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# The Professional Development of Teacher Educators in Digital Pedagogy Amid Change - Comparing Competence During 2018 and 2021

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**Abstract**
A changing society requires its members to be ready to evolve and absorb new things quickly. One of the biggest drivers of change was the COVID-19 pandemic era, which greatly impacted all sectors of working and learning life. Universities were also forced to transfer to distance education and remote working. This article examines university-based teacher educators' professional development as an umbrella concept and their conceptions of digital pedagogical competences specifically. The study was conducted as a longitudinal study, with 15 teacher educators participating in an interview in winter 2018, and 14 of the same interviewees participating in a new interview in winter 2021. The data was analysed using reflexive thematic analysis. By comparing the data, three themes of digital competence development were produced: generic, pedagogical and didactic, and profession-oriented digital competence. The results are relevant to the more diverse future of teacher education and the digital competences of teacher educators as part of their professional development.

**Keywords**: professional development, digital competence, teacher education, remote teaching

## Introduction

"*Necessity is the mother of invention*" (H5). This was the statement of one teacher educator during an interview in the winter of 2021 when asked about their experiences with remote teaching during the COVID-19 pandemic. The pandemic fundamentally altered teacher education practices both globally and in Finland. The rapid transition to remote teaching in the spring of 2020 was initially referred to as emergency remote teaching (e.g., Flynn, 2021; Bozkurt & Sharma, 2020). This forced numerous teachers and teacher educators into a new kind of professional development in an extremely short time (e.g. Donitsa-Schmidt & Ramot, 2022). Now, remote and hybrid teaching are part of the so-called new normal. The sudden shift to remote teaching was a burdensome experience for some. Articles have discussed the burdens from the perspectives of students, learners, and teachers alike (e.g. Winter et al., 2021). Concerns were particularly high at the beginning of the pandemic regarding students' learning outcomes, learning gaps, well-being, and the risk of social exclusion (e.g. Lavonen & Salmela-Aro, 2022). The mental health and resilience of higher education students have been investigated, leading to ongoing concerns about their well-being (e.g. Salmela-Aro & Lavonen, 2023). Teachers' endurance was also researched (Heikonen et al., 2024). There has been some research on remote teaching related to the pandemic focusing on teacher educators (e.g., Kidd & Murray, 2020; Martin & Mulvihill, 2021; Donitsa-Schmidt & Ramot, 2022), as well as studies on remote teaching experiences in higher education contexts (e.g., Castro & Tumibay, 2021; Cutri et al., 2020).

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Teacher educators represent a significant and unique professional group among higher education instructors. In Finland most of them hold pedagogical qualifications (60 ECTS credits) either as part of their teacher degree or through studies focusing on adult education or university pedagogy. Although pedagogy is part of the content of a teacher educator's work, digital pedagogical competence has emerged as a distinct area of expertise, especially highlighted during the era of remote teaching. Nagel et al. (2023) define the digital professional competence of teacher educators to include 1) generic digital competence, 2) pedagogical and didactic digital competence, 3) pedagogical content knowledge of the subject being taught, and 4) profession-oriented digital competence. Nagel et al. (2023) include also digital transformative competence in the model. This means "competence to act and transform one's practices by choosing and using appropriate digital tools (Brevik et al., 2019; Guðmundsdottir & Hatlevik, 2020; Nagel, 2021)" (Nagel et al., 2023, p. 1). Moreover, the European Framework for the Digital Competence of Educators (DigCompEdu) defines educators' digital competences consisting professional and pedagogical competences, and encompassing competencies dealing with professional engagement, digital resources, assessment, teaching and learning, and empowering learners (Caene & Redecker, 2019; Carretero et al., 2017). Furthermore, artificial intelligence has become a crucial aspect of digital competence, and thus, UNESCO has created an AI competency framework for educators (UNESCO, 2024). Teacher educators serve as role models for future teachers (Uertz et al., 2018), particularly in the development of teachers' digital competence (Carpenter et al., 2024). They have a dual role in that they both use and teach future teachers to use digital tools effectively in teaching (Lindfors et al., 2021).

Finnish teacher education differs from many other countries, particularly concerning research orientation, educational requirements for teacher educators, and job responsibilities (eg. Maaranen et al., 2019). Research on the professional development of teacher educators has increased significantly, especially in the last ten years. Internationally, there has been some research on teacher educators' skills and attitudes towards digital competence (e.g. Taimalu & Luik, 2019; Uerz et al., 2018; Krumsvik, 2012), however, according to Uerz and colleagues (2018), there is insufficient research on digital technology competence. Taimalu and Luik (2019) argue that merely having technological knowledge is not enough; beliefs about the significance of technology and pedagogical knowledge also influence teacher educators' ability to integrate technology into teaching (Taimalu & Luik, 2019). Norwegian Krumsvik proposed a theoretical model of digital competence for teacher educators back in 2012 to help understand their needs. In Finland, the topic has been studied less, even though digital pedagogical competence has been considered a strategically important area for development in teacher education. Finnish society has been viewed as a model for a networked information society since the 1990s.

