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Primary teachers' professional learning during a COVID-19 school lockdown

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ABSTRACT

Background: The COVID-19 crisis forced education providers around the world to cancel contact teaching in schools as part of measures to limit contact between people and to slow-down the spread of the virus. The rapid and unexpected transition to distance teaching in the beginning of the pandemic posed an unprecedented challenge for teachers and placed a significant demand on their informal professional learning. This study focused on Finnish primary teachers' professional learning domains and activities during the first weeks of Finland's COVID-19 school lockdown.

Purpose: The aim was to understand what and how primary teachers learnt during the beginning of the distance teaching period.

Methods: Semi-structured interviews were conducted individually with 20 Finnish primary school teachers, all of whom had been delivering distance teaching from the beginning of the lockdown, during the fourth week of the distance teaching period. Two separate qualitative analyses were undertaken.

Findings: The first analysis indicated that teachers' professional learning involved more than progress in the most self-evident and apparent technological knowledge domain: learning was also firmly connected to pedagogical knowledge and coping skills. The second analysis identified the individual learning activities, such as learning by doing, experimenting and considering one's own teaching practice, and revealed three levels of collective learning activities (with a close colleague, in the school community and in larger online communities) carried out with the aim of improving distance teaching.

Conclusions: The study draws attention to primary teachers' multifaceted professional learning domains and the activities entered into during the rapid shift from contact to distance teaching. It highlights that even in emergency circumstances, teachers' individual and collective learning processes are inter-related and supplementary to each other. Educators' hard-earned understanding achieved in relation to distance teaching should be nurtured and refined to further benefit and support the profession.

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Introduction

The COVID-19 crisis forced education providers around the world to cancel face-to-face teaching in schools as part of measures to limit contact between people and to slow down the spread of coronavirus. At the peak of the crisis at the beginning of April 2020, around 1.5 billion learners worldwide were affected by school closures, accounting for more than 90% of total enrolled learners (UNESCO 2020). In Finland, schools were closed in mid-March 2020 and the restrictions continued until mid-May 2020 (Finnish Government 2020a). Only children in primary-level grades 1–3 (aged from 7 to 9) whose parents or guardians were working in sectors critical to the functioning of society had an opportunity to participate in contact teaching in school. After this two-month distance teaching period, contact teaching was reintroduced in a controlled manner and with particular attention paid to safety (Finnish Government 2020b). In the school year that ran from August 2020 to June 21, Finnish primary education was mainly organised as contact teaching (Finnish Government 2021).

The rapid and unexpected transition to a distance teaching environment at the beginning of the pandemic posed an unprecedented challenge for teachers around the world (Carrillo and Flores 2020; Kim and Asbury 2020; König, Jäger-Biela, and Glutsch 2020; Scully, Lehane, and Scully 2021). Teaching in an online environment has been acknowledged to require technological skills but also modified instructional practices compared with traditional face-to-face teaching in classrooms (e.g. Barbour 2015; Rice and Dawley 2009). The necessity of changing teaching methods when shifting to an online context may even have led some teachers to fear losing control over their teaching (Singh and Hardaker 2014). Correspondingly, during the pandemic lockdowns, teachers have described that transition to delivering distance teaching as being harmful to their professional identity and making them ‘not feel like a teacher’ (Kim and Asbury 2020, 16). Therefore, it is fair to consider that ‘the virus threw teachers straight into the deep end’ (the Trade Union of Education in Finland, 2020a [translation of the quotation provided by the authors]) and, thus, imposed a prominent requisite on teachers’ professional learning (TPL): namely, to be able to adapt teaching to an online environment with just a few days’ notice. Countries have variously reported national, sub-national and school-level support provided for teachers in their transition to distance teaching (OECD 2021). However, the rapid shift to distance teaching has, too, highlighted the significance of informal TPL – i.e. unstructured learning that does not have systematic, explicit and organised support (Hoekstra et al. 2009; Jansen In de Wal et al. 2014; Van Eekelen, Vermunt, and Boshuizen 2006).

