

# TEACHERS' PERSPECTIVES ON ENHANCING PROFESSIONAL DIGITAL COMPETENCE BY PARTICIPATING IN TEACHMEETS

## *IL PUNTO DI VISTA DEGLI INSEGNANTI SUL MIGLIORAMENTO DELLE COMPETENZE DIGITALI PROFESSIONALI PARTECIPANDO A TEACHMEETS*

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**ABSTRACT** This study examines teachers' experiences in fostering Professional Digital Competence (PDC) by participating in TeachMeets. TeachMeets are bottom-up professional development events where teachers meet to share pedagogical ideas about teaching and learning using digital technology. The study also examines how this participation may nurture teachers' transformative digital agency as competent digital practitioners. The study employs qualitative methods, drawing on data from open-ended questionnaire answers (n=36) and five in-depth interviews. Thematic analysis is performed by taking an inductive approach to identify themes and drawing on the Norwegian PDC Framework for Teachers as the analytical lens. The findings reveal that the teachers consider participation in TeachMeets useful for the development of their PDC and participation may nurture teachers' transformative digital agency. These findings have implications for facilitating Teachers' Continuing Professional Development (CPD) by focussing not only on their pedagogical and technological competencies but also their agentic capacities.

**KEYWORDS** Teachers' Professional Digital Competence; Transformative Digital Agency; Continuing Professional Development; TeachMeets.

**SOMMARIO** Questo studio prende in esame le esperienze degli insegnanti nel promuovere la loro Competenza Digitale Professionale (PDC) partecipando ai TeachMeets. I TeachMeets sono eventi di sviluppo professionale costruiti dal basso, in cui gli insegnanti si incontrano per condividere idee pedagogiche sull'insegnamento e l'apprendimento utilizzando la tecnologia digitale. Lo studio esamina anche come questa partecipazione possa nutrire l'agire trasformativo digitale degli insegnanti come professionisti digitali competenti. Lo studio impiega metodi qualitativi, attingendo ai dati delle risposte a questionari aperti (n=36) e a cinque interviste in profondità. L'analisi tematica viene eseguita adottando un approccio induttivo per identificare i temi e attingendo al quadro delle competenze professionali digitali degli insegnanti<sup>1</sup> come lente analitica. I risultati rivelano che gli insegnanti considerano la partecipazione a TeachMeets utile per lo sviluppo della loro Competenza Digitale Professionale (PDC) e la partecipazione può alimentare l'agire digitale trasformativo degli insegnanti. Questi risultati hanno implicazioni per facilitare lo Sviluppo Professionale Continuo (CPD) degli insegnanti, concentrandosi non solo sulle loro competenze pedagogiche e tecnologiche, ma anche sulle loro capacità agenziali.

**PAROLE CHIAVE** Competenze Digitali Professionali dei Docenti; Agire Trasformativo Digitale; Sviluppo Professionale Continuo; TeachMeets.

## 1. INTRODUCTION

This study examines teachers' experiences in participating in TeachMeets and provides insights into how this participation may enhance their professional digital competence (PDC) and nurture their transformative digital agency (TDA). A TeachMeets is an informal, professional development event where teachers from different disciplines and schools share best practices, innovations and pedagogical ideas about teaching and learning with digital tools (Walsh, Bradshaw, & Twining, 2011). The first TeachMeets was arranged by Scottish teachers in 2006, and these events have since become a global phenomenon (Amond, Johnston, & Millwood, 2018). One of the first large-scale TeachMeets in Norway was arranged in 2013 at the National Conference on Using ICT in Teaching and Learning (NKUL), an educational technology (EdTech) conference for teachers (NKUL, 2013). Over the last decades, schools worldwide have become increasingly digitalized. In Norway, the Knowledge Promotion Reform identifies digital skills as one of five basic skill groups across all school subjects and levels (Norwegian Directorate of Education and Research [NDER], 2005). Recent reports show that most students in Norway now use digital technology in school (Fjørtoft, Thun, & Buvik, 2019), making teachers' PDC a matter of utmost importance.

Teachers' PDC can be conceptualised as a twofold framework within which teachers must continuously develop their digital competence and foster the development of their students' digital competence (Kelentrić, Helland, & Arstorp, 2017; McGarr & McDonagh, 2019). The changing nature of digital technology emphasises the need for teachers to be agentic practitioners, and PDC demands that teachers not only adapt their practices to digitalisation but also develop the capacity to design and enact learning environments that contribute to their students' learning (Lund, Furberg, & Gudmundsdottir, 2019). Thus, teachers' PDC is closely connected with their TDA, defined as

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1 Norwegian PDC Framework for Teachers.

their competence in taking initiative and transforming their practices via relevant digital tools (Brevik, Gudmundsdottir, Lund, & Strømme, 2019; Engeness, Nohr, Singh, & Mørch, 2020). However, many teachers both in Norway and across Organisation for Economic Co-operation and Development (OECD) countries perceive that they have inadequate PDC. They report a need for competence development to develop their knowledge on how technology can best be integrated into their teaching practices (OECD, 2019; Throndsen, Carlsten, & Björnsson, 2018).

Internationally, teachers have reported TeachMeets as valuable continuing professional development (CPD) arenas to develop PDC (Amond et al., 2018; Amond, Johnston, Millwood, & McIntosh, 2020; Walsh et al., 2011). Nonetheless, the TeachMeets concept is relatively new, and research on TeachMeets is scarce, necessitating more systematic examinations (Amond et al., 2018). To the authors' best knowledge, no research has previously examined how teachers experience developing their PDC and TDA by participating in TeachMeets. This study aims to address this gap by examining the following research questions (RQs):

RQ1: What do teachers say about fostering their PDC by participating in TeachMeets?

RQ2: How do TeachMeets contribute to nurturing teachers' TDA?

## **2. THEORETICAL PERSPECTIVES AND RELEVANT RESEARCH**

### ***2.1. Dimensions of teachers' PDC***

Internationally, research interest in teachers' digital competences in educational practices has accelerated (De Rossi & Trevisan, 2018). Although teachers' PDC is a "fuzzy" rather than an established concept (Brevik et al., 2019), over the last 15 years, several models and frameworks have been developed to describe the aspects of digital competences that teachers need to effectively respond to the current demands in classrooms.

