

TEAM TEACHING WITH TECHNOLOGY: UPSETTING THE TPACK APPLCART

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Abstract

In contrast to the pedagogical solitude experienced by some teachers working with their students behind closed doors, teams of teachers collaboratively teaching larger groups of students is a practice becoming more frequently employed with junior and middle years classes. The research literature examining team teaching reports a number of benefits that lend support to the decision of schools who have adopted a team teaching approach; however, studies also report a number of challenges that have also been commonly identified with this practice. In particular, research indicates difficulties associated with the formation of effective teaching teams due to the differences in teachers' professional knowledge and skills. These differences can manifest themselves in a number of key areas including pedagogical approaches and content knowledge. The efficacy of teaching teams is further complicated by the increased availability of digital technologies and the tensions created by the different skill levels and pedagogical choices made by teachers in the same team. In this paper we consider the ways in which TPACK is challenged by the complex nature of team teaching and propose the notion of developing a communal TPACK for improved team effectiveness.

Teaching with technology

Secondary school teachers' pedagogical adoption of technology is a *wicked problem* (Rittel & Webber, 1973) characterised by complex, contradicting and changing interdependencies between technological, pedagogical and content demands that are mediated by the situated social contexts that bound teachers' practice (Archambault & Crippen, 2009; Cox, 2008; Mishra & Koehler, 2006; Mumtaz, 2000; Shulman, 1986; Somekh, 2008; Straub, 2009). Research investigating this multifarious problem reports that technology integration is either not happening, happening too slowly or happening with little or no effect on student's learning (Cuban, 2004; Dynarski et al., 2007; Howley, Wood, & Hough, 2011; Selwyn, 2010).

Factors influencing the diffusion and adoption of technology into teachers' pedagogical practices have been the focus of considerable academic research (Barron, Kemker, Harmes, & Kalaydijian, 2003; Birch & Irvine, 2009; Graham, 2011; Mishra & Koehler, 2006; Mumtaz, 2000; Somekh, 2008; Straub, 2009; Webb & Cox, 2004). A number of studies in this field have applied recognised adoption-diffusion theories whose genesis have been from fields as diverse as political science, public health, communications, history, economics and information systems (for example, see: Birch & Irvine, 2009; Christou, Eliophotou-Menon, & Phillippou, 2004; Davis & Roblyer, 2005; Hall, 1979; Rogers, 1962; Sahin, 2006; Straub, 2009; Taylor & Todd, 1995; Venkatesh & Davis, 2000; Venkatesh, Morris, Davis, & Davis, 2003). However, the application of these models to the pedagogically dependent technology adoption decisions facing secondary school teachers' fails to provide researchers with effective explanations or frameworks as they are too generalised and do not take into account the specific requirements of secondary school teachers (Somekh, 2008; Webb & Cox, 2004).

The complex factors contributing to teachers' technology adoption and integration choices have been considered in Mishra and Koehler's (2006) work that considers teachers' technological, pedagogical and content knowledge (TPACK). Mishra and Koehler (2006) proposed that good teaching with technology involves a combination of technological, pedagogical and content knowledge or TPACK. Mishra and Koehler (2006) represented their TPACK framework as composed of three overlapping knowledge domains, with each representing a different component of teachers' professional

knowledge. This framework results in increasing overlap seven potential forms of teachers' professional knowledge with the aspirational TPACK positioned at the nexus combining all three forms of knowledge. Bounding these different forms of knowledge is the context in which teachers' acquire and exhibit their knowledge as shown in Figure 1.

