



Conditions for professional digital competence: the teacher educators' view

Maria Lindfors, Fanny Pettersson & Anders D. Olofsson

To cite this article: Maria Lindfors, Fanny Pettersson & Anders D. Olofsson (2021) Conditions for professional digital competence: the teacher educators' view, *Education Inquiry*, 12:4, 390-409, DOI: [10.1080/20004508.2021.1890936](https://doi.org/10.1080/20004508.2021.1890936)

To link to this article: <https://doi.org/10.1080/20004508.2021.1890936>



© 2021 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group.



Published online: 01 Mar 2021.



Submit your article to this journal [↗](#)



Article views: 2185



View related articles [↗](#)



View Crossmark data [↗](#)



Citing articles: 1 View citing articles [↗](#)

Conditions for professional digital competence: the teacher educators' view

Maria Lindfors ^a, Fanny Pettersson ^a and Anders D. Olofsson ^b

^aDepartment of Education, Umeå University, Umeå, Sweden; ^bDepartment of Applied Educational Science, Umeå University, Umeå, Sweden

ABSTRACT

This study explores how Swedish teacher educators view individual, collegial, and organisational conditions framing the fulfilment of their dual didactical task, which is to use digital technology in a way that ensures student teachers graduate from teacher education (TE) with the professional digital competence (PDC) needed for their future working lives in a digitalised school. Using a purposive sampling approach, we used thematic coding to analyse 13 semistructured interviews with teacher educators representing 21 mandatory courses in educational science at one teacher education institution in Sweden. The findings cover aspects of the teacher educators' PDC, how to act as a digital role model for the student teachers, support in educational policy and assignments, and the possibilities for participating in continuous professional development (CPD) in PDC. This study demonstrates an urgent need to improve conditions for successful fulfilment of teacher educators' dual didactical task. For example, TE policy requires a strong focus on digital technology and PDC. CPD activities should be easy to access in order for teacher educators to develop their PDC. Moreover, leaders at the organisational level in TE institutions should acknowledge and place higher value on teacher educators' work to digitalise educational practices.

KEYWORDS

Dual didactical task; professional digital competence; teacher education; teacher educators

Introduction

Today's schools are taking part in an ongoing digitalisation process (Håkansson-Lindqvist & Pettersson, 2019), and the COVID-19 pandemic, which began in early 2020, is most likely a catalyst in this digital development. Moreover, researchers anticipate that technology such as virtual reality, educational robots, and artificial intelligence will play significant roles in teaching and learning (Hrastinski et al., 2019). Taken together, the new digitalised conditions create high expectations on teacher education (TE) to educate and prepare student teachers to meet the changing

CONTACT Maria Lindfors  maria.lindfors@umu.se  Department of Education, Umeå University, SE90187 Umeå University, Umeå, Sweden

Re-submission to the special issue of Education Inquiry: Teaching and Teacher Education in Light of the Digitalised K–12 School—A Nordic Perspective.

This article has been republished with minor changes. These changes do not impact the academic content of the article.

© 2021 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group.

This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

demands of new technology in their teaching practice (Livingstone, 2016; McGarr & McDonagh, 2019). Put differently, TE should ensure that future teachers can help pupils to develop digital competence for taking part, working, and learning in 21st-century society (International Society for Technology in Education, 2008; United Nations Educational, Scientific and Cultural Organization, 2011). In this way, TE intuitions and teacher educators have a substantial responsibility for enabling educational environments that will help student teachers to develop the sufficiently high levels of professional digital competence (PDC) (Lund, Furberg, Bakken, & Engelién, 2014) considered necessary for teaching in the classroom of tomorrow (Baran, Canbazoglu Bilici, Sari, & Tondeur, 2019; Tømte, Kårstein, Enochsson, & Buskqvist, 2015; Tondeur et al., 2017). The role of the teacher educator can therefore be regarded as a second-order teacher, which includes a dual didactical task and for which the teacher educator's level of PDC is important (Jackson & Burch, 2019; Krumsvik, 2011). Instefjord and Munthe (2016) pointed out that teachers' PDC consists of three areas of knowledge: technology proficiency, pedagogical compatibility, and social awareness. In line with their Norwegian colleagues, Lund et al. (2014) described PDC in TE as a:

move away from understanding digital competence as a set of generic skills suitable for all situations, both personal and professional, and toward an understanding of PDC that includes both generic and specific teaching-profession skills. In the case of teacher education, PDC involves teachers not only appropriating technologies, but also making their learners appropriate them and put them to productive use. This is an extremely demanding, dual endeavour (pp. 283–284).

With this brief background, and acknowledging the call for further research on teacher educators PDC (Uerz, Volman, & Kral, 2018), we aim to explore how Swedish teacher educators view individual, collegial, and organisational conditions framing the fulfilment of their dual didactical task, which is to use digital technology in a way that ensures student teachers graduate from TE with the PDC needed to work in increasingly digitalised schools.

Swedish teacher education

In 2011, the Swedish TE system underwent a profound reform, and new TE programmes were introduced. The rationale behind the reform was, among other things, the need to strengthen teachers' professional identity (Government Bill 2009/10, 2009). The reform resulted in several new changes. For instance, and of special interest for this study, the set of mandatory educational science courses considered to be central of the teaching profession were changed and became more specialised for each degree. According to Government Bill 2009/10 (2009, p. 89), Swedish TE programmes encompass three reciprocally well-integrated educational fields:

- the general education field, common to all student teachers, pertaining to educational science and comprising pedagogical, relational, and interdisciplinary topics central to teacher professions (60 course credits, 1 year of full-time study);
- an orientation field with one or more areas of emphasis (at least 40 course credits specific to a subject or subject area); and

- one area of specialisation to deepen and broaden previously acquired knowledge (at least 20 course credits).

In the TE institution of specific interest in this study, the general educational field (60 course credits) includes 21 educational science courses (see [Appendix A](#)).

Signs of PDC in Swedish TE

The Swedish government regulates TE using laws and regulations. The most important are the Higher Education Act and the Higher Education Ordinance. When graduating from a Swedish TE institution, student teachers shall, in addition to the general goals in the Higher Education Act (1 Chap. 9 §), fulfill the national goals according to the Higher Education Ordinance (1993, p. 100; SFS, 2010, p. 541).