The technology, pedagogy, and content knowledge (TPACK) framework by Mishra & Koehler (2006) was one of the first frameworks defining the essential qualities of teacher knowledge required to integrate technology into teaching by emphasising the connections, interactions, affordances and constraints between technological knowledge (TK), pedagogical knowledge (PK) and content knowledge (CK). Quality teaching, as Mishra & Koehler (2006) argued "*requires developing a nuanced understanding of the complex relationships between technology, content, and pedagogy, and using this understanding to develop appropriate, context-specific strategies and representations*" (p. 1029). The TPACK framework has been widely used and applied for both educational and research purposes all over the world and has influenced how the concept of teachers' PDC is understood and conceptualised in Norway (Tømte, Wollscheid, Bugge & Vennerød-Diesen, 2018).

A subsequent attempt to conceptualise teachers' digital competence included not only their skills to understand digital technology's affordances and constraints but also the need for teachers' motivation to engage in digital culture (Ilomäki, Paavola, Lakkala, & Kantosalo, 2016). This attitudinal aspect is also visible as the third of four dimensions in the pedagogical, ethical, attitudinal and technological (PEAT) model (McGarr & McDonagh, 2019). The attitudinal dimension describes the teachers' positive attitude and openness to new technologies, which may reflect their motivation and agentic capacity to use technology in their teaching practices. In another study, Brevik et al. (2019) conceptualised teachers' PDC through four pillars — generic digital competence, didactic digital competence, professionally oriented digital competence and transformative digital agency. The fourth pillar amplifies and connects the agentic aspect with teachers' PDC. In sum, recent research-based attempts to

conceptualise teachers' PDC emphasise the need for teachers to develop their agentic capacity as digitally competent teachers.

In addition, by drawing on research and policy documents several other frameworks have emerged on national and international levels. In Europe the Digital Competence Framework for Educators (DigCompEdu) (Redecker & Punie, 2017) is aimed at providing a frame of reference to describe European teachers' digital competences as well as a general reference frame for developers of digital competence models, in and across EU member states. DigCompEdu describes 22 educator-specific digital competences which are organised in 6 areas:

- 1) Professional engagement,
- 2) Digital resources,
- 3) Teaching and learning,
- 4) Assessment,
- 5) Empowering learners and
- 6) Facilitating learners' digital competence.

In Norway, the Directorate for Education and Training have conceptualised teachers' PDC via the Norwegian Professional Digital Competence Framework for Teachers (Kelentrić et al., 2017). The overall aim of this framework is to establish a common understanding of what teachers' PDC in Norway entails. The framework builds on national and international policy documents, research and frameworks, like DigCompEdu (Arstorp, 2019). Similar to the DigCompEdu framework, the Norwegian PDC Framework centres both around teachers' professional development as well as the actual practice of the profession. The Norwegian framework in line with the TPACK model emphasises the importance of teachers balancing their knowledge of content, pedagogy and technology. Additionally, it addresses teachers' ability to understand how technology changes and expands the way we learn and subject content as such (Tømte et al., 2019). The Norwegian framework focuses on teachers' ability to foster not only their own, but also their students' digital competences and *bildung*. In doing so, it complements and expands the TPACK model. The Norwegian framework is founded on a socio-cultural learning perspective (Tømte et al., 2019) and consists of seven competence areas (Table 1) operationalising the competencies teachers need to develop and explicate in their teaching in a digital society (Kelentrić et al., 2017). The seventh area, *Change and Development*, encompasses agentic aspects of teachers' PDC by focussing on teachers' capacity to improve and adapt their teaching and drive their developmental work.

PDC FRAMEWORK COMPETENCE AREAS	TEACHERS
<b>Subject and Basic Skills</b>	Understand how digital developments change, support and expand school subjects' content, teaching methods and the development of basic skills Utilise and further develop their subject-specific digital skills and those of their students
<b>School in Society</b>	Have insight into how digital developments influence the world and society Ensure that students are prepared to participate in the future labour market and become active participants in a global, digital and democratic society
<b>Ethics</b>	Have insight into legislation and ethical concerns Contribute to the students' development of digital <i>bildung</i>
<b>Pedagogy and Subject Didactics</b>	Can practice the profession in a digitally infused environment through planning, implementing and evaluating their teaching Possess pedagogical and subject didactic knowledge to foster the individual student's learning and development in a digital environment
<b>Leadership of Learning Processes</b>	Are classroom leaders in technology-rich environments and understand how this challenges and changes the teacher role Facilitate and organise teaching and learning both for groups of learners and individual students
<b>Interaction and Communication</b>	Use digital communication channels for information, collaboration, and knowledge sharing across time and space Can participate in digital arenas for their learning and development
<b>Change and Development</b>	Are aware that the development of a teacher's PDC is a lifelong, dynamic, situational and flexible learning process Can improve and adapt practices based on research and development Can independently drive their professional development and contribute to a shared culture around learning in a digital environment, in the teacher's professional community Can develop local curricula and steering documents

**Table 1.** Summary of the Norwegian PDC framework competence areas created by the researchers.

The PDC framework has been anchored in national plans and academic regulations for teacher education in Norway; it is employed for research purposes (e.g. Hjukse, Aagaard, Bueie, Moser, & Vika, 2020; Tømte, Wollscheid, Bugge & Vennerød-Diesen, 2018) and used as a guiding document for teachers' professional development (Hjukse et al., 2020). Therefore, it was chosen as a main frame of reference for the data analysis in this study.

To summarise, different PDC frameworks demonstrate several similarities. For example, they include the demand for teachers to possess pedagogical and technological skills and competencies to interact with technology and integrate it into their teaching. However, recently introduced frameworks focus on the agentic capacity of teachers as competent digital practitioners, in addition to their pedagogical and technological competencies.

## **2.2. Dimensions of agency**

Early understandings of human agency from a socio-cognitive perspective conceptualise agency as humans' ability to influence their functioning because of their ability to self-organise, self-regulate, self-reflect and be proactive (Bandura, 2006; Deci & Ryan, 1995). However, agency cannot be adequately theorised as an individual attribute; the sociocultural contexts in which agency is enacted must be considered (Rajala, Martin, & Kumpulainen, 2016). Agency is closely related to autonomy and power relations in human learning activities and can be understood as "the opportunity, will and skill of people to act upon, influence as well as transform activities and circumstances

*in their lives*” (Rajala et al., 2016, p. 1). Such an understanding resonates with Mäkitalo’s (2016) conceptualisation of agency as “*the capacity of humans to distance themselves from their immediate surroundings*”, which “*implies recognition of the possibility to intervene in, and transform the meaning of, situated activities*” (p. 64).

