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Evaluating professional digital competence in ELT: Insights from initial teacher education programs and pre-service teachers' perceptions

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ABSTRACT

The global demand for digitally skilled teachers has risen significantly, particularly in the wake of the COVID-19 pandemic, which disrupted conventional teaching practices. Initial teacher education programs are widely regarded as critical platforms for the early development of professional digital competence among teacher candidates. This study examines how professional digital competence is incorporated into initial teacher education programs in Türkiye and explores pre-service teachers' perceptions of both the current curricula and their own competence levels. Data were collected through a perception scale and three focus group interviews with 142 senior ELT pre-service teachers from one state and two foundation universities in Istanbul. The findings reveal that pre-service teachers are largely critical of the education and guidance they received regarding digital competence. Many participants perceived their university instructors and mentor teachers as ineffective role models, citing in particular the limited demonstration of educational technology use in teaching practices. This study highlights the urgent need for stronger alignment between teacher education curricula and classroom practices to ensure that professional digital competence is effectively modeled, practiced, and embedded across both coursework and practicum experiences.

Keywords
higher education institutions, initial teacher education, practicum, professional digital competence

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Introduction

In today's rapidly evolving educational landscape, the integration of digital technologies has become an essential component of effective teaching. The COVID-19 pandemic highlighted this need, acting as a catalyst that accelerated the use of digital tools in classrooms worldwide (Fernández-Batanero et al., 2020; Hadar et al., 2020). However, this shift also exposed a significant gap in teachers' professional digital competence defined by the European Commission (2018) as a key component of teaching expertise. According to König et al. (2020), many teachers lacked the necessary digital skills to implement technology effectively, revealing an urgent need for structured support and training in this area. Digital competence, as clarified by Krumsvik (2007) as well, refers to "the teacher's ability to use information and communication technology (ICT) with a good pedagogical-didactic ICT understanding and to

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be aware of how this might impact the learning strategies and educational formation of pupils" (p. 68).

Recent research has emphasized that teachers' digital skills are at the forefront of the building of new educational practices. They are meant to use new ICT to carry out communicative actions corresponding to their professional duties (Berezhna & Bessarab, 2024; Svoboda, 2024). The use of immersive technologies in teachers' professional training has also been highlighted, as flexibility, adaptability, and interdisciplinarity are critical to the modern education environment (Bakhmat et al., 2022). These above-mentioned multidimensional skills contribute in a positive manner to the improvement of teaching efficiency and student performance in a rapidly evolving digital era (McDonagh et al., 2021).

According to recent studies, teachers' perception of their own digital competence also varies immensely in different professional environments, based on factors such as their hierarchical level within the education system (Hatos et al., 2022). To illustrate, teachers with higher-grade jobs tend to report higher levels of digital competence, while those in peripheral positions, i.e., those who are substitutes, tend to be less certain about their competence (Hatos et al., 2022). This gap reflects the necessity of ongoing professional development to enhance teachers' digital competencies via specialized training programs for filling gaps created during times of crisis, such as the COVID-19 pandemic, which forced the majority of educators to rapidly embrace online pedagogy strategies (Kahraman & Bicen, 2022).

Furthermore, the creation of teacher profiles in the Education 4.0 environment highlights the imperative blending of technological skills and soft skills (Soledad et al., 2021). This blended approach necessitates continuous enhancement and redefinition of teacher education programs to better prepare teachers with the demands of digital classrooms (Lindfors et al., 2021). Most importantly, the development of systematic frameworks for evaluating and building PDC is pivotal in ensuring that teachers can navigate complex digital environments (Gudmundsdottir & Hatlevik, 2018; Kucheryaviy, 2022;). As the educational surroundings are constantly changing due to digital transformation, the vocational preparedness of teachers can act as a benchmark for the quality and innovativeness of education.

