



Research paper

Teacher educators' professional agency in facilitating professional digital competence

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ABSTRACT

This study builds on a comprehensive conceptualisation of teachers' professional digital competence (PDC) that goes beyond the use of technology for teaching and learning. We investigate teacher educators' facilitation of not only generic and didactic digital competence but also profession-oriented and transformative aspects. Drawing on professional agency, we analysed interviews with teacher educators in Norway. Most of them neglected the profession-oriented and transformative PDC aspects. The interplay of teacher educators' competence, colleagues, task perception, and course descriptions contributes to their PDC facilitation. The findings imply the need to move beyond the tool focus and increase collaboration among teacher educators.

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1. Introduction

In this article, we explore and contribute to conceptualising teacher educators' professional agency in light of digitalisation. More precisely, we address the extent to which teacher educators facilitate student teachers' development of professional digital competence (PDC). Furthermore, we explore factors that influence this facilitation by drawing on the concept of agentic space.

Digitalisation not only influences the subject matter and the ways of teaching and learning but also poses questions concerning ethics and epistemology (Krutka et al., 2019; Lund & Aagaard, 2020). Teacher educators prepare prospective teachers for a rapidly changing profession (Tondeur et al., 2020). Even though some studies and reports show that teacher education has made progress in preparing students for teaching with ICT, teacher education is still criticised for not sufficiently training future teachers to cope with the challenges of using digital technology in education (Guðmundsdóttir & Hatlevik, 2018; Napal Fraile et al., 2018; Nelson et al., 2019). As teachers of teachers, teacher educators are expected

to teach not only the subject matter but also the craft of teaching (Lunenberg et al., 2014; Murray & Male, 2005). PDC is required to cope with the impact of digitalisation on the subject matter and the craft of teaching. This study addresses the need for more research on PDC in teacher education (Mørk Røkenes et al., 2022; Starkey, 2020; Voithofer et al., 2019).

This study builds on a comprehensive understanding of PDC. PDC encompasses several intertwined competence areas, including *generic digital competence* in the use of digital tools, via pedagogical and *didactical digital competence*, competence in teaching one's subject, and *profession-oriented digital competence*, which is concerned with digital responsibility and awareness of changes in subjects and roles as well as in society and epistemic practices. There is also *transformative digital agency*, the competence to act and transform one's practices by choosing and using appropriate digital tools (Brevik et al., 2019; Guðmundsdóttir & Hatlevik, 2020; Nagel, 2021).

Transforming work practices, developing new knowledge and skills or opposing suggested changes and keeping existing practices implies professional agency (Goller & Harteis, 2017). Professional agency is afforded or constrained by personal factors, such as knowledge, identity, experience, or attitudes, and contextual factors, such as material circumstances, physical artefacts, work cultures, or power relations (Eteläpelto et al., 2013). These factors form

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an agentic space that, depending on its size, provides room to choose one's actions (Oolbekkink-Marchand et al., 2017). Research exploring teacher educators' professional agency is limited, and contributions to the theoretical and empirical understandings of the multifaceted nature of professional agency are needed (Hinojosa, 2020). Thus, this qualitative study is guided by the following research questions:

1. To what extent do teacher educators facilitate student teachers' development of PDC?
2. How does teacher educators' agentic space appear in their reflections on facilitating student teachers' development of PDC?

Norway is an internationally interesting and relevant case for exploring PDC facilitation in teacher education and the factors influencing teacher educators' professional agency. It is a digitally mature country with a high level of digitalisation in its economy and society (OECD, 2017). Educational authorities have emphasised digital competence in policy documents more than in other Scandinavian countries (Erstad et al., 2021; Lisborg et al., 2021). A major initiative to support teacher educators in preparing students for being teachers in a digital society was a framework for teachers' PDC, which was introduced in 2017 (Kelentric et al., 2017). Centralised financial efforts were also made between 2018 and 2020 to support the implementation of PDC in various teacher education institutions (Mørk Røkenes et al., 2022). Nevertheless, Norwegian teacher education has also been criticised for insufficient attention to PDC in teacher education (Guðmundsdóttir & Hatlevik, 2018, 2020; Hjukse et al., 2020).

In the following sections, we briefly clarify the concepts of PDC and teacher educators' professional agency before presenting the research design and methods.

2. PDC in teacher education

2.1. From digital literacy to digital competence to PDC

In research, policies, and standards, several terms describe the skills and competences needed to participate in a digital society. Usually, the concepts combine a domain part, such as digital or ICT, and a knowledge perspective, such as skills, competence, or literacy (Hatlevik et al., 2015). However, the different terms overlap in content and are used interchangeably (Hathaway et al., 2023). In a review, Ilomäki et al. (2016) found that the most common terms are digital literacy, new literacies, multiliteracy, media literacy and digital competence. Digital competence is a new term in research and encompasses a broad understanding of literacy concepts. Recently, researchers (e.g. Falloon, 2020; Krutka et al., 2019) have called for moving away from a skill-focused digital literacy emphasis towards competences that also recognise knowledge and attitudes concerning the healthy, responsible, and ethical use of ICT, as well as an understanding of the role digital technology plays in society. Digital competence also encompasses competences that fall under the umbrella of digital citizenship (Choi, 2016; Vajen et al., 2023; Örtegren, 2022).

Regardless of how these concepts are termed, most describe digital competence for general citizens, including learners, but not teachers or teacher educators (Brevik et al., 2019). However, teachers are expected to foster their pupils' digital competence, teach in increasingly technology-rich classrooms, and use digital technology for teaching and learning purposes. Therefore, teachers' and teacher educators' digital competence includes "both generic and specific teaching-profession skills" (Lund et al., 2014, p. 283). As a result, scholars have begun to call these competences *professional digital competence*, referring specifically to the digital competence

necessary for the teaching profession. The term was introduced in Norway in 2013 (Tømte et al., 2013) and is rooted in Norwegian research, policy, and practice. Furthermore, PDC is increasingly used primarily in European (e.g. Heine et al., 2022; Mirete Ruiz et al., 2020; Örtegren, 2022) but also in international research (e.g. Starkey, 2020; Starkey & Yates, 2021).

Teachers' need for PDC has also been recognised in standards and guidelines worldwide. Several policies and frameworks stress the use of digital technology in education. They are guiding documents for teacher education, such as the International Computer and Information Literacy Study (ICILS) standards that are employed worldwide (Fraillon et al., 2020), the International Society for Technology in Education (ISTE; Trust, 2018) standards and the Teacher Educator Technology Competencies (TETC; Foulger et al., 2017) in the United States, the Digital Competence Framework for Educators (DigCompEdu; European Commission, 2019) in Europe, and the PDC framework (Kelentric et al., 2017) in Norway.

In the following section, we elaborate on the concept of PDC in more detail.

