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Teachers' use of digital learning tool for teaching in higher education: exploring teaching practice and sharing culture

Abstract

Purpose

The purpose of this study is to explore teachers' use of digital learning tools for teaching in higher education. Moreover, it investigates how the use of digital tools affect educational practices and how teachers experience the culture of sharing among colleagues and within the organisation.

Design/methodology/approach

A qualitative methodology was chosen, and semi-structured interviews were conducted with teachers at a higher education institution in Norway. The study uses the TPACK-framework, which illustrates the relationship between technology, professional content knowledge and pedagogical approaches as its theoretical foundation.

Findings

The findings conclude that teachers are concerned with the convergence of how technology and digital learning tools can support educational processes by engaging and involving the students. The findings further indicate that they are committed to using digital tools to motivate, engage and facilitate student-based education, which in turn leads to more reflection on teachers' own

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teaching practices. Based on the theory of Professional Learning Communities (PLC), the respondents agree that sharing is a basic prerequisite for a learning organisation. They experience however, that sharing between colleagues is easier in formal forums than at informal settings.

Originality/value

The rapid development of technology suggests that many sectors including the education sector must adapt to the new changes in their teaching practices. Nevertheless, many teachers merely use the basic form of digital learning tools to distribute the teaching materials, as such tools are less utilised to support students' learning process (Fossland, 2015). The research indicates that digital learning tools have positive effect on teaching practices and that they can function as tools to improve the teachers' own teaching practices. Positive teaching practices should also be shared in a learning organisation to improve teaching practices on an organisational level. Hence, sharing at a professional level can impact learning and the organisational culture in academic institutions.

Keywords: Technology, Pedagogy, And Content Knowledge (TPACK/TPCK), digital learning tools, sharing culture, student engagement, Professional Learning Communities (PLC)

1.0 Introduction

Changes in educational practices and technological development have led to the increased use of digital learning tools in higher education. Such tools may consist of learning management

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systems (LMS), student-activating tools (Kahoot), social media platforms (Facebook), and video production tools (TechSmith). Previous research have shown that most digital tools are used to manage and distribute the content while they are less used to support students' learning process (Fossland, 2015). For instance, while the use of digital technologies helps teachers to manage class activities more efficiently, they are less used to create student activity and variation in teaching (Amundrud, 2015; ; Ørnes *et al*., 2015; Lal and Paul, 2018). Many teachers also use such tools in conjunction with traditional teaching methods such as PowerPoint presentations. As teachers' approaches to teaching with technology is imperative for the successful implementation of technologies in higher education (Englund et al., 2017), this indicates that there are some common challenges in the education sector (Amundrud, 2015). Hence, more studies are needed in order to understand why teachers use digital learning tools and how they can be used to improve teaching methodology and practices (Fossland, 2015).

This study investigates how teachers at a higher educational institution utilise digital learning tools in the classroom, what grounds do they have to utilise such technology as well as how they share such experiences with other colleagues in the organisation. As the theoretical foundation, the study uses the TPCK-framework coined by Mishra and Koehler (2006), also called TPACK by Harris et al. (2009), which illustrates the relationship between technology, professional content knowledge and pedagogical approaches. In regards to the culture of sharing, Professional Learning Community (PLC) is adapted in order to explore such phenomenon. Thus, the purpose of this study is to explore teachers' use of digital learning tools for teaching in higher education. This is followed by two underlying research questions consisting of:

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- How does the use of digital tools affect teaching practices among teachers?
- How do teachers experience sharing and learning culture in the organisation in regards to the usage of digital tools?

A qualitative methodology consisting of semi-structured interviews with teachers at a one of the largest higher education institutions in Norway were conducted. Norway is currently the second most advanced digital economy in Europe where its government is placing digitalisation as a top priority. Such priority along with the well-developed infrastructure, makes it easy to adopt new technologies and digital services including education technologies (Norwegian Ministry of Foreign Affairs, 2018). Thus, Norway as a study context is of particularly interest in regards to teachers and their use of digital tools at the higher education sector. The study explores an area that is highly relevant, and the findings could be used to understand and suggest improvements in teaching methods, which are beneficial for both the individual teacher and the organisation as a whole.