The current study offers a contribution to the TPL literature by investigating Finnish primary teachers’ professional learning domains and activities during the first weeks of Finland’s COVID-19 school lockdown (i.e. the distance teaching period). Finnish teachers have been described as a mainstay of an education system that is highly ranked and often held to be one of the best in the world (e.g. OECD 2020a; WEF 2017). They have been characterised as having a high level of professional autonomy and a great sense of individual responsibility for the learning and wellbeing of their pupils (Mikkilä-Erdmann, Warinowski, and Iiskala 2019). During the distance teaching period, notwithstanding the generic recommendations for schools on digital learning applications and assessment (Finnish National Agency for Education, 2020a, 2020b), Finnish teachers implemented

a wide range of unique teaching and learning solutions, and thus, also directed their own learning. However, before describing our study in greater detail, we situate our work in relation to the relevant literature on TPL, and teaching and learning in distance contexts.

Background

Teachers' professional learning

In most lines of work, professionals are constantly called upon to adapt their skills and knowledge to the ever-changing environment they work in. These expectations hold for professionals in the field of education: changes in society and policies, educational reforms and innovations require teachers to keep adjusting and improving their practices throughout their career (Hoekstra et al. 2009; Jansen In de Wal et al. 2014; Solheim, Roland, and Ertesvåg 2018). This process is considered a crucial factor in improving teacher quality and teachers' impact on student learning (Kwakman 2003; Opfer and Pedder 2011). However, the term *professional development* is often restricted, referring to activities arranged for teachers, while *professional learning* typically defines a broader scope of activity and places the focus and responsibility for learning on teachers and their evolving needs (Durksen, Klassen, and Daniels 2017). We have chosen to employ the term professional learning in this paper as it aligns more fully with the conceptual underpinning of our study.

TPL is typically described as a series of complex developmental processes taking place after teachers' graduation from initial teacher education (Niemi 2015; Postholm 2012). Avalos (2011, 10) defines the TPL as a 'process, which requires cognitive and emotional involvement of teachers individually and collectively, the capacity and willingness to examine where each one stands in terms of convictions and beliefs and the perusal and enactment of appropriate alternatives for improvement or change'. TPL includes the uptake of, and active engagement in, learning opportunities that deepen and extend teachers' knowledge, teaching practices, motivation, beliefs and self-regulatory skills (Bakkenes, Vermunt, and Wubbels 2010; Richter et al. 2011). Opfer and Pedder (2011) state that TPL is about the growth of teachers' expertise that leads to changes in practices to enhance pupils' learning outcomes.

TPL activities are considered formal when they include prescribed learning frameworks, structured environments, organised events, credits or certificates, and a specified curriculum with learning goals (Jansen In de Wal et al. 2014; Richter et al. 2011). In contrast, informal professional learning which is not restricted to a certain environment and where the control of, and responsibility for, learning lies with the learner has even been described as the only option for TPL in many cases (Van Eekelen, Vermunt, and Boshuizen 2006). Even when teachers' learning is not systematically organised and supported, teachers are continuously learning by reflecting on, discussing and sharing their experiences of the everyday classroom practices and activities they undertake (Bakkenes, Vermunt, and Wubbels 2010; Czerniawski 2013; Kwakman 2003; Postholm 2012; Richter et al. 2011; Solheim, Roland, and Ertesvåg 2018; Vermunt and Endedijk 2011). However, the nature of informal workplace learning is complex and nuanced: it has been described as unintentional and even implicit, which complicates the precise definition (Tynjälä 2008).

Another typical classification of TPL includes the comparison between individual and collective activities. Teachers' individual and collective learning processes are equally important (Opfer and Pedder 2011), interrelated and supplementary to each other (Solheim, Roland, and Ertesvåg 2018). Nevertheless, collaboration with colleagues has been identified as the most influential type of TPL (e.g. Durksen, Klassen, and Daniels 2017; Kennedy 2011). According to Hargreaves (2009, 98), 'teachers can only really learn once they get outside their own classrooms and connect with other teachers'. A study by Meirink et al. (2009) reveals a certain pattern of collaborative TPL that helps teachers become more progressive in their teaching: getting an idea from a colleague, experimenting with the idea in their classroom, and then evaluating the experiment. Connecting with other teachers can nourish personal resources through observing other teachers and their practices but also through shared affective states (e.g. enthusiasm). This, in turn, supports self-efficacy and collective efficacy and so development of the school as a community (Durksen, Klassen, and Daniels 2017; Solheim, Roland, and Ertesvåg 2018). To clarify informal TPL activities, Hoekstra et al. (2009) have distinguished four main categories from previous inventories: (1) learning by doing, (2) learning by experimenting, (3) learning by considering one's own teaching practice, and (4) learning by getting ideas from others. These activities capture both individual and collective perspectives of informal TPL.