2.2. Teacher (educator) PDC — a concept in the making

PDC is a concept still "in the making" (Almås et al., 2021, p. 73) and encompasses several dimensions. The most prominent dimension focuses on teaching with digital tools (Skantz-Åberg et al., 2022). It relates to the TPACK model, which combines technological, pedagogical, and content knowledge (Mishra & Koehler, 2006). However, teachers' and teacher educators' PDC is more complex than integrating technology and teaching with digital tools. A development from tool-oriented to more complex theoretical PDC conceptualisations is noticeable (Tveiterås & Madsen, 2022). Several researchers have contributed to describing these more complex dimensions that teachers need to meet the requirements of technology-rich schools and digital society (e.g., Brevik et al., 2019; Falloon, 2020; McDonagh et al., 2021). In this study, we draw on the conceptualisations by Nagel (2021) and Guðmundsdóttir and Hatlevik (2018, 2020) that consider dimensions beyond technological and pedagogical competence. Nagel's (2021) conceptualisation describes PDC as composed of connected layers, as illustrated in Fig. 1. The layers can be related to Guðmundsdóttir and Hatlevik's (2018, 2020) PDC model.

The inner circle, use of digital tools, describes the basic use of digital tools: *generic digital competence*. Considering recent discussions on artificial intelligence, particularly chatbots, the inner circle covers knowing *how* to operate a chatbot. The next set of circles in Fig. 1—subject-specific pedagogical and didactic use (using digital tools considering pedagogy and methods specific to the subject) and promoting pupils' digital skills—cover *didactic-digital competence*. In the context of chatbots, these circles involve, for instance, a teacher's or teacher educators' competence in designing lessons or creating lesson materials with the help of a chatbot. Moreover, these circles cover teachers' competence in showing pupils the various possibilities offered by chatbots, such as improving the quality of a text and discussing risks, such as not knowing the origin of the chatbot's sources or their accuracy.

The outer circles of the figure—awareness and enactment of digital responsibility, understanding of digitalisation's influence on culture, society, and democracy, the development and transformation of subjects and roles, and awareness and understanding of implications for epistemic practices—refer to what Guðmundsdóttir and Hatlevik (2018, 2020) call *profession-oriented digital competence*. These circles ask for complex reflection. In the case of using a chatbot, they encompass ethical considerations on, for example, copyright and accountability—that is, who is the author eventually and responsible for the result? Furthermore, they

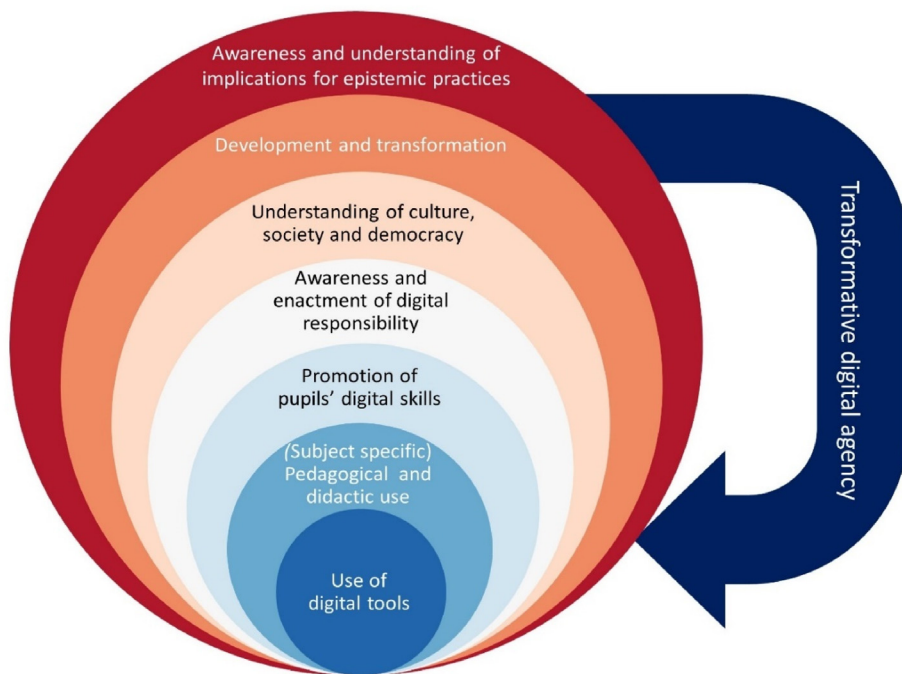


Fig. 1. Teacher educators' professional digital competence
 Note: Source, Nagel (2021).

highlight the need for awareness of how, for example, fake news or deep fakes created with the help of artificial intelligence influence society. In particular, the outer circle is concerned with where knowledge is located when working with a chatbot and how these practices change how we work and think.

Relating to Brevik et al. (2019), Guðmundsdóttir and Hatlevik (2020) also suggested that *transformative digital agency* is a dimension of PDC.

Transformative digital agency captures (student) teachers' competence in taking initiatives and transforming their practices by selecting and using relevant digital tools. It arises as a necessity when (student) teachers are placed in demanding situations involving challenges or a conflict of motives, thus creating a wish or need to break out of the current situation. (Brevik et al., 2019, p. 4, p. 4)

The researchers (Brevik et al., 2019; Guðmundsdóttir & Hatlevik, 2020; Nagel, 2021) agreed that the PDC dimensions are not separate but connected, intertwined, and mutually constitutive. However, Nagel (2021) pointed out that transformative digital agency is based on the awareness that subjects and roles, as well as epistemic and thus educational practices, are changing. This focus on agency highlights that humans have the possibility to decide if and how to use digital tools. The tools do not determine their actions. Considering chatbots, transformative digital agency encompasses the ability to transform how one employs a chatbot in teaching and assessing pupils' work based on reflections, such as those named above, concerning profession-oriented digital competence. Teachers and teacher educators who have not developed these PDC dimensions may feel determined by technology and unable to handle the constant advances of technological development in school and society.

2.3. The extent of teacher educators' facilitation of student teachers' development of PDC

Concerning the extent to which PDC is addressed in teacher education, generic and didactical digital competence seems to be the principal focus of research and practice. Several studies worldwide focus on instructional technology and technology integration in teacher education (e.g. Agyei, 2013; Ning et al., 2022; Tondeur et al., 2020). Only a few studies address how digital citizenship or ethical awareness can be fostered in teacher education (e.g., Dabner, 2015). However, several studies highlight the missing profession-oriented and transformative dimensions of PDC. For example, a study from Spain revealed a limited focus on ethical issues when integrating ICT into teacher education (Novella-García & Cloquell-Lozano, 2021). Similarly, studies from Sweden (Örtengren, 2022) and Canada (Hui & Campbell, 2018) ask for increased emphasis on digital citizenship. Also, researchers from the United States call for technoethics and generally more ethical, democratic, and legal explorations of technologies in teacher education (Krutka et al., 2019).

Similarly, studies from Norway show that, generally, few teacher educators address PDC in their teaching (Tømte et al., 2015) and that the focus lies on the use of digital resources for teaching while, for instance, ethical or societal issues are neglected (Hjukse et al., 2020). However, there are also examples from Norway in which profession-oriented and transformative dimensions of PDC are addressed. Brevik et al. (2019) integrated PDC into a small, personal online course to foster transformative digital agency. Aagaard et al. (2022) reported that PDC and transformative digital agency might be developed by placing student teachers in challenging situations.