2.0 Literature review

2.1.1 Digital learning tools to promote learning

Teachers' teaching practices are imperative to promote students' learning. Mausethagan and Kostøl (2009) identify some characteristics of good teaching practices including appraisal and encouragement, clear expectations of the students, involvement in teaching, supervising of students, the teacher's academic excellence and the use of dialogues. In addition, inspirational teaching methods combined with ability to provide speedy feedback were also argued as good qualities a teacher at a higher education institution should possess (Su and Wood, 2012). As in

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many other sectors, the education sector also needs to keep track of the use of digital learning tools and methods to improve teaching practices. According to Nybølet (2015), 90 percent of tomorrow's workforce are required to possess sound ICT skills while on the educational policy side, employees' digital competence in the tertiary education sector is an important part of government's accreditation basis in countries such as Norway (NOKUT, 2016). Zweekhorst and Maas (2015) further argues that digitisation and use of ICT has been seen as a tool to raise the quality of education in regards to students' learning outcomes. In addition, from the teachers' point of view, Ørnes *et al*. (2015) present five main reasons for using digital tools in teaching which include varied teaching, additional academic resources increased students' self-activity, better follow-up of the students and contributes to increased learning for the students.

However, access to ICT structures and digital tools is not enough to promote the use of these tools in teaching (Tondeur, Valcke and Van Braak, 2008). In the same way as a teacher seeks to actualise the education content (Mausethagan and Kostøl, 2009), the use of digital learning tools in the education must be actualised (Fossland, 2015). As technology helps to change the way teachers teach (Vermeulen, Van Acker, Kreijns and Van Buuren, 2015), it is also important to understand how this occur. Often, it has been about the individual teacher who has acquired the expertise needed in using such technology. Subsequently, the teacher will use such expertise by mixing the new skills into their existing pedagogical approach to the subject, either as a self-interest or to comply with expectations from the educational institution (Fossland, 2015). This may be a contributing factor as to why the use of digital learning tools can be unfocused and not integrated into learning methods designated as educational (Fossland, 2015). Harris, Mishra and Koehler (2009) further point out that many of today's methods have too much focus on

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technology, where the consideration of the dynamic and complex relationships between content, technology and pedagogy has been left out.

Based on this complex picture, it is important to develop a model to understand the teacher's knowledge as a connection between pedagogical considerations, professional competence and choice of technology (Fossland, 2015). Many factors should be considered to integrate the technology into teaching. One of such model this is TPACK-framework.

2.1.2 TPACK-framework

The TPACK-framework illustrates the connection between technology, professional knowledge and specific pedagogical approaches. It demonstrates how teachers' understanding of the various parts are connected with each other in order to produce effective teaching and learning (Harris et al., 2009; Mishra and Koehler, 2006).

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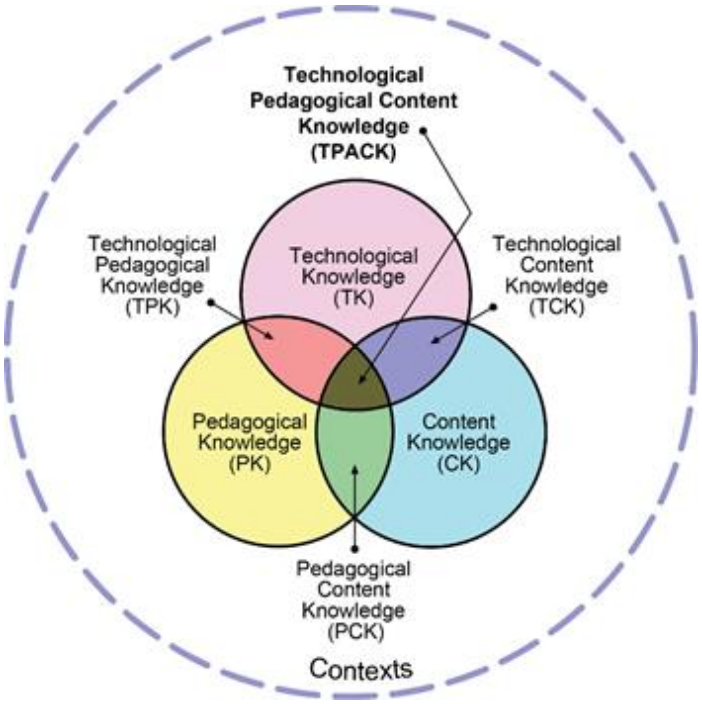