Research on the professional development of teacher educators has generally increased, but it remains fragmented (Ping et al., 2018). The multinational InFo-TED network has published numerous studies on the professional development of teacher educators (e.g. MacPhail & O'Sullivan, 2019; Tack & Vanderlinde, 2019). The topics of these studies have addressed, for example, the research orientation of teacher educators, professional development needs, learning, and well-being. Thus, professional development is a broad and multifaceted concept encompassing many diverse skills or competence areas.

In this article, we will examine the professional development of teacher educators, particularly from the perspective of digital pedagogical competence. The purpose of the first interview data (2018) in this study was to explore the professional development of teacher educators broadly, with digital pedagogical competence being one of seven interview themes. The pandemic and the subsequent mandatory leap to remote teaching provided a unique opportunity to revisit questions of digital pedagogical competence and usage with the same interviewees three years later. The research objectives are formulated into two research questions:

1. How did the perception of one's own digital professional competence change due to the pandemic?
2. What kind of professional development can be observed when comparing the data?

## Theoretical Framework and Literature Review

### *Professional Development of Teacher Educators*

Research on the professional development of teacher educators is an emerging field. In Finland, it has been relatively underexplored both academically and practically (e.g. Byman et al., 2020; Maaranen et al., 2018; 2019). Dengerink et al. (2015, p. 80) define professional development for teacher educators as encompassing formal or informal individual learning, various activities, attitudes, knowledge, and skills. The role of teacher educators is broad and multifaceted, which, according to Kleinsasser (2017), presents challenges. For instance, Hökkä and colleagues (2012, p. 98) highlight the challenges of forming a researcher identity from the perspective of Finnish teacher educators. They also emphasize the importance of providing methodological research support and the diverse support of the work community as part of professional development as a teacher educator (Hökkä et al., 2012, p. 99). Increasing attention has been paid to the fact that to function as professionally competent, teacher educators must commit to continuous professional self-development throughout their careers (Van der Klink et al., 2017, p. 163). Several researchers emphasize the development of teacher educators' competencies and lifelong learning (e.g. Van der Klink et al., 2017, p. 164). Gallagher et al. (2011, p. 880) point out that the work of teacher educators is challenging due to its diversity, and although this is well known, there is generally little support and mentoring available for their professional development. Snoek et al. (2011) reported that no measures have been taken in any of these countries regarding the lifelong professional development of teacher educators (Snoek et al., 2011). Research by Van der Klink and colleagues (2017), Van Velzen and colleagues (2010), and Snoek et al. (2011) indicates that barriers to professional development include a lack of time and significant workload, insufficient resources, as well as a lack of interest and encouragement from leadership and an unproductive work atmosphere. According to Boe et al. (2015), the professional development of teacher educators was associated with collaboration with colleagues, an increase in theoretical knowledge, the alignment of theory and practice, and a strengthened professional identity and understanding of their role as teacher educators. Finnish studies have found similar results. Lack of time and personal interest influence whether a teacher educator engages in professional development, but on the other hand, their own research is seen as an essential part of this development (Maaranen et al., 2018; 2019; Byman et al., 2020). Since the professional development of digital competencies of teacher educators have been studied relatively little (e.g. Taimalu & Luik, 2019; Uerz et al., 2018; Krumsvik, 2012), the main focus of this article is precisely on this issue.

### *Remote Teaching in Teacher Education*

In Finland, remote teaching has been used in teacher education. As part of teacher education in Finland, various technology-focused courses have been offered, but these have hardly prepared students for actual remote teaching. As Zenkov and colleagues (2021) state, teacher education courses rarely prepare for the organization of basic or secondary education remotely. However, well before the pandemic, remote or virtual teaching has been shown to have benefits. For example, Murray and colleagues (2020) found no observed difference in student engagement between in-person and remote teaching. The flexibility of remote teaching is also an advantage that offers better study opportunities for, for instance, those with families, individuals living far from their study location, or those with other life-related commitments (see Castro & Tumibay, 2021). It can generally enable fairer accessibility (Murray et al., 2020, p. 490). Cutrin and colleagues (2020) note in their research how, during the

pandemic, academic teaching staff were willing to convert their teaching to virtual or hybrid formats with the aim of achieving the best possible outcomes, even though they simultaneously acknowledged that the rapid change was not easy (Cutri et al., 2020, p. 530).