The following section provides a background on the factors that affect the extent to which teacher educators address PDC in their teaching.

2.4. Factors influencing teacher educators' facilitation of student teachers' PDC development

Several studies have explored the factors influencing teacher educators' facilitation of students' PDC. Research has identified teacher educators' deficiencies in knowledge and skills as a barrier to PDC integration (Amhag et al., 2019; Lindfors et al., 2021; Uerz et al., 2018). Teacher educators generally have a positive attitude towards digitalisation, which contributes to integrating digital technology into their teaching (Cattaneo et al., 2022; Lindfors et al., 2021; Madsen et al., 2018). Furthermore, educators' task perception—the personal understanding of tasks they see as or refuse to accept as part of their job (Kelchtermans, 2009)—plays an important role (Fransson et al., 2019). Moreover, teacher educators consider and conform to concrete formulations in policies that expect them to equip student teachers with PDC (Ifinedo & Kankaanranta, 2021; Madsen, 2020). Teacher educators from different subject disciplines address PDC differently (Hjukse et al., 2020). For example, educators in natural sciences may use computers more frequently than social sciences teachers, who most likely do not “perceive knowledge of technology as relevant for teaching their subjects” (Ifinedo et al., 2020, p. 9).

Professional agency allows exploring the interplay of several factors that influence how teacher educators facilitate students' PDC. In the following section, we offer an introduction to the concept.

3. Teacher educators' professional agency

Agency is understood as individuals' opportunity and capacity to act and influence something (Emirbayer & Mische, 1998; Goller & Paloniemi, 2022; Rajala et al., 2016). In social and educational research, agency refers to how individuals influence developmental and learning processes. However, it may also be interpreted as a relational factor mediating between the individual and the context and shaping how humans interact with the environment (Goller & Paloniemi, 2022). In line with other researchers, we see agency as what is done, exercised, or achieved rather than a prerequisite or character trait (Biesta et al., 2015; Goller & Harteis, 2017). *Professional agency* is exercised when professionals make choices and decisions that influence their work and act on them—or choose not to act (Eteläpelto et al., 2013). Thus, agency is related to specific outcomes (Goller & Harteis, 2017) and is, for example, practised when people try to transform work practices, oppose suggested changes and keep existing practices, or develop new knowledge and skills. Agency may change the socio-cultural circumstances in which it is negotiated—that is, worked out and formed—while being constrained and afforded by these circumstances (Eteläpelto et al., 2013).

Research on professional agency in education focuses on schoolteachers (e.g., Biesta et al., 2015, 2017; Juutilainen et al., 2018; Oolbekkink-Marchand et al., 2017). A meta-analysis revealed that teachers had *weak* or limited agency concerning their possibilities of influencing their work at the municipal or organisational level (Vähäsantanen, 2015). However, when confronted with reforms, teachers' professional agency became *stronger* and ranged from *reserved*—when teachers performed the minimum required activities—to *progressive*—when teachers approved the reform or suggested change and engaged actively and innovatively (Vähäsantanen, 2015).

Professional agency has the potential to enhance understanding of professionals' choices and decisions concerning their work. Such understanding offers implications for how teacher educators' work can be influenced and supported. Conceptually, teacher educators' professional agency is perceived, on the one hand, as intertwined

not only with socio-cultural conditions but also with organisational and situational demands, such as policy mandates, curriculum guidelines and national standards (Hinostroza, 2020). On the other hand, it is entangled with the individual teacher educator's professional interests, values, and background (Hökkä & Vähäsantanen, 2014). As Hinostroza (2020) summarised:

Teacher Educators' Professional Agency encompasses innovation and creativity but also resistance and rejection. Located and enabled by structural contexts as well as time-embedded, agency and professional agency emerge as continual reflexive processes to negotiate their [teacher educators'] own contingencies individually or through a web of relations with others. (p. 5)

Empirical studies on teacher educators' professional agency have mainly investigated four entangled themes (Hinostroza, 2020): education policies (e.g., Bourke et al., 2018; Ellis et al., 2014; Henning et al., 2018), professional development (e.g., Edwards-Groves, 2013; Hökkä et al., 2017; Ping et al. 2018), and identity (e.g., Chaaban Y. et al., 2021; Hökkä & Vähäsantanen, 2014; Roumbanis Viberg et al., 2021), and social justice (e.g., Halai & Durrani, 2017; Shealey et al., 2014). A study on Swedish teacher educators that explored the perception of professional agency in digital society found that teacher educators perceived having both autonomy and space, enabling them to exercise agency by rejecting changes to their current work practices (Roumbanis Viberg et al., 2021). Furthermore, Vähäsantanen et al. (2020) investigated professional agency in a Finnish higher education institution and found that academic staff had a high degree of freedom that offered them the option of following their professional interests and values. These two studies (Roumbanis Viberg et al., 2021; Vähäsantanen et al., 2020) indicate that the perception of agentic space is crucial for agency negotiation.

3.1. Agentic space

To understand the formation of teacher educators' professional agency, we draw on the idea of agentic space (Oolbekkink-Marchand et al., 2017; Priestley et al., 2016). Agentic space describes the room for manoeuvre, making decisions, and acting upon them. It is formed by the interplay of factors that influence agency, such as professional knowledge, rules, work history, experience, power relations, and work cultures. When negotiating agency, teachers evaluate their agentic space, decide how to act within it, and influence and transform it (Oolbekkink-Marchand et al., 2017). To understand why teacher educators facilitate student teachers' development of PDC the way they do, we analysed teacher educators' reflections. We examined how they perceive and describe their agentic space and its formation. The concept of agentic space has received little attention, and we hope to contribute to a better understanding of teacher educators' professional agency by discussing the formation of agentic spaces through modalities of agency.

3.2. Modalities of agency

Inspired by earlier studies on agency (Hilppö, Lipponen, Kumpulainen, & Rainio, 2016; Impedovo, 2016), we examine how teacher educators perceive their agentic space through six different modalities. Modalities of agency build on narrative semiotics in general (Fontanille, 2006; Greimas & Porter, 1977), and particularly on the work of Jyrkämä (2008), who suggested a framework focusing on six modalities and their interrelation to describe how agency emerges. The six modalities—to want, to know, to be able, to

have to, to feel, and to have the possibility to—are illustrated and briefly explained in Fig. 2.

We use these six modalities as an analytical tool to explore how teacher educators' agentic space is formed. They relate to the definition of professional agency as capability (to be able to, to have the possibility), capacity (to know), and will (to want) to make choices and act upon them (Eteläpelto et al., 2013), and allow for operationalisation in connection to different factors influencing (to feel) or constraining (have to) it. The modalities position the actor in relation to objects or actions; they are considered prerequisites for transforming one's actions and describing a "condition of realisation" (Fontanille, 2006, p. 115), thus shaping people's agentic space.

4. Methods

This qualitative study builds on interview data to highlight teacher educators' views and ways of facilitating students' PDC, including teacher educators' perceived factors influencing their choices and actions.