Figure 1. TPACK-model

Source: http://tpack.org

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The framework consists of three circles (illustrated in figure 1). The first circle represents Content Knowledge (CK), which is knowledge of the content to be taught (Mishra and Koehler, 2006). If the teacher does not have the correct knowledge, the students may end up developing unpresented concepts (Brandsford, Brown and Cocking, 1999). The circle of Pedagogical Knowledge (PK) describes the knowledge of processes and routines in teaching and learning (Mishra and Koehler, 2006). These include pedagogical purposes, goals, values, strategies and similar. Pedagogical knowledge therefore requires an understanding of cognitive, social and developmental theories of learning (Harris *et al*., 2009). As the Technological Knowledge (TK) is a dynamic state and always changing, it is often more difficult to define such knowledge

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compared to the former two. For example, it is difficult for teachers to keep up to date on technological developments because they are fast and can be experienced over time. TK is therefore not considered in the framework as an "end state", but as rather having the premise that the field evolves over time with many interactions and with more technologies (Harris et al., 2009; Mishra and Koehler, 2006).

The interaction between these three basic knowledges (CK, PK, TK) leads to further knowledge. A teacher can possess different knowledge according to the framework. The truly effective and high skilled teacher would possess the knowledge in the middle, which is called TPACK. Table 1 summarises the researchers' interpretation of the different knowledge in the TPACK-framework which is based on Harris *et al*. (2009) and Mishra and Koehler (2006).

Table 2. Interview questions

I. How does the use of digital learning materials affect teachers' teaching practices?	1) Teaching practices including lectures, preparations, evaluations of compulsory assignments, consultation, and communication with students. • What types of digital learning materials are used in your teaching practices? • What is your motivation of using such tools in your teaching practices?
II. How does it lead to increased reflection of their own teaching practices?	2) Reflections – questions concerning own pedagogical practices • How do you experience students' responses when digital learning materials are used in teaching practices that lead to changes in teaching approaches? • Could you reflect on students' experiences in such process including their motivation and involvement?

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		• Could you reflect on the extent to which the use of digital learning materials lead to increased reflection of your own teaching practices? For instance, how does it trigger reactions on your own practices? • Could you reflect on the extent to which the use of digital learning materials lead to changes in the overall teaching approaches?
III.	The extent to which such teaching practice lead to an increased culture of sharing at the department/ organisation.	3) Culture of sharing • How is the sharing culture among colleagues? • How do you share your experiences and reflections with colleagues?

The framework is considered relatively intuitive and easily communicable (Voogt, Fisser, Roblin, Tondeur and Van Braak, 2013). On the other hand, there are differences in how to use the framework, depending on the individual teacher's own pedagogical basis, field of study and the belief in technology (Voogt *et al*., 2013). Harris *et al*. (2009) argue that professional development based on such a framework must allow for different approaches, styles and philosophies related to their own pedagogical practices. This is also supported by Tømte and Olsen (2013) which indicate how planning and implementation of teaching is complex and consists of far more than just a tool-based approach. Therefore, even if the framework works well in practice, it may be difficult to determine exactly what the TPACK-knowledge consist of among each individual teacher. Although technology plays an essential role in the TPACK-framework, it can also be argued that effective teaching programs do not necessarily require the dependency on technology if there are pedagogical, content-related and technological

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arguments to refrain from using technology. Furthermore, Heitink et al. (2016) in their studies argue that despite the usefulness of the TPACK-framework to understand the relationship between the three basic knowledge, the framework is a conceptual model. This means that teachers do not usually think in separate domains of knowledge as it is difficult to separate these knowledges in practice (Kafyulilo et al., 2015). Similarly, Brantley-Dias Brantley-Dias and Ertmer (2013) also argue that the framework has too many domains which is difficult to distinguish from each other. Archambault and Barnett (2010) even questioned whether the various domains exist in practice. However, while teachers might not be able to distinguish and categorise their knowledge into different domains (Chai et al., 2011), the framework does serve the purpose of illustrating how technology can improve teaching and learning.

2.1.3 Sharing and the culture of sharing

While the use of digital learning tools can improve the teaching of individual teachers, the collective development of organisational education practices is just as important. In education research, the PLC has been developed in the last decade and it is essentially about teachers coming together for the purpose of professional development (DuFour, 2004; Sizer, 1992). The definition of PLC varies in literatures (Vangrieken *et al*., 2017). A proper investigation of this can be found in the systematic review of Vangrieken *et al*. (2017: 49), where five points that describe common themes across the definitions are identified.

1. "Supportive and shared leadership" – The desire for sharing culture must be rooted in leadership level, and trust in the organisation must be established by establishing what Vangrieken *et al*. (2017) indicate as "Shared values, vision, and goals".

