



Professional digital competence in strategy and management: A case study of three teacher education programs in Norway

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Abstract

Since 2017, all grade 1–10 teacher education programs in Norway have been required to provide training in professional digital competence (PDC). Five of the country's 12 teacher education institutions received government funding for this purpose in 2018. The aim of this article is to describe how PDC is understood and implemented at management level in teacher education at three institutions, one of which received this government funding. We apply interpretive repertoires as discursive tools to access discursive understandings of digital conceptualizations within a case study methodology, using data from management interviews and document studies. Irrespective of the national strategy and PDC requirements, the findings show that management in the three institutions had different conceptualizations of PDC, reflected in wide variation in local implementation measures of PDC for teacher educators and students. The government funding did make a difference. Theoretical and practical implications are discussed.

Keywords

professional digital competence, 1-10 teacher education, management perspectives, interpretive repertoires

Introduction

Nordic countries have been “digital front-runners in the European and even global context” (Randall & Berlina, 2019, p. 8), especially in the public sector (Tømte et al., 2019). Reflecting this development, a framework for professional digital competence (PDC) for teachers (FPDC) (Kelentrić et al., 2017) was introduced in Norway in 2017, the same year as the European Framework for the Digital Competence of Educators (DigCompEdu) (Redecker, 2017). The FPDC also applies to teacher education (TE), the focus of this article. By 2017, research on digital competence among teacher educators had established that digital competence in TE was either lacking or inconsistently implemented (Guðmundsdóttir, 2014; Krumsvik, 2016; Tømte et al., 2013). Accordingly, Norway's Ministry of Education and Research (MER) called for a nationwide strategic plan (MER, 2016, 2020b).

To support and strengthen the development of PDC in TE, the government granted targeted PDC funding to five of Norway's 12 TE programs in the spring of 2018. Recent studies have looked at student teachers' (e.g. Almås et al., 2021; Brevik et al., 2019) and teacher educators' (e.g. Sollied Madsen et al., 2019; Thorvaldsen & Madsen, 2020) experiences with and development of PDC in Norwegian TE. However, research on digital development processes in higher education indicates that management understandings, involvement, and strategic planning are important factors for successful and sustained implementation (Bates & Sangrà, 2011; Lillejord et al., 2018) and that further research in this area is needed (Aagaard & Lund, 2019). In this article, we explore how PDC is understood and implemented at management level in TE at three institutions: one that received PDC funding, and two that did not.

This article investigates three research questions. How do the TE institutions' strategic documents and education program plans address the development of PDC (RQ1)? How do management in TE institutions perceive PDC and what kind of measures have they adopted to implement it (RQ2)? To what extent, if any, are there differences in the answers to RQ1 and RQ2 between institutions with and without targeted funding (RQ3)?

The article is structured into five parts. The first briefly presents the PDC strategies regulating TE institutions in Norway and the funding afforded to strengthen this focus. The second part describes the conceptual-theoretical framework and the third the research methodology and limitations. The research findings are then presented, and in the final part we discuss the findings and their implications for teacher educators' continuous development of PDC.

National strategies and funding for implementing PDC in TE for grades 1–10

Since 2017, all TE study programs in Norway have had to include a focus on PDC. While the FPDC (Kelentrić et al., 2017) is only a recommendation, the concept of PDC is central to the national strategy for quality and collaboration in TE (MER, 2020b, p. 7), and a required student output competence in grade 1–10 TE programs (MER, 2016).

Specifically, after the five-year master's program, graduates are to have the skills to “assess and use relevant teaching aids, digital tools and resources in teaching, and to give pupils training in digital skills” and “to have professional digital competence” (MER, 2016, p. 2.2, all quotes our translation). However, the conceptualization of PDC is not further specified.

To strengthen the development of PDC in TE, the government launched a call for proposals to access targeted funding of NOK89.6 million for digitalization in TE in 2017. Based on detailed project plans following the government criteria and the FPDC, five of Norway's 12 TE programs were granted funding for three-year projects in spring 2018. The grants' most relevant requirements are as follows (NDET, 2018):

- Project organization founded in and including educational leadership in TE.
- Project to include the main parts of the study programs and all subject areas.
- Project to include a competence development strategy for teacher educators.
- Project to ensure practical PDC development arenas and support during and after the project.

The goal was for projects to result in lasting measures that TE institutions that did not receive funding could learn from and adapt for their institutions.