Regarding professional digital competence, initial teacher education (ITE) is perceived as the starting point providing teacher candidates with appropriate ICT knowledge whereas it has been severely criticized in terms of functionality. Gudmundsdottir et al. (2014) reported that what digital requirements beginning teachers face in real classrooms do not actually correspond to what they are exposed to during ITE. Similarly, Tømte et al. (2013) indicated poor emphasis on professional digital competence in ITE that results in insufficient and unsatisfactory ICT training for student teachers. It seems that the conceptualization of digital competence is not successfully placed in teacher education programs in depth as it is mostly covered through "shallow and instrumental activities" (Ottestad et al., 2014, p.244).

Literature Review

The significance of digital competence

It is quite apparent that with global changes, economic concerns and environmental issues, the 21st century is a highly dynamic era that demands having a lot of dynamic skills citizens should have to maintain a proper lifetime (Partnership for 21st Century Skills, 2010). Perhaps, the most reformist feature of that century stems from huge technological innovations demanding digital

competence (Engen et al., 2014; Keskin & Yazar, 2015), which have substantially affected all units of life, in turn, the cores of education. As it is also indicated by the European Parliament and the Council in 2006, the citizens need various key competences which allow them to keep up with the new requirements. The European Reference Framework of Key Competences for Lifelong Learning by the Council presented eight key competences including digital competence which are strongly advised to educational organizations to reshape their teaching philosophies in accordance with the demands of the 21st century (European Commission, 2018). The DigComp 2.2 framework, as the most recent version released by the European Commission (2022), outlines 21 competences grouped under five main categories: information and data literacy, communication and collaboration, digital content creation, safety, and problem solving (Vuorikari et al., 2022). The framework provides examples of knowledge, skills, and attitudes for each competence and serves as a policy guide for teacher training and curriculum development across Europe. Moreover, DigComp 2.2 functions as a reference model in teacher education, supporting the development of professional digital competence. This competence enables teachers to use digital tools effectively and integrate them into their pedagogical practices to enhance student learning.

As an important key player of the learning process in that rapidly developing setting mentioned above, teachers are expected to have requisite competencies to meet learning goals of their students such as creativity, critical thinking, communication, and collaboration (Cretu, 2017). Professional Digital Competence (PDC) has become a crucial component of teacher readiness in the ever-changing educational landscape. PDC includes the pedagogical and ethical considerations required for successful integration into teaching practices, in addition to the technical skills needed to operate digital tools. By highlighting topics like digital pedagogy, content production, and professional engagement, frameworks like DigCompEdu have been crucial in defining the complex nature of PDC (Redecker & Punie, 2017). The goal of recent research has been to improve the conceptual comprehension of PDC. Skantz-Åberg et al. (2022) highlighted the complexity and scope of PDC by identifying seven core dimensions, such as cultural awareness, pedagogical strategies, and technological competence. In a similar vein, Pettersson (2021) highlighted the necessity of all-encompassing frameworks that consider the dynamic interactions among pedagogy, content knowledge, and technology.

Teacher education programs, then, are assumed as the initial place where pre-service teachers get ready with expected technological, pedagogical and content knowledge (TPACK) which all contribute to the students' development in terms of 21st century skills (Davis, 2003; Hofer & Grandgenett, 2012). Although there are still worries about limited technology use in teaching practice (Lemke et al., 2018), it has been also seen that now more attempts are being initiated both in pre-service and in-service teacher education programs in order to place a greater emphasis on digitized teaching (International Society for Technology in Education, 2008; Partnership for 21st Century Skills, 2010). Moreover, a growing interest in research studies has been observed for the last ten years which aim to explore the integration of digital competence into teacher education programs (Barton & Haydn, 2006).

Integration of digital competence into teacher education programs

When it comes to how digital competence develops in many teacher education programs, and what strategies institutions follow in order to enable pre-service teachers to enhance their ICT knowledge, in his comprehensive review study with 68 different teacher education related

articles, Kay (2006) came up with ten key strategies frequently appearing in teacher education: "delivering a single technology course; offering mini-workshops; integrating technology in all courses; modeling how to use technology; using multimedia; collaboration among preservice teachers, mentor teachers and faculty; practicing technology in the field; focusing on education faculty; focusing on mentor teachers; and improving access to software, hardware, and/or support" (p. 383). About the effective integration of technology into learning, he added that since ITE programs are the starting point for teacher candidates, who need a great number of competencies for their future teaching careers, like many other professional skills, ICT knowledge can be successfully acquired in the event of enriched digitized practice. As Bennett (2001) revealed in her review study, global awareness of digitized education has been rapidly increasing all over the world, and the extent of using ICT tools in teacher education has been enhanced by many significant educational organizations (OTA, 1995; CEO Forum on Education & Technology, 2000; ISTE/NCATE, 2003; National Council for Accreditation of Teacher Education, 2003, as cited in Kay, 2006).