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2. “Shared values, vision, and goals” – A set of common purposes, visions and values to work towards to in community.
3. “Collective learning and application” – Core components in this process are reflective dialogue and discussions about curriculum, teaching methodology and student progression. Practicing common open practice.
4. “Shared individualize practice" – An important prerequisite for learning and evaluating in larger communities.
5. “Supportive conditions (both physical and human)” - Here they point out to the importance of establishing forums where people meet and work is organised. It must be ensured that all who participate “get a voice”, are heard, and feel that their contribution to the community is valuable.

PLC describes a learning organisation in miniature, working towards developing better practice when professionals share experiences and learn from each other (Vangrieken *et al*., 2017). Laursen (2004) illustrates that teachers who see their colleagues as resources and are willing to share their experiences with others, can further strengthen students’ learning. Nore, Engelien and Johannessen (2010) point out that the knowledge gained through TPACK can be shared in a networking context and can lead to professional development, greater open mind and sharing culture amongst teachers. While they have merely focused on learning at primary and lower secondary schools, similar ideas can be applied to higher education as well.

Fisher and Brimblecombe (2014) further argue that in a learning organisation; teachers will be coordinated to cope with the challenges in regards to how learning takes place, while

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understanding that not all students learn as fast. This is best done by establishing a sharing and collaboration culture among teachers, where a deeper learning takes place (DuFour, 2004). Through a systematic approach to collaborate in teams that analyse and evaluate each other's teaching practices, and constantly raise new questions, teachers are learning better together than individually (DuFour, 2004). It is about focusing on the results and using them in the improvement process of adapting and shaping the teaching so that a common goal can be achieved and the responsibility is not placed on individual's competence or will. A PLC is thus a prerequisite for a learning organisation.

3.0 Methodology

Qualitative methodology in the form of semi-structured in-depth interviews was used as a methodological approach for this study. This type of method is used to study particular characteristics of the phenomenon to be researched (Tjora, 2012). The flexibility of qualitative methods and transparency allow the researchers to explore the relevant topics and phenomenon in-depth. The respondents also have great influence on what information is collected and can control what they want to share. This leads to a better understanding of the respondents, especially when it is their reflections and thoughts about the topic the study is seeking for (Tjora, 2012). In studies in which there is still relatively little research, qualitative approach is useful, as the study is not seeking to test hypotheses (Roulston, 2001). The nature of this study thus suggests that qualitative methodology was the most suitable approach at this stage.

3.1.1 Research design and method

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A purposive sampling approach was used, as it was important to select the best-suited respondents due to the impact that they would have on the result of this study (Mehmetoglu, 2004). Based on the purposive sampling, convenience sampling and criteria was used to select suitable respondents. The main criterion was that the potential respondents needed to be considered as more than average experienced users of digital learning tools at their institutions. This type of selective sampling was logical, as the study required to recruit respondents with the greatest possible experience in using digital learning tools in teaching practices. Based on convenience sampling, several potential respondents located in several departments within one university college were contacted by emails. Although sample size is important in any studies, there are no rules for size in qualitative inquiry as the size is dependent on the research aim, contribution and resources available (Patton, 2015). Furthermore, in a qualitative study, the depth of the collected data is essentially more important than the numbers (Burmeister and Aitken, 2012). Ringdal (2013) argues for instance that a saturation point could be reached in as little as five when the aim is to gain insight into how and why the respondents feel and react to a certain phenomenon. The respondents' participation was strictly voluntary and they could terminate the interviews at any given time. Anonymity was guaranteed, and their names are not mentioned in the study. This was informed before the interviews.

There were in total five respondents in this study, four female and one male, with an age span of 49-59. They all have six to 19 years of teaching experiences at their respective departments at one university college. The interviews, which lasted between 40 and 55 minutes each, were conducted at various campuses. The respondents were provided a safe and relaxed environment as the interviews were carried out as conversations between colleagues. A digital recorder was

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not used. Instead, one researcher initiated the conversation while another researcher participated passively either through Skype or in person to in order to write comprehensive notes. Such notes included complementary statements along with other keywords. Not using a digital recorder may have caused methodical and analytical risks due to incompleteness and challenges in data interpretation. Therefore, there were always at least two researchers present in the interviews. While it is generally the academic rigour to record the interviews, transcribe and then analyse, some respondents may feel reluctant to be recorded. In addition, respondents are likely to talk more freely off-the-record without a recording device (Peabody et al., 1990). Similarly, Byron (1993) argues that more detailed off-the-record information can potentially be obtained when the interview is not recorded. Notes were written, discussed and interpreted between the researchers immediately after the interviews were completed. The data analysis was also carried out shortly after the interviews to ensure that data was relatively recent and fresh. To ensure the reliability of the data, the member check method was used by providing the notes that were taken to each respondent to verify the accuracy of the content after the interviews were completed. The member check is an important procedure as it has the ability to determine if the information and findings reflect and represent the realities of study participants (Hoffart, 1991; Lincoln and Guba, 1985) and it is seen as an important process due to the subjective nature of qualitative research (Schwandt, 1997).