Now, remote and hybrid teaching have become part of everyday life. In the future, attention must be paid to creating and maintaining online interpersonal relationships so that students feel they belong to the university community, as well as successfully developing teaching methods that enhance student engagement (Flynn, 2021, p. 6). Carillo and Flores's (2020) literature review explored which social, cognitive, and pedagogical variables support teaching and learning processes in remote-based teacher education. Social presence was related to belonging, cohesion, optimal levels of social presence, interactivity, and participation. Cognitive presence was influenced by concrete experience, contextualization, conceptualization, and the development of action. Finally, pedagogical presence was affected by pedagogical approach, learning design, and facilitation (Carillo & Flores, 2020). These factors should be considered in the long-term development of remote and hybrid teaching to achieve the highest quality online teacher education.

The pandemic changed our lives in many different areas. Lehmuskallio (2021, p. 167) states that the increased use of various displays became a normal part of activity while simultaneously protecting people from infectious viruses through close contact. Although in one way, the use of remote connections increased communication between people, and perhaps even closeness with distant others, remote situations also involved feelings of isolation. According to Flynn (2021, p. 3), students have experienced challenges and feelings of isolation due to the "facelessness" and "impersonality" of remote learning. Teachers have also felt as though they were teaching "into a void" when students refused to use their cameras (Flynn, 2021, p. 8). Murray and colleagues (2020, p. 493) highlight that relationship-building work faced challenges during the pandemic due to physical remoteness and the novelty of remote teaching for the teaching staff. However, some teaching staff experienced the opposite. They reported that the emergency remote teaching and coping with it during the pandemic produced even more authentic teacher-student relationships. The teaching environment transformed from a neutral lecture hall into a more private form (Murray et al., 2020, p. 493). Research indicates that remote education carries the risk that college students' sense of belonging may remain weak, increasing the risk of experiencing isolation and feeling disempowered (Burke & Larmar, 2021). In the development of remote education, attention must be paid to quality, and there should be a continuous effort to create a better remote learning environment where students can identify with their virtual learning community (Burke & Larmar, 2021).

**Research Methodology and Data**

The study was conducted as a qualitative thematic interview research. The ontological and epistemological foundations of the research are rooted in constructivism, particularly socioconstructivism (see, e.g., Lincoln et al., 2018). The interviewed teacher educators discussed themes of digital competence twice: first in the winter of 2018 (N=15) and a second time in the winter of 2021 (N=14). The interview questions can be found as an appendix. The interviewees were the same on both occasions, representing different staff groups (Table 1).

The research adhered to the ethical guidelines of the Finnish National Board on Research Integrity (tenk.fi), the ethical guidelines of the University of Helsinki, and generally accepted ethical practices. The first author of the article invited the interviewees to participate in a voluntary thematic interview on both occasions. The purpose of the first interview data (2018) was to broadly explore the professional development of teacher educators, with digital pedagogical competence being one of seven interview themes. In 2021 we were interested in how the pandemic and remote teaching and work had impacted professional development, particularly concerning digital pedagogical competence. Overall, the data

provided a multifaceted view of the challenges and opportunities related to the professional development of teacher educators concerning digital pedagogical competence.

Table 1.

*Background information of the interviewees*

| Code | Position | Age | Experience as teacher educator |
|---|---|---|---|
| P1 | Post Doc Researcher | 40-49 | 8 |
| P2 | Professor | 40-49 | 16 |
| P3 | University lecturer | 40-49 | 15 |
| P4 | Professor | 50-59 | 1 |
| P5 | University lecturer | 60-69 | 35 |
| P6 | University lecturer | 30-39 | 5 |
| P7 | Post Doc researcher | 30-39 | 5 |
| P8 | University lecturer | 30-39 | 9 |
| P9 | Doctoral researcher | 40-49 | 4 |
| P10 | University lecturer | 60-69 | 20 |
| P11 | University lecturer | 30-39 | 6 |
| P12 | University lecturer | 60-69 | 15 |
| P13 | University lecturer | 40-49 | 6 |
| P14 | University lecturer | 50-59 | 14 |
| P15 | University lecturer | 40-49 | 11 |

In the analysis of the data, we employed reflexive thematic analysis. Thematic analysis is a qualitative method that aims to interpret and describe shared and collective meanings and experiences in the data through systematic identification and organization (e.g., Braun & Clarke, 2006). Reflexivity refers to the analysis as an interpretative process situated in a specific time and place, where themes are constructed as a result of open coding and iterative theme development (Braun & Clarke, 2023). We analyzed the data separately, first examining the 2018 data and then the 2021 interview data. Multiple authors analyzed the data, and discussions about the themes took place among the researchers. The thematic analysis of the transcribed data progressed through six phases (see e.g. Braun & Clarke, 2006). First, we familiarized ourselves with the data by independently reading the transcribed and anonymized interviews while taking notes, focusing on teacher educators' discussions about information technology and digital pedagogical competence. In the second phase, which involved developing preliminary codes, we systematically reviewed the data to identify meaningful expressions related to the research questions and created data-driven codes accordingly. In the third phase, we examined the preliminary codes and combined them into themes guided by the research questions. In the fourth phase, we assessed the quality and descriptiveness of the themes by reviewing each coded data excerpt and examining connections between the data sets, aiming to construct mutually supportive themes while maintaining the distinctiveness of the themes developed from each data set. In the fifth phase, we defined and named the themes while writing an analysis that described the themes, which further clarified the content and names of the themes. In the sixth phase, during the writing of the report, we conducted the final round of analysis in conjunction with the selection of final data excerpts, ensuring that the excerpts corresponded to the research questions and accurately represented each theme. Table 2 shows an example of the analysis process as described through a data excerpt from each data set.