Theoretical perspectives

PDC: an emerging and contested concept

PDC remains an emerging concept with no universally accepted definition. Internationally, there is “considerable debate” about how to conceptualize PDC in the literature and in “how to best develop it during initial teacher education” (Falloon, 2020, p. 2458). For instance, the Dig-CompEdu framework proposes 22 elementary educator-specific digital competences organized into six areas (Redecker, 2017), while a more recent, broadly based teacher digital competency framework builds on the TPACK model (Mishra & Koehler, 2006) by adding to other key areas (personal-ethical and personal-professional competencies); all three are divided into several sub-areas (Falloon, 2020). The Norwegian FPDC is a rather broad conceptualization divided into seven overlapping competence areas that are broken down into 57 learning outcome formulations that can be used directly in TE program plans (Kelentrić et al., 2017).

Digital development conceptualizations on a continuum

Other digital development conceptualizations are also contested. Internationally, the concepts of digital skills, competencies, and literacy are often used interchangeably in higher education and in TE (Falloon, 2020; Spante et al., 2018), but with underlying discourses that guide what is perceived as important or relevant in the realization of these concepts (Nichols & Stornaiuolo, 2019; UNESCO, 2018). In the Norwegian context, PDC is one of several conceptualizations of digital development in education. The main concepts of digitalization, digital skills, digital competence, PDC, digital literacy, and digital *Bildung* have different discursive roots that vary somewhat from international conceptualizations.

Digitalization is often connected to a discourse of industrial efficiency and how digital technologies replace manual operations and routines to increase effectiveness and quality, thus achieving economic or, in an educational context, learning outcome gains (Pettersson, 2021). In the Norwegian curriculum, *digital skills* are defined as foundational transversal skills at all levels of primary and secondary education. Skills express the concrete ability to obtain and show knowledge by being able to search for, and process, produce and communicate with, and critically judge digital media (NDET, 2017, p. 12), which resembles how Falloon considers digital literacy to be functional literacy within the international educational discourse (2020). *Competence*, in Norwegian, is often connected to the ability to use knowledge and skills in social contexts, while *attitudes* are what express the ethical and assessing abilities in using this competence (Erstad, 2010). This is a wider understanding of competence than is often used in English-speaking countries (Falloon, 2020; Spante et al., 2018). All the above notions are part of the concept of digital *Bildung* in a Norwegian context; how knowledge, competencies, skills, and attitudes make it possible for us to function as citizens in an increasingly complex society (Løvlie, 2003). *Bildung* is often compared to the international concept of *literacy* in the social semiotic tradition (Lankshear & Knobel, 2006; Säljö, 2010). In the Norwegian context, competence, *Bildung*, and literacy are sometimes conflated and sometimes seen as evolving concepts, with competence and literacy gradually replacing *Bildung* (Hermann et al., 2003, p. 10).

Thus, the conceptual divide between digitalization as a measure of administrative or organizational efficiency and quality on the one hand and digital *Bildung* as a measure of citizenship and societal participation on the other can be seen as a continuum of discursive positions, with different interpretative repertoires situated between the two poles (Godhe, 2019). Of key importance in our study is how management in the three TE institutions conceptualize PDC, the interpretative repertoires underlying their approach, and the initiatives undertaken to implement both local and national strategies to develop PDC among teacher educators and students.

Formal and perceived curricula and interpretative repertoires

As presented above, the concept of PDC is a curricular requirement (MER, 2016; 2020b, p. 7). It is thus a part of the formal curriculum of TE, further specified in the TE institutions' program plans (Goodlad, 1979, p. 61). However, since the conceptualization of PDC is not specified in the national curricular requirements, and a contested concept in research, different TE institutions may conceptualize PDC differently in local TE curricula, which makes both strategic documents and program plans interesting for our research. The perceived curricula can be seen as a product of both the instructional and institutional domain of the decision making process (Goodlad, 1979, pp. 61-62). In our research, the perceived curriculum is thus specified as the understandings management have of digital development aspects in the curriculum and TE, expressed in their interpretative repertoires.