Complex, multi-layered and intertwined contextual factors, such as working conditions (Hoekstra et al. 2009; Kwakman 2003), leadership (Solheim, Roland, and Ertesvåg 2018), and culture and atmosphere in the schools (Postholm 2012), are expected to affect engagement in TPL. Occasionally, scholars have characterised some teachers as unwilling to learn (Van Eekelen, Vermunt, and Boshuizen 2006) for various reasons. Teachers do not or cannot always fully engage in learning opportunities because of experiencing lack of, or a non-optimal type of, motivation (Jansen In de Wal et al. 2014; Vermunt and Endedijk 2011). For example, teachers who do not feel ownership or enabled to go through a sense-making process with regard to an educational innovation will be less engaged in learning activities aiming to implement the innovation (Ketelaar et al. 2013).

Teachers' transition to distance teaching

A wide array of concepts in existing literature refer to teaching in distant contexts. Concepts such as cyber, online and virtual school or online, virtual and remote teaching encompass fractionally different meanings, but they are often used interchangeably (Carrillo and Flores 2020; Moore-Adams, Jones, and Cohen 2016). Some scholars have referred to the current circumstance as *emergency remote teaching* or *emergency eLearning* in reference to the absence of a genuine design for effective learning situations (e.g. Hodges et al. 2020). The term *distance teaching* is employed in this paper, since the concept has been used in the Finnish context to describe non-contact teaching during COVID-19 school lockdowns (Finnish Government 2020a; Finnish National Agency for Education, 2020b; Finnish Government 2021). A detailed conceptual analysis is beyond the scope and purpose of this study.

Effective distance teaching is a multifaceted phenomenon (Hodges et al. 2020). Nevertheless, when distance teaching is designed carefully, it can be highly effective in overcoming many of the traditional barriers to learning connected with space and time

(Murray et al. 2020). Aspects of space and time are largely dependent on whether distance teaching is designed to be delivered using a synchronous (i.e. through video conferencing or live chat where learners can ask questions or request instructions in real time) or an asynchronous (i.e. via videos, materials and assignments posted online where learners can work through them self-directed at a time of their choosing) approach (Murphy, Rodríguez-Manzanares, and Barbour 2011). However, some scholars have observed that (pre-pandemic) research on effective distance teaching, especially in the lower levels of schooling, has been sparse and most recommendations are mainly derived from existing knowledge and literature on face-to-face instruction (Barbour 2015; Rice and Dawley 2009).

It has been recognised that the distance teaching context sets major requirements for teachers to address a relevant pedagogical approach and authentic assignments (Carrillo and Flores 2020; Singh and Hardaker 2014), and to pay special attention to promoting caring relationships and fostering interaction (Borup, Chambers, and Stimson 2019; Murray et al. 2020). In contrast with many face-to-face classroom settings, in which the use of information and communications technology (ICT) is not a prerequisite, effective distance teaching by its very nature requires teachers to understand how to utilise adequate digital instructional formats (Carrillo and Flores 2020; Moore-Adams, Jones, and Cohen 2016; Scully, Lehane, and Scully 2021). However, scholars have identified barriers to utilising technology in teaching created by inexperience with technology and negative attitudes (Singh and Hardaker 2014) and the complex relationship teachers have with technology (van der Spoel et al. 2020). Also, early career teachers who, by virtue of belonging to the digital native generation and having recently graduated from initial teacher education, are generally expected to be competent in using ICT for teaching, have been observed to need support in digital competencies in transitioning to and succeeding in distance teaching (König, Jäger-Biela, and Glutsch 2020).