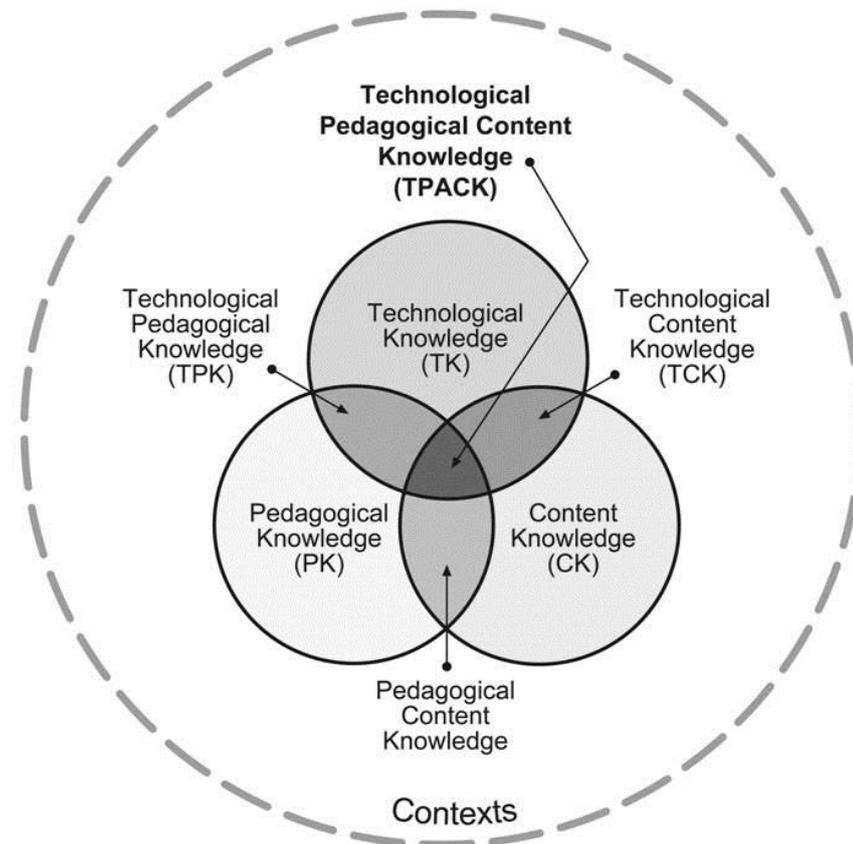


Figure: 1.

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 acquisition in their workplaces remains an under-explored context (for example, see: Jordan & Dinh, 2012). Moreover, the increasing occurrence of team teaching in primary and secondary school settings further challenges our understanding of TPACK.

Team teaching.

Thomas (1992) reported that the ideas underpinning team teaching date back to the early 1960's and

first gained prominence after an insightful address given by Professor William M. Alexander at Cornell University in which he encouraged a rethinking of the existing structure of junior high schools in America. Alexander's original 'middle school reform' proposal was to establish teams of three to five teachers to work with 75 to 150 students organised as either a single-class or on a multi-class basis to operate in large open learning spaces. As a result of this and other reforms, there has been a growing acceptance by educationalists of the need for changing the role of teaching from one of imposed classroom isolation (Little, 1990; Liebermann, 1995; Lortie, 2002) to one which is far more encouraging of professional collaboration and collegial practice (Mills, Powell & Pollak, 1992; Fullan, 1993, 2001; Newman, & Wehlage, 1995).

Team teaching is now a common term and widely used to describe a broad collaborative approach to learning and teaching. In Katherine Main's (2007) yearlong investigation into the formation and development of middle years' teaching teams she found that the educational research literature showed a confusing range of terms associated with team teaching that are often used interchangeably. She noted that "taking into consideration these differences, team teaching can look very different across grade levels, within grades, and from setting to setting within schools" (p22). For example, McIntyre & Salas, (1995) pointed out that the terms 'team' and 'group' are used to describe a broad collaborative approach to learning and teaching. Co-teaching, collegial teaching, collaborative practices, communities of practice, co-operative teaching, complementary instruction, teaming, working parties and learning communities are all terms that are encountered in the literature when researching in this area. In his book, *Team Teaching: What, Why, and How?* Francis Buckley (2000) proposes a broad working definition for team teaching. Buckley describes team teaching as "involving a group of instructors working purposefully, regularly, and cooperatively to help a group of students learn" (p.4). Although Buckley's definition provides a useful starting point to explore team teaching, it is deliberately broad and has more to say about the intended objectives rather than providing guidance on how the approach is to be implemented and supported within schools.

Buckley's original intention was to support teachers to make the shift from working as individuals in isolation to working purposefully in collegial teams with shared objectives or as Shulman (1993) describes, a transition from "pedagogical solitude" to the notion of classroom practice as "communal property" (p.6). The sense of communal practice inherent in the notion of team teaching presents a number of challenges and benefits. In particular, research indicates involvement in team teaching can lead to a sense of collegiality and professional dialogue with fellow teachers (Hargreaves, 2002; Hargreaves & Dawe, 1990; Newman & Wehlage, 1995), a greater sharing of professional classroom practices and resources (Sandholtz, 2000), deeper levels of discussion and a richer understanding of content and pedagogy (Harris & Harvey, 2000) along with particularly rich learning experiences and professional growth for novice teachers (Jang, 2006; Roth, Tobin, Carambo, & Dallard, 2004). Additionally, research has shown that working in a team can result in teachers being placed in a position where they have shared authority and expertise on a range of topics is a shift from being the 'expert' to being an 'expert learner', for in the collaborative classroom, teachers and students can join in a shared process of intellectual discovery (Wentworth & Davis 2002). It is generally accepted that being prompted to look at a familiar topic in a new way or with a different pedagogical approach can be one of the most rewarding experiences of working in a team.