Table 2
*Analysis Phases Described Through a Data Excerpt from Each Data Set*

| Data set | Original expression | Code | Preliminary theme | Theme | Dimension of digital competence |
|---|---|---|---|---|---|
| 2018 | "It is quite clear that, in my opinion, the interface between digital, virtual teaching, and contact teaching needs to be made more functional. [...] This means better tasks, more carefully crafted online lectures, and all this kind of planning interests me a lot." (P11, 2018.) | Adapting teacher training content and methods to distance learning | Teaching: substance of teacher education | Substance and pedagogy of teacher education | The development of pedagogical and didactic digital competence |
| 2021 | "I turned it around, so it's like a breakout escape room. In other words, the students have a task, and they stay there as long as they can solve it" (P7, 2021). | Digitality in support of pedagogy | Teaching: pedagogy | Diversification of pedagogical arrangements and the development of teaching | |

The thematic analyses yielded five themes from the 2018 data and four from the 2021 data (see Figure 1). Regarding the first research question, we reported five identified themes. For the second research question, we compared the 2018 and 2021 data and themes, structuring the findings in accordance with the three dimensions of digital competence development proposed by Nagel and colleagues (2023), excluding one dimension (pedagogical content knowledge of the subject being taught) as it did not emerge from the data.

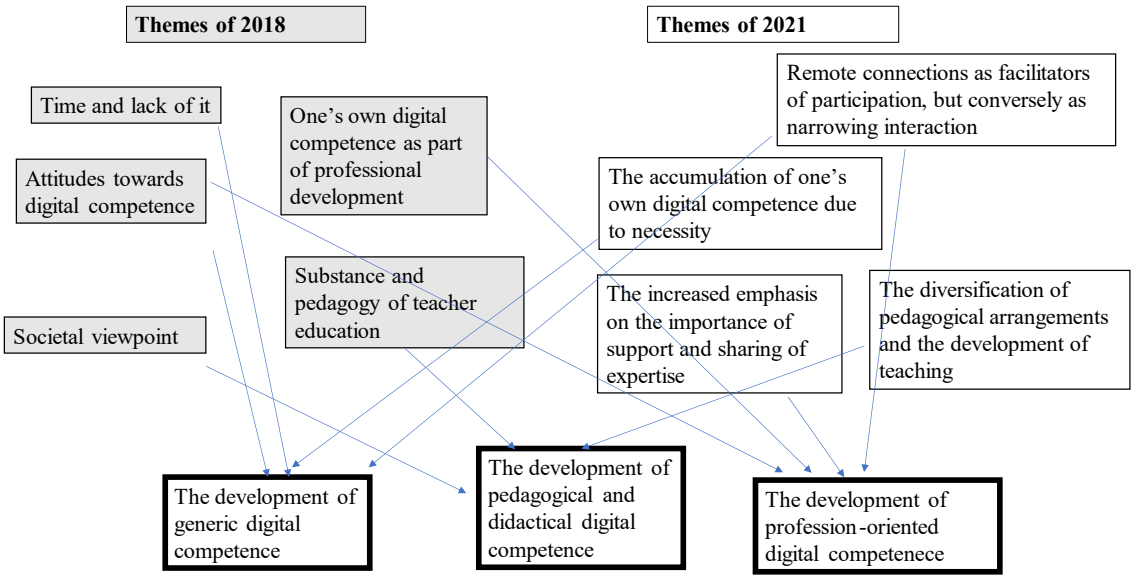


*Figure 1.* Thematic maps developed based on the analysis

## Findings: Digital Pedagogical Competence of Teacher Educators

### *Changes in Teacher Educators' Perspectives Due to the Pandemic*

The thematic analysis of interviews conducted in 2021 produced four main themes: *the accumulation of one's own digital competence due to necessity; the increased emphasis on the importance of support and sharing of expertise; remote connections as facilitators of participation, but conversely as narrowing interaction*; and *the diversification of pedagogical arrangements and the development of teaching.*

Nearly all teacher educators reported an increase in their *digital competence*, particularly during the pandemic, regardless of their skill levels. "Necessity has indeed made us more competent in many areas, better and faster than might have otherwise happened" (P5, 2021). Applications such as Zoom and Teams, intended for video meetings, were new to many. Instead of traditional staff training sessions, interviewees mentioned that they had independently learned to use the tools and applications required for remote teaching. This also referred to the allocated time for professional learning: The advantage of recorded sessions was seen as the ability to fit studying into one's own work schedule and to select content that suited one's needs, thus saving precious working hours. On the other hand, some teacher educators pondered their ability to stay up to date: "I worry about how much I actually realize I need to follow things that I should be following. I don't imagine that I can keep going for the next five years with these skills" (P11, 2021). However, with the increase in technical skills, understanding the possibilities of using information technology expanded, leading to enthusiasm and confidence in its use. "Well, maybe before the pandemic, I thought that these IT tools weren't very central to my professionalism" (P6, 2021).