The emphasis on the active engagement of agentic humans and their interactions with the world indicates the development of agency as a process that unfolds through dialectic transformations (Engeness, 2019; Stetsenko, 2017). These transformations occur when teachers initiate their active participation in practices while making their meaningful contributions to these practices. Hopwood (2021) emphasises the importance of these individual contributions to the community in order to reach a new status quo. In doing so, teachers transform practices and themselves.

When applied to teacher engagement with digital technology, the notion of TDA has been introduced (Brevik et al., 2019; Haapasaari, Engeström, & Kerosuo, 2016; Sannino & Engeström, 2016), implying the competence to take initiatives and transform practices by selecting relevant digital tools. TDA arises when teachers are placed in demanding situations involving challenges or conflicts of motives, creating the desire or need to break out of the situation (Aagaard & Lund, 2019). In many ways, teaching in contemporary classrooms involves demanding situations where teachers aim to foster the development of their students’ conceptual understanding via interactions with appropriate mediational tools, including digital tools. Such demands drive teachers’ need to develop digital agency as active, conscious users of digital technology to enhance their PDC. One of the ways this can be done is through CPD.

### **2.3. Teachers’ Continuing Professional Development**

The traditional top-down approach to facilitating teachers’ CPD has been to engage them in formal courses offered by teacher educators or school authorities (Butler, Lauscher, Jarvis-Selinger, & Beckingham, 2004; Kennedy, 2005). This approach has also been used for the development of teachers’ PDC (OECD, 2019; Tømte, Kårstein, & Olsen, 2013). However, top-down professional development has not always been successful or appreciated by teachers since it either positions them as passive recipients of knowledge or because it lacks connection to the teachers’ classroom context (Kennedy, 2005). Transferring and resituating the presented knowledge to the relevant context may also be complicated and time consuming (Eraut, 2004), placing a great deal of pressure on the teachers. Moreover, top-down approaches may not support the necessary change in educational cultures to foster new digital practices (Langset, Jacobsen, & Haugbakken, 2018).

Researchers have pointed out that CPD must build on teachers’ knowledge, beliefs, perceived needs and existing classroom practices (McCormick et al., 2008; Moon, Passmore, Reiser, & Michaels, 2014; Opfer & Pedder, 2011). Teachers prefer professional development involving collaborative learning with colleagues, including opportunities to apply new ideas and knowledge in their classrooms and focussing on innovation (OECD, 2019). Carpenter and Linton (2016) concluded that informal arenas can provide valuable opportunities for CPD and enhance teachers’ motivation to exchange ideas about innovations in teaching and learning. Teachers appreciate “unconferences”, which are voluntary learning events for teachers to share ideas about teaching practices with fellow teachers, as informal, bottom-up professional development (Boule, 2011; Carpenter & Linton, 2016).

TeachMeets resemble unconferences, representing a bottom-up model of CPD to enhance teachers’ digital competence (Amond et al., 2018; Walsh et al., 2011). Walsh and colleagues (2011) argued that when teachers share and reflect on the pedagogical approaches used in their teaching practices with digital technology, they become “*empowered and motivated because they are recognized as having expertise and not needing to “be*

*developed*” by outside “*experts*” (p. 78). Amond et al. (2018) reported that teachers consider TeachMeets to be valuable professional development arenas that provide the freedom and autonomy to share professional knowledge with colleagues. Thus, TeachMeets may not only contribute to fostering teachers’ PDC but also nurture their agentic capacity as digitally competent teachers.

### 3. METHODS

This study adopts a qualitative approach (Creswell & Creswell, 2018) using two sources of data: responses from open-ended questionnaires ( $n=36$ ) and five in-depth interviews.

#### 3.1. Participants and setting

The participants were 41 teachers from different schools and school levels in Norway who had participated in at least one TeachMeets. They were recruited at a TeachMeets hosted by the Norwegian Society of ICT in Education (NPeD) in November 2018<sup>2</sup> and a TeachMeets hosted by the Østfold University College (ØUC) in March 2019. Although TeachMeets may be organised differently (Amond et al., 2018), both the NPeD and ØUC TeachMeets exhibited several key characteristics (Bennett, 2012). Importantly, they both focussed specifically on teaching and learning with ICT. The TeachMeets were held after work hours at venues suitable for presentations and informal mingling, and the teachers’ participation was voluntary. Approximately 60 teachers participated at each event. Several teachers gave two- or five-minute presentations concerning ideas, tools or best teaching practices using digital technology. The TeachMeets event was led by hosts who randomly picked names of the volunteer teachers, using a digital name picker. Two teacher presentation sessions (45 minutes each) were conducted, and a long break between the sessions allowed the teachers to mingle. Figure 1 illustrates the ØUC TeachMeets.



Figure 1. Photos from the ØUC TeachMeets.

#### 3.2. Participants and data collection

The data from the questionnaire and the in-depth interviews were collected separately and in several successive steps. In the first step, all of the approximately 120 teachers attending the TeachMeets were invited to register their email using a QR code; 45 participants did so. Nine days after the ØUC TeachMeets (i.e., four months after the

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<sup>2</sup> <https://www.settdagene.com/no/>

NPed TeachMeets), an online questionnaire link was sent to the registered emails. The questionnaire included 10 closed questions about the teachers' background and experience with TeachMeets and 10 open-ended questions that invited the teachers to reflect on different aspects of, and their experiences with, participating in TeachMeets and how TeachMeets affected the development of their PDC. The teachers could agree to be contacted for further in-depth interviews. Forty-one respondents answered the questionnaire and 19 agreed to be interviewed. To answer the study's RQs (see section 1), we selected three open-ended questions for further examination:

- Q1. Why did you participate in TeachMeets?
- Q2. How did you experience participating in TeachMeets regarding the development of your PDC?
- Q3. How has participating in TeachMeets affected your teaching practice?

To provide further evidence about the teachers' experiences, we conducted in-depth interviews. We randomly selected five of the 19 teachers who agreed to be interviewed. In the interviews, we used the questions selected from the questionnaire (see above) since we wanted the informants to reflect and elaborate on these in detail. To avoid analysing their answers twice, we excluded these teachers' answers from the analysis of the questionnaire, but their responses in the interviews were carefully analysed. The teachers received the questions prior to the interview and were also invited to familiarise themselves with the Norwegian PDC framework (Kelentrić et al., 2017) to provide a common frame of reference when discussing PDC. The interviews were conducted in October 2019 by the first and second author. Three of the teachers were interviewed at their schools, while two teachers were interviewed via online video meetings. We voice recorded and transcribed all interviews. Relevant quotes were translated into English.