The OECD (2020b) has noted that the 'COVID-19 crisis strikes at a point when most of the education systems are not ready for the world of digital learning opportunities'. Some research has indicated that the major digital leap during the pandemic, including the adoption of a significant number of new digital tools and pedagogical solutions (OECD 2021), has multiplied the sources of teacher stress (MacIntyre, Gregersen, and Mercer 2020). In Finland, three out of four primary teachers said that a distance teaching period involved a significantly higher workload than typical contact teaching, and one teacher out of five reported occasionally having a poor level of coping at work (Trade Union of Education in Finland, 2020b). Lack of physical, temporal or psychological boundaries between work and home (MacIntyre, Gregersen, and Mercer 2020), and educators' competing responsibilities that run parallel to teaching, such as helping their own children with assignments, caring for vulnerable family members or managing their own mental health, can present a highly stressful situation for teachers (Kim and Asbury 2020).

Purpose

In this paper, we focus on Finnish primary teachers' professional learning during the first weeks of the COVID-19 school lockdown by investigating their learning domains and activities. In other words, we sought to understand *what* and *how* primary teachers learned during the beginning of the distance teaching period.

Methods

Ethical considerations

The study follows the ethical guidelines required by the Finnish National Board on Research Integrity (TENK 2012). The participants gave their informed consent to participate in the study. The participants were given the opportunity of withdrawing when they deemed appropriate and assured that their confidentiality and anonymity would be protected. In order to maintain the anonymity and confidentiality of all participants, we carefully chose data extracts that did not contain identifying data and use pseudonyms when reporting the findings. Participants were advised that they would be informed about research publications based on the data they had produced.

Participants

The sample consisted of 20 Finnish primary school teachers, all of whom had been delivering distance teaching from 18 March 2020 (i.e. once the school closures started in Finland) from home or the workplace, depending on the policy of the school or municipality. A purposeful sampling approach was used by the first author to select participants who had been delivering distance teaching due to the school closures and, as a group, broadly reflected the typical gender distribution among Finnish primary teachers and exhibited range in terms of length of work experience, school size, school location and grade taught. The recruitment continued until the target of 20 participants was reached. Participants were known to the first author in advance and contacted via email (addresses were retrieved from municipality websites) or via text/instant messaging in cases where participants' contact information was already in the author's possession.

Of the participants, 15 were women and five were men, which is a broadly typical gender ratio among Finnish primary teachers (OECD 2020c). The work experience of the participants ranged from 2 to 25 years ($M = 9.22$). Based on classification by Gu and Day (2007), seven of the participants were early-career teachers (≤ 5 years of experience), eight were mid-career teachers (6–18 years of experience) and five were late-career teachers (≥ 19 years of experience). The participants were located around the country. The size of the school in which the participants worked, checked from municipality websites, varied from schools of 60 pupils up to schools with a thousand pupils ($M = 425$). All grades in the Finnish primary school (grades 1 to 6, ages 7 to 12) were covered by the participants as a group. In addition to teaching multiple subjects to their own class, almost all participants (18 out of the 20) taught some subjects, most typically crafts, physical education and music, to other classes as well.¹

Data collection

The data were gathered during the fourth week of the distance teaching period (between May 6th and 10th, 2020). The data consisted of semi-structured interviews, which were conducted individually via Microsoft Teams or Zoom, depending on the preference of the interviewee. The interviews were conducted by the first author in Finnish and the duration of each interview was 30 to 40 minutes. In order to obtain

a rich and contextual picture of teachers' experiences and perceptions, participants were encouraged to talk freely in the interviews. Nevertheless, an interview guide – i.e. a script that lists the themes and main questions to be discussed in the interview, in a more or less regular format (Kvale and Brinkmann 2009) – was used as a support. Thus, the interviewer was free to build a relaxed conversation, but at the same time could maintain some influence over what was discussed by focusing on designated, pre-defined topics (Patton 2002).

The interview guide was generated in collaboration with educational experts (scholars, teacher educators and primary teachers), tested in pilot interviews and finalised based on the feedback and comments received. The finalised guide included three themes: (1) quality distance teaching, (2) received support in the transition to distance teaching and (3) professional development during the distance teaching period. As stated, this paper focuses on TPL, which was discussed mainly under the two latter themes. However, due to the intentional flexibility allowed by the semi-structured interview format, some of the participants spontaneously addressed their experiences and perceptions on TPL during the discussion under the first theme. Such material was included in the analysis as well. Participants' principles for quality distance teaching have also been examined by the first author and are discussed in detail elsewhere (Mankki 2021).