Even though the importance of professional digital competence for teaching is considerably realized by the stakeholders of education systems, there are still numerous problems faced in ITE programs. Cuban (2001) showed that whereas technology integration into teaching settings is highly valued, determining the needs of teacher education programs preparing prospective teachers in terms of digital competence are not paid enough attention indeed. Pre-service teacher studies have revealed notable deficiencies in their digital readiness. According to Hatlevik and Christophersen (2013), a significant percentage of pre-service teachers, especially those who did not specialize in STEM subjects, felt unprepared to teach digital skills. This discrepancy highlights the necessity for all teacher education programs to provide more thorough and inclusive digital training. In a review study investigating the teacher education programs in terms of development of professional digital competence by Rakisheva and Witt (2023), it was indicated that from policy makers and administrators to teacher educators and mentor teachers, all actors of teacher education should renegotiate relevant objectives, expectations and necessities.

It seems that teacher educators and mentor teachers play a vital role to model professional digital competence for the pre-service teachers as they both are perceived as the role models. The attitudes of those teachers affect teacher candidates' perceptions of ICT use largely as Bullock (2004) exemplified with his findings showing the unlike interest levels in digitalization between two pre-service teachers with same background and equal opportunities, but different mentor teachers with dissimilar attitudes towards technology integration into teaching. Nevertheless, the general attitudes of pre-service teachers towards ICT use have been observed as positive despite all challenges they face with since most of them are already born into a digital world, and they have been exposed to technologically enriched environments for a very long time (Galindo-Domínguez & Bezanilla, 2021).

Even with the increasing amount of research, there are still a number of gaps in the understanding of how PDC is methodically integrated into teacher education programs, especially in non-STEM fields. The long-term effects of PDC training programs on instructional strategies and student outcomes have not been extensively studied. Furthermore, little is known about how institutional and cultural contexts affect the creation and use of PDC. To fill these gaps, the current study intends to assess pre-service teachers' perceptions of their readiness for PDC and investigate how well ITE programs prepare aspiring teachers with the digital skills they need.

Within the concerns mentioned above, the present study aims to explore senior ELT pre-service teachers' perceptions of professional digital competence, and the emphasis placed on it in ITE programs of universities in Türkiye. The following research questions are addressed to examine the issue:

1. What are ELT pre-service teachers' perceptions of the emphasis placed on professional digital competence within their initial teacher education programs?
2. Does the overall perceived level of digital competency among ELT pre-service teachers differ significantly depending on the type of university they attend?
3. What are pre-service teachers' perspectives on the integration, implementation, and impact of professional digital competence within their teacher education programs?

The findings of this present study are aimed at contributing to literature by ascertaining pre-service teachers' ideas for the integration of professional digital competence in ITE through revealing the current features of campus education and field practice.

Methodology

To comprehensively investigate the research problem, a mixed-methods research design was employed, integrating both quantitative and qualitative approaches to provide a more holistic understanding. Specifically, the quantitative data gathered through a perception scale helped to identify broad trends and measurable patterns in pre-service teachers' self-reported digital competence. In contrast, the qualitative data obtained from focus group interviews offered in-depth insights into participants' experiences, contextual interpretations, and nuanced views regarding their training and preparedness. This methodological integration was particularly valuable given the study's dual aim: to evaluate the digital competence focus of institutional programs and to explore pre-service teachers' individual perceptions. As noted by Creswell (2015), mixed-methods designs are especially suitable when neither quantitative nor qualitative data alone is sufficient to fully address the research problem. In line with Malina et al. (2011), this approach enables the exploration of "more complex aspects and relations of the human and social world" (p. 6).