Interpretive repertoires are relatively coherent ways of talking about objects and events in terms that are already provided by history (Wetherell et al., 2001, p. 198) and function as discursive tools that management use to tell themselves and others about their understandings of, for instance, concepts, implementation of digital strategies and competence measures (Potter & Wetherell, 1987). By comparing managements' interpretative repertoires with their institutions' strategic documents, implementation plans, and concrete measures to develop PDC, we can paint a picture of how PDC conceptualizations are thematized within their institutional frameworks.

Methodology

Case study approach and data collection

Data from three grade 1–10 TE case studies in 2020 were chosen through strategic sampling. One case, Volda University College (VUC), received targeted government funding for specific PDC measures. The contrasting cases without such funding are the Western Norway University of Applied Sciences (WNU) and University of Stavanger (UiS); all three are in western Norway, and in the same network of educational institutions (Yin, 2009). Data were collected and analyzed following a sequential mixed methods design with four phases, each producing the different types of data presented in Table 1 (Teddlie & Tashakkori, 2009).

Table 1 Data sources

Data sources	Focus	n=22
1. Content analysis: digital terms in grades 1–7 and 5–10 study plans: “digital,” “ICT,” “technology,” and “PDC” in Norwegian	VUC 2019–2020 WNU 2019–2020 UiS 2019–2020	n= 3
2a. Strategic plans for institutions applying in 2020	VUC 2017–2020 WNU 2019–2023 UiS 2017–2020	n=3
2b. Allocation letters for 2020	VUC, WNU, UiS	n=3
3. Semi-structured interviews of approximately one hour	TE management at VUC, WNU, UiS	n=6
4. Additional materials from interviews	VUC: Project plan DigiGLU, learning lab webpage, and internal department action plan	n=3
	WNU: Department strategic plan and progression steps	n=2
	UiS: Department strategic plan and DDV learning lab webpage	n=2

First, we carried out a quantitative document analysis of the formal curriculum, the institutions' TE general program plans for the 2019–2020 academic year as a first indicator of the use of digital terms ($n=3$) (Table 2). Second, we thematically analyzed the digital concepts used in the program plans compared to strategic documents relevant for TE in 2020 to gain a better understanding of the strategic influences on the formal and perceived curricula at the institutions. Specifically, the documents were the institutions' 2020 strategic plans ($n=3$) and the funding allocation letters for 2020, the yearly “institutional strategic contract” with the Ministry of Education and Research ($n=3$). Third, in June 2020 we conducted six individual semi-structured interviews (Kvale & Brinkmann, 2009) on initiatives to develop PDC in TE (grades 1–10) with two educational managers in equivalent roles, responsible for strategic plans, competence development measures and program plans in TE, at each of the three case institutions ($n=6$) (Table 1.3). The thematic interview guides used the concept of digital initiatives and PDC as an entry into the interviewees' own understandings and to avoid more loaded terms such as digitalization or *Bildung*. The interviews were transcribed verbatim and analyzed thematically (Joffe, 2011). In the final phase, the data above were supplemented with additional documents mentioned specifically as PDC measures by the interviewees to better understand the discursive interpretative repertoire utilized in each local context (Table 1.4).

Data analysis

In the thematic analysis of documents, we categorized the data further, investigating the conceptualizations and measures found through the contexts of the digital terms in Table 2 in program plans and strategy documents (Joffe, 2011). These thematic categories were used as comparative materials for the analysis of management interviews through the theoretical lens of discursive interpretative repertoires (Wetherell, 1998; Wetherell et al., 2001) and the theoretical perspectives, to see how “systematic clusters of themes, statements, ideas, and ideologies come into play” (Luke, 2000, p. 456). The analysis allowed us to find similarities and differences between discursive understandings of PDC in the TE program plans and broader institutional strategic guidelines on digital development and in the managements' own perceptions.

Quality and limitations

The data were collected as part of two projects. The DigiGLU project at VUC provided documentation for the governmental PDC initiative, and the interviews were part of the cross-institution DIGOV project at VUC, WNU, and UiS (see Acknowledgements). For transparency and credibility, the team of five researchers in these projects used the same protocols for data collection, ensured inter-rater reliability in data analysis, and researchers directly involved with management of PDC development did not collect data at their own institutions (Teddlie & Tashakkori, 2009).