Data analysis

Two separate qualitative content analyses were conducted. The first analysis, which focused on TPL domains during the COVID-19 school lockdown, combined inductive and deductive approaches. In the inductive phase, meaningful expressions were sought from the interview transcripts. These were interpreted, coded and classified into categories of learning. In the following deductive phase, the categories were compared with the existing Technological Pedagogical Content Knowledge (TPACK) framework (Mishra and Koehler 2006) and placed under the learning domains. The synchronisation of the data and theory was supported particularly by the distinctive definitions of learning categories created in the inductive phase, but also by a systematic review of the literature by Moore-Adams, Jones, and Cohen (2016) that provided an extensive and detailed description of the TPACK knowledge domains.

TPACK is one commonly used extension for traditional categorisation of teacher knowledge to incorporate the necessary knowledge of technology into teaching and learning in response to quick ICT transformation. TPACK is based on Shulman's (1987) seminal classification of content knowledge (CK), pedagogical knowledge (PK) and pedagogical content knowledge (PCK). PCK is an intersection and has been considered a fundamental domain for the teaching profession, since it refers to how teachers transform their understanding of the subject matter into instructions. The TPACK model introduces technological knowledge (TK) in addition to the previous primary domains of CK and PK, and then produces new intersections between the primary knowledge domains. To support the distinctiveness of the findings, we utilised only the primary domains of TPACK framework (i.e. PK, TK and CK) in the analysis instead of the intersections. However, because TPL related to CK was not identified from the teachers' explicit expressions, CK was replaced with *coping skills* to capture the TPL categories that were not included in the PK and TK domains.

In the second analysis, which focused on the learning activities, the aforementioned classification of informal TPL activities by Hoekstra et al. (2009) was applied: i.e. (1) learning by doing, (2) learning by experimenting, (3) learning by considering one's own teaching practice, and (4) learning by getting ideas from others. In line with a deductive analytical approach, meaningful expressions were sought, interpreted, coded and placed in the above-mentioned categories. During the analysis, some interesting challenges arose in interpreting and placing the expressions, especially between the first two categories (i.e. learning by doing and learning by experimenting), where there was likely to be overlap in some cases. Rather than using frequencies to illuminate the prevalence of learning activities among participants, it was therefore more meaningful to clarify the distinctiveness of categories by focusing on the typical and most illustrative expressions within a given category.

Findings

In this section, we present the results of our two analyses. The first subsection focuses on the findings of our analysis of the TPL domains during the COVID-19 school lockdown, whilst the second reports on our analysis of the learning activities. Where relevant, anonymised, translated excerpts from the data are included. These extracts were translated into English by the authors during preparation of the manuscript.

Primary teachers' professional learning domains

The analysis indicated that primary teachers' professional learning during the first weeks of the COVID-19 school lockdown was divided into three domains: (1) TK, (2) PK, and (3) coping skills. The overview of the TPL domains, including categories of learning with frequencies and demonstrative extracts, are presented in [Table 1](#).

The first learning domain, TK, connected TPL to the use of technological tools. It included three categories. Category (1a), *general technological skills*, addressed learning in the use of ICT without references to particular software, application or equipment. Category (1b) *use of distance teaching software* referred to learning in the use of specific video conferencing solutions and in the ability to identify and understand the features, possibilities and constraints of the software that was used. According to one teacher's description (see [Table 1](#) – example of 1b), the hesitancy and reluctance felt towards distance teaching software in the beginning of the lockdown turned into fluency over time. Category (1c), *producing instructional videos*, stood for learning how to create videos to support learning and being encouraged to share the created videos with pupils. Altogether 13 out of 20 participants explicitly expressed TPL included in the TK domain.