For the TE institutions, the national goals are specified in 25 expected learning outcomes. One of the outcomes is proficiency with digital technology. By the end of a TE programme, student teachers are expected to “show ability to in a secure and critical way use digital tools in the educational activities and be aware of the importance of different medias and digital environments role for the activities” (The Higher Education Ordinance, 1993, p. 100). On a local level, each TE institution is responsible for specifying the national expected learning outcomes in its courses, which means that the extent that and how national goals appear in TE institutions can differ across the country. In the TE institution of specific interest in this study, two of the 21 educational science courses specify the national goal including digital technology as an expected learning outcome. The expected learning outcome is that students will be able to use and reflect on digital tools in educational practices at the end of the course.

Sweden has recently launched two national educational policy documents: the National Digitalisation Strategy for the School System (Government Decision I:1, 2017) and National Plan for Action for the Digitalisation of School (Swedish Association of Local Authorities and Regions, 2019). These policies most likely will be highly relevant for Swedish TE (Olofsson, Fransson, & Lindberg, 2019). Sweden’s strategy focuses on the conditions and development of so-called adequate digital competence (ADC) in Swedish K–12 schools. This ADC is said to mirror recommendations from the EU (Hanell, 2018) and is understood in the strategy as a continuously changing competence, reflecting needs in the society as well as prerequisites by pupils in the school (see Olofsson et al., 2019). In turn, the action plan provides guidelines for fulfilling the strategy’s proposed goals at a national level. For example, the plan stresses that Swedish TE is critical for developing national equity regarding pupils’ possibilities to develop ADC. In addition, TE and teacher educators should ensure that student teachers frequently use digital tools and participate in teaching and learning activities with relevance to an increasingly digitalised school (Fransson, Lindberg, & Olofsson, 2018; Gustafsson, 2021, this issue).

A national survey of 1,400 student teachers revealed challenges in Swedish TE regarding the use of digital tools and level of PDC (Demoskop, 2016). Among other things, the survey found that nearly half of the student teachers felt the preparation for teaching using digital tools was insufficient, more than one-third expressed that the level of digitalisation in their TE programmes was low, and 60% asked for more

digitalisation in their TE. According to the survey, satisfaction with these items was the lowest during the last semester before leaving TE, which is a worrying and relevant result in light of the current study.

In the next section, we present important key points from previous research based on three broader themes: (a) teacher educators' PDC; (b) teacher educators' use of digital technology, their acting as a digital role model, and possibilities for student teachers to develop PDC in TE; and (c) continuous development in PDC as well as issues concerning technological and technological-pedagogical support. The method, results, and analyses follow. The paper concludes with a discussion, including the conclusion and directions for further research.

Previous research

Teacher educators' professional digital competence

Authors of several studies have reported a low level of PDC among teacher educators and that the use of digital technology in TE is not sufficiently developed in preparatory programmes for teaching in K–12 schools (Krumsvik, 2014; Pedro, Piedade, Matos, & Pedro, 2019; Tondeur et al., 2019). For example, Hanell (2018) pointed out that local authorities in Sweden see a major challenge in the unsatisfactorily low level of PDC among newly qualified teachers, whereas Krumsvik (2014) concluded that informed educational use of digital technology in today's TE requires teacher educators with high PDC levels. According to Tondeur, Roblin, van Braak, Fisser, and Voogt (2013), one way to increase teacher educators' PDC is to work with their technology pedagogy content knowledge (TPACK). However, in a large national survey in the USA, Voithofer, Nelson, Han, and Caines (2019) showed that teacher educators generally have low adoption of TPACK and that it is a complex process influenced by several personal and institutional factors.

Amhag, Hellström, and Stigmar (2019) conducted a digital survey of teacher educators' ($n = 105$) PDC at two Swedish TE institutions. According to the authors, 20% of the teacher educators reported that their PDC was low, and about 26% felt they lacked the ability to use digital technology in their teaching and learning activities with their student teachers. Amhag et al. (2019) argued:

Teacher educators need to understand the potential of digital tools in education and identify the pedagogical surplus value in their own teaching and learning context with digital tools in order to increase motivation for concrete, effective, and subject oriented successful examples presented by experienced teachers (p. 217).

Similarly, a Norwegian study reported a strong positive correlation between teacher educators' self-reported efficacy and PDC, as well as weak positive correlations between both positive management and development support from management with teacher educators' PDC (Instefjord & Munthe, 2017). Tondeur et al. (2019) argued that teacher educators are gatekeepers of student teachers' development into digitally competent teachers when leaving TE and thus that it is important to be aware of teacher educators' information and communication technology profiles.

Finally, in a research overview, Uerz et al. (2018) identified four domains of competence that are important when problematising teacher educators' PDC: (a)

technology competences, (b) competences for pedagogical and educational technology use, (c) beliefs about teaching and learning, and (d) competences in professional learning. The authors concluded that an existing and urgent need exists for research focusing on digital technology, teacher educators, and their role as second-order teachers in digitalised educational practices.

Teacher educators' use of digital technology, acting as digital role models, and possibilities for student teachers to develop professional digital competence

Teacher educators' use of digital technology

Researchers have reported a discrepancy between digital technology practices for teaching and learning in TE and the possibilities and demands that student teachers will meet in their future classrooms (e.g. Instefjord & Munthe, 2017). According to Drent and Meelissen (2008), one reason for this is the need for both bottom-up and top-down initiatives to develop activities that will enable successful implementation and innovative use of digital technology in TE. Another reason, as addressed by Vongkulluksn, Xie, and Bowman (2018), is the lack of regular and systematic use of digital technology in TE. According to Lund et al. (2014), a third reason is that TE must be improved by recognising the pedagogical qualities in the uses of digital technology when tied to various subject domains.

Pedro et al. (2019) and Instefjord and Munthe (2016) addressed the importance of teacher educators integrating digital technology into their teaching practice in general and especially on the shape of learning scenarios for student teachers. The authors further emphasised that this should be done early in student teachers' TE. The main message is to teach teacher students that pedagogy should prevail over technology in teaching and learning. However, transforming theory into practice seems challenging. For example, Amhag et al. (2019) showed that teacher educators use digital technology but not primarily for pedagogical purposes. Gudmundsdottir and Hatlevik (2018) expressed that TE and teacher educators must find more opportunities for student teachers to use digital technology, which would mean avoiding what Tondeur, Roblin, van Braak, Voogt, and Prestridge (2017) called a "reality shock" (i.e. a gap between student teachers' use of digital technology in TE training and their use within their future practice).

