

Using TPACK to Examine Teacher Professional Development for Online and Blended Learning.

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Abstract: Given the current rise of educational technology, more and more teachers are able to deliver their courses partially or fully online. This demands a new way of looking at teaching and learning, and raises many questions (e.g. how to become an online teacher). Therefore, many institutions and professionals try to meet such demands by offering professional development initiatives, aiming to provide teachers with new knowledge, skills, and attitudes towards teaching in an online setting. The technological, pedagogical, and content knowledge (TPACK) framework provides meaningful insights into teachers' necessary knowledge requirements for technology integration. Using the TPACK framework, this paper presents an overview and first analysis of the emphases placed by different teacher professional development approaches. This study will investigate the teacher professional development approaches of research articles by conducting a content analysis of each article, and by comparing the teacher professional development approaches. The analysis consists of sorting the textual data into different categories, and identifying different patterns and themes, which will be held against the TPACK framework. This is done for each individual study (within-case analysis) and between the studies (cross-case analysis). Furthermore, the initial results of this study will be discussed and the first recommendations for future research and practice will be formulated. Moreover, the results can be beneficial for practitioners involved in teacher professional development with regard to online and blended learning, to guide the design, development, implementation, and evaluation of a professional development approach. Therefore, the findings of this article can be of use to teachers, institutions, and professionals who wish to gain more insight into the current trends of existing professional development approaches, and provide them with a more thorough understanding of the initiatives that support teachers to become effective in online and blended learning. Further research could investigate if there is a link between the addressed TPACK elements in a teacher professional development approach and the retained results.

Keywords: Online and blended learning, teacher professional development, TPACK, technology integration, online teaching

1. Introduction

Increasingly, technology is making its way into educational institutions. This leads to a sheer number of new teaching possibilities, which can be used in addition to, or as replacement for, traditional face-to-face education. In this respect, many teachers are still looking to find their way on how to integrate these new technologies into their teaching. Thus, many educational institutions are challenged to train their staff to teach in an online or blended way (Wilson 2012). Due to the fact that teacher professional development (TPD) is perennial, and ultimately affects students' learning, it is worthwhile to think thoroughly about its design, development, implementation, and evaluation.

Good teaching with technology requires knowledge of three core components: technological, pedagogical, and content knowledge, often referred to as TPACK (Koehler & Mishra 2009). Koehler and Mishra (2009) emphasize the importance of knowledge of each separate component as well as the interrelation and interdependence. They add to this, stating that teachers need to know more about new technologies and their pedagogically effective use. Wolf (2006) argues that teachers' effectiveness in face-to-face education does not automatically translate in effective online teaching. Teacher professional development in the different aspects involved in online, and blended, teaching and learning are therefore important.

The research literature of Wolf (2006) states that there is little research regarding the training of teachers to teach online, and that the need for TPD approaches has increased. Furthermore, Doering et al (2009) suggest that TPD, for online and blended learning or teaching, should address the TPACK framework. In this respect, this work-in-progress paper uses the TPACK framework as a reference point to examine where different TPD approaches place their focus, and to present a first overview.

2. Methodology

Content analysis was used to identify core consistencies, patterns, and themes (Patton 2015), and then relate them to the TPACK framework. First, the TPACK framework and its concepts are studied and used as a guideline for the analysis. The visual representation of the TPACK framework, as in figure 1, gives a clear overview of the different knowledge requirements and their relatedness. Second, the textual data of each article, referring to the design of the TPD approach, is classified within the TPACK framework as a within-case analysis (Patton 2015). Third, the articles are placed on the visual representation of the TPACK framework, where a number represents each study, to give a clear picture on the TPD approaches' main focus. This leads to a possibility to compare the different articles and make first conclusive remarks across the selected articles, as a cross-case analysis (Patton 2015). For this work-in-progress paper, the first five of fifteen articles are being analysed and discussed, thus the conclusion is still tentative.

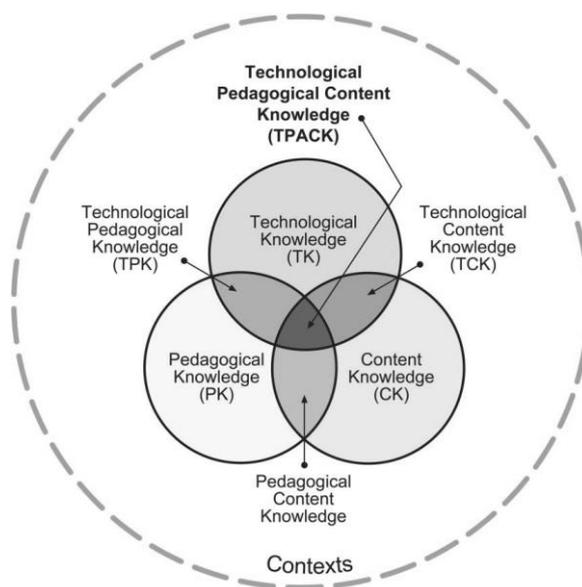


Figure 1: TPACK framework (Koehler & Mishra 2009)

3. Results

Table 1 presents the first five articles analysed for this paper. The numbers given to the articles are based on the alphabetical order of the first author.