Several limitations should be acknowledged. First, the three cases were chosen strategically to investigate conceptualizations of PDC in institutions with and without PDC-targeted funding; there is thus no claim of generalization (Yin, 2009). Secondly, the document analysis could only address “visual” proof of focus on digital concepts in the general TE curriculum, as this is the management responsibility. Third, we cannot infer from the strategic documents or general program plans when digital aspects are addressed implicitly or developed further in, for instance, subject-specific curriculum plans, and the operational curriculum of teaching or assessment (Goodlad, 1979, pp. 62-63). As such, we do not have access to the everyday learning realities of TE. However, the interviews do offer access to the perceived realities of focusing on PDC in TE at management level.

Findings

PDC in study program plans

The content analysis of the TE program plans presented in Table 2 shows the digital concepts used in the general parts of the plans for both grades 1–7 and 5–10 TE programs at VUC, UiS and WNU in 2020, with the top line showing the most frequently used concepts across institutions.

Table 2 Concepts used to describe digital focus in general study program plans for TE grades 1-7 and 5-10 for 2019-20.

Concepts	VUC 2020 1-7/5-10	UiS 2020 1-7/5-10	WNU 2020 1-7/5-10
Digital competence	11/20	1/1	5/5
Digital tools/tools and resources/tools, media and resources	12/14	1/1	3/3
Digital skills	2/0	1/1	2/2
Professional digital competence	9/9	0	5/5
Digital judgement	1/1	0	0
Digital development	1/1	0	0
Digital study techniques	1/1	0	0
Digital innovation	1/1	0	0
Digital Bildung	1/1	0	0
Digital identity	1/1	0	0
Digital professional development	1/1	0	0
Digitalization	1/1	0	0
Digital arena	0/0	0	1/1
Total	42/51	3/3	16/16

The schematics reveal a marked difference between institutions in *conceptualizations*, as UiS does not use the term “PDC” in their program plans and in the *frequency* of focus between institutions, with UiS using a digital term three times, WNU 16, and VUC 42 in grades 1–7 TE and 51 in grades 5–10 TE. Finally, there was a *diversity* of conceptualization, with VUC using twelve different conceptualizations, WNU five, and UiS three. These differences provided an interesting background for further analysis and discussion of findings in strategic plans and interviews.

PDC in strategy at VUC

The VUC strategic plan for 2017–2020 mentions TE as one of two main strategic development areas. The plan also names as a priority “making digital competence and communication relevant for all subject areas (pt. 2.1.4)” and reports that VUC will “strengthen the technical infrastructure and develop subject-pedagogical competence for further emphasis on digitalization and flexible education programs (pt. 2.1.8)” (VUC, 2017).

In the 2020 funding allocation letter, the development of TE for grades 1–10 with a digital profile is a main priority: “Conducting the competence development project DigiGLU (Digitalization of teacher education 1–10) according to the project plan” (MER, 2020a, VUC, p. 8).

When interviewed, management also mentioned the teacher department’s internal action plan, which aims to “strengthen PDC through exchange of experience, modelling and collegial guidance. Conducting the DigiGLU project is a vital part of this” (VUC 2020, Pt. 1.6).

The DigiGLU project is also mentioned by TE management. The targeted government funding came with specific measures and targets pertaining to the involvement of educational leadership and how to develop PDC (NDET, 2018), as the VUC DigiGLU project plan makes clear (DigiGLU, 2021). The TE program manager was part of the operational workgroup – the core of the project organization – while the dean was part of the project board and the project owner (DigiGLU, 2021). The project plan has a competence development strategy that included the measures detailed below, implemented by 2020:

1. Cross-curricular PDC progression steps

This is a shared cross-curricular digital development course in PDC for students across subjects through the five-year TE study program. The teacher educators expand on and refer to this core PDC conceptualization through subject-specific focuses, which are specified in the master steps presented in Figure 1.

5. Digital professional development: Digital professional development, research and development methods		Digital research resources and methods Network for professional learning		Learning portfolio
4. Digital professionalism, bildung and innovation: Digital professionalism, citizenship, ethics and bildung Digital innovation and entrepreneurship in school		AR and VR Programming Sensors and data logging		Learning blog for reflection
3. The teacher role, differentiation and assessment in technology-rich classrooms: Classroom management and cross curricular work in the digital classroom Learning design, differentiation and assessment with digital resources		Adaptive learning Gamification og game-based learning Learning design and analysis		Learning blog for reflection
2. The pupils' media cultures and motivations for learning: The students' digital identities, media cultures and creative competences		Multimodality, ethics and literacy Flipped classroom and educational film Podcast		Learning blog for reflection
1. The teacher role og professional digital identity: PDC, digital identity, ethics and networks for learning Digital competence as foundational skills School in the digital society og digital communication	Digital communication and cooperation Digital ethics	Professional digital communication: Teacher – student –	The digital classroom in practice	Learning blog for reflection

Figure 1 PDC for student teacher at VUC. Blue: Theoretical knowledge base. Turquoise: practical workshops. Green: documentation blog and didactical reflection on subject specific use.