Teacher educators as digital role models

Uerz et al. (2018) emphasised that teacher educators in fact are more than just teachers – they teach future teachers, who will then teach pupils in school. They stressed the importance of teacher educators as role models in TE and stated that "acting as a role model in teaching means that teacher educators' pedagogical behaviour is congruent with the pedagogical behaviour they want to promote in their students" (p. 13). According to Tondeur et al. (2019), teacher educators can be seen as gatekeepers in providing the next generation of teachers with possibilities to develop competences suitable for teaching and learning using 21st-century educational practices. However, Tondeur, van Braak, Siddiq, and Scherer (2016) highlighted teacher educators' insufficient use of digital technology, which reduces possibilities to be role models who inspire student teachers to use technology. Tondeur et al. (2019) argued that a teacher educator

should be able to bridge technology, pedagogy, and content and to show the underlying connections. Additionally, teacher educators should promote dialogue with and between student teachers that motivates and provides opportunities for reflection on digital technology use in school and what level of PDC is required.

Based on the results of a Dutch mixed-method study on student teachers, Admiraal et al. (2017) stated the need for two types of role models in TE. The first type of role model is a teacher educator who demonstrates effective use of digital technology in subject teaching. The second type is schoolteachers whom the student teachers subsequently meet during their practicum placements who can mentor them on integrating technology into the classroom. Instefjord and Munthe (2017) described the importance of role models as follows:

Teacher educators have a dual responsibility in this regard; not only should they be able to use technology for their own teaching; they should also contribute to developing pre-service teachers' professional digital competence. In a complex education like teacher education, where preparation of teachers takes place both on campus and in-field practice schools, the question of how technology is integrated on each of these arenas becomes particularly important (p. 37).

Possibilities for student teachers to develop professional digital competence

Norwegian TE emphasises that student teachers should develop sufficient PDC and be able to use digital technology in a pedagogically sound way in teaching, administrative work, evaluation, and research (Gudmundsdottir & Hatlevik, 2020; Instefjord & Munthe, 2016; Tømte, Kårstein, & Olsen, 2013). According to Lund et al. (2014), teacher educators must teach student teachers to transform their PDC into practice (cf. Gudmundsdottir & Hatlevik, 2018). Moreover, student teachers need more than standalone courses on digital technology; therefore, TE should focus on questions of teaching and learning and integrating them with technology throughout the entire TE curriculum. Similarly, Foulgeri, Graziano, Schmidt-Crawford, and Slukhuis (2017) suggested that TPACK can make the important PDC components for student teachers to develop during TE visible for teacher educators, so that they can teach in a technology-efficient way. Furthermore, Pedro et al. (2019) argued that student teachers having contact with practice schools equipped with digital technology will increase the quality of preparations aimed at enhancing their PDC.

Continuous professional development in professional digital competence and technological and technological-pedagogical support

Continuous professional development in professional digital competence

Krumsvik (2011) pointed out a need for teacher educators to have a professional development framework that supports professional competence in using digital tools. Livingstone (2016) had a similar criticism, stating that PDC is still not regarded as an important component of teacher educators' professional competence. With an even more outspoken criticism, Amhag et al. (2019) addressed the unacceptable fact that TE institutions in Sweden cannot offer adequate education to help student teachers use digital technology in the classroom, which means teacher educators must begin to explore their own educational practice with digital technology to a much greater extent.

One reason for this is that teacher educators lack the time to develop their use of digital technology, but other reasons include insufficient individual knowledge and skills.

One proposed way to improve teacher educators' PDC is through professional development programmes as well as collegial learning and peer mentoring that include a demonstration of best practices. According to Tondeur et al. (2012), teacher educators should be provided with CPD so that they can model teaching and learning with digital technology for student teachers. In contrast to a one-size-fits-all style, Tondeur et al. (2019) emphasised a more nuanced approach that acknowledges teacher educators' individual pedagogical beliefs about digital technology in education. Moreover, Instefjord and Munthe (2017) suggested that CPD should be organised as a collaborative venture between teacher educators on campus and teachers in schools, so that knowledge about digitalised classrooms can be transferred to TE institutions.

Technological and technological-pedagogical support

CPD activities require resources, support, and a collective willingness in TE institutions to increase the level of teacher educators' PDC and to challenge traditional ways of teaching and learning (Krumsvik, 2011). In the same vein, Tømte et al. (2013) argued that the long-term professional development of teacher educators' PDC must be anchored at the management level. Leaders of TE institutions must support ongoing efforts to encourage teacher educators to use digital technology more actively in teaching practice and to increase teacher educators' PDC. Tondeur et al. (2012) used a similar argument, emphasising the importance of TE institutions organising digital-technology-planning strategies with which to connect various institutions involved in TE and enhance teachers' learning experiences. Furthermore, Amhag et al. (2019) added that CPD characterised by technological and pedagogical support is the most encouraging factor for teacher educators to use digital technology.

Previous research pointing out the study's direction

According to researchers, several challenges seem related to teacher educators' possibilities to fulfill their dual didactical task, which is to teach with digital technology and to ensure that student teachers graduate from TE institutions with the necessary PDC. The challenges appear to depend on the individual teacher educators' level of PDC and access to CPD as well as degrees of support for and organisational awareness of PDC in the TE institutions. The findings and lessons learned from previous research have informed the present study, conducted with the subject's multilevel complexity in mind and to answer the call for additional research on teacher educators and PDC (e.g. Uerz et al., 2018).

Method

Given the contextual description above about TE in Sweden and the signs of PDC in this particular educational institution, this section will describe how the data for the interview study were collected and analysed.

Data collection

In autumn 2019, we conducted the study at one TE institution within a university in Sweden. A purposive sampling approach was used to select the participants (cf. Bryman, 2015). We chose potential participants deliberately based on their specific expertise as teacher educators and coordinators in educational science courses for student teachers. Thus, we invited 14 teacher educators (eight women and six men) representing the 21 mandatory courses in educational science for TE, of whom 13 volunteered to participate. The teacher educators averaged 11 years (range 3–20 years) of experience in the field, and they held faculty ranks ranging from junior lecturer to full professors with PhDs.

The data were collected through semistructured interviews to capture a deep and comprehensive understanding of how Swedish TEs view the individual, collegial, and organisational conditions framing the fulfilment of their dual didactical task. The approach used to guide the interview can be described as inspired by in-depth interviewing (see Johnson, 2001), embracing questions like “Tell the story about how you . . . ,” “Describe how you think about . . . ,” and “Give examples and discuss possibilities you have experienced in” These types of questions and talk enabled the respondents to discuss and elaborate on the given themes and provided the researchers with possibilities to guide the respondents through the interview.