The second learning domain, PK, connected TPL to methods, strategies and organisation of teaching, and included five categories (2a – 2e). Category (2a), *planning*, addressed learning in making more accurate and detailed weekly schedules and lesson plans to support teaching in an environment with only slight room for spontaneous reacting and creativity. Category (2b), *instructions*, pointed to learning in giving clear, unequivocal and carefully premeditated instructions to avoid challenges faced in correcting misunderstandings and supplementing insufficient instructions. Category (2c), *creating new assignments*, dealt with learning in composing, preparing, and carrying out novel and authentic

Table 1. Analysis of the primary teachers' professional learning domains during the COVID-19 lockdown.

Learning domain	Learning category	Frequency ¹	Demonstrative extract
(1) Technological knowledge	(1a) General technological skills	7	Well, it's been a must to learn to use more technology. I have really made progress on that side of things.
	(1b) Use of distance teaching software	8	At least I have gotten familiar with these distance teaching systems. In the end, [software] has been easy to use, although I first thought that I don't have the necessary strength to learn something new until I noticed that it was really simple.
(2) Pedagogical knowledge	(1c) Producing instructional videos	2	I have been encouraged and developed in producing instructional videos. It wasn't smooth at the beginning, but I have noticed that it gets easier all the time.
	(2a) Planning	3	I have experienced problems with not being able to make accurate enough plans. However, during these first weeks I have learned to make more detailed week and lesson plans. Now I have found some kind of system for it.
	(2b) Instructions	4	The clarity of my instructions has improved. In distance teaching instructions need to be very clear and presented point by point, because you cannot explain it many times. Everyone should be able to figure it out at once.
	(2c) Creating new assignments	5	Now in distance teaching I have learned to compose and create different kinds of new tasks for the pupils and new ways to have these tasks done.
(3) Coping skills	(2d) Differentiation	2	I have tried very hard to think what each child needs the most now. That I could relax demands on one pupil and give more challenging tasks to another. That I could engage the pupils individually and take their needs and learning level into account. There has been much to think about, but I certainly believe I have made progress here.
	(2e) Giving feedback	1	I have become better in giving more rapid feedback to the pupils. I think it's developing quickly at the moment.
	(3a) Restricting working hours	3	Thus far, working has been more distinct. You have gone to school, completed your working day and maybe sometimes taken some tasks home as well. But now I have been at the computer round the clock and making work calls until 8pm. In these circumstances I should also learn to set limits on the length of the working day. In the last couple of days, I have learned to be better at this and realised that pupils still don't need me at night. It should be accepted that everything is not going to work out the way it was planned or meant to be now. I have learned to live with this and some tolerance of uncertainty.
	(3b) Tolerating uncertainty	2	The biggest thing I have learned here, is how to run life at home and teaching simultaneously, which, in the long run, is quite burdensome and probably not very healthy.
	(3c) Multitasking	2	

¹Note on Table 1: Frequencies indicate the number of participants that expressed TPL linked to each learning category.

tasks that support learning in a distance setting. Further, category (2d), *differentiation*, addressed learning in tailoring the teaching to meet the individual needs of the pupils more accurately. The extract in Table 1 at (2d) illustrates one teacher's personal reflections about enhanced learning in differentiation. Category (2e), *giving feedback*, referred to learning in giving comments to pupils more rapidly and regularly. Altogether, half of the 20 participants explicitly expressed TPL included in the PK domain.

The third domain, coping skills, connected TPL to practices that support teachers' wellbeing and ability to manage their work, and it included three categories. Category (3a), *restricting working hours*, addressed learning in finishing and setting boundaries on work, to ease the challenges deriving especially from teaching from home during the lockdowns. The extract in Table 1 at (3a) gives a detailed insight into the kinds of boundary-related demands experienced and coping strategies applied. Category (3b), *tolerating uncertainty*, referred to learning in relating to the increased insecurity and unpredictability, whilst category (3c), *multitasking*, dealt with learning related to running working and private life concurrently but also learning in helping colleagues during one's own teaching. Altogether, 6 of the 20 participants explicitly expressed TPL included in the coping skills domain.

Primary teachers' professional learning activities

As explained above, we analysed the teachers' professional learning activities by applying the four categories from Hoekstra et al. (2009). In the first category, *learning by doing*, teachers explained that, in order to guarantee continuity of education, they were forced to introduce themselves to, and start using, new tools and materials; as one teacher observed, 'There has been a necessity to become acquainted with different materials available and new ways of teaching so that you can keep delivering teaching'. In this category, teachers expressed learning through carrying out teaching in a new environment, trying one's best and solving any problems faced along the way.

