TPACK AS WORKPLACE LEARNING[1]

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Abstract

Technological, pedagogical and content knowledge (TPACK) has been used as a theoretical lens which identifies the nature of knowledge required by teachers for technology integration in their teaching. While there have been hundreds of studies that have used TPACK to examine what teachers need to know about technology as part of their classroom practice, there has been little research specifically investigating how in-service teachers acquire this knowledge. This paper builds on earlier reviews of workplace learning literature and suggests that Communities of Practice (CoP), in particular notions of a socially formed identity, may provide an alternate lens through which teachers' TPACK development can be understood.

Introducing TPACK

Academic research into the knowledge separating teachers' professional knowledge from the knowledge used in other professions has been reported in research literature for almost a century (for example, see: Kayser, 1916). While many investigations have contributed to our current understanding of teachers' professional knowledge, Shulman's (1986) delineation of teachers' professional knowledge as pedagogical content knowledge (PCK) has been particularly powerful. The PCK framework differentiates teachers from content experts as expert teachers have a balanced blend of pedagogical knowledge (PK) and content knowledge (CK) collectively labelled pedagogical content knowledge (PCK) in contrast to content experts' deference to CK. Shulman's (1986) conception of PCK has been utilised in different educational contexts (for example, see: Bennett & Dewar, 2012; Benson & Brack, 2009; Berliner, 1988), particularly in the education of Science teachers (for example, see: Loughran, Mulhall, & Berry, 2004).

Koehler and Mishra (2005) have added to Shulman's PCK framework in an attempt to understand how the increasing use of digital technologies in schools might impact on the development of teachers' professional knowledge. In doing so, they proposed two questions:

1) What do teachers need to know about technology?

2) How can teachers acquire this knowledge?

To explore their first question, Mishra and Koehler (2006) expanded the PCK framework through the addition of technological knowledge (TK). In doing so, Mishra and Koehler (2006) proposed that good teaching with technology involves a balanced combination of technological, pedagogical and content knowledge or TPACK. Mishra and Koehler (2006) represented their TPACK framework as three overlapping circles, with each circle representing a component of teachers' professional knowledge. This framework resulted in seven potential forms of teachers' professional knowledge with the aspirational TPACK positioned at the nexus of these circles. Bounding these different forms of knowledge is the context in which teachers' acquire and exhibit their knowledge as shown in Figure 1.

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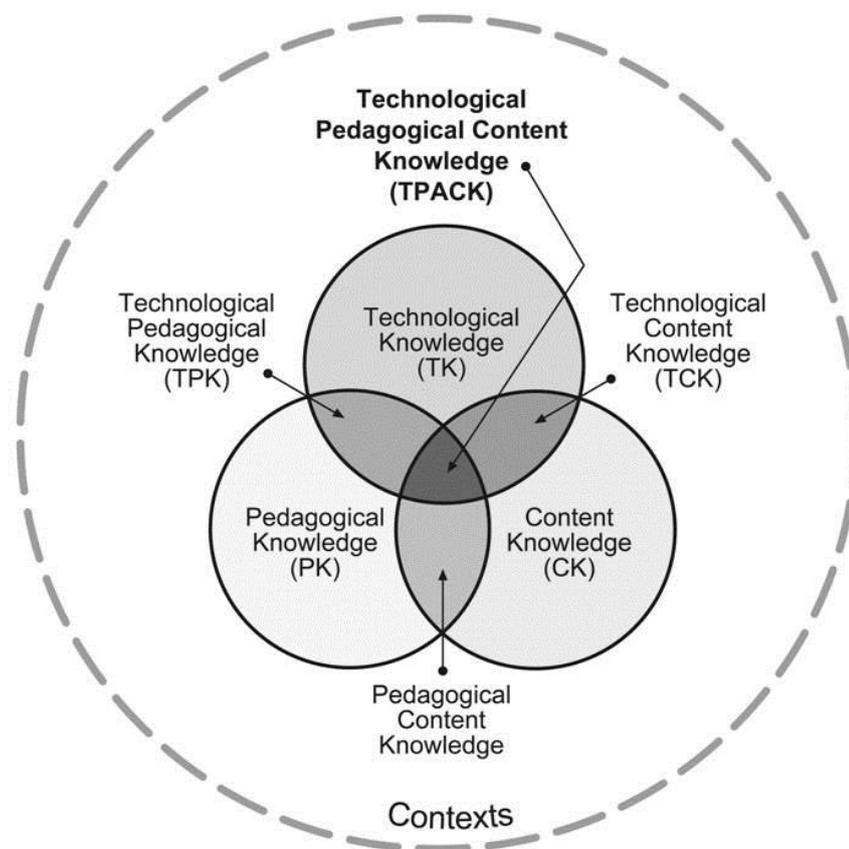
Figure: 1