3.1.2 Interview guide

Interviews can be designed with different degree of structures. Semi-structured interviews were chosen because they provide greater opportunity to make comparisons between the respondents. Semi-structured interviews offer opportunities for flexibility in the interviews so

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that data is produced along the way and it can guide the questions asked (Thagaard, 2003). In addition, this type of structure provides a consistent balance between flexibility and standardisation (Jennings, 2001). First, an interview guide was made and the questions in the interview guide were formulated based on topics raised in the literature. The interview guide consisted of three main parts where part one of the questions focused on teaching practices and grounds for using digital learning tools. Part two dealt with reflection on the respondents' own teaching practices, and part three explored the culture of sharing. The interview questions allowed the respondents to reflect on how the use of digital learning tools affects their teaching practices. The purpose of the interviews was to get the respondents to reflect on the use of digital learning tools in teaching, and in this relation, discover attitudes and practices that they have not thought about before or have been conscious about previously. The specific interview questions are provided in table 2.

[Insert table 2 here]

3.1.3 Data analysis

Data analysis was carried out by the means of a thematic approach. Thematic analysis is a widely used method for qualitative research to identify and analyse themes based on so-called "rich data" obtained by interviews (Roulston, 2001). Thematic analysis does not aim to quantify the themes, but find connections between the themes. The topics or categories are often generated from reading, labelling and encoding, followed by an assessment of the categories (Jennings, 2001). It involves organising data into different categories based on central topics, concepts or other similar functions. In addition, new themes are developed as new conceptual definitions are formed and compared among the key concepts to be studied (Berg, 2001). Both the TPACK-framework and PLC have been used as the basis for the analytical framework.

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Following the interviews, data was distributed on various themes and categories. All researchers participated in this process so that the content and categories were thoroughly discussed. Data was categorised by themes and interview questions in the interviews. Although none of the interview questions mentioned TPACK or PLC directly, the researchers searched for expressions, keywords and phrases that were considered as relevant to these concepts. Colour codes were used to distinguish the respondents from each other, making it easier to keep track on who had said what. Since the interviews were not recorded, this was a useful procedure in cases where data and findings had to be further verified and cleared. The categories and themes consist of; type of digital learning tools used, teaching practices, motivation, reflection, changes in teaching practices, students' reception, sharing between colleagues and organisational sharing.

4.0 Result and discussion

4.1.1 Types of digital learning tools used

The findings concur with both Fossland (2015) and Ørnes *et al*. (2015), indicating that the most widely used digital learning tools among many of respondents are the university colleges' own digital learning management system (Fronter), streaming of lectures (both flipped classroom and direct transfer), along with social media platforms such as Facebook, and some student activating tools like Kahoot – an interactive question and response system. Table 3 illustrates a detailed overview of the types of digital learning tools used and how they are used.

[Insert Table 3 here]

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Several respondents emphasise the importance of both variation and a combination of both digital tools and traditional lectures, and that they must alternate between different tools and methods (Respondent 1, 2 and 3). For instance, respondent 2 states that switching between different tools enables the student to conduct the learning process and that the student is "forced" to work more. She also states that variation is important also for her own motivation. Similarly, respondent 3 indicates that that using digital tools is about variation and "meeting the youngsters where they are", as well as teaching them technology in a different way. The keyword here is variation. According to Bradbury (2016), variation in learning activities is important as a student cannot hold the concentration for more than 10 minutes at a time, with some studies arguing for an even shorter attention span among university students (Bunce et al., 2010). Thus, integrating digital learning tools as part of teaching practices is one way to vary teaching and learning. Respondent 4 further emphasises that no students are equal as people learn in different ways. He also states that students need different learning strategies to learn. Hence, this also leads to different teaching styles. Such findings are also supported by the literature, as teachers need to adapt to the students' needs and thus teach in a style, which is suitable for the students and the teachers themselves (Fisher and Brimblecombe, 2014).