Based on the previous research discussed above, a semistructured interview guide (Bryman, 2015) was constructed. However, as a baseline for the interviews, some prequestions were formulated, including about the teacher educators’ background characteristics (e.g. their age, professional experience as a teacher and a teacher educator, and qualifications). The participants were then asked to explain their knowledge of the extent to which the steering documents (programme descriptions, education plans, and curricula for the educational core curriculum courses) include writings about digitalisation or learning goals requiring student teachers to develop PDC. To collect data on the PDC levels teacher educators need for their dual didactical task, the interview guide was complemented by questions focusing on teacher educators’ competences and experience in using digital technology and preparing their student teachers to teach with it. Moreover, the guide also addressed competences for using digital technology in a pedagogical way, beliefs about teaching and learning, and experiences with CPD on digital technology and PDC (for more information, see the interview guide in [Appendix B](#)). All of the teachers were interviewed individually. The interviews were audiotaped and took approximately 1 hr each.

Data analysis

As an initial step, the interviews were transcribed verbatim and read through. The transcripts were then analysed through a thematic content analysis (Bryman, 2015) using the software package NVivo 12. The text and sentences were analysed and grouped into broad themes (professional development, digital competence, etc.). Each theme was analysed by giving texts and sentences codenames (see [Table 1](#)). Codes that featured similar content were grouped together as subthemes, which were compared and, in some cases, placed under new themes. This process resulted in four themes: (a)

teacher educators' views on PDC (subthemes: pedagogical use of digital technologies and critical reflection on technology use), (b) teacher educators' PDC and dual didactical task in TE (subthemes: the dual didactical task and teacher educators' PDC), (c) teacher educators' views on support in educational policy and assignments (subthemes: lack of support in policy and modest application of policy), and (d) teacher educators' CPD on PDC (subthemes: lack of time and CPD, from thought to action, and technological-pedagogical support). To establish the robustness of the coding procedure, all of the authors were involved in conducting the analysis.

Table 1. Examples of themes, subthemes, and codes.

Theme	Subtheme	Codes	Quotes
Teacher educators' PDC and dual didactical task in TE	Dual didactical task	Role model; students' lack of PDC	"This is a computer generation that who knows how to communicate, but they don't handle pedagogical and educational aspects. These aspects they need to learn, and foremost, we need to serve as role models, so it becomes a natural part."
		Include PDC in teaching	"It is written in the curriculum that preschool teachers should use digital technology in their educational practice. From that point of view, we should also include it in our education."
	Teacher educators' PDC	Lack of PDC	"No one here is comfortable using smartboards."
		Knowledge to administer	"I use digital technology to make schedules, report grades, and handle the learning management platform."

Findings

In this section, we provide insight into the Swedish teacher educators' views on PDC in TE. The data analysis generated four main themes, covering aspects of the teacher educators' views on PDC, PDC and dual didactical task in TE, views on support from educational policy and assignments, and CPD in PDC. The themes each have relevance to ensuring that student teachers graduate from TE programmes with the PDC needed to work in a digitalised school.

Theme 1: teacher educators' views on professional digital competence

According to all of the teacher educators, the student teachers' PDC is an important part of TE and has a strong connection to kindergarten, primary, and secondary school practice. Many of the teacher educators described PDC as a two-part concept that includes knowledge of the pedagogical use of digital technology and the ability to reflect critically upon both the use of digital technology and the rapid digitalisation of Swedish society. The first part highlights the importance of TE institutions and teacher educators addressing and elaborating on how student teachers can use digital technology in various teaching and learning designs, as well as offers discussions about why and how a certain design might affect pupils' learning in the classroom. This part of the concept was, for example, expressed by one participant as understanding "how these [digital] products are developed, what is behind the design, what opportunities there are and thereby also being able to hold a critical stance". Some of the teacher educators

expressed that student teachers are often familiar with digital technology and social media but they lack sufficient competence to use technology in a pedagogical way: “This generation knows how to communicate, but they don’t handle the pedagogical aspect of digital technology. That is something they need to learn”.

The second part of how PDC was conceptualised included a more critical stance towards digitalisation in TE and schools. That is, digitalisation – as an ongoing phenomenon influencing society – must be discussed critically in relation to the school practice: “In my view, our role is about providing a critical voice to critically reflect and review what we do and why”. Thus, teacher educators expressed the need to have sufficient knowledge, experience, and competence to post relevant questions and steer student teacher discussions about the use of digital technology in the classroom, at home, and in their future working life. Critical thinking was included as an aspect of PDC due to a concern for pupils’ (and to some extent, also student teachers’) lack of critical judgement regarding digital information and sources, cyberbullying, lifestyles becoming more sedentary, and screen addiction. Therefore, many of the teacher educators emphasised the need for student teachers to develop critical aspects of PDC during their TE in order to foster pupils’ competence in a highly digitalised Swedish society. One teacher educator expressed this idea as follows: “Actually, this [digitalisation] is part of the society, and we need to, in some way, prepare our student teachers for this part”. Another expressed: “Our role is to teach them critical thinking, to be critical on how and why things are done and how this might affect school and society”.

Theme 2: teacher educators’ professional digital competence and dual didactical task in teacher education

The teacher educators had strong beliefs that teaching and learning with digital technology is part of a teacher educator’s dual didactic task, which was considered important for a teacher educator to handle in relation to the student teachers’ future work. One teacher educator stated that the student teachers: “. . . are the computer generation that know how to communicate, but they don’t handle pedagogical and educational aspects, these aspects they need to learn and foremost we need to serve as role models so it becomes a natural part [of TE]”. Several teacher educators stated that PDC is required in the school’s steering documents and curricula. For example: “It is written in the curriculum that preschool teachers should use digital technology in their educational practice. From that point of view, we should also include it in our [teacher] education”. However, because of the teacher educators’ experiences of low individual PDC, the use of digital technology in their teaching appeared to be limited: “I mean, all schools have smartboards and we don’t even have them at the university. Thus, no one here [the TE institution] is comfortable using smartboards”. According to another teacher educator: “I don’t really feel safe or comfortable. Well, I don’t have a negative attitude [in relation to use technology], but it feels that I’m gradually slipping behind”. Most teacher educators described their PDC as the ability to use digital technology on a relatively basic level, whereas some were more advanced: “I have enough computer competences for handling most programmes. I try to acquire further knowledge in how to use digitalisation in the [teacher] education”. Furthermore, several teacher educators talked about their

ability to record lectures, use digital learning management platforms, and communicate and distribute course material to the student teachers digitally. A few of the teacher educators described their PDC as knowledge of digital production and use of animation, audio- and video-recorded materials for flipped classrooms, smartboards, videoconference systems, and so on. For example, one teacher educator stated: “I know how to use digital technology for communication. We also use computers, projectors, PowerPoint, digital recorded lectures, the Web, etc., sometimes also smartboards, but unfortunately not that much”. Another expressed: “Well, I use digital technology to make schedules, report grades, and handle the learning management platform, and actually, we have started to use more and more of short recorded lectures”. However, several teacher educators expressed that they lacked the ability to provide instruction that gave student teachers important opportunities to develop their PDC. In sum, most of the teacher educators seemed comfortable using digital technology in a basic way in their teaching and learning practices and in administration. However, they did not perceive themselves as digital role models in this knowledge and competence area.