The TPACK framework from http://tpack.org/

The impact of the TPACK model has been profound and widely used in hundreds of studies examining teachers' professional knowledge (Graham, 2011), with the majority of these using surveys to measure the extent and sophistication of teachers' TPACK (Jordan & Dinh, 2012). With such a proliferation of TPACK based research, it comes as little surprise that there is marked variation in the contexts in which investigations have examined TPACK and include international examinations of the TPACK development of pre-service teachers (for example, see: Albion, Jamieson-Proctor, & Finger, 2010), distance educators (for example, see: Archambault & Crippen, 2009) and primary teachers (for example, see: Chai, Ling Koh, Tsai, & Lee Wee Tan, 2011). In Australia the most recent, large-scale use of the TPACK framework was in the nationally funded Teaching Teachers for the Future (TTF) project. While these investigations have made valuable contributions to our understanding of the interplay between forms of professional knowledge in a variety of settings, in-service teachers' TPACK development in their workplaces remains an under-explored context (for example, see: Jordan & Dinh, 2012).

Considering TPACK as workplace learning

Workplace learning theories have contributed much to our understanding of professional knowledge development in a broad range of contexts (for example, see: Argyris & Schön, 1978; Beckett & Hager, 2002; Schön, 1983, 1987; Winch, 1998) and researchers have also used workplace learning as a lens to explore teachers' professional knowledge development (Butler, Lauscher, Jarvis-Selinger, &

Beckingham, 2004; Cochran-Smith & Lytle, 1999; Feldman, 1994; Garmston & Wellman, 2013; Krajcik, Blumenfeld, Marx, & Soloway, 1994; Musanti & Pence, 2010; Wilson & Berne, 1999; Zottmann et al., 2013). Despite the numerous studies that have used workplace learning theory to examine teachers' professional knowledge development, the use of such frames to consider teachers' TPACK development is a notable absence in the research literature (for example, see: Jordan & Dinh, 2012). Phillips (2013) recently began to explore the suitability of workplace learning theories to examine in-service teachers' TPACK development and, in doing so, argued that in order for us to better understand teachers' workplaces as the context for TPACK development, "it is necessary to have a detailed understanding of workplace learning theories" (p.23).

Phillips (2013) provided an extensive review of workplace learning literature that outlined how workplace learning theories can be considered as being from one of two research traditions with theorists generally subscribing to learning in a workplace via an acquisitional or participatory perspective. This understanding was developed from Hager (2005) argument that early accounts of workplace learning "were strongly influenced by the [concept of] learning as a product…" (p.829) in which knowledge was considered as an individually acquired novel attribute. In contrast, more recent accounts of workplace learning focus "more on learners developing [knowledge] by actively engaging in the processes of workplaces" (Hager, 2005, p. 829). These two categories mirror many aspects of the learning metaphors of acquisition and participation that Sfard (1998) argued underpin much educational thought.

