teaching competence on student achievement. In the following section, we will attempt to embed TPACK into the teacher professional competence-in-action framework depicted in Fig. 2. Then, we will review the resultant hybrid model and ponder about its applicability within various contexts in technology-enhanced accounting and business education.

INTEGRATING TPACK INTO THE TEACHER PROFESSIONAL COMPETENCE-IN-ACTION FRAMEWORK

Methodologically, embedding TPACK into the generic teacher professional competence-in-action framework is not problematic, as both frameworks are built on the same Shulman's (1986, 1987) concept of pedagogical content knowledge. Following Mishra and Koehler (2006), we assume that adding four additional teacher knowledge sub-domains (as shown in Fig. 3) to the domain of teacher professional knowledge (as shown in Fig. 1 and Fig. 2) will allow to significantly enrich the multidimensional concept of teacher competence by capturing and structuring the specific knowledge about technology integration. In addition, it will create methodological tools for observation, measurement, analysis, and development of faculty competencies related to effective teaching with technology. The resultant hybrid model (TCA-TPACK) is presented in Fig 4. (originally appeared in Thomas & Chukhlomin (2020), reprinted with permission from AACE).

FIGURE 4
PROPOSED TPACK-POWERED, TEACHER COMPETENCE-IN-ACTION FRAMEWORK (TCA-TPACK)



To effectively function in a technology-rich educational environment, a professional teacher employs several facets of professional knowledge, as well as a combination of personal skills and motivational characteristics (Baumert & Kunter, 2013). In the proposed model, as shown in Fig. 4, teacher professional knowledge is hierarchically organized (Paths 1-2, 3-4, 5-6, and 7) in the form of seven, distinctly different sub-domains (CK, PK, TK, PCK, TCK, TPK, and TPCK) (Mishra & Koehler, 2006; Graham, 2011). The

overall teacher competence is a multidimensional construct (Klieme et al., 2008) which incorporates the seven sub-domains of teacher professional knowledge (Connecting lines 8-14, respectively) and a combination of personal and motivational, non-cognitive attributes (Connecting line 15). Teacher competence in this model is the instructor's capability to effectively teach the subject matter with technology ("what the instructor can do"). This capability resides within the individual instructor and manifests itself in her teaching performance (Path 16) in various, technologically enhanced settings and contexts ("what the instructor does do"). Teaching performance is moderated by motivational, institutional, student-related and other factors (Paths 17-18). The relationship of teacher competence and teaching performance defined here as competence-in-action (Chomsky, 1965; Greimas & Courtés, 1982) is "like that of an iceberg and its visible peak, with the difference that what kind of peak is visible at any time depends on the changing environment [setting and context]" (Pikkarainen, 2014, p. 634). Competence-in-action (i.e., teacher competence through teaching performance) positively impacts student achievement (Path 19) which is also subject to a variety of factors, including institutional, student-related, and other context-specific factors (Path 20). The effectiveness of teaching is the overall student progress (learning and motivational gains and satisfaction) attributed to teacher competence (preparation) and teaching performance (quality of teaching) of the individual instructor. We assume that teaching effectiveness can be objectively evaluated through student, peer, and self-assessment (Paths 21-23). Then, the evaluation can be used as a diagnostic tool for identification of the instructor's strengths and gaps in knowledge, skills, and/or motivation (Path 24), and for setting professional development goals (Paths 25-32).

The presented generic model can be implemented in any disciplinary area within higher education and, as discussed in the following section, will require further customization for implementation in specific contexts and content areas.

LIMITATIONS AND DIRECTIONS FOR FUTURE WORK

In this and earlier (Thomas & Chukhlomin, 2020) papers, we have attempted to bridge the gap in knowledge about effective teaching with technology in accounting and business education by developing a conceptual framework of teacher competence in technology-enhanced learning environments within higher education. The presented generic TCA-TPACK model is well-suited to capture and to structure the facets of faculty knowledge for effective teaching with technology, but it also has some limitations addressed below and will require further customization for specific environmental settings.