*Support and the sharing of expertise* among colleagues were deemed essential during the sudden shift to remote teaching. At the beginning of the pandemic, the teaching responsibilities of teacher educators varied, and those who had to urgently transition their teaching online and quickly learn new skills with minimal resources later provided support to those who did not have teaching duties at the outset of the pandemic. The new situation placed both teacher educators and students in a context where

they were equally confronted with the new reality. Interviewees described students guiding each other and, when necessary, also assisting teacher educators. Teacher educators appeared more approachable: "It's like we're maybe together at the same point, so nobody assumes, for example, that I have everything completely under control all the time" (P11, 2021). The remote period was thought to have also improved the university's capacity to support staff in using technologies. Many praised the university for providing abundant materials and recordings for self-study, and some interviewees even expressed feelings of guilt for not participating in organized training sessions, despite their availability. However, there was also a demand for support that was closer and immediately accessible, as well as for updating work tools to be more modern and suitable for home use.

*Participation and interaction,* along with the changes that occurred in them, emerged in nearly all interviews. On one hand, many felt that remote connections facilitated participation and brought new opportunities, especially for international collaboration, with remote meetings often described as more efficient than face-to-face meetings. Maintaining contact with colleagues was also somewhat simpler through remote connections. "It has brought an entirely new dimension, as it's so easy to keep in touch with people, and it doesn't require such a calendar show at all; we can advance matters on short notice" (P10, 2021). Additionally, participation in staff meetings and other necessary gatherings, which otherwise would not have been attended, became easier. "[…] just turn on Zoom and listen while being able to do something else at the same time" (P5, 2021). Conversely, working remotely also led to feelings of loneliness, exhaustion, and uncertainty. With the reduction or outright absence of face-to-face contact, interaction was described as becoming one-dimensional, missing important dimensions. For instance, the immediate feedback conveyed through eye contact, gestures, and comments in teaching situations was no longer received through the screen, leading some interviewees to feel isolated and inadequate as teacher educators. The pedagogical solutions used in remote teaching were described as resulting in "the reorganization of social relationships" (P1, 2021). Generally, remote implementation was viewed as most suitable for teaching situations that do not rely on dialogue and interaction, such as large lectures. Recorded lectures provided an opportunity for participation for those who could not attend the actual (remote) lecture. Interviewees noted that some students had performed exceptionally well and enjoyed remote studies, with remote teaching enriching the teaching arrangements. Questions related to organizing teaching were primarily considered through the lens of students' learning and needs. "It shouldn't necessarily depend on our teaching skills that I don't want to teach remotely, that [laughs] it doesn't suit my subject because I don't want to" (P10, 2021). Sensitive and challenging topics, as well as teaching situations requiring physical tools, were perceived as more difficult to implement remotely.

*The new pedagogical arrangements* that teacher educators described as being brought to teacher education during the remote period were made possible through technological solutions. It was hoped that alternative modes of participation and flexible teaching arrangements could continue to meet the diverse needs of students and thus improve the accessibility of education. Possibilities for alternative solutions were also envisioned in collaboration with high schools and primary schools. Teacher students would gain valuable experience in remote teaching, while schools would benefit from a broader course selection. The crossing of geographical boundaries and the use of international experts in teaching would also be possible through remote connections. "In many schools, it is not even possible to study subjects other than subject X very broadly, so in a way, what opportunities remote teaching could bring to that […] it is important that we provide our future teachers with the skills for remote teaching as well" (P13, 2021). Although teacher education is inherently interactive and especially in subject didactics, a variety of tools are used, it can still "genuinely be of many kinds" (P14, 2021). The interviewed teacher educators described the most significant learning experiences brought by the pandemic as related to organizing remote teaching in a meaningful way that supports students' learning.

> The biggest leap has been that I have had to rethink the contents of my courses and reconsider them […] not so much whether I master those platforms, but how I can make them work best so that I can either get a small group to function smoothly or that I can manage a mass course in such a way that it has perhaps been the most significant part of my own learning. (P8, 2021).