Many of the early theories of workplace learning focused on the notion of knowledge as a product that can be acquired by individuals. Such ideas stemmed from the fields of organisational psychology, action learning, experiential learning and management theory (for example, Argyris and Schön (1974, 1978); Schön (1983, 1987); Marsick and Watkins (1990)). Despite variations in early workplace learning theories, Hager (2005) claims that these concepts have a range of common features:

1. *They centre [on] individual learners.*

2. *They focus mainly on the rational, cognitive aspects of work performance*

3. *Work performance tends to be conceived as thinking or reflection followed by application– this is especially evident in Schön's work.*

4. *Learning itself is taken for granted and not theorised or problematized. This means in practice that, as Elkjaer (2003) points out, it tends to assume that workplace learning is formal learning, thereby traditionally associated with the acquisition metaphor.*

5. *The social, organisational and cultural factors in workplace learning and performance are downplayed. (Hager, 2005, pp. 832-833)*

The individual, rational and cognitive aspects of work performance common to these theories takes little account of the social, cultural and political dimensions that may be argued as important aspects of workplace learning. As such, it can be suggested that early workplace learning theories may be of little assistance when trying to understand the socially mediated contexts in which in-service teachers' develop TPACK in their school workplaces. It is worthy to note that the majority of investigations into TPACK take little account of the workplace setting in which in-service teachers continue to develop and refine their professional knowledge; however, research studies too often consider TPACK as an individual attribute or possession. This approach has attracted criticism from researchers such Bereiter (2002) who argued that many forms of research investigating learning too often carry with them unreflective assumptions about what such learning is like, instead rely on the 'common-sense' or 'folk theory' perspective of learning dominated by the acquisition perspective.

In contrast to the acquisitional theories of workplace learning another conception of workplace learning theories is evident in the literature. These theories broadly recognise that workplace learning and performance are embodied phenomena that are shaped by social organisational and cultural factors that extend beyond individuals. Key theorists from this perspective include Lave and Wenger (1991), Engestrom (2001; 1999), Billett (2001) and Eraut (2000). Given the body of research

indicating the growing importance of collaborative knowledge development in schools (for example, see: Butler, Lauscher, Jarvis-Selinger, & Beckingham, 2004; Feldman, 1994; Garmston & Wellman, 2013; Krajcik, Blumenfeld, Marx, & Soloway, 1994; Musanti & Pence, 2010; Wilson & Berne, 1999; Zottmann et al., 2013) it is not surprising to find "that the participation [theorists] ha[ve] been extremely influential" (Hager, 2005, p. 844).

In particular, this paper will specifically consider the potential contributions offered by the frameworks developed by Lave and Wenger (1991) and Wenger (1998). These researchers have made important contributions to the conception of participatory workplace learning through their development of notions such as legitimate peripheral participation and Communities of Practice (CoP). These concepts provide a stark contrast to the view of learning as acquisition and emphasise learning through relationships.

CoP and TPACK: Considering identity as an aspect of workplace learning

The ideas underpinning the CoP framework have their origins in Lave and Wenger's research in situated learning in the 1980's. The term CoP was first coined in the Lave and Wenger's (1991) book *Situated Learning: Legitimate Peripheral Participation* which places emphasis on learning in a shared, situated and culturally mediated context. Wenger's (1998) subsequent and more detailed examination of CoP provided a greater insight into the factors that underpin this complex socially mediated practice and it is in this work that the distinction is made between a CoP and other forms of 'community'.

This distinction has been highlighted by other researchers using CoP as a theoretical lens including Skerrett (2010) who stated that "communities of practice are groups of people that are mutually engaged in a joint enterprise and who share a common repertoire ... for engaging in their work" (p. 648). CoP's differ, therefore, from other definitions of 'community' such as 'communities of learners', 'discourse communities', 'learning communities', 'school communities' and 'teacher communities' (Branch, Jones, & Orey, 2010) as membership of a CoP is not necessarily based on formal notions of membership rather a sense of belonging to the particular community which is reflected in mutual engagement, a joint enterprise and shared repertoire (Wenger, 1998). These three concepts regularly appear in CoP literature and are often described as the core CoP concepts which "associate practice with community" (Wenger, 1998, p. 72).