The Role of Context

Knowing about environmental settings and specific contexts is critically important for determining: a) ways in which educational technology is (or can be best) implemented and b) required faculty competencies. While in some situations it is the faculty decision whether she or he can adopt a certain technological tool - like Kahoot! or Google Forms - to use in the classroom, on many occasions the use of educational technology is predetermined by the institution or educational program (Anderson, 2008). For example, when the institution uses a large-scale enterprise system (Lowenthal & White, 2009) for delivering standardized online or hybrid courses, teaching faculty must adhere to the existing learning management system, video recording software, communication tools, etc. Future research should focus on identifying and analyzing typical environmental settings and look for patterns in educational technology utilization and required faculty competencies.

Constituent Components of Teacher Professional Knowledge

All sub-domains of teacher professional knowledge are highly contextual (Park & Oliver, 2008) and dependent on the environmental setting. As discussed earlier, future researchers will need to identify the constituent components of CK, PK, TK, PCK, TCK, TPK, and TPCK for accounting educators in specific contexts. We envision a series of case studies and experiments (Weick, 1989) in which researchers could: a) identify and examine the constituent components of professional knowledge of accounting faculty in various higher education settings; b) create a process for assessing constituent components of professional

knowledge of individual instructors' and measuring their impact on the teaching effectiveness; 3) propose a diagnostic tool for identifying competency gaps and establishing faculty learning goals for professional development. For example, when configuring the generic TCA-TPACK model for an undergraduate or graduate online program in Accounting designed for adult learners, the constituent components of CK, PK,TK, PCK, TPK, TCK and TPCK will need to reflect the specific instructor's knowledge for that context, such as theories of adult learning, best practices in online teaching and course development, typical undergraduate or graduate student misconceptions of the subject matter, the use of online MS Excel simulators, etc.

Motivation + Technology

The proposed TCA-TPACK model draws on the original teacher competency model (Kunter et al., 2013) which includes three motivational aspects, namely teachers' beliefs, self-regulatory style, and self-efficacy. When educational technologies come into play, researchers should also consider the specific motivational factors that underpin faculty and students' technology acceptance and innovative use (Teo, 2015).

Teaching Performance With Technology

In the original teacher competence model, Kunter et al. (2013) examined three essential components of instructional quality that are typical for a traditional, face-to-face setting, including: a) the degree of cognitive challenge and activation offered to students; b) the degree of learning support provided through individual monitoring of the learning process and c) efficient classroom management. In technology-rich environments, researchers and practitioners will need to take into account additional components of instructional quality that support interaction, learner-to-learner collaboration, and independent study (Anderson, 2008).

Student Achievement in Technology-Enhanced Environments

The original teacher competence model (Baumert & Kunter, 2013) uses grades and student motivation as indicators of student achievement. In technology-enhanced higher education, those indicators are often complemented by broadly defined learning gains, career and lifelong learning skills, satisfaction, and institutional goals, such as completion and retention (Wyatt, 2011).

Teaching Effectiveness in Technology-Enhanced Environments

In highly structured settings, such as enterprise systems (Lowenthal & White, 2009), the teaching process is fragmented so that learning design, production of learning objects, facilitation, and teaching support are often provided by different people. Future researchers will have to modify the definition of teaching effectiveness to accommodate for different faculty roles.

Professional Development Needs and Faculty Learning Goals

In the present paper we didn't discuss teacher competence formation including the levels of competence, as one cannot "say much [about competence] unless it is situated in a specific context" (Mulder et al., 2009, p. 757). The proposed TCA-TPACK model should be first situated in practice and configured for the context so that it can provide valid diagnostic data and meaningful directions for faculty development in all sub-domains of their professional competence.

CONCLUSION

The implication for accounting and business education is that the model has the potential to provide guidance for faculty development far beyond maintaining currency in the content area as typically required by accounting professional bodies (Zajkowski et al., 2007). The advantage of using the model is that: 1) it clearly demonstrates that – in addition to content knowledge - there are other, potentially equally important knowledge areas, as well as motivational factors, that jointly contribute to professional success of an

accounting teacher; 2) effective technology integration can only be defined in context; 3) for any individual instructor devoted to effective teaching with technology, the model can provide directions and tools to "obtain an optimum level of teaching effectiveness… by reallocating, increasing the level of, or changing faculty characteristics" (Wetzstein & Broder, 1985, p. 7).

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