4.1. Method and dataset

The empirical data consisted of interviews with 18 teacher educators from six teacher education institutions in Norway. We decided to target our sample of teacher educators from the same type of teacher education programme. We invited all 13 teacher education institutions offering a five-year integrated master's programme preparing students for teaching in grades 5–10 (children aged 10 to 15) to participate. Eight of the 13 institutions accepted our invitation. From the eight institutions, we selected six based on two main criteria: a) variation in student population (accepting from 60 to 150 students per year) and b) geographical location in the country. The third criterion was to include at least half of the participating institutions that, in 2018, received targeted

funding from the educational authorities (the Norwegian Directorate for Education and Training) for three-year R&D digitalisation projects.

The interviews took place in the autumn of 2021 on the video platform Zoom. The length of the interviews varied from 25 to 83 min, amounting to a total of 16 h and 57 min. Table 1 provides an overview of the participants. All participants provided informed consent.

The semi-structured interview guide addressed both teacher educators' prior experience with technology, digital competence and how they address PDC in their teaching. Additionally, the participants were presented with statements that initiated reflections about digital competence in general, their roles and responsibilities, and questions on context (institutional factors, colleagues). Examples of statements during the interviews are: "When addressing digital competence, I stick to the course description" and "We discuss digital competence and how we address it in our teaching with colleagues". The statements were shared on the screen during the interviews and followed up with questions. Using statements, or "provokers", stimulated the discussion and challenged the participants to reflect on "established meanings, conventions and practices" (Törrönen, 2002, p. 345). The complete interview guide, with all statements used and the follow-up questions, is attached in the Appendix (see Table 5). The interview recordings were transcribed verbatim.

4.2. Analytical strategy

The analysis was inspired by Braun and Clarke's (2006, 2019, 2020) approach to thematic analysis. Thematic analysis allows for a reflective approach in which the researcher actively creates themes of interest, searches for patterns, and goes beyond the description of content (Braun & Clarke, 2019, 2020). The analysis was conducted in two steps, with slightly different approaches targeting the two research questions.

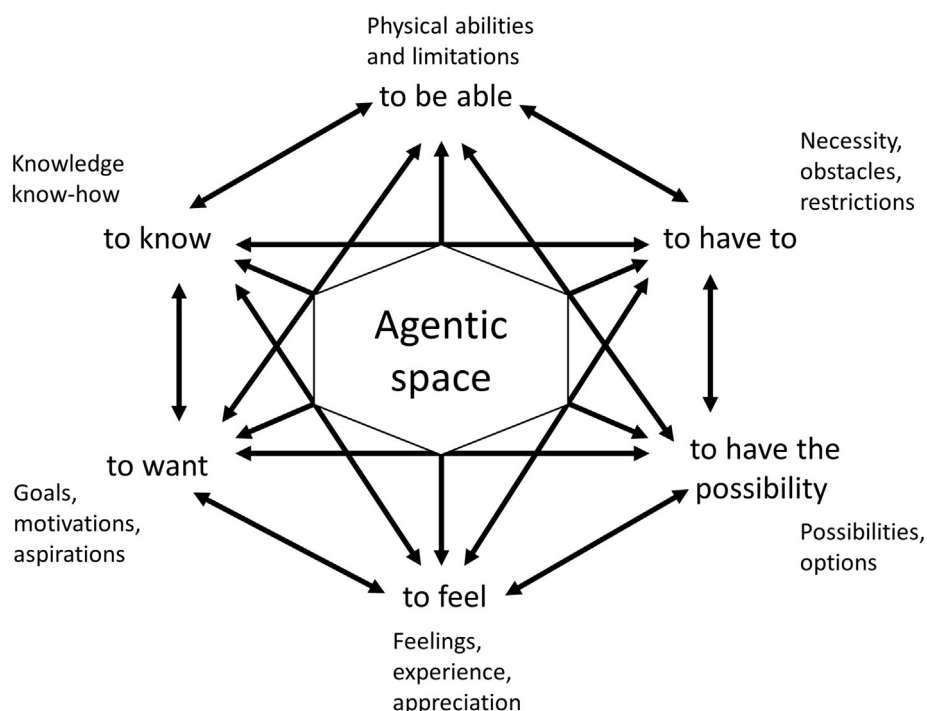


Fig. 2. Formation of Agentic Space through Modalities of Agency
 Note: Source, Jyrkämä (2008), translated into English and adapted by the authors.

Table 1
Overview of participants.

Name (Pseudonym)	Institution	Subject	Work experience in years
Peter	TEI 1	Natural Sciences	6
Robert	TEI 1	Religion and Ethics	25
Olivia	TEI 1	English	5
Mary	TEI 2	Social Sciences	12
Sarah	TEI 2	Religion and Ethics	20
Christin	TEI 2	Pedagogy	5
Marcus	TEI 3	Mathematics	3
Sebastian	TEI 3	Natural Sciences	15
Charles	TEI 3	Norwegian	4
Mathew	TEI 4	Norwegian	6
Agatha	TEI 4	Pedagogy	17
Elizabeth	TEI 4	Social Sciences	14
David	TEI 5	Norwegian	4
Susan	TEI 5	English	17
Ian	TEI 5	Mathematics	4
Michael	TEI 6	Natural Sciences	5
Jonas	TEI 6	Social Sciences	3
Sandra	TEI 6	Social Sciences	10

Note: Table 1 shows the participants, their teacher education institution (TEI), teaching subjects, and work experience as a teacher educator.

We conducted an initial inductive coding to become familiar with the data and identify overall themes relevant to the research questions, such as *teaching, course descriptions, school, and society*. To answer RQ1 (To what extent do teacher educators facilitate student teachers’ PDC development?), we followed an abductive approach to thematic analysis (van Maanen et al., 2007). We examined the transcripts, focusing on parts that were initially coded with categories related to *teaching*. We went forth and back between Nagel’s PDC model (2021) and the data and created four themes: (1) *use of digital tools*, (2) *(subject-specific) pedagogical and didactical use*, (3) *awareness and enactment of digital responsibility*, and (4) *understanding of culture, society, and democracy*. During this abductive process, we were open to new impressions and found additional sub-themes that were not mentioned in the earlier literature, such as *no technical details*. Sometimes, the distinctions between the themes were blurred. For example, when re-visiting the transcripts in which teacher educators talked of explicit tools (e.g., Microsoft Word), we had to decide whether they talked of mere *use of a tool* (track changes feature) or if they described how they developed students’ *didactic* competence focusing on learning with digital tools (using Word for collaborative writing and engaging the students in meta discussions reflecting on the learning process). When in doubt, we discussed these issues and came to a mutual understanding. All the themes and sub-themes are described in the Findings section. To answer RQ2 (How does teacher educators’ agentic space appear in their reflections on facilitating student teachers’ development of PDC?) we conducted a thematic analysis using modalities of agency (Jyrkämä, 2008) as an analytical lens, as illustrated in Table 2.

Table 2
Analytical framework for exploring modalities of agency.