Theme 3: teacher educators’ views on support in educational policy and assignments

The third theme includes the teacher educators’ views on support in educational policy and assignments in relation to their dual didactical task. They strive to use digital technology in the TE classroom. However, when trying to include digital technology in tasks and assignments, they expressed a lack of support in the policy, goals, and expected learning outcomes. One teacher educator stated: “Well, I would like to include it [digital technology] in my course, but I don’t see how this could be supported by the expected learning outcomes in the course”. Another expressed: “I don’t really feel support in the expected learning outcomes, so when I discuss digital technology, I do it more indirectly”. As described earlier in this paper, digital technology is included in one of the national goals and in two of the 21 educational science courses at the local TE institution included in this study. However, among the 13 teacher educators, only a few were aware of these learning goals at the national and local policy level. As one teacher educator stated: “Well, I’m not sure. I don’t remember seeing it; guess I have not been looking for it either”.

The teacher educators often returned to the importance of student teachers developing a solid PDC during their time in TE. However, they reported equally often that tasks and assignments in the educational science courses neither required integration of digital technology for fulfilment nor had the potential to contribute to the student teachers’ PDC development, knowledge of how to design for teaching and learning supported by digital technology in the school, or understanding of how PDC supports pupils’ digital competence development. Aspects of PDC and the use of digital technology seemed to be more or less a matter of using PowerPoint. According to one teacher educator:

We have a vague writing [in the course] and a “digital technology task” where they [the student teachers] literally should plan and do a “digital technology lesson”, or a sequence of a lecture built on something. I mean, you are expected to be able to create a PowerPoint presentation and discuss the constraints of the actual use of digital technology in school.

Theme 4: teacher educators’ continuous professional development in professional digital competence

The findings showed that many of the teacher educators were aware of a strong need for CPD in PDC, on an individual, collegial, and organisational level. They pointed to a lack of time as a strong contributing factor to why so few of them had participated in any form of CPD in PDC arranged by the TE institution: “No, this is not something that I can prioritise, [but] rather something that I have to learn out of office”. Furthermore, there was a hesitation about who should be responsible for arranging such activities, including difficulty precisely describing what activities should be targeted and why. Several of the teacher educators requested a better collective knowledge base and described CPD as an incentive to raise the PDC level among all teacher educators and avoid the risk of falling even further behind, which many teacher educators expressed was the case today. A telling example was the challenge of reflecting upon the pros and cons of digitalisation in schools in an informed way with their student teachers.

Many of the teacher educators stressed that CPD in PDC should be encouraged and rewarded by the TE institution’s leaders. However, this was not requested on the management level and, consequently, the individual teacher educator was entirely responsible for whether this type of professional development would happen. In addition to poor management support and lack of time, a challenge for teacher educators was that despite CPD in PDC, they found it difficult to convert the new structures of thought into action in their specific core educational courses. One of the teacher educators said: “So, there are sometimes occasions for ‘come and learn’ ... It may give me thought structures, but it may not give me the ability to go from thought structure to action ... that connection does not exist. And when I want to go to action, I have no support”.

The support seemed to include technical rather than technological-pedagogical aspects. The overall picture suggests that the 13 teacher educators were relatively pleased with the technological support, whereas the technological-pedagogical support was rarely, if at all, provided. Descriptions such as “the support has more to do with technology, not the pedagogical side” were common among the teacher educators. Some of them highlighted collegial learning as a way of giving each other the needed technological-pedagogical support, which was arranged as informal dialogues in smaller TE teacher teams, creating the opportunity to enhance their PDC. Moreover, as a possibility to learn from best practice, one teacher educator said: “We have improved on a group level; we teach each other how to best do it [using digital technology in teaching]”. These dialogues were described as valuable because they not only focused on promoting digitalised teaching but also gave room for reflection regarding when it is preferable to enhance student teachers’ learning.

Discussion

What will be required of tomorrow's teachers? What kind of PDC is needed for teaching in future technology-rich classrooms equipped with virtual reality, educational robots, and artificial intelligence (Hrastinski et al., 2019)? Over time, various educational scenarios and required competences have been addressed in policy (International Society for Technology in Education, 2008; United Nations Educational, Scientific and Cultural Organization, 2011) as important for TE institutions to act upon (Hanell, 2018; McGarr & McDonagh, 2019). However, the extent to which today's TE institutions provide student teachers with possibilities to develop the necessary level of PDC (Baran et al., 2019; Tømte et al., 2015) seems to be moderately uncertain (Instefjord & Munthe, 2017; Krumsvik, 2011). This uncertainty can be connected to research that points to teacher educators' limited level of PDC (Pedro et al., 2019; Tondeur et al., 2019; Uerz et al., 2018). The reality of low PDC levels is in line with what Amhag et al. (2019) suggested was also the case among Swedish teacher educators (see also Demoskop, 2016).

In our study, we continued to explore the question of Swedish teacher educators' PDC. More precisely, our intention was to deepen knowledge of how Swedish teacher educators view the individual, collegial, and organisational conditions that frame their fulfilment of the dual didactical task, which is to be a role model in teaching with digital technology that in turn can enable student teachers to graduate from TE with the PDC needed for their future success.

Before discussing the findings, it seems reasonable to be reminded of the two recently launched national educational policy documents for the school, namely the National Digitalisation Strategy for the School System (Government Decision I:1, 2017) and the National Plan for Action for the Digitalisation of School (Swedish Association of Local Authorities and Regions, 2019). The content and intentions of these policies are examples of how both explicit and implicit pressure is put on Swedish TE institutions and teacher educators to ensure that emerging teachers can ensure that pupils' ADC meets national standards (cf. Hanell, 2018). This type of pressure is something that teacher educators must constantly relate to and manage (cf. Instefjord & Munthe, 2016).