***The Development of Digital Competence in the Wake of the Pandemic***

For the second research question, namely "What kind of professional development can be observed when comparing the data?" the data and themes from 2018 and 2021 were compared. This led to three types of development, reflecting the classification by Nagel et al. (2023): *the development of generic digital competence, pedagogical and didactic digital competence,* and *profession-oriented digital competence*. Although some interviewees expressed a desire to return to the previous state, the insights gained from this development ultimately facilitated each teacher educator's professional growth.

*The development of generic digital competence* is linked to *time*, *necessity,* and *attitudes.* In 2018, teacher educators identified a lack of time as a significant barrier to the adoption of digital tools and technologies. Some interviewees expressed feelings of fear and uncertainty regarding the continuous changes. Additionally, the rapid pace was perceived as exhausting, and technical support was not always available when needed: "Well, maybe this fast pace, which is constantly changing, creates a bit of a fear of getting stuck, wondering if one can keep up with the new developments" (P12, 2018). By 2021, *time constraints still appeared,* as teacher educators still felt that it was not time-efficient for them to participate in time-bound training sessions; instead, they reported that they had primarily taken the initiative to learn the necessary software and tools for remote teaching independently, according to their schedules and needs. Previous studies have indicated that time constraints and workload are barriers to the professional development of teacher educators (e.g., Snoek et al., 2011; Byman et al., 2020). The increase in alternatives due to remote implementations could facilitate a broader offering of professional development and participation opportunities. As Maaranen et al. (2018) have noted, professional development for teacher educators largely depends on their own motivation and areas of interest. However, due to the pandemic, it became necessary to bring IT skills to an adequate level to manage remote teaching and working. As described by Donitsa-Schmidt and Ramot (2022) and Cutri et al. (2020), the transition to remote teaching was rapid and quite challenging, forcing staff to adapt whether they wanted to or not. On a positive note, nearly all interviewees, regardless of their skill levels, reported that their IT skills had improved and that the variety of applications used had increased due to remote teaching. With the increased competence, enthusiasm for digital tools also grew, as one interviewee described:

> It's nice to notice that before, learning new things in IT was a bit like, is it necessary, but now I follow with interest that Zoom is getting new features, and I think, oh, this is actually a really good thing that I can incorporate into my teaching next time. (P6, 2021).

Interviews revealed that transforming teaching into a remote format was seen as a *challenge and an opportunity for professional development:* "I have a positive attitude towards digitalization and such things, of course, there can be many opinions about them, but they are coming anyway, or they are already there" (P5, 2018). In 2018 some teacher educators felt uncertain about keeping up with new applications and updates. According to Deger et al. (2015), attitudes are part of professional development. On the other hand, the use of technology in teaching became more commonplace during the pandemic, and the fact that "the broadcast comes from one's own living room is no longer a big deal" (P11, 2021). Teacher educators also described that with the accumulation of skills, they began to use digital tools and technological applications more confidently and regarded them as just one set of tools

among others. It can be concluded that for many, the pandemic positively influenced their attitudes toward digitalization and their own competence in it.

With *the development of pedagogical and didactic digital competence,* teacher educators' perceptions of the *content of teaching, pedagogy, and organization expanded.* In the 2018 interviews, teacher educators emphasized their important role in preparing teachers for the future. As noted by Lindfors et al. (2021), teacher educators have a significant dual role in both using and teaching future teachers to use digital tools. The practice of mastering these tools and applications during their studies has become even more crucial in the post-pandemic era, yet the reality of education and teacher training does not always align with digitalization. *The substance and pedagogy of teacher education was apparent:*

> It is quite clear that, in my opinion, the interface between digital, virtual teaching, and contact teaching needs to be made more functional. [...] This means better tasks, more carefully crafted online lectures, and all this kind of planning interests me a lot. (P11, 2018.)

In the 2018 interviews, teacher educators indicated that they included tasks in their courses where students practiced using technical applications. Some also felt it was essential to critically consider the use of technologies in teacher education with students: the knowledge and skills acquired in teacher education must be useful in the teacher's actual work. From *a societal perspective,* teacher education was seen to have an important role in training students to become significant contributors to society, preparing individuals to educate future generations. Teacher educators serve as role models for future teachers (Uertz et al., 2018). Digital competence is an essential part of society, and its role in the future is likely to strengthen rather than weaken. "It is not really in anyone's interest if a teacher educator were to encourage closing one's eyes to digitalization and many other things" (P5, 2018). Carpenter et al. (2024) emphasize the importance of developing the digital competence of teacher educators. In the 2021 interviews, tighter collaboration with schools and other educational institutions was proposed so that teacher education could better offer teacher students opportunities to practice the use of technologies used in the field. Remote teaching changed attitudes toward educational technology. Some interviewees were already eager users of educational technology in 2018, while others felt that achieving a deeper understanding did not necessarily require "fancy gadgets" (P1, 2018). Few interviewees consciously developed high-quality online pedagogy. Not only was teaching converted to a remote format "as is" due to the pandemic, but some teacher educators began to plan and implement remote teaching according to “the principles of online education” (Carillo & Flores, 2020). Thus, teaching was not only adapted to the necessary limitations of remote implementation, but *it was fundamentally designed based on the conditions of the online environment, aiming specifically to produce high-quality online learning.* For instance, one teacher educator noticed, after observing student discussions, that breakout rooms used for small group work in remote teaching were not very popular among students. They realized that breakout rooms are best utilized when participation is voluntary for students or when they do not have to spend a specific limited time there, but only as long as they find it beneficial: "I turned it around, so it's like a breakout escape room. In other words, the students have a task, and they stay there as long as they can solve it" (P7, 2021). Although remote teaching was successfully developed, the challenges that emerged must be carefully considered in the future. These challenges have been identified by Flynn (2021) and Burke and Lamar (2021) in the form of students' isolation and the challenge of fostering a sense of belonging. In the future, flexibility and alternatives in organizing teacher education were hoped for, as well as a readiness to broadly and openly examine various modes of teaching implementation. "To somehow return to a situation where everyone has to be here in person and perform in this one way feels like a terribly meaningless future" (P7, 2021).