Modality	Definition	Analytical description
to want	What a person wants to do; their motivations, goals and aspirations	Expressing what the person wants (or does not want) to achieve or plans to do
to know	A person’s knowledge, understanding and know-how	Describing the person’s knowledge, understanding and awareness (or lack thereof), skills and know-how (or lack thereof)
to be able	Physical abilities and limitations	Describing a persons’ physical ability to do something
to have to	Something the person has to do	Referring to necessities, obligations, expectations, restrictions and rules set by the person him/herself or others
to feel	Feelings and experiences	Dealing with attitudes, what is important (or not) to the person; what is appreciated, interesting, difficult, or frustrating; how situations are experienced
to have the possibility	Indicating possibilities to do something in a given situation	Describing situations in which the context or external structures offer the person the possibility or opportunity to do something, make choices, or influence the surrounding structure

We constructed sub-themes within five of the six modalities. The modality *to be able to* focuses on physical abilities, which were irrelevant and therefore excluded from our analysis. The analysis was an iterative and circular process of considering the initial themes, reading the interview transcripts repeatedly, and discussing them considering the modalities. When rereading a statement, a modality was assigned, followed by a code. For example, the statement “Nothing is blocking your way to do more than it says there [in the course description]. You choose your teaching methods” was related to the modality *have the possibility*. The first part of this statement was coded as *curricula*, and the second part as *freedom of methods*. First, all authors coded two interviews independently and discussed the results to develop a common understanding. Then, one author continued the analysis of the remaining 16 interviews. When themes and codes needed clarification, we discussed them together. Lastly, we conducted a final round of reviews and merged some sub-themes into one. For instance, *course description vague* and *course description revision* within the modality *have the possibility* became the theme *course description*. This process resulted in a total of 30 themes. Some themes (*course descriptions, colleagues, task perception, and programme structure*) appear across the modalities. An overview and description of the themes can be found in the Findings section.

5. Findings

In what follows, we present our findings, starting with the extent to which teacher educators facilitate student teachers’ PDC development (RQ1). We continue by describing the teacher

educators' reflections on the facilitation of student teachers' PDC considering modalities of agency and shed light on the formation of the teacher educators' agentic space (RQ2) in which agency is negotiated.

5.1. The extent to which teacher educators facilitate student teachers' development of PDC

The thematic analysis of the interviews focusing on the extent to which the teacher educators addressed PDC revealed a diverse picture that is summarised in Table 3 and exemplified in the text below.

Most teacher educators were concerned with the general (1) use of digital tools, and they listed the tools they use. In their teaching, the teacher educators mostly used Microsoft Office tools, Zoom, and the learning management system Canvas. However, most of the interviewed teacher educators emphasised that it was not their task to teach the students how different programs worked and which buttons to press. David, for example, said, "They may play with them and find out how they work, watch on YouTube how they can do it". The teacher educators expressed that students needed to be able to transfer their technological knowledge to new tools and that it was essential to know how to teach and learn with the tools and how to employ them when designing lessons. Thus, they focused on (2) (subject-specific) pedagogical and didactical use, aimed at employing digital tools and methods useful to reach the subject's learning goals and to engage students in active participation, such as the flipped classroom, student response systems, virtual reality, games, and production of podcasts and videos. The teacher educators teaching mathematics highlighted programming and simulations. The ones teaching Norwegian and English discussed multimodal texts, collaborative writing, and digital storytelling. Most teacher educators emphasised their critical approach to teaching and learning with digital tools; they contrasted digital and analogue teaching methods and discussed possibilities and challenges with their students. Some also addressed (3) awareness and enactment of digital responsibility. For example, teacher educators addressed ethical issues and netiquette in social sciences, pedagogy, religion and ethics. Many participants stated that they were concerned with evaluating sources, correct citations, and copyright. Those in social sciences also worked on topics related to (4) understanding of culture, society, and democracy, such as digital citizenship and pupils' digital culture.

Summarising the PDC dimensions addressed, we can state that the teacher educators focused on the inner layers of Nagel's (2021) PDC model. This means that primarily generic and didactic digital competence were addressed. Only a few teacher educators referred to profession-oriented competence, and aspects related to transformative digital agency in their teaching were rarely mentioned. In addressing didactic digital competence, the teacher educators focused on what was conducive and fitting for their subject; thus, many had a clear subject-specific focus.

Table 3
Extent of teacher educators' facilitation of student teachers' PDC.

Theme	Codes
(1) use of digital tools	No technical details, Tools used
(2) (subject-specific) pedagogical and didactical use	Critical reflection (analogue vs digital teaching) Collaborative writing, Flipped classroom, Digital storytelling, Programming, Simulation, Podcast production, Video production, Multimodal production, Wiki production, Blogging
(3) awareness and enactment of digital responsibility	Ethical issues, Netiquette, Copyright, Source Criticism
(4) understanding of culture, society and democracy	Digital citizenship, Pupils' digital life

5.2. Teacher educators' agentic space considering facilitating student teachers' development of PDC

The thematic analysis of the teacher educators' reflections on how they facilitated student teachers' development of PDC, focusing on the modalities of agency, resulted in several themes within the modalities to want, to know, to have to, to feel, and to have the possibility, as illustrated in Table 4. Below, we elaborate on the themes within each modality.

5.2.1. To want

To want consists primarily of themes expressing what the teacher educators aspired or planned to do. Some said that they would like to develop their digital competence and become more confident in using digital tools for teaching before using them with their students.

Others said they planned to engage in research projects focused on teaching and learning using digital tools.

Two teacher educators emphasised that there was too little focus on ethics and wanted to address it more often in their teaching. Susan explained, "I have a strong wish to address data literacy more. I think that this [PDC] is not only about using tools".

5.2.2. To know

To know comprises themes that describe the teacher educators' understanding of digital competence and know-how. They showed a multifaceted understanding of PDC. All interviewees said that PDC entails being able to critically evaluate and reflectively use relevant digital tools for teaching and learning. Some mentioned that there are dimensions of PDC that not every teacher educator needs that relate to subject-specific content and didactics, such as programming. Most of them reflected on the perspective of being a teacher of teachers and said that teacher educators should also enable student teachers to use digital teaching methods. Some participants added that teacher educators should also be able to teach student teachers how to foster pupils' digital skills in school. About half of the participants explicitly mentioned aspects of digital responsibility, such as netiquette, copyright, privacy, the general data protection regulation (GDPR), ethics, and being able to search for information and critically evaluate the sources. Some teacher educators also emphasised that PDC entails understanding how digital technology works and influences our society (e.g., Susan's quote above). Four participants thought PDC also involves openness towards technology and new teaching methods. Peter said, "We do not oppose testing new programmes and are not afraid of pushing buttons."

Although not directly relating it to PDC, the teacher educators expressed an understanding of digitalisation's influence on subjects, teaching, schools, and society. They described how their subjects were changing and developing in different ways. For example, new ways of narrating in computer games are relevant for language teaching. About two-thirds of the teacher educators noted that teaching and their roles have changed from teacher-centred

Table 4
Modalities of Agency in Teacher Educators' Reflections.