The many faces of the conditions for professional digital competence in teacher education

Overall, the findings revealed several views on the conditions located on different levels in this TE institution, with the view common to all teacher educators that PDC is a needed and important competence for TE to address. In other words, the teacher educators shared the view regarding the right of all student teachers to develop and form their individual PDC in TE (Baran et al., 2019; Foulgeri et al., 2017; Tømte et al., 2015). Despite consensus regarding PDC as a key competence for teachers, it seemed that with a few exceptions, the teacher educators had a view of their own PDC as being at a relatively low level, an individual condition that was said to limited the teacher educators' full ability to function as the digital role models they wanted to be. Even if the teacher educators felt comfortable using rather basic technology such as

PowerPoint or a learning management platform for course administration, they often voiced a wish for more advanced use and deeper understanding. That is, they are aware of their dual didactic task in using digital technology in their teaching practice in TE in such a way that the student teachers are given the opportunity to develop their PDC, including how to integrate the technology in the classroom practice in an informed pedagogical and didactic way (Admiraal et al., 2017; Gudmundsdottir & Hatlevik, 2018, 2020; Instefjord & Munthe, 2017). For example, one of the teacher educators expressed the desire to have the ability to post relevant questions and facilitate discussions in a critical and reflective way that would make student teachers position the rapid digitalisation of Swedish society in relation to the teaching profession and their future profession. The ability to facilitate such discussions is a dimension of PDC that is urgently required in the era of learning analytics and big data, as well as fake news and powerful algorithms.

The challenges in fulfilling this dual didactical task were due to conditions other than just the teacher educators' own PDC level, such as a lack of support in terms of national policy, goals, and expected learning outcomes. As mentioned earlier in this paper, content about digital technology and PDC is rare in TE policy at a local level. In the The Higher Education Ordinance (1993, p. 100), the national learning goals is concerned with this issue, but only one expected learning outcome is found in just two of the 21 educational science course curricula at the local TE institution included in this study. It is probably safe to claim that such poor support in educational policy will neither require nor encourage the teacher educators at this TE institution to engage in designing and carrying out digital teaching, learning, and assessment practices that can develop student teachers' PDC (Gudmundsdottir & Hatlevik, 2018; Instefjord & Munthe, 2016). One can reasonably conclude that the poor policy support might not be the main challenge at this Swedish TE institution; rather, the major challenge is that only some of the 13 teacher educators were familiar with the existence of these learning goals in policy. This lack of knowledge among the teacher educators is interesting in several ways. They recognised their low level of PDC in their basic use of digital technology and simultaneously considered it to be relatively important to act as a digital role model for students, as well as to fulfill the dual didactic task. However, it seems difficult to pinpoint one specific reason educational policy concerned with digital technology and PDC seemed to exist somewhat in parallel with the everyday educational practice at this TE institution, yet the two aforementioned conditions – low level of PDC and too little experience using digital technology in teaching – are probably part of the problem. Perhaps Cuban's (2001) words, "oversold and underused" – meaning that faith and money is placed in digital technology for educational purposes, but less attention is given to how educational activities can be enhanced with such technology – are still relevant in Swedish TE.

A third possible condition could be the unclear possibilities for CPD in PDC (Amhag et al., 2019; Livingstone, 2016). CPD was discussed in terms of the technology-pedagogy support needed for the teacher educators to put creative digitalised teaching ideas into practice (Krumsvik, 2011; Tondeur et al., 2012). Another challenge was the lack of CPD in PDC that targeted not only the individual teacher educators but also the collegial and organisational levels. The teacher educators felt that the leaders at the TE institution were not encouraging enough and that they did not fully pay attention to the conditions for fulfilling the dual didactic task. This can be considered a possible reason

the teacher educators experienced a lack of time for CPD, combined with difficulties in describing what such activities would be aimed at and why (cf. Tømte et al., 2013). This might also be considered a sign of the necessity for the organisational level to immediately start taking more responsibility for student teachers completing TE with the competence, skills, and confidence needed to work in tomorrow's increasingly digitalised schools.

Conclusion and further research

Based on the Swedish teacher educators' views of the conditions for successful fulfilment of their dual didactical task, it can be concluded that much work remains before the conditions needed can become a reality. Another conclusion is that this work is urgent. Here, one catalyst would be a stronger focus on digital technology and PDC at the earliest date possible, which should be thoroughly addressed at the national educational policy level for TE. This focus must trickle down into more local programmes and course curricula and in the end be manifested in the educational practices in which student teachers participate. Another catalyst would be to offer and make visible CPD activities to increase the teacher educators' individual PDC levels and support their creation of new and innovative digital teaching and learning designs and activities. A third and interrelated catalyst would be continuous work towards a scenario in which all teacher educators at the TE institution to some extent can be digital role models. Moreover, leaders of the TE institution should acknowledge and value the work of teacher educators in digitalising educational practices. In other words, leaders should place this issue high on their agenda and show an awareness of and willingness for providing teacher educators with the best individual, collegial, and organisational conditions possible to ensure that student teachers graduate from TE with the PDC needed to teach pupils in increasingly digitalised schools (cf. Uerz et al., 2018) in a way that enables them to develop the ADC needed in the society of tomorrow (Fransson et al., 2018).

Finally, as shown in the section on previous research and in the findings, the need for future research on teacher educators, PDC, and the use of digital technology in TE is extensive. However, such research must always be conducted in a reflective way, carefully considering the apparent risk of serving, or reproducing, the policy makers' intentions and thereby ending up blaming TE for not providing good enough conditions for the student teachers' PDC development.

Disclosure statement

The authors report no potential conflicts of interest.

Notes on contributors

Maria Lindfors is a Senior Lecturer, PhD, at the Department of Education at Umeå University, Sweden. Lindfors research interests concern technology enhanced learning, epistemic cognition, and digital competence in educational practices.

Fanny Pettersson is a Senior Lecturer, PhD, at the Department of Education at Umeå University, Sweden. Pettersson's research interests concern digitalization in school and higher education, professional development, digital competence and cultural-historical activity theory (CHAT).

Anders D. Olofsson is a full Professor, PhD, at the Department of Applied Educational Science, Umeå University. His main research interest is in the field of the digitalization of the K-12 school and teacher education, with a special interest in teaching, learning and professional digital competence.

Acknowledgment

The authors are thankful to the participating teacher educators for contributing to this study.