The PDC master steps were implemented through a) a digital knowledge base with evolving PDC focuses through the five-year master's program based on the learning outcomes of the PDC framework (Kelentrić et al., 2017); b) practical collaborative digital workdays with all students every year; c) digital development portfolios for all students to reflect on their application of the knowledge and competence of measures a) and b) in their chosen subject areas; and d) support for PDC development through a digital learning lab in the VUC library. The PDC master steps were specified in the general part of the study program, with more subject-specific learning outcomes based on the shared PDC steps developed by project teams in all subjects.

2. Digital learning lab for students and educators – Læringsverkstaden

A PDC learning lab, with both physical facilities and online PDC training elements, where teacher educators, student teachers, and in-school practice teachers can collaborate and enhance their PDC was established to ensure a broader focus on PDC than the progression steps alone could provide.

3. Professional development courses for teacher educators

Two professional development courses of five ECTS credits each in digital pedagogy and PDC for teacher educators to incorporate the PDC progression steps in the TE study program and the online training and the learning facilities of the learning lab, thus ensuring a shared baseline for PDC across subjects and a focus on using cross-curricular PDC training for students as a reference for subject-specific focuses on PDC.

The development of PDC thus appears to be present at a strategic level at the institution. PDC is only mentioned directly in the internal action plan for the TE department, but it is indirectly thematized by using the DigiGLU project as a direct measurement of digital competence development in the overall VUC strategic plan.

PDC in program plans and managers' repertoires at VUC

In the general part of VUC's 2019–2020 study program plans, PDC is emphasized through a section specifying the progression steps focused on the FPDC (Figure 1). PDC is also explicitly connected to in-school practice periods (VUC, 2019-20a, 2019-20b), and connected to a wide diversity of digital conceptualizations, as shown in Table 2.

When asked about TE digital initiatives at VUC, the interviewed managers mentioned the project funding as a gift, exemplified as: "We got a lot of resources and (...) a push on things we had to do anyway." The interviewees showed a conscious understanding of the need for and requirements of PDC and how developing teacher educators' and students' competence is necessary. They pointed to different factors for PDC development connected to both internal and external initiatives:

Motivated staff was a driving force. And also the signal from the practice field that the students were not good enough in this area was an important element (...) and the framework for (...) professional digital competence that give us the frames for what the students should have in place.

Both interviewees explicitly emphasized the PDC framework and mentions the DigiGLU measures above as central for implementation of the framework: "mixing tools and these central themes in relation to ethics et cetera", also referring broader conceptualizations of PDC:

Digital Bildung, digital harassment (...) and judgement (...) I think will become very important now that school is so digital and social media surround us all the time. We must teach the future generations (...), and then you have to start with the teachers having competence and engagement and awareness in this. And that starts with us.

Through the interviews, managers showed interpretative repertoires concerning digital development centered on PDC, in focusing on digital skills, curriculum demands, and competence areas such as ethics and societal perspectives. They emphasized both their own PDC responsibilities further on and implemented PDC measures thus far, such as competence development courses for teacher educators, and the PDC progression steps and access to digital school equipment for students specifically, also highlighting the importance of the learning lab for preparing student teachers for their in-school practice periods. Thus, at management level, there seems to be a shared interpretative repertoire focused on PDC as conceptualized in the FPDC.

PDC in strategy and management at VUC

The strategic documents and program plans refer to the DigiGLU project with a coherent focus on PDC based on the national PDC framework. Managers support the DigiGLU project organization, and are focused on the further development of PDC after the end of the project. The management's interpretative repertoires center on a discursive understanding of PDC as conceptualized in the framework, also mentioning digital Bildung. Digitalization as increased efficiency and gains in learning outcomes, on the other hand, does not seem part of the discursive understanding.