To Want	To Know	To Have To	To Feel	To Have the Possibility
Develop own digital competence	Varied understanding of PDC	Society and schools are digital	Attitude	Course descriptions
Research projects	Understanding of digitalisation's influence on subjects, teaching, school, and society	Part of the job (task perception)	Importance of critical reflection and critical use	Freedom of methods
More focus on ethics	Varied know-how in the use of digital tools for teaching	Institutional expectations	Possibilities and usefulness	Not addressing PDC
	Little about programme structure	School curricula	Difficulty, uncomfortable, and causing problems	Collaboration with colleagues
		Follow course descriptions	Someone else (task perception)	Access to support
		Colleagues agreed	Wish for a clear programme structure	Access to tools
		Students wish for Corona pandemic	Collaboration with colleagues	Projects
			More time and space in courses	

Note: Words in bold are themes appearing in multiple modalities.

lecturing to more student-active and group-based approaches. David pointed out that “dialogue becomes more important; lectures can be watched on YouTube at home”. They expressed having more possibilities for differentiated instruction and flexibility in organising lessons. About two-thirds of the participants addressed digitalisation's influence on society in general, including social media, filter bubbles and privacy issues.

The teacher educators expressed *varied know-how in the use of digital tools for teaching*. Most teacher educators stated that they knew how to use digital tools for teaching and how to acquire more of such knowledge. However, one-third of them also expressed that they lacked knowledge and skills, did not feel confident using social media, and did not know enough about how technology, algorithms, and artificial intelligence work.

Additionally, some teacher educators pointed out knowing *little about the programme structure* or how other subjects within teacher education worked with PDC and which dimensions they covered. Furthermore, they had an incomplete picture of cross-curricular activity days (*profesjonsdager*) focusing on PDC. They did not know what topics were addressed or how to connect them to their teaching.

5.2.3. *To have to*

To have to focuses on themes related to teacher educators feeling obliged to address PDC in their teaching. Most stated that the main reason why they had to address digital competences was because *society and school are digital*. They further explained that it is *part of the job* to be digitally competent and to develop students' digital skills. Half of the teachers also discussed experiencing *institutional expectations*; being future-oriented, and thus digital, is part of their institution's vision, and their leaders expected them to be digital and to use the digital resources available.

Furthermore, one-third of the teacher educators, primarily in mathematics and social sciences, described having to work with digital competences as part of the *school curricula*. Some also stated that they addressed digital competence to *follow the course descriptions*. If the course descriptions were vague, they integrated PDC because they discussed it with their *colleagues*, had a common understanding, and *agreed on* what to do. Michael explained, “We work together a lot, so we have a common view.”

Some teacher educators also said that they had to address PDC because the *students wished for it*. Student teachers often requested video lectures and flipped learning. In their course evaluations, they asked for variations in teaching and clearly expressed that they wanted to learn how to teach with digital tools. However, this was not always the case. Robert explained that his students were glad

he did not teach using digital tools like the other teacher educators, and he carried on without.

Finally, about half of the participants also referred to the *COVID-19 pandemic* as forcing them to use digital tools for teaching and learning.

5.2.4. *To feel*

To feel shows teacher educators' attitudes and experiences in addressing digital competence and teaching with digital tools. Two-thirds of the participants expressed a positive *attitude* towards digitalisation in education. Although not all described themselves as very digitally competent, they were interested, curious, and explored and experimented with tools for teaching and learning. Only a few teacher educators explicitly voiced a negative attitude. Sebastian only used the tools he had to use, such as Zoom during the pandemic, email or PowerPoint. Others expressed a critical attitude. Robert, for example, admitted that digital tools might be helpful but felt that many things were changing because of them, and not necessarily for the better, especially relationships. He was afraid of losing his personal connection to his students.

Others also pointed out that this fear might be one reason why almost all participants emphasised the *importance of critical reflection and the critical use* of digital tools for teaching. Ian said:

I feel that many teachers say, “We use the computers because then we can say we are digital”, but they do not use them meaningfully, and then I feel half of the point is gone. There is nothing wrong with having a book in front of a computer. [...] So, I think we shouldn't use technology for the sake of using technology. There has to be a purpose.

Similarly, many other participants said there should be a balance between digital and analogue tools in teaching. They found it vital to discuss how digital tools might influence the learning process and when to use them—or not. Almost all felt that digitalisation offered *possibilities and was useful*, making it possible to travel to different places with virtual reality, access interesting teaching materials, be more flexible and create more dynamics in the classroom. Susan elaborated, “For example, I think it is fantastic that you have tools that open up completely new processes that you cannot carry out without them”.

Nevertheless, the teacher educators also experienced teaching with digital tools as *difficult* and *uncomfortable* while also *causing problems*. Some said that they or other colleagues were afraid and out of their comfort zone when teaching with digital tools due to a lack of technical proficiency. During the Covid-19 pandemic, when

they had no choice but to go digital, they felt uncomfortable talking to black screens (when the students did not turn on their cameras) and found it challenging to engage and activate students. Some mentioned that slow, malfunctioning digital tools, especially interactive whiteboards, caused great trouble.

Regarding feeling responsible for promoting students' digital competences, some participants, as mentioned above, said it was part of their job and that they had to do it. However, almost one-third felt that *someone else* should do it. Some said that they had colleagues who were interested in digital competences and that the students would meet these colleagues during their studies. Charles explained that at his institution, PDC development was part of an overarching programme plan; thus, the responsibility was distributed; as a result, he did not take the initiative around these learning goals. His statement was closely related to those of participants who lacked and wished for a *clear structure* and overview of the development of students' PDC to ensure their progression. Furthermore, many voiced that they would like more *collaboration with their colleagues* to discuss and share tips on teaching with digital tools. Some emphasised that they needed *more time and space in courses* to integrate PDC into their teaching. Christin said, "We have discussed it a lot, how much focus we should have on the digital content at the expense of the other subject content".

5.2.5. To have the possibility

To have the possibility illustrates in what ways the surrounding structures and context make it possible to do something, make choices or influence the structures themselves. A highly discussed theme is *course descriptions*. The teacher educators agreed that the course descriptions were vague, especially regarding PDC, and many documents did not address it. There is much room for interpretation, and many teacher educators said they addressed PDC more than the course descriptions demanded. As Susan said, "Nothing is blocking your way to do more than it says there [in the course description]. You choose your teaching methods and such". However, most teacher educators had the possibility to revise the course descriptions or create them themselves. Although some teacher educators pointed out that they would like to be more concrete about PDC in the course descriptions to ensure that it was addressed, most said this was impossible because it limits the *freedom of methods*. Elizabeth explained, "We agree on the subject's content, but how you teach it is somehow seen as private". Vagueness in course descriptions and freedom of methods were also described as possibilities for *not addressing PDC*. As Charles put it, I feel that it does not say anything in my course descriptions [...]. I expect that it [digital competence] will be covered at a higher level, that digital competence will be addressed on the cross-curricula activity days without me having to address it.

Moreover, the participants emphasised the possibility of *collaborating with colleagues*. They could engage in collaborative teaching, for example, in mathematics with a focus on programming. In social sciences and pedagogy, they experimented with Minecraft and flipped classrooms. The teacher educators also talked about meetings and workshops where they could share tips and ideas. Usually, these were facilitated by one of the institutional digitalisation projects conducted at three institutions. However, some of the meetings and workshops were also initiated by the teacher educators themselves. Furthermore, different *projects* made it possible to finance tools and programmes.