The project was approved by the Norwegian Centre for Research Data (NSD). All participants provided informed consent. The interviewees' names are pseudonyms. Tables 2 and 3 present information about the questionnaire respondents and the interviewed teachers.



QUESTIONNAIRE RESPONDENTS			PROFESSIONAL BACKGROUND	
Number of Respondents	Gender	Age	School Level	School Subject <sup>3</sup>
36	Male: 27% Female: 73%	Under 25=2% 25–40=39% 41–55=55% Over 55=4%	Lower Primary=27% Upper Primary=20% Lower Secondary=16% Upper Secondary=16% Teacher Educator=10% Other=12%	Norwegian=51% Mathematics=55% Social Sciences=43% English=39% Natural Sciences=39% Religious and Ethical Education=33% Physical Education=25% Music=16% Art and Crafts=12% Home Economics=10% Foreign Languages=8%

**Table 2.** Overview of questionnaire respondents.

TEACHER PSEUDONYM	SCHOOL LEVEL	SCHOOL SUBJECTS	AGE	LENGTH OF INTERVIEW
John	Upper Primary	Norwegian Mathematics Natural Sciences Social sciences	39	30:22
Maria	Upper Secondary	Vocational Subjects	48	21:24
Jane	Lower Secondary	French Physical Education Home Economics	34	25:56
Susan	Lower Primary	Norwegian Mathematics Special Needs	50	18:02
Sara	Lower Primary	All Subjects	35	11:39
<b>Total Length of Interviews</b>				<b>108 min 23 sec</b>

**Table 3.** Overview of interviewees.

### **3.3. Analytical strategy**

After collecting the data, both the open-ended questionnaire answers and the interview responses were imported to NVivo 12 for further analysis. The analysis was conducted collaboratively by the three authors, who are senior

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3 Note: Several of the respondents teach more than one subject.

and younger researchers in the field: an assistant professor, a PhD student and a professor. To adhere to the qualitative paradigm of this study, we used thematic analysis inspired by Braun and Clarke (2006). Themes were developed by the researchers through interpretive and iterative processes, via the following steps: First, we familiarised ourselves with the data through transcription and then by re-reading the questionnaire answers and interview transcripts. Second, we coded the open-ended questionnaire answers by following an inductive approach (Castleberry & Nolen, 2018). To name the codes, we used descriptive labels that directly described or were taken from the comments. For example, if an informant commented “Inspiring, I got some new ideas that I can use in my lessons”, we used the labels *Inspiration* and *Ideas*. After analysing the open-ended answers, we analysed the interviews in the same way. We analysed the data looking for “*patterns of shared meaning, cohering around a central concept*” (Braun & Clarke 2020, p.331) to reflect teachers’ experience of participating in TeachMeets. We grouped related codes, developed initial themes and named them. For example, the codes *Inspiration* and *Tips* were grouped into the theme *Inspiring tips and ideas*. After the themes were named, we re-read the data and discussed the themes before further revising and renaming them. Through this analytical process we developed five themes which we describe in section 4. Finally, to discuss the research questions, we compared the themes with the areas in the Norwegian PDC framework to explore what teachers say about fostering their PDC and nurturing TDA by participating in TeachMeets.

## 4. FINDINGS

The thematic analysis of the participants’ responses to Q1, Q2 and Q3 and the interviews identified five overall themes:

- 1) Inspiring tips and ideas
- 2) Professional learning network
- 3) Positive atmosphere
- 4) Limited impact
- 5) Reflecting on development

Below, we examine the nature of the teachers’ experiences in detail and illustrate them with selected quotations.

### 4.1. Inspiring tips and ideas

Many teachers (both in the questionnaire answers and interviews) described participating in TeachMeets as useful because they received tips, ideas and were inspired about how to use digital tools in their teaching practices. This is illustrated in the following examples:

[I] get practical and relevant tips concerning how [digital tools] can be integrated in teaching, and how they can be used. (Questionnaire answer)

“We get insight into how other teachers work and which digital tools they use; we develop our curiosity and motivation to start using these digital tools, and in the long run, improve our PDC”. (Interview - John)

The responses indicated that the teachers appreciated TeachMeets because they were introduced to relevant and concrete tips, ideas and methods to integrate digital tools into their classroom practices. Moreover, insights into

other teachers' digital practices were valued as motivating and inspiring because of their transferability and relevance to teachers' work.

Some teachers pointed out that they were updated about new digital practices or educational technology available on the market:

*"TeachMeets has helped me a lot because it is so difficult to know about everything, all the new things. I feel that TeachMeets are a great way to be updated"*. (Jane)

This theme was one of the most ubiquitous across participants' reflections on TeachMeets.

## **4.2. Professional learning network**

The teachers indicated that participating in TeachMeets helped creating professional networks with colleagues:

*"It's a good opportunity to extend your own professional learning network"*. (Questionnaire answer)

In the interviews teachers further explained how building networks, but also developing a sharing culture among fellow teachers was important, as illustrated in this example:

*"You build a network. Suddenly, there are many people from your area whom you have never seen before. And they have the same occupation as you and then... then it becomes an arena for getting to know new people, create networks, share experiences and have a sharing culture"*. (Interview - Jane)

Some of the questionnaire respondents also explained how they connected with people through social media, thus extending their professional development beyond the TeachMeets itself:

*"In addition, I build networks both in person and digitally – [I] find new people to follow on Twitter, which can also contribute to developing my PDC after the TeachMeets is over"*. (Questionnaire answer)

In all, the teachers stated that TeachMeets were unique and important arenas for their professional development, building a sense of community, socialising, and learning from colleagues. They appreciated meeting teachers with the same interest in gaining insights into the opportunities provided by using digital tools in classrooms, and they developed their digital competence by sharing knowledge.

## **4.3. Positive atmosphere**

Several teachers reflected on the informal and positive atmosphere at TeachMeets:

*"The atmosphere was relaxed and it was so much fun meeting other teachers"*. (Questionnaire answer)

*"I appreciate new ideas and meeting colleagues in an informal yet work-related way"*. (Questionnaire answer)

In the interviews teachers elaborated how the informal atmosphere made them feel comfortable about both sharing and learning. For example, Jane explained how TeachMeets made her feel knowledgeable at her own level:

*“I think it’s a real advantage that it’s done in such an informal way. It’s less scary, you can talk at your own level. You don’t have to have a PhD in Kahoot, you know? I think that’s important. All of a sudden you can discuss important topics and open up to things you might wonder about”.* (Interview - Jane)

Susan also commented on how the positive atmosphere enabled her to learn in an enjoyable way:

*“It was nice! Kind of unpretentious, but educational at the same time. I often experience that if I’m attending a course or a lecture, I end up sitting [passively] for hours. But now, I had a good time. [...] I mostly remember the good feelings and that you could be yourself and people were having a good time, not worrying about making a fool of themselves [...] yeah, positive atmosphere”.* (Interview - Susan)

To sum up, teachers experienced participating in TeachMeets as enjoyable, exciting, and engaging. The informal format of the presentations and the opportunity to talk to the presenters and other participants during session breaks were mentioned as valuable and motivating.