4.1.2 The students' involvement as the main reason

A common feature of the respondents' statements is that they are committed to utilise digital learning tools to motivate, engage and facilitate student-based education, thus increasing student-learning outcomes. Student engagement is one of the main reasons for introducing information and technological technologies such as digital tools (Steinberg & Preiss, , 2005;

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Säljö, 2010; Zweekhorst and Maas, 2015). As discussed, increased variation and that the students think it is fun to integrate digital learning tools, make the students learn more according to respondent 1. Other respondents justified in a similar way as students learn more efficiently and are more inspired (Respondent 3 and 4). Greater involvement among students and positive feedback were also emphasised by respondent 2. Such findings also concurs with Fossland (2015) who argues that these are the main reasons for teachers to utilise digital tools and technology in teaching practices.

According to the respondents 1 and 3, some students are negative towards using digital learning tools and less keen to participate in varied learning opportunities when it requires more effort from their side. The respondents also believe that some students feel uncomfortable because of how the tools are used, and some of the respondents stated that they had to return to the old fashion way of using paper. However, when they went back to the old fashion way, the students realised that the digital platform was better after all. This indicates that both the teacher and the students need to go through an adaptation process.

The respondents also indicated that they had used Facebook groups for discussions to "meet the students where they are", but the reception had been mixed. Especially as some students found it difficult to receive comments from other students or to provide feedback on others' work. The respondents state that there are also some students who were very positive by indicating, "it's just us in the class". Similarly, respondent 2 points out that some students use flipped classroom principle as a reason not to show up to class. Supported by Tømte and Olsen (2013), students are for example less interested in student active learning in which they

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themselves must contribute to a greater extent. This may lead to less involvement from their side and a reluctance to use digital learning tools as a part of their education. Miller (2007) stresses that if such types of teaching methods are to be effective, the students must primarily be dedicated to the task, that they must be open to feedback by accepting each other's strengths and weaknesses, and not least appreciate each other's contribution. Thus, such teaching approaches are not suitable for all students and subjects, which is reflected in the findings of this study. However, it can be argued that it is not the digital learning tools that they are negative towards, but rather a new approach to learning. Tømte and Olsen (2013) further explain that students often fail to see the opportunities for learning that is available in the application of technology and that the purpose of using the digital tool as part of the educational process is not clearly explained by the teacher. Hence, the students are not necessarily negative towards using digital learning tools as part of student learning; rather the respondents have met resistance from students who are negative towards a new approach of learning, which requires more effort from the students themselves.

4.1. Improved teaching practices in conjunction with TPACK

PCK, which is one of the knowledge platforms in the TPACK-framework, refers to the professional knowledge of the learning process. This means that the teacher can help students to understand the content without being dependent on technology (Pusparini *et al*., 2017). This was expressed in the findings as respondents had good knowledge of the content-based curricula. The respondents state for example that they spend more time to think about the content by planning the teaching and constantly evaluating whether to include or not include one or more digital tools (Respondents 1 and 3). They also express that they are conscious of

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why they choose to use certain digital learning tools and that the ultimate purpose is encourage effective learning. This shows that they possess TPK, where the teacher knows how to use the different digital learning tools available and uses them in teaching in order to promote learning (Harris *et al*., 2009; Pusparini *et al*., 2017). Furthermore, respondent 2 and 4 point out that they reflect more when using digital learning tools because they think about what it is like to be the receiver. They explain how they systematically assess their teaching plans and that this is used to further develop the teaching practices. This in turn leads to variation in teaching methods and that they become aware why "things don't work" in a different way. Similarly, respondent 1 emphasises that he becomes more aware of the structure and content during the planning of the teaching to achieve the benefit and outcomes that he wants. Such findings concur with existing studies which also indicate that when teachers ask questions about their own teaching practices, they are able to develop their own teaching (Postholm, 2008).

More reflection on own teaching practices can also be found when the respondents use videos for teaching, feedback and communication. For instance, several respondents state that they make videos of the lectures and use them for reverse education such as flipped classroom. Respondent 2 indicates that "when making videos, one has to be even better prepared [than in traditional lectures] and be alert, because it is important to be precise". Another respondent says that she becomes more focused on the structure and tidiness when conducting direct streaming of lectures (Respondent 5). This means that she really must plan the content accordingly because it "can easily fail" if it is not well-prepared. One of the respondents also drew reflection on feedback and evaluation work. She uses videos to provide assignment feedback, and she experienced that students really appreciate this type of feedback. However, she needs to be