PDC in strategy at WNU

The WNU does not have a specific focus on PDC or on TE in either its 2020 funding allocation letter (MER, 2020a) or its 2019–2023 strategic plan, but does refer to digitalization for quality development. The strategic plan also specifies that competence development for students is to include “critical judgement for a digitalized working life” (WNU, 2019, p. 11).

The local strategy plan of the Faculty of Education, Arts and Sports details an emphasis on future-oriented ways of learning, assessment and research adapted to the 21st century: the goal is to “facilitate competence development and use of digital tools in learning” (WNU, 2019, FLKI, p.10). This understanding is detailed to ensure that the academic staff has “competence in using digital technology to enhance learning” (ibid., p. 19). PDC is not mentioned. The focus thus seems to mainly be on the use of digital tools for quality and learning enhancement at this strategic level.

PDC in program plans and managers' repertoires at WNU

The general parts of the TE study program plans are identical for grades 1–7 and 5–10 (Table 2). A section on PDC defines the concept as knowledge, attitudes, and skills in the use of digital tools, media, and resources in a secure and purposeful way, emphasizing how digital development can affect the content and work methods in different subject areas and pupils' digital competence (WNU, 2019–20). This definition offers a narrower conceptualization of PDC than the FPDC seven conceptual areas (Kelentrić et al., 2017).

Progression in developing PDC through the five-year program is specified in subject-specific plans, and in-school practice periods, under titles detailed in the progression steps shown in Figure 2.

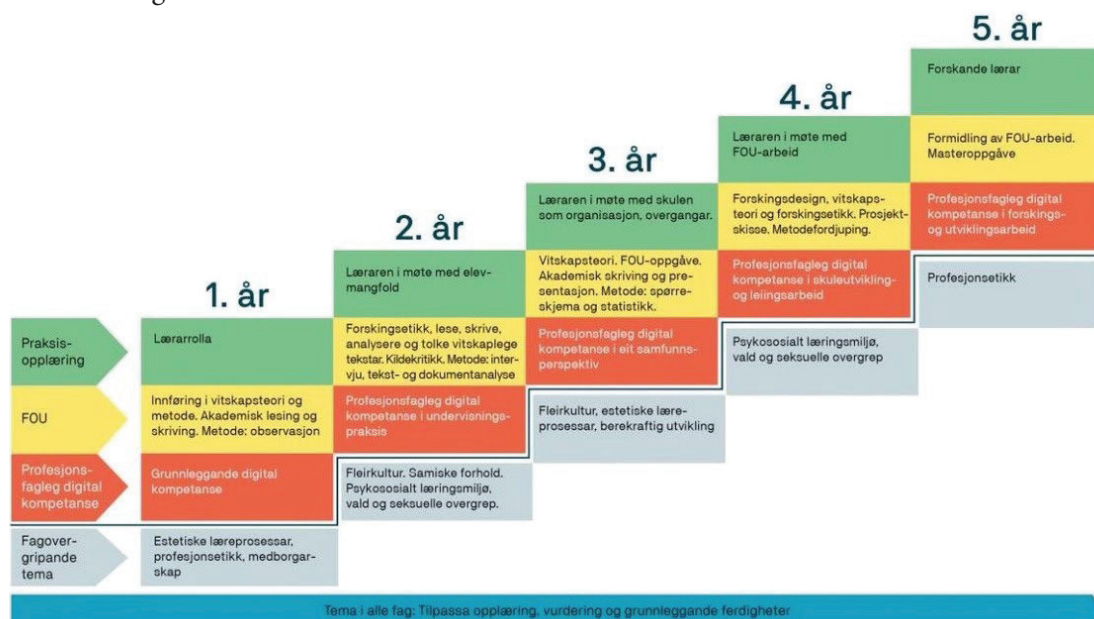


Figure 2

PDC in WNU teacher education study program plans (WNU, 2020)

Translated, the focus in PDC (orange) evolves from foundational digital competence in the first year, through PDC in teaching practices in the second, PDC in societal perspectives in the third, and PDC in school development and management in the fourth, to PDC in research and development in the fifth. There are no further details on these thematizations in the program plans.

The WNU TE managers have three specific focuses in their interviews on digital development. First, a focus on administrative measures such as infrastructure, equipment, and systems for online teaching. This repertoire seems specifically connected to WNU becoming a TE institution that merged three earlier TE institutions in 2017, and the need for shared administrative development following this merger.