*The development of profession-oriented digital competence* concerned the advancement of research and projects, particularly in international networks, but also changes in local meeting practices. In 2018, the use of information technology and learning to use it was perceived as an additional task on top of one's primary work, whereas in the 2021 interviews, they appeared as an integral part of the job, with the scheduling of daily activities even perceived as easier due to reduced physical transitions. This could promote more equitable accessibility (Murray et al., 2020, p. 490) not only for students but also for staff. In 2018, the use of technology was partly seen as a *matter of interest* or desire, and not all interviewees were enthusiastic about the opportunities presented by technology. Interviewees understood that the adoption of new digital tools and technologies *requires practice*. However, many felt there was not enough time for this. The *support and appreciation* shown by employers for the professional development of teacher educators were seen as important but sometimes insufficient. Previous studies have identified the practical framework in the community and lack of collaboration (Hökkä et al., 2012) as challenges to the professional development of teacher educators, as well as limited support offerings (Gallagher et al., 2011; Snoek et al., 2011; Van Velzen et al., 2010). The pandemic was perceived to have brought new opportunities for international collaboration through remote connections. Although informal discussions and dinners, which are important for networking, were less prevalent in remote conferences and other meetings, remote implementations were considered sustainable. Especially those with longer commutes viewed the reduction in physical transitions positively. Not only did they have more free time, but *they also participated more* in staff meetings and other necessary gatherings that they otherwise would not have attended. Remote opportunities have thus facilitated personal well-being, as well as work-related well-being, as Bloom and colleagues (2024) have observed.

## Discussion and Conclusions

This article aimed to examine the professional development of teacher educators, particularly from the perspective of digital pedagogical competence. Digital pedagogical competence is important (Carpenter et al., 2024), which is why it is essential to delve into the needs and opportunities for professional development of teacher educators in this area. In this study, digital competence manifested itself in three areas according to Nagel et al. (2023): generic, pedagogical and didactic, and profession-oriented digital competence. 1) Regarding generic digital competence, the results highlighted the challenges of time management for teacher educators, their enthusiasm for professional development, and their attitudes towards digitalization. 2) In terms of pedagogical and didactic competence, the results focused on the use of digital tools as part of teaching and the development of quality online education. 3) With respect to profession-oriented digital competence, the findings emphasized the opportunities provided by remote work, the potential increase in well-being, and the support and offerings for professional development. Our findings also show that teacher educators have developed their competence in relation to Nagel et al's (2023) other dimensions, but do not use, at least to the same extent, the competence to transform their practices.

According to our research, in 2018, teacher educators expressed that a lack of time was a significant barrier to the adoption of digital tools and technologies. However, by 2021, teacher educators still felt that time-bound training did not serve their needs. Previous studies (Van der Klink et al., 2017; Van Velzen et al., 2010; Snoek et al., 2011; Byman et al., 2020) have identified time constraints and significant workloads as obstacles to professional development. Interestingly, the pressures of time and workload seemed to remain challenging both before and after the pandemic, even though remote opportunities had freed up time that could be used for other purposes, such as commuting. In 2018, teacher educators assessed their digital pedagogical competence as generally good or at least sufficient. However, the development of digital competence was perceived to be somewhat a matter of choice and could be enhanced according to individual eagerness and willingness. Thus, universities should offer various development opportunities for both independent study and collaborative learning. According to

the research by Amhagin et al. (2019), teachers utilize ICT tools in their teaching if they perceive added value from them. Maaranen et al., (2019) noted that research, whether through conducting studies themselves or engaging with others' research, is the most important method of professional development for Finnish teacher educators. Would it be possible to link the development of digital competence to conducting research, acquiring research skills, or enhancing methodological knowledge, so that teacher educators would be more interested in it?