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more precise as a teacher to clarify the feedback when video is used. She must be more structured and precise at what effect the feedback should have (Respondent 1). When the teacher manages to use technology to promote learning by creating good arenas for communication and discussion (Pusparini *et al*., 2017) such as using video feedback, it indicates that the teacher has TCK. In addition, the study by Mathiesen (2013) supports the notion that video feedback on student assignment has an effect beyond the academic work. The students experience the feedback as more precise and modernised, and that it increases motivation and inspiration to the writing work. The students would also experience a closer proximity to the teacher as the teacher is regarded as more "visible" and "seen" by the students when they receive video feedback (Mathiesen, 2013). In this study, it was also emphasised by the respondents that they use video feedback because it facilitates and simplifies the job while providing the opportunity for precision and quality beyond what written feedback can provide. In addition to knowing the advantages and limitations of digital learning tools and technology, teachers who also reflect on their own learning practice by varying the teaching approach and conveying content with different teaching strategies, are those who possess TPACK-knowledge (Baran, Canbazoglu, Albayrak and Tondeur, 2017; Hilton, 2016; Pusparini *et al*., 2017). Although none of the interview questions mentioned TPACK directly as stated, the respondents' statements expressed an understanding that teaching is dependent on an integration of their pedagogical, technological and content knowledge, and that it is a dynamic and flexible process. Therefore, it can be argued here that the respondents possess TPACK-knowledge.

4.1.4 Sharing culture in the organisation among teachers

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This section discusses how teachers experience sharing and learning culture in the organisation in regards to the usage of digital learning tools. As discussed, this study has used the systematic overview of the Vangrieken *et al*. (2017) and the five basic common features of PLC to explore to how the respondents experience the sharing culture among colleagues and in the organisation: (1) "Supportive and shared leadership". (2) "Shared values, vision, and goals". (3) "Collective learning and application". (4) "Shared individual practice". (5) "Supportive conditions (both physical and human)".

In regards to how the respondents perceive that management in the organisation supports them to share their work and experience with digital tools (1), several respondent indicate that they believe there is an increased focus in the organisation, even though there is no formal culture of sharing (Respondent 2 and 4). Specially, an internal expert team was mentioned which functions as a facilitator and driver to both encourage the use of digital learning tools and to develop ICT-supported learning at the university college. It is also interesting to see this in conjunction with point (5), where the pedagogical forum is also referred to as the arena for sharing (Respondent 4). This forum is anchored at a high level and is perceived by respondent 4 as both a facilitation by management and an arena for sharing. Although support from the leadership is important, Vescio, Ross and Adams (2008) also discuss that teachers must be given authority and be regarded as equal contributors. Hence, while the management can and should function as the driver, the teachers themselves must be given ownership to their achievements.

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In the case of shared purposes, visions and values (2), some scepticism was found. The respondents agree that both themselves and other colleagues see the purpose and value of "becoming as good lecturers as possible", where the use of digital learning tools can be useful to achieve such purpose (Respondent 1). However, they are not that good at supporting each other in the process (Respondent 3 and 5), and the opinion is perceived as divided (Respondent 2 and 3) when it comes the interest, or willingness to share with others. The literature emphasises that trust among teachers is important in order to develop PLC (Newmann, 1996; Webb *et al*., 2009). Hence, a common purpose, vision and values are difficult to achieve if members do not trust each other by not being willing to share. Similarly, this is also found in point (3), where not all respondents believe that there are good discussions about teaching methods and study progressions (Respondent 2). There can be resistance, or a "change of mind" among the colleagues (Respondent 3), although a few number of people do speak and share informally with each other on a regular basis (Respondent 5). Resistance to change may also lead to resistance to apply new knowledge and skills, which is one of the core characteristics of PLC (Webb *et al*., 2009; Vescio *et al*., 2008).

Most interesting is when the notion of transparency and sharing of individual practice are discussed (4). There are two remarkable points of views on the topic. Some respondents report that they shared on request and that they would like to "give away" the teaching materials and method they had made and that this was positive (Respondent 1, 3). Some of the other respondents (2 and 4) stress that discussion had risen in situations where people have quit or left the organisation, or they had to replace someone else. The question that arises is that who owns the teaching materials and method where hours of work has been invested to integrate

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digital learning tool to create variation? Is it the educational institution? If so, who has the main responsibility to share this? Is it the teacher, the colleagues or the management? PLC suggests that such responsibility should be a collective one based on collaboration (Webb *et al*., 2009). However, to achieve so in practice, formal systems, ownership and trust among members must be in place. This is also relevant in point (5), which states that certain preconditions must be in place, both physically and socially, for a sharing culture to be created. It seems that when sharing occurs on the organisational level, it usually happens in formal arenas such as pedagogical forums (Respondent 1 and 4). Nevertheless, the respondents emphasise that the degree of sharing is determined by the interest of the individuals and other social conditions (Respondent 2, 3 and 5). The findings indicate that on the organisational level, there are still a long way to go to achieve a sharing culture based on the PLC, although some informal sharing between certain teachers do occur. Thus, the findings have not been able to identify any formal obligations that the respondents believe they have in order to share their experiences in regards to the usage of digital tools with others. This means that good experiences may not have been shared and that sound teaching practices and methods may not have been carried forward.