Despite the possibilities suggested in literature promoting team teaching approaches, research also highlights a number of common challenges associated with team teaching. These include mismatches in the personal pedagogy and/or personality of team members (Achinstein, 2002; Kruse & Louis, 1997; Minonopoulos & Fordred, 1997) which can lead to potential conflict (Davis & Roblyer, 2005), teachers remain anxious when teaching with a colleague and the rejection of continual personal evaluation by a colleague (Geen, 1985; Hargreaves & Dawe, 1990; Smylie, 1999).

While team teaching has been the focus of academic research for some time, very few studies have investigated how the attributes and skills of team members can influence the short and long term effectiveness of teaching teams. Moreover, there is no research that examines the ways in which team

teaching in a school workplace influences teachers' understanding of their professional knowledge, identity or their social position in their workplaces that may be impacted by teaching in a team. It could be argued that in many schools the adoption of team teaching although well intentioned has been implemented with little understanding of the potential difficulties teachers and leaders are likely to encounter and the importance of teacher selection for team success. The lack of clarity facing those looking to implement team teaching in school settings is further complicated by the professional demands to use new digital technologies that ultimately disrupt the pedagogical stability resulting from the pedagogical solitude offered by individual teaching practice.

It would appear that TPACK may be an appropriate framework to use as the basis for investigations examining the effectiveness of teams of teachers working together in digitally enabled classroom settings. While TPACK has been used to explore the effectiveness of digital technologies in individual teacher's classrooms, it is not immediately apparent how this framework could be used in a team teaching context. The remainder of this paper illustrates some theoretical challenges likely to be encountered when considering TPACK in a team teaching context.

Upsetting the applectart: Considering TPACK as communal property

As indicated earlier in this paper, the TPACK framework has regularly been utilised to examine individual teachers' effectiveness. Despite the wide use of TPACK in hundreds of investigations, there have been some researchers who have questioned the effectiveness of the TPACK framework (for example, see: Archambault & Barnett, 2010; Graham, 2011; Parr, Bellis, & Bulfin, 2013). Many of the concerns raised by authors have focused on the lack of theoretical clarity underpinning TPACK (Graham, 2011; Parr et al., 2013) and while these apprehensions are valid, the effectiveness of TPACK is further problematized by the increasing occurrences of teaching teams in schools. In particular, we would like to highlight additional epistemological challenges to the TPACK premise which are brought into focus when considering the balance of the different forms of knowledge required for effective team teaching with technology.

In changing the focus from individual teachers to teams of teachers, the TPACK framework appears to be ill-equipped to examine the complex, situated and socially mediated negotiations that shape the collective knowledge and practice within teaching teams. While recognising the interplay between technological, pedagogical and content knowledge does not produce a single solution for all teachers (Mishra & Koehler, 2006), the TPACK framework does portray teachers' knowledge as an individually acquired attribute (Phillips, 2013). This individual acquisition of TPACK is challenged by the introduction of team teaching in schools where an individual's understanding of "the complex relationships between technology, content, and pedagogy" (Mishra & Koehler, 2006, p. 1029) 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 team and therefore as knowledge "as something outside of the individual's head, or even body" (Hager, 2005, p. 833).

To advance the concept of TPACK as communal property, we propose that researchers might consider situated learning theories, in particular Communities of Practice (Wenger, 1998), to better understand how TPACK might be understood from a communal perspective. Communities of Practice (CoP) may be potentially helpful when examining teaching teams as it provides a framework within which researchers can consider the contestation and negotiation of different TPACK elements through mutual engagement in a joint enterprise with mutually accepted objectives and utilising a shared repertoire.

Mutual engagement is dependent on participants undertaking things with a shared purpose and allowing them to develop a sense of collegiality and belonging. This sense of belonging in turn influences a participant's perspective of the practices within the community or teaching team and enables them to take on a new meaning. The development of this common frame of reference or joint enterprise can then form the basis of common understandings within the teaching team for identifying and prioritising activities and resolving problems as they occur (Wenger, 1998). The interrelationship between the elements of mutual engagement, joint enterprise and shared repertoire in a CoP is summarised by Wenger (1998) in Figure 2.