While the previous category emphasised necessity and obligation, the second category, *learning by experimenting*, highlighted bravery, enthusiasm, and acknowledgement of the challenging circumstances, as the following extract illustrates: 'We are in a new situation. It feels quite nice, interesting, and even inspiring to try out everything new, although it also feels frustrating at times, of course'. In this category, teachers described how during the first weeks of school lockdown their work had largely been exploring and experimenting with new tools, software, materials and methods. The same teacher as quoted above, in the previous extract, continued by outlining the explorative process as follows:

We try different things and notice that 'well, this doesn't work, let's try that one. Well, that one didn't work either.' Eventually the best alternative is found. So pretty much we have proceeded by trial and error.

During the first weeks of distance teaching, teachers were required to assess the adequacy of their skills and reflect on the suitability of their practices to distance teaching from multiple perspectives (see the previous section on learning domains). The third category, *learning by considering one's own teaching practice*, included expressions concerning these reflection processes which, as the following extract indicates, have

occasionally been rather difficult for some teachers: 'I have felt discomfort and helplessness, because this period has revealed my own need for professional growth. There is an internal process and confusion going on right now'. However, the special circumstances allowed novel possibilities, too, for reflecting on teaching practices:

I record every lesson. Then I can watch it afterwards and see what it looked like. This way I have reflected on what has gone well and what could be improved. It's quite uncomfortable to watch one's own teaching, but it gives me ideas how to make my teaching stronger.

Although using recordings to reflect on teaching might not have been common, it might not have been completely exceptional either, since recording and watching recorded lessons is straightforward in the online environment.

In the fourth category, *learning by getting ideas from others*, three levels of sources for ideas to improve distance teaching were identified. The first level was the close colleague, most typically the teacher teaching another class in the same grade. As one teacher noted, 'It has been beneficial not needing to work alone, and I have a really competent working partner. We have made plans together from the start and bounced ideas off each other during this period'. The second level was the work community in school: 'I have received constant support from my work mates. I can always ask for tips and ideas for the assignments from other teachers'. The third-level source for ideas was the larger teacher communities operating online and in social media: 'I have closely followed [online teacher community]. From there, I have got new ideas on how others have acted and organized their teaching'. Overall, teachers found the enhanced culture of sharing and collaboration at different levels favourable, as made clear in the following extract:

Teachers are sharing materials across Finland, which is very welcome. We are all in the same new situation, so it has been nice to notice that teachers are willing to share what we have produced with other teachers.

Discussion

The rapid and unexpected transition to distance teaching posed an unprecedented challenge for teachers and demands on TPL. In this study, we examined Finnish primary teachers' learning domains and activities during the first weeks of the COVID-19 school lockdown in Finland and, thus, sought to understand *what* and *how* teachers learned during this time. The findings suggested that, during the beginning of the distance teaching period, TPL amounted to considerably more than progress in the most self-evident and apparent TK domain; i.e. use of technological tools. Specifically, TPL was firmly connected to PK – i.e. learning in methods, strategies and organisation of teaching, and coping skills which encompassed learning in practices that support teachers' well-being and ability to manage their work. The findings are in line with previous research suggesting that distance teaching sets major requirements for teachers' technological understanding (König, Jäger-Biela, and Glutsch 2020; Moore-Adams, Jones, and Cohen 2016; Scully, Lehane, and Scully 2021; van der Spoel et al. 2020) and pedagogical approaches (Borup, Chambers, and Stimson 2019; Carrillo and Flores 2020; Murray et al. 2020; Singh and Hardaker 2014) as well as challenges for their wellbeing (Kim and Asbury 2020; MacIntyre, Gregersen, and Mercer 2020).