ORCID

Maria Lindfors  <http://orcid.org/0000-0002-5251-0374>

Fanny Pettersson  <http://orcid.org/0000-0003-3985-7848>

Anders D. Olofsson  <http://orcid.org/0000-0001-8409-0557>

References

- Admiraal, W., van Vugt, F., Kranenburg, F., Koster, B., Smit, B., Weijers, S., & Lockhorst, D. (2017). Preparing pre-service teachers to integrate technology into K-12 instruction: Evaluation of a technology-infused approach. *Technology, Pedagogy and Education*, 26(1), 105-120.
- Amhag, L., Hellström, L., & Stigmar, M. (2019). Teacher educators' use of digital tools and needs for digital competence in higher education. *Journal of Digital Learning in Teacher Education*, 35(4), 203-220.
- Baran, E., Canbazoglu Bilici, S., Sari, A., & Tondeur, J. (2019). Investigating the impact of teacher education strategies on preservice teachers' TPACK. *British Journal of Educational Technology*, 50(1), 357-370.
- Bäst i klassen - en ny lärarutbildning* [Best in class—A new teacher education]. (2009). <http://www.regeringen.se/content/1/c6/13/93/30/100696be.pdf>
- Bryman, A. (2015). *Social research methods*. Oxford: Oxford University Press.
- Cuban, L. (2001). *Oversold and underused: Computers in the classroom*. Oxford: Harvard University.
- Demoskop. (2016). *Lärarutbildning och digitalisering - en undersökning bland Sveriges lärarstudenter 2016* [Teacher education and digitalization—An investigation among pre-service teachers in Sweden 2016], Stockholm. Author.
- Drent, M., & Meelissen, M. (2008). Which factors obstruct or stimulate teacher educators to use ICT innovatively? *Computers & Education*, 51, 187-199.
- Förordning om ändring i högskoleförordningen (1993:100)* [Ordinance of change in the Higher Education Ordinance (1993:100)]. (2010). Svensk författningssamling [SFS]. (pp. 541), Stockholm. Swed.
- Foulgeri, T. S., Graziano, K. J., Schmidt-Crawford, D., & Slukhuis, D. A. (2017). Teacher educator technology competencies. *Journal of Technology and Teacher Education*, 25(4), 413-448.
- Fransson, G., Lindberg, J. O., & Olofsson, A. D. (2018). Adequate digital competence – A close reading of the new national strategy for digitalization of the schools in Sweden. *International Journal of Media, Technology & Lifelong Learning*, 14(2), 217-228.

- Government Bill. (2009/10:89). *Best in class - a new teacher education* [Bäst i klassen - en ny lärarutbildning]. Retrieved 2020-12-28 from <http://www.regeringen.se/content/1/c6/13/93/30/100696be.pdf>
- Gudmundsdottir, G. B., & Hatlevik, O. E. (2018). Newly qualified teachers' professional digital competence: Implications for teacher education. *European Journal of Teacher Education*, 41(2), 214–231.
- Gudmundsdottir, G. B., & Hatlevik, O. E. (2020). “I just Google it” - Developing professional digital competence and preparing student teachers to exercise responsible ICT use. *Nordic Journal of Comparative and International Education*, 4(3), 39–55.
- Gustafsson, U. (2021). this issue). Taking a step back for a leap forward – Policy formation for the digitalisation of schools from the views of Swedish national policymakers. *Education Inquiry*. doi:10.1177/0046958021991293.
- Håkansson-Lindqvist, M., & Pettersson, F. (2019). Digitalization and school leadership: On the complexity of leading for digitalization in school. *The International Journal of Information and Learning Technology*, 36(3), 218–230.
- Hanell, F. (2018). What is the ‘problem’ that digital competence in Swedish teacher education is meant to solve? *Nordic Journal of Digital Literacy*, 13(3), 137–151.
- Hrastinski, S., Olofsson, A. D., Arkenback, C., Ekström, S., Ericsson, E., Fransson, G., ... Utterberg, M. (2019). Critical imaginaries and reflections on artificial intelligence and robots in postdigital K-12 education. *Postdigital Science and Education*, 1(2), 427–445.
- Instefjord, E., & Munthe, E. (2016). Preparing pre-service teachers to integrate technology: An analysis of the emphasis on digital competence in teacher education curricula. *European Journal of Teacher Education*, 39(1), 77–93.
- Instefjord, E., & Munthe, E. (2017). Educating digitally competent teachers: A study of integration of professional digital competence in teacher education. *Teaching and Teacher Education*, 67, 37–45.
- International Society for Technology in Education. (2008). ISTE standards for teachers. <http://www.iste.org/standards/iste-standards/standards-for-teachers>
- Jackson, A., & Burch, J. (2019). New directions for teacher education: Investigating school/university partnership in an increasingly school-based context. *Professional Development in Education*, 45(1), 138–150.
- Johnson, J. M. (2001). In-depth interviewing. In J. F. Gubrium & J. A. Holstein (Eds.), *Handbook of interview research. Context & method* (pp. 103–119). Thousand Oaks, California: SAGE.
- Krumsvik, R. J. (2011). Digital competence in Norwegian teacher education and schools. *Högre Utbildning*, 1(1), 39–51.
- Krumsvik, R. K. (2014). Teacher educators' digital competence. *Scandinavian Journal of Educational Research*, 58(3), 269–280.
- Livingstone, K. (2016). Teacher education's role in educational change. *European Journal of Teacher Education*, 39(1), 1–4.
- Lund, A., Furberg, A., Bakken, J., & Engeliën, K. L. (2014). What does professional digital competence mean in teacher education? *Nordic Journal of Digital Literacy*, 9(4), 281–299.
- McGarr, O., & McDonagh, A. (2019). Digital competence in teacher education. Output 1 of the Erasmus+ funded developing student teachers' digital competence (DICTE) project. <https://dicte.oslomet.no/>
- Olofsson, A. D., Fransson, G., & Lindberg, J. O. (2019). A study of the use of digital technology and its conditions with a view to understanding what ‘adequate digital competence’ may mean in a national policy initiative. *Educational Studies*, 46(6), 727–743.
- Pedro, A., Piedade, J., Matos, J. F., & Pedro, N. (2019). Redesigning initial teacher's education practices with learning scenarios. *The International Journal of Information and Learning Technology*, 36(3), 266–283.
- SFS 2010:541. *Ordinance of change in The Higher Education Ordinance* (1993:100) [Förordning om ändring i högskoleförordningen (1993:100)]