#### **4.4. Limited impact**

Although most teachers reflected a positive attitude, some described limitations and how TeachMeets had not contributed to developing their PDC:

*“I do not think I developed professionally through participating in TeachMeets. [...] For me, a TeachMeets is merely a social event where we exchange simple ideas about digital tools, apps and websites that can be used in educational practice”.* (Questionnaire answer)

In the interviews several teachers commented that it depended on who presented and what was being presented:

*“How participation in TeachMeets contributes to the development of my PDC depends on what is being presented”.* (Interview - Sara)

Not knowing what would be presented beforehand was a possible limitation as some presentations contained information and ideas that were already known or irrelevant to their work. It was also pointed out that the length of the presentations did not allow for longer discussions.

Some reflected that participating in TeachMeets had not affected their teaching practices either because they had not used any of the tips or ideas or because the input was seen as too random:

*“Hasn’t [had an impact] yet, but I think it will if I attend more TeachMeets”.* (Questionnaire answer)

*“How we use teaching methods needs to be more systematic, not just involve single examples at single events”.* (Questionnaire answer)

In the interviews, Jane further explained how she experienced TeachMeets as valuable CPD events, but she also emphasised that they had to be part of a greater context or else they would have limited impact:

*“If I only had TeachMeets, I wouldn’t have come as far as I have. But everything is connected. We’ve had [school-based development projects], we’ve been to conferences and I’m passionate about using digital tools. So when it comes to my development, several elements go together. But at least TeachMeets has its place as an important part of my development”.* (Interview - Jane)

The responses indicated that because of the limitations mentioned above, simply participating in TeachMeets may not be sufficient to have a considerable impact on the participants’ teaching.

#### **4.5. Reflecting on development**

The teachers stated that TeachMeets initiated contemplation about their teaching with digital tools and how they could change and develop their practices:

*“TeachMeets presentations can show me ways to think about, organise and execute a learning activity, which makes me reflect on my practice and how I work”.* (Questionnaire answer)

*“When watching and listening [to others], you get inspired to change your practice, or you want to develop and learn more”.* (Maria)

Respondents explained that attending TeachMeets provided deeper insights into their teaching practices. They were inspired to change their existing practices and motivated to learn and find out more about the digital tools and their use in classrooms.

*“You gain insights into the digital development, because so many knowledgeable people participate. And that way I also get to develop my own PDC, because I have to take in what I learn and reflect on how I could and should use it”.* (Questionnaire answer)

To sum up the overall findings, the teachers reported obtaining valuable ideas and tips for teaching with digital tools, initiating reflections on their teaching practices. They were inspired to engage in further learning about the introduced digital tools. The teachers enjoyed a sharing culture, met likeminded practitioners, and built networks. However, they also mentioned limitations, such as short presentations. Some teachers noted that participating in TeachMeets did not affect their teaching practices.

## **5. DISCUSSION**

This study focussed on examining the teachers’ experiences in participating in TeachMeets by addressing two RQs:

- RQ1: What do teachers say about fostering their PDC by participating in TeachMeets?
- RQ2: How do TeachMeets contribute to nurturing teachers’ TDA?

The overall findings indicated that the teachers saw TeachMeets as valuable professional development arenas, corroborating previous research results (Amond et al., 2018; Amond et al., 2020, Walsh et al., 2011). In the next section, we discuss our findings in relation to our study's RQs.

### 5.1. Teachers' fostering of PDC by participating in TeachMeets

After developing the themes, we analysed them via the PDC framework. It became evident that individual themes coincided with several framework areas. Table 4 presents themes and their descriptions and relations to the Norwegian PDC framework.

	THEME	DESCRIPTION OF THEME	RELATED FRAMEWORK ELEMENTS
1	<b>Inspiring tips and ideas</b>	<ul style="list-style-type: none"> <li>- New ideas and tips about digital tools and methods to use in classroom</li> <li>- Insight into other teachers' practices</li> <li>- Inspiration to integrate tools and methods into their practice</li> <li>- Up-to-date information on new digital technology and developments</li> <li>- Easier to find an overview of the digital tools available</li> </ul>	Subjects and basic skills  Pedagogy and subject didactics  Leadership of learning processes
2	<b>Professional learning network</b>	<ul style="list-style-type: none"> <li>- Sharing culture and sense of professional community</li> <li>- Creating networks</li> </ul>	Change and development
3	<b>Positive atmosphere</b>	<ul style="list-style-type: none"> <li>- Socialising and learning in an informal setting and positive atmosphere</li> </ul>	Not related
4	<b>Limited impact</b>	<ul style="list-style-type: none"> <li>- Short presentations give little time for in-depth knowledge and discussions</li> <li>- Learning outcome depends on teachers' prior knowledge and what is being presented; no time to implement tools or practices yet</li> <li>- No systematic training, just a single event</li> </ul>	Not related
5	<b>Reflecting on development</b>	<ul style="list-style-type: none"> <li>- Premises for teachers reflecting on their teaching practices and CPD</li> </ul>	Change and development

**Table 4.** Themes and their descriptions and framework relation.

The most frequently coded theme, *Inspiring tips and ideas*, correlates to three areas — *Subject and basic skills*, *Pedagogy and subject didactics*, *Leadership of learning processes* and *Change and Development* indicating connections and possible overlaps within the framework (Tømte, Wollscheid, Bugge, & Vennerød-Diesen, 2019). The teachers' responses reflect that through participation in TeachMeets, they may develop an understanding of how digital technology influences and expands school subjects and affects their teaching practices in digitally infused environments. Participating in TeachMeets offered teachers examples of useful teaching practices to facilitate teaching and learning with technology. Hence, this theme also reflects the TPACK model (Mishra & Koehler, 2006) because it interweaves its three key pillars: technology, pedagogy and content. The ideas and tips the teachers received were not simply about specific digital tools isolated from the subject content or pedagogy.