This study has focused on teachers with great experiences with using digital learning tools, who are willing to integrate such tools, as part of their varied teaching method. Thus, their experience and knowledge should be shared with other colleagues in the organisation. In such sense, sound skills and knowledge of using of digital learning tools as part of teaching can to be transferred and spread to other colleagues. However, the goal of sharing should not solely be on sharing the experience of using such tools. Rather the shared knowledge should be the experience on how such tools can be used to engage the students and understanding how the technology can

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complement and support the current teaching methods. Moreover, teachers can improve their teaching methods if they articulate the reason of using digital learning tools in their teaching and share such experience with colleagues (Heitink et al., 2016). Ertmer and Ottenbreit-Leftwich (2010) further stress that teachers would need practical and authentic examples of using such digital technology to support them in this process.

Although the TPACK-framework can arguably not be directly transferred to another individual, because it is essentially a conceptual model as discussed, it is still crucial for teachers to share their practical experiences with other colleagues to improve their teaching methods as a way to gain the TPACK-knowledge. By sharing the experiences through the five points of PLC, teachers who already possess the TPACK-knowledge can help other colleagues to understand the importance of variation where using digital learning tools is one way of doing such. This would ideally create more teachers with TPACK-knowledge in the organisation. Essentially, TPACK does not necessarily require technology to be integrated, as technology is only a means to achieve the goal (Heitink et al., 2016; Harris et al., 2009). Teachers need to be able to evaluate whether the use of digital learning tools is necessary in teaching, or such tools only have supportive functions (Britten and Cassady, 2005). Hence, it is up to the individual teacher to plan and adjust the teaching methods accordingly (Fisher and Brimblecombe, 2014) in order to possess their own TPACK-knowledge.

5.0 Conclusion

Where previous studies argue that most teachers do not use digital learning tools to create student activity and variation (Amundrud, 2015; Fossland, 2015), the findings in this study indicate that some teachers are more innovative than the majority in their use of digital learning

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tools. Creating activity, variation and commitment are some of the main reasons for using digital learning tools in planning and conducting the teaching. The respondents emphasise that the use of digital learning tools in the classroom helps them reflect more about their own practices, both in the planning phase and after teaching is completed. Hence, digital learning tools have a positive effect on their teaching practices and they function as tools to improve their practice. The fact that the respondents are concerned with the relationship between how technology and digital learning tools support pedagogical processes is an indication that they possess TPACK-knowledge in the form of a combination between PCK, TPK and TCK. This means that they meet the requirement of what Tømte and Olsen (2013) characterise as digitally competent teacher. This also indicate how technology and teaching practices could interplay dynamically with each other, as such relationship is arguably beneficial to improve the society as a whole.

Furthermore, the findings indicate that sharing of the respondents' experiences of using digital learning tools is easier in formal forums rather than in informal settings. The respondents experience that the organisation does facilitate sharing, but further clarifications into the relation of ownership and responsibilities of the teaching plan must be clarified at the organisational level to assure that good experiences and teaching methods are being shared and carried forward. To ensure that both the individual teacher and the educational institution reach the goal of coordinating the use of digital learning tools, the organisation must facilitate sharing so that the individual's TPACK-knowledge and competence can be shared amongst colleagues. This will also ensure the best possible learning outcomes for the students.

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Although the TPACK-framework is useful for understanding and producing effective discipline-based teaching with educational technologies, the framework does not focus on sharing as it rather concentrates on the individual teacher. Future studies should thus further develop the framework to integrate sharing on an organisational level as well as sharing of teaching experiences in general. While the findings of this study are based on respondents from two campuses at one university college, the study has been able to generate new understanding of a topic, which still requires further studies. Future studies should also focus on several institutions and with more respondents as well as seek to connect theoretical knowledge with practice. In addition, the perception of the students should be taken into consideration, especially when the focus is on effective student learning approaches.

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