While there is little doubt that these concepts can add to our understanding of how teachers' develop knowledge in workplace settings (for example, see: Brouwer, Brekelmans, Nieuwenhuis, & Simons, 2012; Hartnell-Young, 2006; Henderson, 2007; Hodkinson & Hodkinson, 2004; Phillips, 2012; Printy, 2008) it is hoped that the remainder of this paper can draw attention to an additional aspect of the CoP framework that remains comparatively underexplored: identity.

Identity

While mutual engagement, joint enterprise and a shared repertoire in a school CoP are inevitably implicated in the development of secondary school teachers' professional knowledge, Wenger (1998) also points out, "the formation of a community of practice is also the negotiation of identities" (p.149) and "issues of identity are an integral aspect of a social theory of learning and are thus inseparable from the issues of practice, community and meaning" (p.145). Identity in this sense is defined socially; that is, it is produced through participation in a community and "expands the focus beyond communities of practice, calling attention to broader processes of identification and social structures" (Wenger, 1998, p. 145). Changing the focus from individuals to a broader conceptualisation of identity challenges our understanding of TPACK as we are required to consider TPACK not simply as an individually acquired attribute (Phillips, 2013) but as part of a broader set of social forces that suggest TPACK may also be thought of "as something outside of the individual's head, or even body" (Hager, 2005, p. 833).

The individual acquisition of TPACK is therefore challenged by situated, workplace learning frameworks such as CoP where the influence of knowledge on participation and identity can no longer be considered in "pedagogical solitude" but instead as "communal property" (Shulman, 1993, p. 6). In this sense, TPACK may be considered as knowledge that grows and develops through participation, knowledge sharing and negotiation as a productive member of a community and therefore as knowledge "as something outside of the individual's head, or even body" (Hager, 2005, p. 833).

If one accepts the connection between TPACK development and the negotiation of identity development within a CoP, then this brings additional challenges to the theoretical concepts underpinning the TPACK framework. Such challenges are typified by Wenger's (1998) notion that identity cannot be considered an object but a "constant becoming" (p.154). Wenger argues that our identities are constantly changing, moving in a trajectory that ties both the past and future. In this way we identify ourselves as much by where we have come from and where we believe we are going as by our current competence as members of the CoP. In doing so the concept of trajectory within the CoP framework is used to argue that:

1. *identity is fundamentally temporal;*

2. *the work of identity is ongoing;*

3. *because it is constructed in social contexts, the temporality of identity is much more complex than a linear notion of time;*

4. *identities are defined with respect to the interaction of multiple convergent and divergent trajectories. (Wenger, 1998, p. 154)*

If this is the case, then TPACK also needs to be considered as a fundamentally temporal, ongoing, and multifaceted concept. The complexity that is brought to the TPACK framework when considering it in light of the CoP notion of identity is considerable and challenges the idea published in previous research that TPACK represents an aspirational end point, acquired by individuals.

This reconceptualization of TPACK has only been suggested in this paper and requires a great deal of additional research to further develop our understanding of the benefits and limitations of such a perspective. Future research is needed in a number of areas including: to examine how TPACK may be measured by different members of a CoP, how differences in TPACK are negotiated and reconciled within a CoP and the ways in which teachers incorporate TPACK dimensions into their repertoire and identity and different career points.

Conclusion

Examinations of teachers' professional knowledge have been ongoing and have recently reflected the increasing prevalence of digital technologies in teachers' practice. The TPACK framework has provided a valuable lens through which researchers have been able to examine teachers' knowledge. Despite the proliferation of empirical research using TPACK, in-service teachers' development of TPACK in the context of their workplace remains under represented in the research literature. Highlighting the complex context in which professional educators work and learn, this paper has suggested workplace learning theories, in particular CoP, as a different backdrop against which in-service teachers' TPACK development can be more clearly comprehended. Further research incorporating the temporal, ongoing and multifaceted dimensions of identity from the CoP framework in reconsidering the concept of TPACK have been suggested.

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