On the contrary, the theme reflects how teachers might develop a more nuanced understanding of the complex relationships between technology, subject content, and pedagogy (Mishra & Koehler, 2006).

Two themes, *Professional learning network* and *Reflecting on development*, correlated to the framework area *Change and development*. However, the findings indicated that the teachers experienced developing only some aspects related to this area, such as the awareness that developing PDC was a lifelong learning process and that teachers must be able to engage in continuously updating their PDC. Such reflections may also indicate teachers' awareness of the agentic (TDA) aspect related to the development of their PDC.

Two identified themes did not correlate to the framework — *Positive atmosphere* and *Limited impact*. Both mostly referred to positive or negative aspects of the events' format. Thus, *Limited impact* might indicate that TeachMeets could not be stand-alone CPD arenas and other professional development measures would be needed to enhance teachers' PDC.

None of the themes that emerged in the analysis correlated to the three areas of the PDC framework of *School in society*, *Interaction and communication* and *Ethics*. This may be because the teachers attended TeachMeets that lacked presentations focussing on these aspects. However, it may also point to TeachMeets' limitations in terms of promoting only certain areas of the PDC framework.

To summarise, the teachers' responses indicated that they viewed TeachMeets as opportunities to develop their PDC related to the following framework areas: *Subjects and basic skills*, *Pedagogy and subject didactics*, *Leadership of learning processes* and *Change and development*. However, the teachers' responses did not reflect developing their PDC in *School in society*, *Interaction and communication* or *Ethics*.

## **5.2. TeachMeets as arenas to nurture teachers' transformative digital agency**

The theme "*Professional learning network indicated that TeachMeets may nurture teachers' TDA by facilitating their active engagement (Engeness et al., 2020) and allowing them to take the initiative in both participating in and making meaningful contributions (Hopwood, 2021) to the development and transformation of their own and their colleagues*" digital practices. By sharing ideas about useful digital tools, the teachers reported being inspired to adapt these ideas to their practices. Corroborating the findings reported by Amond et al. (2018), Amond et al. (2020) and Walsh et al. (2011), the teachers in this study experienced TeachMeets as arenas that allowed interactions with their fellow professionals, where they were the experts, with the freedom and the autonomy to share and learn from peers. Thus, TeachMeets may create positive premises to facilitate the development of teachers' TDA by providing arenas and opportunities for teachers to share ideas about using digital tools, which might be adopted and implemented in their teaching practices. The teachers' responses also indicated that participation in TeachMeets might contribute to developing a shared culture among teachers to exchange ideas about learning and teaching in digital environments, hence enhancing their professionalism (OECD, 2019) and TDA.

Closely related to *Professional learning network* is the theme *Positive atmosphere*. The friendly and informal atmosphere in TeachMeets motivated the teachers to be involved in the digital culture (Ilomäki et al., 2016) and promoted their positive attitude and openness (McGarr & McDonagh, 2019) to engage with new technology. Thus, the positive and friendly environment provided an opportunity and facilitated the teachers' active engagement and willingness to learn and interact with fellow teachers.

The theme *Reflecting on development* shows that teachers experience TeachMeets as valuable arenas to develop their TDA. By initiating reflections on their teaching practices, the teachers may have enhanced their agentic

capacity to redesign and transform their teaching practices with digital tools (Lund et al., 2019). The teachers' responses indicated that TeachMeets may foster their reflections and awareness to select and use relevant digital tools and transform their teaching practices (Brevik et al., 2019). In this way, their TDA might be enhanced. Nonetheless, some teachers emphasised their belief that TeachMeets had little or no impact on their teaching practices because they had only participated in a few TeachMeets or the TeachMeets were "stand-alone" events. This suggests that developing teachers' TDA is a complex task that cannot be resolved by teachers' participating in TeachMeets alone.

To conclude, the teachers indicated that they experienced TeachMeets as relevant and valuable professional development events that could promote the development of their PDC, in particular regarding the framework areas which focus on pedagogical and subject-related use of technology in teaching and learning, similar to the key elements of the TPACK model. TeachMeets may nurture teachers' TDA as active and conscious users of digital technology to enhance their pedagogy and students' learning.

However, the findings also indicate that a TeachMeets should be considered *one* possible arena to develop teachers' PDC, in addition to others.

## 6. IMPLICATIONS

This study has several implications concerning teachers' continuing development of PDC and TDA. First, the findings reveal that TeachMeets may be valuable arenas to develop at least certain aspects of teachers' PDC. Four of the five themes made visible how teachers valued and appreciated taking part in, and learning from, this experience. Therefore, school authorities, headteachers and teacher educators may consider directing their efforts towards creating informal arenas, such as TeachMeets for developing teachers' PDC. At the same time, the limited impact some teachers reported, indicate that TeachMeets cannot be stand-alone CPD events. Hence, the affordances of TeachMeets could be combined with other types of professional development measures to complement and support teachers' capacity to implement technology in their pedagogical and didactical practices. Such an approach aligns with Opfer & Pedder's (2011) belief that "*teacher learning must be conceptualized as a complex system rather than as an event*" (p. 378). TeachMeets could for example be combined with organised training and workshops over a longer period of time, collaborative activities that are integrated in the teachers' daily work and offer them the possibility to engage directly with their practice (Opfer & Pedder, 2011).

Second, the findings suggest that by participating in TeachMeets, teachers may develop their PDC to transform their teaching practices, and thus, themselves. By engaging in these transformations, teachers reposition themselves in knowledge practices and enhance their TDA. Therefore, TeachMeets may create useful premises to enhance the development of teachers as independent agentic practitioners who can transform their teaching by interacting with the rapidly evolving digital technology.

Finally, the findings may indicate the need to revise the Norwegian PDC framework to further explicate the agentic aspects of teachers' PDC (Brevik et al., 2019; Engeness et al., 2020). Although our findings reflect certain agentic aspects, such as teachers' ability to drive their own development and contribute to a shared culture, the PDC framework does not emphasise the importance of teachers' motivation (Ilomäki et al., 2016), positive attitude (McGarr & McDonagh, 2019) or willingness (Rajala, 2016) to develop their PDC. The dynamic, evolving nature of digital technology and teachers' PDC is inherently connected with the development of their digital agency as conscious and motivated practitioners who are willing to adopt technological advances in their teaching practices.