The findings illuminated the informal TPL activities during the beginning of the distance teaching period. Individual TPL activities, such as learning by doing, experimenting and considering one's own teaching practice, were observed. The findings are similar to those suggested in pre-pandemic TPL studies concerning contact teaching: teachers learn from their experiences of the everyday classroom practices and activities they undertake (Bakkenes, Vermunt, and Wubbels 2010; Czerniawski 2013; Kwakman 2003; Solheim, Roland, and Ertesvåg 2018; Postholm 2012; Richter et al. 2011; Vermunt and Endedijk 2011). The findings also indicate that the (enhanced) collaboration with colleagues was perceived as influential for TPL in emergency circumstances, as suggested in previous studies as well (Durksen, Klassen, and Daniels 2017; Hargreaves 2009; Kennedy 2011; Meirink et al. 2009; Solheim, Roland, and Ertesvåg 2018). However, our study highlights that collective TPL is not restricted to a work community, but that many teachers are willing to collaborate in large online groups by sharing practices and adopting ideas to improve teaching, including distance teaching.

Limitations and future research

The aim of our study was not to draw generalisable findings and conclusions, but to undertake a careful qualitative analysis and offer valuable insights into the kinds of professional learning that teachers engaged in during school lockdowns. In interpreting the findings, it should be borne in mind that the interviews were executed at quite an early stage of the distance teaching period. TPL during the fourth week of the distance teaching period was undoubtedly rapid and new requirements for TPL were still constantly emerging. Therefore, it should be noted that if the interviews had been executed at the end of the distance teaching period, the TPL domains and activities might have differed from those described in this cross-sectional study. The missing CK domain could perhaps have been identified in a study conducted among subject teachers that usually specialise in teaching only one subject in secondary schools. At primary level, the teachers teach multiple subjects to their own class, which might have affected the lack of CK-related categories. Equally, since informal learning in the workplace has been described as implicit (Tynjälä 2008), it may not have been possible for teachers to describe, in explicit terms, the full details of their TPL during the pandemic.

Additional research is clearly required to deepen our understanding of TPL during the sudden transition to a distance teaching environment. Since much valuable pre-pandemic TPL research concerns activities that are separate from the complex teaching and learning environments in which teachers live (Jansen In de Wal et al. 2014; Opfer and Pedder 2011), more research is needed on informal learning embedded in teachers' professional lives in order to help address TPL as a whole. Looking to the future, it will be important to focus on whether the knowledge gained during the distance teaching period translated into effective instructional practices and to examine the nature of permanent (and advantageous) impact on teachers, teaching and classroom practices. In this way, it might be possible to identify, behind the dark cloud of observed learning loss and damage to wellbeing, learning that may benefit teaching and learning yet to come.

Conclusion

As pandemics (Smith et al. 2014) and climate disasters, such as heat waves, wildfires, earthquakes and floods are becoming increasingly frequent (United Nations 2020), the current disruption to education might not be entirely exceptional. Therefore, the experiences of distance teaching should not be forgotten in the wake of the current emergency – rather, the hard-earned understanding that came from it should be nurtured and utilised to support and benefit education going forwards. For example, in non-emergency circumstances, distance teaching could offer an opportunity for schools in different locations to collaborate more extensively and, for instance, provide a broader range of courses in optional subjects and languages. This could offer more equal opportunities for pupils, particularly in sparsely populated areas and in smaller schools, to select studies from a wider range based on their own interests. Further, to maintain and foster the knowledge and skills developed, creative proposals, such as an annual distance teaching day, have been suggested. In teacher education, where teacher educators have been recently trying to find ways to prepare student teachers to develop appropriate pedagogical and technological skills for use in a distance setting (Murray et al. 2020), there may also be opportunities for development. For instance, practicums could include a piece of synchronous and asynchronous online teaching to expose pre-service teachers to the specific challenges faced and opportunities that exist when delivering teaching in an online environment.

Understanding teachers' professional learning in a period of distance teaching at primary level is of great importance, as there was no established online delivery to this sector before the crisis (Allen, Rowan, and Singh 2020). Our study is offered as a contribution to the literature by illustrating primary teachers' multifaceted professional learning domains and activities during the pandemic-induced rapid shift from contact teaching to distance teaching. The study highlights that in emergency circumstances, teachers' individual and collective learning processes are interrelated and supplementary to each other (Opfer and Pedder 2011; Solheim, Roland, and Ertesvåg 2018).

Note

1. In Finnish primary schools, the teaching of art and physical education subjects is often divided in a flexible manner, based on the expertise and interest of the teachers.

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