Access to tools was described in various ways. Some teacher educators have access to various tools and future classroom labs to experiment with and without students. In contrast, others feel that their possibilities are limited because of GDPR or lack of access to the programmes and tools used in schools. Teacher educators also emphasised that they had the possibility to ask for and quickly

obtain *access to support and courses* for competence development if needed.

Some themes (course descriptions, colleagues, task perception, and programme structure) appear across the modalities and are further discussed below.

6. Discussion

In this study, we explored the extent to which teacher educators facilitate student teachers' development of professional digital competence (PDC). Furthermore, we explored the factors influencing this facilitation by drawing on the teacher educators' professional agency and agentic space.

6.1. The extent of PDC addressed

Generally, our findings concerning the extent to which teacher educators address PDC are in line with earlier national and international studies (e.g. Hjukse et al., 2020; Novella-García & Cloquell-Lozano, 2021; Örtégren, 2022). Teacher educators in Norway focus on facilitating *generic* and *didactic* digital competence, but few address aspects that can be related to *profession-oriented* digital competence or *transformative digital agency* (Brevik et al., 2019). This focus on generic and didactic digital competence for teaching mirrors the expectations for teacher educators outlined in the Norwegian teacher education institutions' programme and course descriptions (Nagel, 2021). Teacher educators' facilitation of students' subject-specific competence is crucial (Amhag et al., 2019; Lund et al., 2014). However, in the same way, as there are tendencies to move towards profession-oriented digital competence and transformative digital agency in the curricula (Nagel, 2021), we can find such tendencies in teacher educators' practice. For example, we found teacher educators who address ethics and children's digital lives and those that let students explore and discuss how to use digital technology and engage in changing teaching practices.

6.2. Teacher educators' agentic space

The agentic space mirrored in the teacher educators' reflections regarding the facilitation of student teachers' development of PDC was analysed by drawing on the modalities of agency. Jyrkämä's illustration (Fig. 2) demonstrates that the modalities are strongly intertwined and draw and pull one another as they form an agentic space. In general, *to have the possibility* makes the space larger and *to have to* limits it, whereas *to know*, *to want*, and *to feel* shape it further. The smaller the agentic space, the less room there is for negotiating agency. This means teacher educators have fewer choices to make and act on.

Regarding the relationships and tensions between the themes across modalities, we focus on the themes that seem crucial and offer implications for teacher education policy and practice. We first explore the role of *understanding PDC* and its relation to other themes. Then, we look at the themes across the modalities: *course descriptions*, *programme structure*, *colleagues*, and *task perception*. Lastly, we discuss the consequences of a relatively unlimited and undefined agentic space.

Understanding PDC. Academics' professional agency is related to their professional knowledge (Vähäsantanen et al., 2020). However, teacher educators' knowledge and understanding are not only essential for technology integration (cf. Lindfors et al., 2021; Uerz et al., 2018), but they are also crucial for the extent to which they address it—in both institutional policy and practice. For example, teacher educators' general *understanding of PDC* as being able to use relevant digital tools for teaching and learning makes them focus

on teaching generic and didactic digital competence in their teaching practice. Furthermore, this understanding of PDC also influences how they address PDC in their course descriptions. Traditionally, academics enjoy the freedom of methods (have the possibility); therefore, teacher educators do not want to explicitly incorporate ICT into the course descriptions (have the possibility).

Course descriptions. Course descriptions is a theme that is spread across modalities. Some teacher educators said they addressed PDC because it was explicit in their course descriptions (have to); concrete descriptions thus limited their agentic space and choice to act. However, teacher educators have the possibility of designing and revising course descriptions. Teacher educators have a greater possibility and stronger agency to influence the formal setting of their work than schoolteachers (cf. Vähäsantanen, 2015). As pointed out above, although many actively choose not, they have the possibility to change their own and colleagues' working conditions. They do not address digital teaching methods in the course descriptions and thus do not limit their agentic space. If PDC is not mentioned explicitly in the course descriptions, or if these descriptions are vague (have the possibility), teacher educators' agentic space becomes unrestricted and undefined.

Programme structure. Many teacher educators do not know how the teacher education programme is organised regarding the facilitation of PDC and wish for (to feel) a clear structure in the programmes. The often-imprecise organisation and structure open the agentic space. Some of the teacher educators interviewed thought another colleague already covered PDC or that it was addressed on extra-curricular days. Thus, they did not feel responsible for contributing to PDC facilitation; instead, they prioritised subject content. Hjukse et al. (2020) emphasised the challenge of PDC not being institutionalised and, thus, fragmented. Therefore, collaboration or coordination between the subjects is needed.

Colleagues. Some teacher educators explained they addressed PDC in their courses, even though their course descriptions were vague, since they had discussed them with colleagues and agreed on how to develop students' PDC (have to). These teacher educators chose to limit their agentic space together, which is an agentic action that influences their working conditions. Further, they regarded their colleagues as essential in sharing and discussing ideas (to feel), exploring digital tools together, or engaging in common teaching projects (have the possibility). Thus, even though colleagues can limit the space for agency, they also offer many possibilities for negotiating its form and contributing to action and transformation of teaching. Here, the relational aspect of professional agency and the role of colleagues, also described by Hinostroza (2020), comes into play.

Task perception. Some teacher educators expressed not feeling responsible for student teachers' PDC development. In contrast, others stated that they must work with PDC development because it was part of their job to educate future teachers and prepare them adequately for teaching in a setting where society and school were digital and because the school curriculum expected them to address digital competence. These teacher educators also admitted that what they expected from themselves (and colleagues) was congruent with what national policy documents indicate but that they would do it anyway. The teacher educators seemed to have a clear picture of their professional tasks and assigned policy less importance. It is remarkable that the teacher educators described their convictions and beliefs as more important and driving than policy documents when implementing PDC. This finding challenges earlier conclusions by Madsen (2020), who stated that the main reason Norwegian teacher educators integrated digital tools into their teaching was the top-down policy. It can therefore be argued whether teacher educators with such task perceptions limit their

agentic space and choices, possibly forcing themselves to facilitate PDC or if they react in a *progressive* way and employ the unrestricted and undefined agentic space teacher educators generally have.

6.2.1. Consequences of unrestricted agentic space, reserved, or progressive agency

In line with earlier findings (cf., Vähäsantanen et al., 2020; Roumbanis Viberg et al., 2021), the teacher educators in this study also perceived agentic space as unrestricted and undefined due to contextual factors, such as unclear structures and often vague institutional policy. Although it may be limited and formed through collaboration with colleagues, many teacher educators preserved this unrestricted space by not specifying PDC in their course descriptions. When the agentic space offers many possibilities, agency can take many forms, either *reserved* or *progressive*. When agency is *reserved*, teacher educators perform the minimum number of required activities (Vähäsantanen, 2015). In our study, this is the case if teacher educators' agentic space is formed by personal factors, such as the feeling that digital tools cause problems and make teacher educators uncomfortable, or if they do not perceive PDC facilitation as part of their job.