Limitations of this study are especially connected to the participants. The number of participants is low ( $n=41$ ); hence, the results cannot be generalised. Moreover, since the participants actively signed up for the study, there is a risk that mostly teachers with a positive attitude towards TeachMeets participated. This might have skewed the data. Another limitation is that the analyses are based only on the teachers' reflections about participating in TeachMeets. Further research is needed to examine how teachers develop their PDC and digital agency over time by engaging in TeachMeets and how teachers' participation in TeachMeets influences their classroom practices.

## 7. REFERENCES

Aagaard, T., & Lund, A. (2019). *Digital agency in higher education: Transforming teaching and learning*. New York, NY, US: Routledge.

Amond, M., Johnston, K., & Millwood, R. (2018, March). *Self-organised professional development – the TeachMeets phenomenon*. Paper presented at the 12th International Technology, Education and Development Conference, Valencia, Spain.

Amond, M., Johnston, K., Millwood, R., & McIntosh, E. (2020). A decade of TeachMeets: An interpretive phenomenological analysis of participants' tales of impact. In *6th International Conference on Higher Education Advances (HEAd'20), 2020, Valencia, Spain* (pp. 483–491). doi: [10.4995/HEAd20.2020.11089](https://doi.org/10.4995/HEAd20.2020.11089)

Arstorp, A.-T. (2019). Hva er lærerens profesjonsfaglige digitale kompetanse? [What is teachers' professional digital competence?]. In T. A. Wølner, K. Kverndokken, M. Moe, & H. H. Siljan (Eds.), *101 digitale grep - en didaktikk for profesjonsfaglig digital kompetanse* (pp. 17–32). Bergen, NO: Fagbokforlaget.

Bandura, A. (2006). Toward a psychology of human agency. *Perspectives on Psychological Science*, *1*(2), 164–180. doi: [10.1111%2Fj.1745-6916.2006.00011.x](https://doi.org/10.1111%2Fj.1745-6916.2006.00011.x)

Bennett, L. (2012). TeachMeets: Guerilla CPD. *Educational Developments*, *13*(3). Retrieved from <https://www.seda.ac.uk/seda-publishing/educational-developments/past-issues-2000-onwards/educational-developments-issue-13-3-2012/>

Boule, M. (2011). *Mob rule learning: Camps, unconferences, and trashing the talking head*. New York, NY, US: Information Today.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77–101. doi: [10.1191/1478088706qp063oa](https://doi.org/10.1191/1478088706qp063oa)

Braun, V., & Clarke, V. (2020). One size fits all? What counts as quality practice in (reflexive) thematic analysis? *Qualitative research in psychology*, 1-25. doi: [10.1080/14780887.2020.1769238](https://doi.org/10.1080/14780887.2020.1769238)

Brevik, L. M., Gudmundsdottir, G. B., Lund, A., & Strømme, T. A. (2019). Transformative agency in teacher education: Fostering professional digital competence. *Teaching and Teacher Education*, *86*, 102875. doi: [10.1016/j.tate.2019.07.005](https://doi.org/10.1016/j.tate.2019.07.005)

Butler, D. L., Lauscher, H. N., Jarvis-Selinger, S., & Beckingham, B. (2004). Collaboration and self-regulation in teachers' professional development. *Teaching and Teacher Education*, 20(5), 435–455.

[doi:10.1016/j.tate.2004.04.003](https://doi.org/10.1016/j.tate.2004.04.003)

Carpenter, J. P., & Linton, J. N. (2016). Edcamp unconferences: Educators' perspectives on an untraditional professional learning experience. *Teaching and Teacher Education*, 57, 97–108. [doi:10.1016/j.tate.2016.03.004](https://doi.org/10.1016/j.tate.2016.03.004)

Castleberry, A., & Nolen, A. (2018). Thematic analysis of qualitative research data: Is it as easy as it sounds? *Currents in Pharmacy Teaching and Learning*, 10(6), 807–815. [doi: 10.1016/j.cptl.2018.03.019](https://doi.org/10.1016/j.cptl.2018.03.019)

Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative & mixed methods approaches* (5th ed.). Los Angeles, CA, US: Sage.

Deci, E. L., & Ryan, R. M. (1995). Human autonomy. In M. H. Kernis (Ed.), *Efficacy, agency, and self-esteem*, 31–49. Boston, MA, US: Springer US.

De Rossi, M., & Trevisan, O. (2018). Technological pedagogical content knowledge in the literature: How TPACK is defined and implemented in initial teacher education. *Italian Journal of Educational Technology*, 26(1), 7–23. [doi: 10.17471/2499-4324/988](https://doi.org/10.17471/2499-4324/988)

Engeness, I. (2019). Teacher facilitating of group learning in science with digital technology and insights into students' agency in learning to learn. *Research in Science & Technological Education*, 38(1), 42-62. [doi: 10.1080/02635143.2019.1576604](https://doi.org/10.1080/02635143.2019.1576604)

Engeness, I., Nohr, M., Singh, A. B., & Mørch, A. (2020). Use of videos in the Information and Communication Technology Massive Open Online Course: Insights for learning and development of transformative digital agency with pre- and in-service teachers in Norway. *Policy Futures in Education*, 18(4), 497-516. [doi: 10.1177/1478210319895189](https://doi.org/10.1177/1478210319895189)

Eraut, M. (2004). Informal learning in the workplace. *Studies in Continuing Education*, 26(2), 247-273. [doi: 10.1080/158037042000225245](https://doi.org/10.1080/158037042000225245)

Fjørtoft, S. O., Thun, S., & Buvik, M. P. (2019). *Monitor 2019. En deskriptiv kartlegging av digital tilstand i norsk skoler og barnehager* [A descriptive mapping of the digital state of Norwegian schools and kindergartens] (2019: 00877). SINTEF. Retrieved from [https://www.udir.no/contentassets/92b2822fa64e4759b4372d67bcc8bc61/monitor-2019-sluttrapport\\_sintef.pdf](https://www.udir.no/contentassets/92b2822fa64e4759b4372d67bcc8bc61/monitor-2019-sluttrapport_sintef.pdf)

Haapasaari, A., Engeström, Y., & Kerosuo, H. (2016). The emergence of learners' transformative agency in a Change Laboratory intervention. *Journal of Education and Work*, 29(2), 232–262. [doi: 10.1080/13639080.2014.900168](https://doi.org/10.1080/13639080.2014.900168)

Hjukse, H., Aagaard, T., Bueie, A. A., Moser, T., & Vika, K. S. (2020). Digitalisering i grunnskolelærerutdanningen: Om faglige forskjeller i arbeidet med profesjonsfaglig digital kompetanse [Digitalization in teacher education. On subject differences when working with professional digital competence]. *Acta Didactica Norden*, 14(1), 1-27. [doi:10.5617/adno.8023](https://doi.org/10.5617/adno.8023)