- Government Decision I:1, Supplement to Government Decision. 2017. Nationell Digitaliseringsstrategi För Skolväsendet [National Digitalisation Strategy for the School System]. Dnr U2017/04119/S. Stockholm: The Swedish Ministry of Education and Research.
- Government Bill. (2009/10:89). Best in class - a new teacher education [Bäst i klassen - en ny lärarutbildning]. Retrieved 2020-12-28 from <http://www.regeringen.se/content/1/c6/13/93/30/100696be.pdf>
- Swedish Association of Local Authorities and Regions (SALAR). (2019). #skolDigiplan Nationell handlingsplan för digitalisering av skolväsendet [#skolDigiplan National plan of action for the digitalisation of school]. Sveriges Kommuner och Regioner. Retrieved from <https://issuu.com/sverigeskommunerochlandsting/docs/7585-773-2>
- The Higher Education Ordinance. (1993). including appendix on the act on amendment of the higher education ordinance (2018:1503). Swedish Ministry of Education and Research (pp. 100). (Swed.).
- Tømte, C., Kårstein, A., Enochsson, A.-B., & Buskqvist, U. (2015). Educating online student teachers to master professional digital competence: The TPACK-framework goes online. *Computers & Education*, 84, 26–35.
- Tømte, C., Kårstein, A., & Olsen, D. S. (2013). *IKT i lærerutdanningene – På vei mot profesjonsfaglig digital kompetanse?* [ICT in teacher education—Toward a professional digital competence?]. Nordic Institute for Studies in Innovation, Research and Education, Oslo, Norway.
- Tondeur, J., Aesaert, K., Pynoo, B., van Braak, J., Fraeyman, N., & Erstad, O. (2017). Developing a validated instrument to measure preservice teachers' ICT competencies: Meeting the demands of the 21st century. *British Journal of Educational Technology*, 48(2), 462–472.
- Tondeur, J., Roblin, N. P., van Braak, J., Fisser, P., & Voogt, J. (2013). Technological pedagogical content knowledge in teacher education: In search of a new curriculum. *Educational Studies*, 39(2), 239–243.
- Tondeur, J., Roblin, N. R., van Braak, J., Voogt, J., & Prestridge, S. (2017). Preparing beginning teachers for technology integration in education: Ready for take-off? *Technology, Pedagogy and Education*, 26(2), 157–177.
- Tondeur, J., Scherer, R., Baran, E., Siddiq, F., Valtonen, T., & Sointu, E. (2019). Teacher educators as gatekeepers: Preparing the next generation of teachers for technology integration in education. *British Journal of Educational Technology*, 50(3), 1189–1209.
- Tondeur, J., van Braak, J., Sang, G., Voogt, J., Fisser, P., & Ottenbreit-Leftwich, A. (2012). Preparing pre-service teachers to integrate technology in education: A synthesis of qualitative evidence. *Computers & Education*, 59(1), 134–144.
- Tondeur, J., van Braak, J., Siddiq, F., & Scherer, R. (2016). Time for a new approach to prepare future teachers for educational technology use: Its meaning and measurement. *Computers & Education*, 94, 134–150.
- Uerz, D., Volman, M., & Kral, M. (2018). Teacher educators' competences in fostering student teachers' proficiency in teaching and learning with technology: An overview of relevant research literature. *Teaching and Teacher Education*, 70, 12–23.
- United Nations Educational, Scientific and Cultural Organization. (2011). UNESCO ICT competency framework for teachers. <http://unesdocunesco.org/images/0021/002134/213475E.pdf>
- Voithofer, R., Nelson, M. J., Han, G., & Caines, A. (2019). Factors that influence TPACK adoption by teacher educators in the US. *Educational Technology Research and Development*, 67(6), 1427–1453.
- Vongkulluksn, V. W., Xie, K., & Bowman, M. A. (2018). The role of value on teachers' internalization of external barriers and externalization of personal beliefs for classroom technology integration. *Computers & Education*, 118, 70–81.

Appendix A. Mandatory educational science courses

Learning and Teaching (7.5 course credits)

Knowledge, Science and Research Methodology (7.5 course credits)

Ethics, Democracy, and the Heterogeneous Teaching Environment (7.5 course credits)
 Preschool Teacher as a Profession (6 course credits)
 Professional Aspects of Teaching (6 course credits)
 Secondary School Teacher as Profession (6 course credits)
 Preschool Teachers' Professionalism for Preschool (7.5 course credits)
 Leisure-time Pedagogues' Professionalism (7.5 course credits)
 Research-based Professional Development for Early-Years Classes and Grades 1–3 (7.5 course credits)
 Research-based Professional Development for Grades 4–6 (7.5 course credits)
 Research-based Professional Development (7.5 course credits)
 Educational Science, Teaching, and Learning for Preschool (8 course credits)
 Educational Science, Teaching, and Learning for Primary School – Extended School (8 course credits)
 Educational Science, Teaching, and Learning for Primary School (8 course credits)
 Educational Science, Teaching, and Learning (8 course credits)
 Special Needs Education for Preschool (6 course credits)
 Special Needs Education for Primary School (5 course credits)
 Special Education – Secondary and Upper Secondary Level (5 course credits)
 Assessment for Learning for Preschool (10 course credits)
 Assessment for and of Learning for Primary School (11 course credits)
 Assessment for and of Learning for the Secondary and Upper Secondary Level (11 course credits)

Appendix B. Interview guide

- Technology competences** • General ICT competence
- How comfortable are you in using ICT in everyday life? Describe and give examples.
 - How comfortable are you in using ICT at work/in your profession (administration, teaching, communication)? Describe and give examples.

Beliefs about teaching and learning with technology

- How/what do you think about ICT in teaching and learning within TE? (Elaborate on the importance, opportunities, challenges, etc.)
- What is the role of TE when it comes to digitalisation in/of school, now and in the future?
- Are there any requirements/demands for being a digitally competent teacher educator? Elaborate.
- In research, teacher educators are sometimes described as “second-order teachers/role models for their students in teaching with technology as well as in fostering students’ technological literacy.” Can you describe what you think about such statements?

Competences for pedagogical and educational technology use

- Can you describe and give examples of how you use ICT in your teaching?
- Does the use of ICT influence how you conduct/visualize/explain/elaborate on the teaching and learning content in class? Describe and give examples.
 - Elaborate on how your use of ICT in different ways might influence (or not influence) students’ development of PDC to be used in their future profession.
- Have you seen any writings in courses, tasks, or assignments that aim to enhance students’ development of PDC and use of ICT? If so, please describe and exemplify.

- In relation to the National Digitalisation Strategy for the School System, can you elaborate on how your TE prepares or does not prepare the student teachers to meet and act in a future digitalised school?

Competences for innovation and professional learning

- Do you perceive your PDC to be sufficient for leading digital development work in teaching and learning practices/in your TE? Why/why not?
- Are there any ICT infrastructures, technical, or pedagogical support at your institution? If yes, describe and elaborate.
- Are there any possibilities for CPD in PDC and use of ICT in teaching and learning practices? If yes, describe their content, structure, and meaning.
- Have you experienced any collaboration between colleagues when it comes to PDC and use of ICT in the classroom? Describe and provide examples.