Nevertheless, teacher educators may also become *progressive* when the agentic space is perceived as large; they engage in the change process actively, innovatively, and approvingly (Vähäsantanen, 2015). Further, progressive agency is related to personal factors. Those who show a broad understanding and awareness of how digitalisation influences our society and have task perception that includes PDC development engage in and take the initiative to facilitate PDC development. Other personal factors contributing to teacher educators' progressive agency are openness towards (new) technology, recognising its usefulness, and the importance of critical discussions. Teacher educators' attitudes towards ICT are important in using and integrating digital tools in teaching (Cattaneo et al., 2022; Lindfors et al., 2021). With greater confidence in their digital skills, teacher educators also seem to move away from a deterministic view of technology towards seeing their students and themselves in control. Thus, knowledge, task perception, and attitudes are essential for teacher educators to take an active stance, transform teaching, address PDC, and foster students' digital transformative agency.

7. Conclusion and implications

This study focuses on how and to what extent teacher educators address PDC in their teaching. It sheds light on teacher educators' agentic space and agency negotiation, which underlie their practices related to PDC facilitation. Beyond extending the body of research on PDC in teacher education, this study contributes to the theoretical conceptualisation of teacher educators' professional agency by drawing on the idea of an agentic space influenced by contextual and personal factors. The main methodological contribution of this study is how it uses various modalities of agency (Jyrkämä, 2008) to understand teacher educators' agentic space.

We draw the following conclusions and implications from the findings and discussion. First, our participants' prevailing focus on generic and didactic digital competence and little attention to profession-oriented or transformative aspects imply that PDC is mainly dealt with considering the subject matter and general skills rather than viewed in all its complexity. In line with Brevik et al. (2019), we emphasise the importance of profession-oriented digital competence and transformative digital agency. We suggest that these dimensions should become an integral part of teacher educators' professional development and knowledge work, in addition to expanding their know-how in teaching and learning with digital

tools.

Second, teacher educators perceive their agentic space as large. This has implications for student teachers' PDC development, as such unrestricted agentic space allows reserved practices (cf. Vähäsantanen, 2015), and does not necessarily stimulate progression. However, our findings show that individual interest, collegial collaboration that values PDC, and/or explicit course descriptions that include PDC impact the range of PDC implementation in teacher education. The findings imply that collaboration within teacher education and discussions concerning coordinating and distributing responsibilities are crucial for PDC facilitation. Teacher educators' professionalism and task perceptions need to be raised within the teacher educator community.

7.1. Suggestions for future research

We suggest that future research explore teacher educators' task perception in greater detail, as it is crucial for the formation of agentic space and the negotiation of agency. Furthermore, research is needed on the profession-oriented dimensions of PDC and transformative digital agency, so these can be conceptualised more clearly and scaffolded. Future research that contributes further to the conceptualisation and demarcation of these dimensions will be able to change the terms we use about PDC—moving away from “the tool metaphor” that is extensively employed in language and research (Tveiterås & Madsen, 2022, p. 383) towards a more transformative and agentic understanding of the term.

8. Limitations

The study's reliance on self-reported data that mirrors the teacher educators' subjective understandings, perceptions, and reflections can be considered a limitation. Observations of classes may have nuanced the teacher educators' self-reports of how they

addressed PDC in their teaching. Observation as a method does, however, has certain limitations. These are observer disturbance and the risk of teaching for observation, but also practical concerns such as time use and logistic matters, as the teacher education institutions in our study are spread around the whole country. Further, the sample was not random, and there is a risk that most participants were interested in the study's topic or were teacher educators with high digital competence or positive attitudes towards digitalisation. The country context of the study should also be noted. As previously pointed out, Norway strongly emphasises digital competence at the national policy level. Other countries may not have the same centralised, top-down approach to digitalisation in education. Thus, teacher educators in such contexts may not perceive policy as a factor influencing their agentic space to the same extent as their colleagues in Norway.

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Declaration of competing interest



The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The authors do not have permission to share data.


Appendix

Table 5 Interview guide

Prompt	Follow-up questions	Comment
 <p>(Picture by The People Speak! Flickr)</p> <p>In the following, I will show different statements related to your work as teacher educator and digitalisation. It might be that you fully agree that you partly agree, find the choice of words questionable, or are provoked. I just want you to reflect aloud on the statement.</p> <p>“As a teacher educator, I have many roles – teacher of teachers, coach, researcher, curriculum maker, broker (in relation to field of practice) and gatekeeper”.</p>	<p>Who are you, who am I? Let's start with a short introduction. Tell me about you and your educational background. How did you end up in teacher education? How long have you worked in teacher education? Tell me about your institution. How big is it? How many students? How is the atmosphere? Do you collaborate a lot with your colleagues? What does it look like in your classroom? How do you organise your teaching? What role is most important to you? Do you experience tensions between the roles?</p>	<p>Icebreaker Important to emphasise that I am interested in THEIR opinion. Establish an open and non-judging atmosphere!</p>
 <p>(https://www.piqsels.com/en/public-domain-photo-jdddu)</p>	<p>Now let's focus a bit more on the digital. How would you describe yourself? How digital are you? In private life and at work? Are you aware of your digital footsteps? How would you describe your digital journey as a teacher educator? Has your attitude towards digitalisation in the educational sector changed over time? What do you think – which digital competencies do teachers and teacher educators need? What is professional digital competence for teachers and teacher educators, according to you?</p>	<p>Important to ask about digital footsteps to make participants consider the profession-oriented dimension, especially concerning the questions about PDC, and not only talk about which programmes they use.</p>

(continued on next page)

Table 5 (continued)

Prompt	Follow-up questions	Comment
<p>"As a teacher educator, I should explore digital resources for teaching and learning and develop my students' competences, shouldn't I?"</p>	<p>How do you perceive your role concerning the facilitation of student teachers' digital competence? So, what do you do to develop their competence? Could you tell me about how you approach PDC and describe some lessons that you are satisfied with? Do you address PDC in your research as well? Do you divide topics among you? Who is addressing what topic? To what degree can you influence, create, or revise the course descriptions? How much room for interpretation of the course description do you have? (How detailed or vague are they?) To what degree do you feel that your programme leaders expect you to address PDC? This leads us to the debate about academic freedom and autonomy. What do you think? Has academics' freedom been constrained? Do we have to follow more rules and regulations? What is your opinion on that? To what degree do you address digital competence because of guidelines and regulations? Are you familiar with the Norwegian framework for teachers' PDC? Do you use it?</p>	
<p>"My colleagues and I discuss how to address and develop digital competence' 'I address digital competence in line with the course descriptions."</p>		
 <p>(Kelentric et al., 2017, p. 3)</p> <p>"As a teacher educator, I should prepare teachers for teaching children and youths that are supposed to participate in tomorrow's digital society." "Digital development contributes to changing subjects, the role of the teacher and relations between students and colleagues." "Usually, I develop my digital competence and the use of digital tools for teaching and learning on my own."</p>	<p>What is your opinion on schools' and teacher educators' public mandate? Do you have examples? Do you have the possibility to influence your own professional development? Do you also cooperate with colleagues to develop your digital competence?</p>	

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