The second focus is on the national requirements in digital competence for student teachers. Management exemplifies how this focus has resulted in the PDC progression steps in program plans presented above, specifying how: “in teacher education, professional digital competence is thematized in all subjects where the students from the first year get progression (...) to develop your competence in digital tools throughout the five years.” However, they also present a challenge in implementing these measures: “the things that are part of the progression steps I can push and promote and front, but everything has to go through the departments.” Management can influence PDC development steps in the general TE program plans, but do not have measures to ensure that teacher educators focus on PDC or develop their own PDC.

This third focus is exemplified by implemented measures for PDC development for teacher educators. Both interviewees mention that parts of a national PDC massive open online course (MOOC) developed for in-service teachers have been made available for teacher educators’ voluntary self-study for competence development. They emphasize that teacher educators have time for professional development, but that the faculty has no organized initiative to develop their PDC other than the MOOC: “I think we have a clear awareness of this, but it of course depends on everyone in the organization seeing the need for it and contributing to strengthen that field.” The faculty’s strategic measure of “facilitating competence development and use of digital tools in learning” thus does not seem to be further specified in incentives or other measures (WNU, 2019, FLKI, p.10).

Through the three focuses, managements’ own interpretative repertoires seem mainly focused on progression in using digital tools, not on broader PDC understandings, as reflected in the quotes above.

PDC in strategy and management at WNU

Comparing WNU’s strategic documents with its TE program plans and management interviews, the strongest focus on PDC appears to be in the voluntary PDC MOOC and in the program plans, which for instance includes societal perspectives in the third year in the PDC progression steps (Figure 2). Management deployed a repertoire that focused more on organizational measures and digital tools than the PDC framework itself. Their focus thus seems more in line with the WNU strategic documents’ focus on the “use of digital tools to enhance learning” than on the broader perspectives in the PDC framework, thus positioning the management focus locally more towards a discourse of digitalization than digital Bildung on the theoretical continuum.

PDC in strategy at UiS

The UiS funding allocation letter has quite specific measurements for digital development in TE in 2020. Digital competence is one of two key focus areas of development (MER, 2020a, UiS, p. 9), with the following specific measures:

- a. A digital-pedagogical workshop for students and teacher educators established by 2020 with: “The physical equipment needed for an education able to give the students the opportunity to try out, use, and study ICT and digital tools in learning situations” (our translation, p. 9).
- b. Data from the TE students’ reported use of digital tools in national measurements (*Studiebarometeret*).
- c. The use of digital teaching methods by teachers in teacher education as measured by increased engagement in exploration and use of digital learning resources.

At the same time, the overall strategic plan for UiS (2017) explains digitalization with reference to the funding allocation letter, as follows:

- Having good hybrid solutions in using digital tools and campus-based learning.
- Communicating with and administering students who are in the forefront of digital development through digital platforms.
- Digital competence will be a central element in students’ learning outcomes.
- New digital assessment forms will be developed in accordance with the uniqueness of education adapted to a digitalized society.

Despite this ostensible digital pedagogical focus, PDC is not mentioned.

PDC in program plans and managers’ repertoires at UiS

PDC is also not mentioned in the TE program plans. The digital focus is on foundational skills and the use of ICT in learning in school subjects, under the heading “Professional work and professional development” shared across the two plans (Table 2). The sentence mentioning these concepts is a direct citation from §4.3 in the national regulation of the framework plan for TE (MER, 2016), with the program plan specifying that the concepts will be thematized in different ways in different subjects (UiS, 2019-20b).

The UiS program plans do not contain PDC progression steps or other conceptualizations of digital development. Instead, the program plan for grades 1–7 thematizes foundational digital skills as a specific cross-curricular focus in the fifth semester (UiS, 2019-20b). For grades 5–10 there is no particular digital focus in the general program plan (UiS, 2019-20a). The strategic measure of the didactic-digital workshop (DDV) found in the allocation letter is not mentioned in any of the program plans.