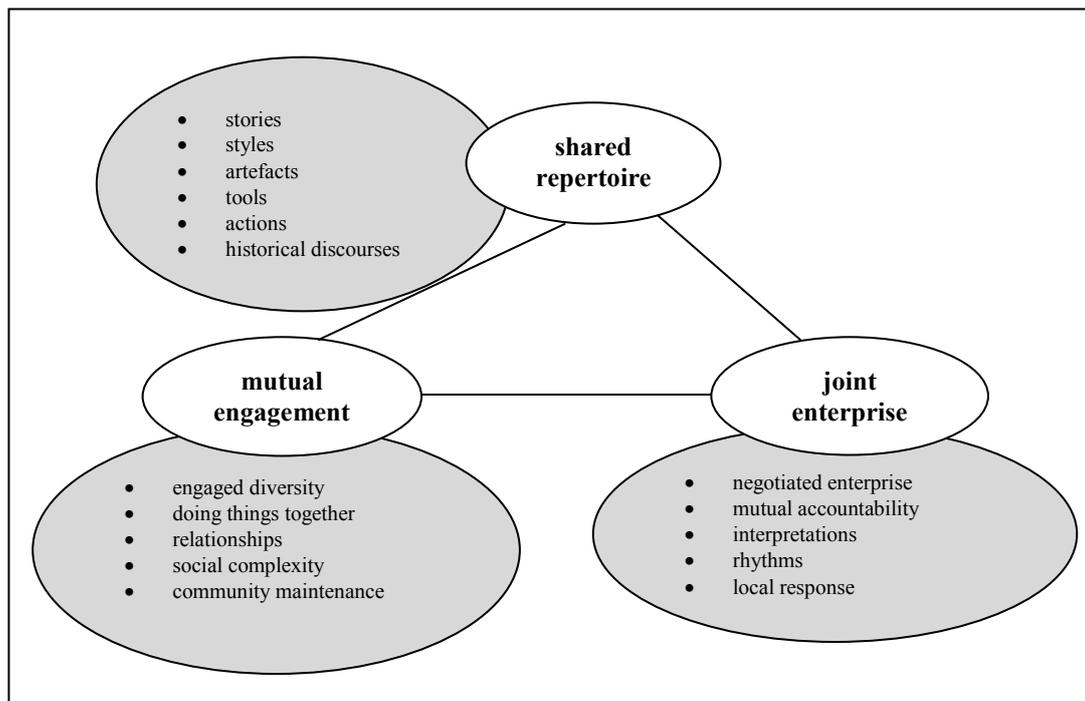


Figure: 2

Dimensions of practice as the property of a community.

The interrelationships underpinning this situated learning framework could then be utilised to explore the negotiations whereby teams prioritise certain forms of TPACK knowledge and ignore others, where particular pedagogical approaches are privileged and aspects of content knowledge stifled, where certain uses of digital technology take hold and grow when others wither and die.

While this approach has potential, we recognise the need for research to support a number of the notions put forward in this paper. In particular, areas of future research may include:

- 1) How the effectiveness of team teaching is influenced by measurable differences in the individual TPACK of the participating teachers
- 2) How the implementation of team teaching influences the building of a shared and richer understanding of TPACK through professional learning and shared classroom practice.
- 3) How the practice of shared reflection on lesson pedagogy encouraged by team teaching may impact on the setting of shared TPACK goals and improved understanding.

Conclusion

In contrast to the pedagogical solitude experienced by some teachers working with their students behind closed doors, teams of teachers collaboratively teaching larger groups of students is a practice becoming more frequently employed with junior and middle years classes. The research literature examining team teaching reports a number of benefits that lend support to the decision of schools who have adopted a team teaching approach; however, studies also report a number of challenges that have also been commonly identified with this practice. In particular, research indicates difficulties associated with the formation of effective teaching teams due to the differences in teachers' professional knowledge and skills. These differences can manifest themselves in a number of key areas including pedagogical approaches and content knowledge. The efficacy of teaching teams is further complicated by the increased availability of digital technologies and the tensions created by the different skill levels and pedagogical choices made by teachers in the same team. This paper has presented the ways in which TPACK is challenged by the complex nature of team teaching and has proposed the notion of developing a communal TPACK for improved team effectiveness.

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