Context for this study

This research study took place in ITE programs of a state and two foundation universities in Istanbul. The compulsory integration of ICT into pre-service teacher education, the main focus of the present study, dates to 1998 (Goktas et al., 2008). Though there have been many regulations and adjustments from then on (Özen, 2013), the universities now follow the curriculum that was put into practice by the Council of Higher Education in 2018, and their curriculums include two ICT courses in the first and second academic year. Those courses offered in initial stages aim to provide student teachers with enough information about "the basic concepts of ICT, the role of ICT in society and education, and also have them gain competency in basic computer applications such as word processors, spreadsheets, databases, and presentation programs, and the Internet … a variety of instructional technologies in developing and evaluating technology based instructional materials" (Goktas et al., 2008, p. 169). Another aspect of those ITE programs is that the student teachers are supposed to have school experience and teaching practice in the fourth academic year where they are expected to

improve and enact their professional digital competence by effective guidance of their mentor teachers.

Regarding the institutional characteristics of the participating universities, it was observed that the state university had limited access to digital infrastructure, including outdated hardware, insufficient access to multimedia tools, and classrooms lacking interactive technologies such as smart boards or projection systems. Additionally, there was a noticeable absence of structured technical support services or dedicated personnel to assist instructors or students in integrating digital tools into their teaching and learning activities. In contrast, the two foundation universities were generally well-resourced and digitally advanced. They provided modern infrastructure, including smart classrooms, virtual learning environments (e.g., LMS platforms such as Moodle or Blackboard), and ready access to digital devices such as tablets and laptops. These institutions also employed dedicated IT units, offered in-house training or support, and actively encouraged faculty members to integrate technology into their pedagogy.

Participants

A total of 142 ELT pre-service teachers from one state and two foundation universities in Istanbul voluntarily completed the Digital Competence Perception Scale during the spring semester of 2024. Of these, 74 were from the state and 68 were from the foundation universities. Since female predominance in educational faculties in Türkiye is common (The Council of Higher Education, 2024), the majority of participants were female preservice students (n = 97) and the rest were males (n = 45). For the semi-structured interviews, 14 students (9 female & 5 male) who had also taken part in the quantitative study volunteered. All the participants were the senior pre-service teachers who have been in the ITE program for almost four years and attending practicum recently. Since the hosting universities follow the same curriculum presented by the Council of Higher Education in 2018, they all had ICT-related courses in the first two academic years with similar contents. For the selection of participants, the researcher conducted convenience sampling which enabled to include conveniently available individuals in the study.

Data collection tools

A digital competence perception scale developed by Instefjord and Munthe (2017) was utilized to collect information about what pre-service teachers think about ITE programs in Türkiye in terms of digital competence development. The reliability of the professional digital competence scale was evaluated to ensure consistency in measuring pre-service teachers' perceptions. The original scale reported an acceptable Cronbach's alpha of .78 across dimensions. In the current study, the internal consistency of the scale items was assessed, yielding a Cronbach's alpha of .74, which indicates a satisfactory level of reliability for social science research (Field, 2013). These values suggest that the scale is a dependable instrument for examining perceived digital competence in the context of ITE. The scale consisted of 9 questions about how ICT training takes place on campus and during practicum, and what perceptions they have of their current level of professional digital competence (see Table 1). A 6-point Likert type rating is used as "strongly agree" (6), and "strongly disagree" (1) on the scale.

Another data collection instrument of the present study was focus group interviews which allow the researcher to have an integrative and interactive technique while addressing

the interview questions (Gibbs, 2012). With groups of four or five from each participant university, three different semi-structured interviews were conducted. During focus group interviews lasting for almost an hour, the pre-service teachers were asked following questions (Alev, 2003, pp. 311-313): "Have you ever received any ICT training? If yes, can you give details of this training?", "Do you use any ICT resources as a teaching tool? If yes, which ones? And why? How often? If not, why not?", "Have you had direct experience of planning and managing lessons with ICT in the classroom?", "How do you get access to ICT resources in that faculty?", "Do you have any support and encouragement from your tutors during your practice or course?" and "If you could improve the integration of ICT into teacher education, what would you do?". The interviews were audio-recorded to be transcribed later.