Table 1: Papers for analysis

Author	Context (educational level)	Participants (n=)	Length of study
1. Ching (2014)	Primary and secondary	69	Three years
2. Comas-Quinn (2011)	University	20	One-time data collection
3. Cowan (2013)	Secondary	3	One year
4. Doering (2009)	Secondary	8	One time date collection and follow up after four months
5. Ernest (2013)	University	20	Six weeks

Ching and Hursh (2014) place a strong emphasis on instructional technology, wherein the participants have to create a web-based project that they will use in their classroom teaching. There is a clear relatedness between the new technology and its implementation in practice, whereby the teachers' hands-on experience with technology can change the representation of the subject matter. The main focus is on the instructional technology with no explicit reference to how learning, or teaching, can change as a result of the instructional technology. Therefore, we conclude that the pedagogical factor is poorly addressed. The content part is addressed, due to the fact that they have to use the new technology in their own teaching, hence this gives them the chance to experience the relatedness between content and technology. Consequently, we see this study addressing the *technological content knowledge*.

Comas-Quinn (2011) also places a strong emphasis on the technological part, where the teachers learned using an online audio-conferencing tool. It has been made clear throughout the article that the TPD approach consists of two parts: compulsory and voluntary training. The compulsory training was used to provide non-experienced online teachers with an understanding of new technology. The second type of training focused on the pedagogical part, including the pedagogical function of online teaching, and the teachers' role in facilitating this. So, we conclude that the design of the TPD approach of this study addresses the *technological pedagogical knowledge*.

Cowan (2013) describes a TPD approach whereby teachers who are less experienced with technology visit teachers with a more profound experience to observe them in their classroom practice. This is followed by the self-creation of a virtual learning environment. By addressing the subject areas of the observing teachers, the article stresses that a direct, practical transfer is possible, thus appealing to both technology and the interrelationship with content. Furthermore, teachers are expected to reflect and report on the impact of their course design. Thus, the relatedness between technology and content is present in this design of the TPD approach. We acknowledge that the pedagogical part could also be a part of this approach, and certainly a result of it, but we did not find any explicit indications for this. Hence, this study is being placed under the *technological content knowledge* part of the TPACK framework.

Doering et al (2009) can be described succinctly. The teachers develop their content knowledge about their own course by using the new technology. At the same time, they are looking for an optimal pedagogy to use this new technology by investigating the different pedagogical possibilities for content-related problem solving. Therefore, we can conclude that this study relates to the *technological, pedagogical and content knowledge* parts of the TPACK framework.

Ernest et al (2013) emphasise mainly the technological part. They focus on the skill development that supports online collaborative learning and online group work. The description of the TPD approach does not give a clear insight into whether other elements, besides the technological one, are being addressed. In the summary of the project activities, the focus remains solely on online collaboration and on a trial of a set of pilot activities to raise awareness of factors related to online group work. Hence, we conclude that this article addresses only *technological knowledge*.

When we put these results into the aforementioned TPACK framework (Koehler & Mishra 2009), we get the following overview (figure 2), concerning the emphasis of each article.

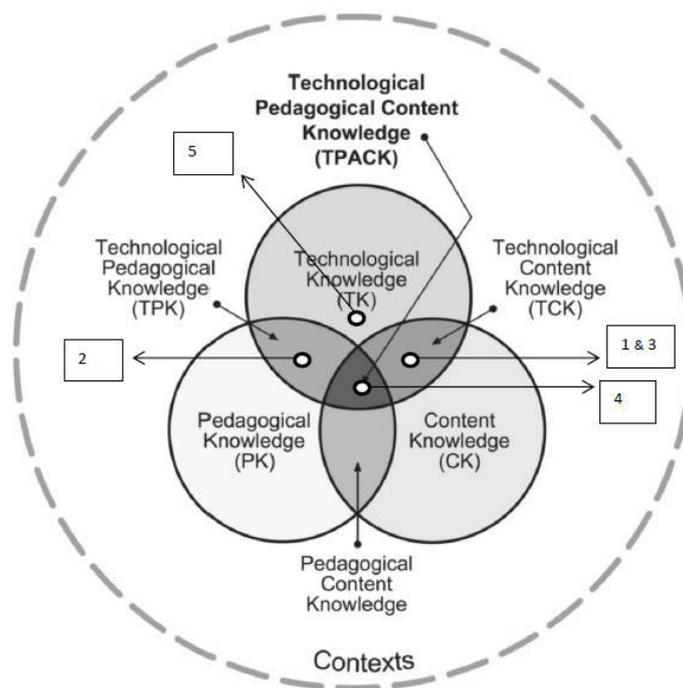


Figure 2: Studies integrated in TPACK framework from Koehler and Mishra (2009)

4. Conclusion and discussion

As a tentative conclusion, it can be stated that the initial designs of TPD approaches differ a lot between the included articles. Often addressing different types and levels of professional development (Wilson 2012), the design elements, however, are relatively easy to attribute to the TPACK framework. We need to point out that the initial design of the TPD program can differ from the retained results of it. Therefore, we would like to state clearly that this examination is solely about the design of the TPD approach, and what the intended results are. In all articles, 'technology' gets a large amount of attention. Only one of the five studies addresses, in the initial design of their TPD approach, all the TPACK elements. The study makes a very explicit initial reference to TPACK, which might suggest a relationship that addresses all the TPACK elements in their TPD approach. Concerning recommendations for practice and further research, it is interesting to know whether there is a relationship between the addressed elements of TPACK within a TPD approach, and the retained results and satisfaction. A second recommendation can be given due to the fact that TPD is a perennial aspect of education; it is of utmost importance to know which approaches prove to be effective and why this is the case. Further research needs to develop a better understanding as to why certain approaches are successful. Consequently, there needs to be more research into effective professional development (Wilson 2012) and the TPACK framework (Doering et al, 2009). The future analysis of the other ten identified articles will give more insight into where the main emphasis is put, with a more detailed discussion of every article and with more recommendations for further research and considerations for practice.

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