In the 2018 interviews, teacher educators emphasized their important task of training teachers for the future. The training of digital tools and applications is highlighted even more in the post-pandemic era, but the real-world context of schools and teacher education does not always align with digitalization. Consequently, remote teaching changed the approach to educational technology. Few interviewees consciously developed quality online pedagogy, as thoroughly described by Carrillo and Flores (2020). However, for the sake of high-quality teacher education and future teachers, it is crucial to invest consciously in the development of remote and hybrid teaching. The research has revealed that in the data collected at both time points, teacher educators prioritize student learning and the growth of teachers in every situation. This research finding, where the student is at the center of the teacher educator's work, has also been noted in our previous studies (see Maaranen et al., 2018). Alongside this, our observation that teacher educators did not merely "digitize" their teaching under pressure, but also planned implementations with a focus on quality and diverse online and remote teaching, while simultaneously emphasizing the importance of dialogical, interactive teaching and face-to-face interaction (cf. Carrillo & Flores, 2020), presents an interesting topic for further research. Learning opportunities expand and the accessibility of education improves when more diverse teaching is offered to all (e.g. Castro & Tumibay, 2021; Murray et al., 2020, p. 490).

The practices of remote teaching during the pandemic and the applications of digitalization and technologies are likely to leave more permanent practices, such as various hybrid teaching models and remote staff and other meetings. This research indicated that the pandemic era forced teacher educators to take responsibility for the area of digital competence that belongs to their professional development, as solutions related to remote teaching had to be made primarily independently, facing related technical challenges alone. The opportunities to participate in national and international meetings, conferences, and events have clearly improved due to advanced remote arrangements (cf. Lehmuskallio, 2021). Overall, remote and hybrid work has improved employee well-being (Bloom et al., 2024), and its popularity has remained high after the pandemic. Although studies indicate (e.g., Boei et al., 2015) that the professional development of teacher educators is linked to collaboration with colleagues, as well as the increase of theoretical knowledge and the integration of theory and practice, it appears from this research that digital competence as part of the professional development of teacher educators primarily depends on the individual themselves. The pandemic changed the form of collegial collaboration, and alongside theoretical knowledge, digital competence was particularly strengthened through practical experimentation.

This research began in 2018 from a broad perspective on the professional development of teacher educators. When the global situation changed in 2020, the research group had the opportunity to establish a before-and-after research design. In both rounds of interviews, digital competence was explored from the perspective of professional development of teacher educators, even though the initial premise was not a comparative study. The final research design emerged retrospectively, and it is worth critically considering how this affects the data or its interpretation compared to if it had been known from the beginning what kind of "intervention" the world would face. Although reaching saturation is not considered a requirement in reflexive thematic analysis (Braun & Clarke, 2021), it must be noted that the size of the data should be seen as a limiting factor. While 29 interviews can be considered a relatively large number, the thematic delimitation of the topic to digital pedagogical competence

nonetheless produced somewhat limited data. It would be important to deepen the topic with broader and more diverse datasets in the future.

Based on our research, we can state that the professional development of teacher educators also deserves more attention in the future. Rapidly changing technologies along with AI requires stronger commitment for teacher educators' digital competencies and their development, for example, following the frameworks by EU (Carretero et al., 2017) and UNESCO (2024). The DigCompEdu focuses on the pedagogical aspects of educators' digital competencies, such as how technologies can be integrated into teaching and learning, how they can be used to enhance teaching and learning strategies (Caena & Redecker, 2019, pp. 363-364). As Caena & Redecker (2019) state, the frameworks can help on different educational system levels. They can aid an individual teacher educator in their daily practice and professional development. They can support the development of institutions and communities of practice, and finally, they can provide digital competence standards for initial teacher education (Caena & Redecker, 2019). On national and institutional levels these policy documents should be considered as important and lead to joint efforts to keep up with the constantly developing (digital) world. The question of how to find a good balance between different teaching methods in teacher education has become timely based on this research. Thus, it is also about the fact that "[…] this way you reframe this current technological-social space" (P7, 2021), as one teacher educator participating in the research stated.

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**Appendix 1**

**Interview questions in 2018**

1. Describe your IT and media skills and competences in your work as a teacher educator.
2. Would you like to have more skills in ICT or media use in your work?
3. How have you developed your own work (as a teacher educator)?
4. In what other ways have you sought to develop yourself professionally, e.g. courses, etc.?
5. What plans do you have for the future in terms of professional development?

**Interview questions 2021**

1. Describe your current IT and media skills and competences.
2. How has the COVID-19 pandemic period influenced your professional development?
    - To what extent have you learned new skills?
    - To what extent have you received help or training (enough, little...)
    - What has the experience been like from an ICT perspective?
3. What additional skills do you wish you had in using ICT or media in your work?
4. Where does ICT/media fit or not fit in your teaching?