In interviews, PDC was not mentioned unsolicited. The interviewed managers’ repertoires concerning digital development focused largely on foundational digital skills, individual teachers’ initiatives, or DDV services, independently of program plans. The lack of focus on PDC was described directly, one of the interviewees emphasizing that PDC-focus: “has never been communicated explicitly from my side or from the faculty.” The interviewees referred to the DDV as the main focus of developing digital skills for both teacher educators and student teachers, offering courses, summer school for students, and hosting different subject-specific gatherings. Interviewees referred to the faculty action plan, which specifies that a digital competence survey among the teaching staff in 2017 will be followed up by development courses in collaboration with the DDV, but this had not yet happened in June 2020. PDC in TE thus does not seem to be systematically addressed in development measurements at management level, an impression strengthened by one of the managers pointing out that digital initiatives “come from employees in the organization, and they come in part from above, and they have quite different intensions in digital initiatives.” A closer exami-

nation of the description of the DDV on the UiS website, nevertheless, shows that its goal is defined as “facilitating students’ reflections on processes, learning, competences, didactics, and pedagogy and through this being able to develop professional didactical competence”, thus addressing parts of FPDC for students (UiS, 2021). It is however unclear if this includes broader perspectives on ethical or societal perspectives linked to a discursive position of PDC and digital Bildung or mainly focus on teaching and learning with digital tools.

PDC in strategy and management at UiS

We did not find consistency in digital focus between the institution’s strategic documents and TE program plans. The focus on digitalization in TE in the 2020 allocation letter is not present in the program plans but could signal a development for the coming academic year. However, it is unclear if this will include a PDC focus, as this is not a concept used in the documents or by the managers. Despite having the most specific strategic digital development measurements at institutional level through the DDV, implementation of PDC at UiS does not seem to be a focus at TE management level. The management focus in digital development centered on individual or subject-specific digital initiatives and skills development, independently of PDC, a discursive position that does not necessarily focus on digitalization to improve efficiency, but rather geared towards gaining foundational digital skills than the focus in the FPDC or digital Bildung.

Concluding discussion

The aim of this study was to investigate three TE institutions’ development of PDC at management level. The findings showed clear differences in how TE institutions’ strategic documents and program plans addressed PDC development (R1), how management perceived PDC, and what kind of measures have been adopted to develop it (R2). VUC has the most coherent focus on PDC across its strategic plans, program measures, and management’s interpretative repertoires. At WNU and UiS, meanwhile, the PDC framework lacked a shared understanding, and digital development had less of a coherent conceptual focus across data sources. This raises the key question of the extent to which these differences can be attributed to the targeted PDC project financing (R3). The PDC project financing came with clear requirements for active inclusion of educational management in the project organization. As a result, management was actively involved in developing the required PDC development plan at VUC for both students and teacher educators. Indeed— and in contrast to the non-funded WNU and UiS – it was impossible for VUC management *not* to take an active part in PDC development in accordance with the national PDC framework. The management’s interpretative repertoires concerning PDC and the development measures implemented both indicated a deeper level of understanding of PDC based in the FPDC that is not evident among the management at the other two institutions.

The management interviews at the two non-funded cases showed that the focus on digital development does not necessarily center on the FPDC, and that management is not necessarily active in developing PDC if that is not mandated. There are also distinct conceptual differences in the interpretative repertoires concerning digital development in the institutions’ management. The management interviewed at VUC appeared to have a repertoire of PDC that included both digital skills and broader educational issues like ethics and digital Bildung. The management interviewed at WNU and UiS had narrower repertoires. Compared to UiS, WNU showed a greater focus on the use of digital tools to enhance learning in both strategic documents and interviews, while their program plans

revealed broader PDC conceptualizations. At UiS, the interpretative repertoire centered on individual or subject-specific digital initiatives, independently of PDC. Neither its program plans nor its interviewed managers had a focus on PDC. Thus, while these latter two institutions had developed some similar measures to VUC – with WNU using PDC progression steps (Figure 2) and UiS establishing the DDV – these measures were not part of a consistent PDC development strategy and the institutions' interviewed management were positioned at different parts of the digital continuum without a shared understanding of PDC.

Previous studies on the effect of educational managements' involvement in digital development processes in higher education argue that such engagement can have a positive influence (Tømte et al., 2019; Aamodt et al., 2016); our study supports those findings. The required active involvement of TE management in the PDC development project at VUC contributed to consistency between strategic and practical measures in its TE programs. A suggestion for further research is to examine the extent to which Norway's seven non-funded TE institutions will be able to benefit from the outcomes in the five funded projects, which was the ultimate purpose of the targeted funding. In other words, will the lessons learned help implement more consistent PDC development strategies, without the project-induced external push for management involvement and additional monitoring of PDC development of both students and teacher educators?

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