Hopwood, N. (2021). From response and adaptation to learning, agency and contribution: making the theory of practice architectures dangerous. *Journal of Praxis in Higher Education*, 3(1), 78-94. doi:10.47989/kpdc114

Illomäki, L., Paavola, S., Lakkala, M., & Kantosalo, A. (2016). Digital competence—An emergent boundary concept for policy and educational research. *Education and Information Technologies*, 21(3), 655–679. doi:10.1007/s10639-014-9346-4

Kelentrić, M., Helland, K., & Arstorp, A. (2017). *Professional digital competence framework for teachers*. Retrieved from [https://www.udir.no/globalassets/filer/in-english/pfdk\\_framework\\_en\\_low2.pdf](https://www.udir.no/globalassets/filer/in-english/pfdk_framework_en_low2.pdf)

Kennedy, A. (2005). Models of continuing professional development: A framework for analysis. *Journal of In-Service Education*, 31(2), 235–250.

Langset, I. D., Jacobsen, D. Y., & Haugbakken, H. (2018). Digital professional development: Towards a collaborative learning approach for taking higher education into the digitalized age. *Nordic Journal of Digital Literacy*, 13(01), 24–39. doi: 10.18261/issn.1891-943x-2018-01-03

Lund, A., Furberg, A., & Gudmundsdottir, G. B. (2019). Expanding and embedding digital literacies: Transformative agency in education. *Media and Communication*, 7(2), 47–58. doi:10.17645/mac.v7i2.1880

Mäkitalo, Å. (2016). On the notion of agency in studies of interaction and learning. *Learning, Culture and Social Interaction*, 10, 64–67. doi: 10.1016/j.lcsi.2016.07.003

McCormick, R., Banks, F., Morgan, B., Opfer, D., Pedder, D., Storey, A., & Wolfenden, F. (2008). *Schools and continuing professional development (CPD) in England—State of the nation research project (T34718): Literature review report*. London, UK: Training and Development Agency for Schools.

McGarr, O., & McDonagh, A. (2019). Digital competence in Teacher Education Output 1 of the Erasmus+ funded Developing Student Teachers' Digital Competence (DICTE) project. Retrieved from <https://dicte.oslomet.no/>

Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record*, 108(6), 1017–1054. doi: 10.1111/j.1467-9620.2006.00684.x

Moon, J., Passmore, C., Reiser, B. J., & Michaels, S. (2014). Beyond comparisons of online versus face-to-face PD: Commentary in response to Fishman et al., Comparing the impact of online and face-to-face professional development in the context of curriculum implementation. *Journal of Teacher Education*, 65(2), 172–176. doi: 10.1177/0022487113511497

National Conference on using ICT in Teaching and Learning. (2013). NKUL 13. Retrieved from <https://www.nkul.no/wp-content/uploads/nkul-2013-program.pdf>

Norwegian Directorate of Education and Research. (2005). Kunnskapsløftet - reformen i grunnskole og videregående opplæring [The Knowledge Promotion Reform in primary and secondary school]. Retrieved from [https://www.regjeringen.no/globalassets/upload/kilde/ufd/prm/2005/0081/ddd/pdfv/256458-kunnskap\\_bokmaal\\_low.pdf](https://www.regjeringen.no/globalassets/upload/kilde/ufd/prm/2005/0081/ddd/pdfv/256458-kunnskap_bokmaal_low.pdf)

- Opfer, V. D., & Pedder, D. (2011). Conceptualizing teacher professional learning. *Review of Educational Research, 81*(3), 376–407. doi: 10.3102/0034654311413609
- Organisation for Economic Co-operation and Development. (2019). *How teachers learn. An OECD perspective*. Retrieved from [https://issuu.com/oecd.publishing/docs/how\\_teachers\\_learn\\_-\\_an\\_oecd\\_perspe/20](https://issuu.com/oecd.publishing/docs/how_teachers_learn_-_an_oecd_perspe/20)
- Rajala, A., Martin, J., & Kumpulainen, K. (2016). Agency and learning: Researching agency in educational interactions. *Learning, Culture and Social Interaction, 10*, 1–3. doi: 10.1016/j.lcsi.2016.07.001
- Redecker, C., & Punie, Y. E. (2017). *European Framework for the Digital Competence of Educators: DigCompEdu*. (JRC107466). Publications Office of the European Union. Retrieved from <http://publications.jrc.ec.europa.eu/repository/handle/JRC107466>
- Sannino, A., & Engeström, Y. (2016). Relational agency, double stimulation and the object of activity: An intervention study in a primary school. In A. Edwards (Ed.) *Working relationally in and across practices: Cultural-historical approaches to collaboration* (pp. 58–77). New York, NY, US: Cambridge University Press.
- Stetsenko, A. (2017). *The transformative mind: Expanding Vygotsky's approach to development and education*. New York, NY, US: Cambridge University Press.
- Thronsdén, I., Carlsten, T. C., & Björnsson, J. K. (2018). *TALIS 2018 Første funn fra ungdomstrinnet* [TALIS 2018 First findings from lower secondary school]. Retrieved from <https://www.udir.no/contentassets/cee13d13f3c14e029320fbf10833925e/talis2018-rapport..pdf>
- Tømte, C., Kårstein, A., & Olsen, D. S. (2013). *IKT i lærerutdanningen: På vei mot profesjonsfaglig digital kompetanse?* [ICT in teacher education: Moving towards professional digital competence?] (8272189194). Retrieved from <https://www.nifu.no/publications/1027114/>
- Tømte, C., Wollscheid, S., Bugge, M., & Vennerød-Diesen, F. F. (2018). *Digital læring i askerskolen: Midtveisrapport fra følgeforskning* [Digital learning in the Asker School: A mid-term report] (2018:29). Retrieved from <https://nifu.brage.unit.no/nifu-xmlui/handle/11250/2569067>
- Tømte, C., Wollscheid, S., Bugge, M., & Vennerød-Diesen, F. F. (2019). *Digital læring i askerskolen. Sluttrapport fra følgeforskning* [Digital learning in the Asker School. Final report] (2019:27). Retrieved from <https://nifu.brage.unit.no/nifu-xmlui/handle/11250/2631639>
- Walsh, C. S., Bradshaw, P., & Twining, P. (2011). *E-learning through collaborative teacher professional development in primary and secondary schools in England*. Paper presented at the IADIS International Conference e-Learning.