Data analysis

In the analysis of the quantitative data derived from the professional digital competence perception scale, the IBM SPSS Version 25 software program was used. For the general outcomes of the scale, some descriptive analyses were conducted (see Table 1). To find out if there was a significant difference between two student groups attending from state and foundation universities in terms of perceived professional digital competence, independent samples t-test was used.

For the analysis of the focus group interviews, a thematic analysis approach was employed, following the guidelines of Creswell (2002). After transcribing the recordings verbatim, the qualitative data were imported into NVivo 12, which was used to assist in the organization, coding, and categorization of the data. The analysis followed an inductive (data-driven) approach, where codes and themes were not predetermined but instead emerged from the participants' responses. The researcher began with open coding, identifying recurring patterns, key phrases, and significant statements. These initial codes were then clustered into broader categories, leading to the development of main themes. Throughout the process, a constant comparative method was used, enabling the researcher to iteratively refine codes and themes to ensure analytical depth and internal consistency.

To enhance the trustworthiness of the qualitative findings, several strategies were employed. First, a peer debriefing process was conducted with a fellow researcher who independently reviewed the codes and themes and provided feedback to reduce researcher bias. Second, a reflective journal was maintained to document analytic decisions and emerging interpretations. Third, participant quotations were used to support each theme and provide transparency in representation, with pseudonyms assigned to protect participants' identities. Lastly, member checking was conducted with selected participants to verify the accuracy and resonance of the identified themes.

Results

Descriptive analyses

To answer the first research question looking for the ELT pre-service teachers' perceived levels of professional digital competence, the scores of a six-point Likert scale ranging from strongly disagree (1) to strongly agree (6) were examined through a descriptive analysis for each item (see Table 1). Mean scores between 1.00 and 2.65 are defined as low, the ones between 2.66

and 4.31 are interpreted as average, and the mean scores between 4.32 and 6.00 are evaluated as high (Pimentel, 2019).

From the results, it seems that pre-service teachers are mostly unsatisfied with the teacher education they receive in terms of their professional digital competence development. The results showed that the items related to training in the use of smart boards on campus and during field practice received the lowest mean scores (M= 2.70) and (M= 2.81), respectively. From the total percentages for those items' negative values (65.5%) and (62.7%), it was seen that more than half of the participants thought they did not get sufficient training for interactive whiteboards at university and in the practicum. The items investigating the effectiveness of university teachers in teaching and using ICT tools, the results were found a bit higher though they were not still satisfying.

Table 1. *Pre-service teachers' perceived levels of professional digital competence*

	1	**2**	**3**	**4**	**5**	**6**	**M**	**SD**
Teachers at my university/college have taught me how to use digital tools	13.4	20.4	23.9	19.0	14.8	8.5	3.27	1.49
Teachers at my university/college are good role-models for the use of digital tools for teaching	23.2	9.9	26.8	17.6	17.6	4.9	3.11	1.54
I have a good understanding of how to use digital tools to promote pupils' learning	1.4	7.7	20.4	28.8	27.5	16.2	4.20	1.24
I have had good training in the use of interactive whiteboards (e.g. Smart Board) on campus	33.1	12.0	20.4	23.9	7.7	2.8	2.70	1.47
I have had good training in the use of interactive whiteboards (e.g. Smart Board) during field practice	30.3	18.3	14.1	19.7	12.7	4.9	2.81	1.59
Field practice schools expect more of my digital competence than what is emphasized in the teacher education programme	9.2	4.2	15.5	24.6	24.6	21.8	4.17	1.50
I can use digital tools to assess pupils' work	32.4	16.9	12.7	12.7	15.5	9.9	2.92	1.76
I have developed a good understanding of the use of digital tools for administrative work in school	12.0	31.7	27.5	12.7	11.3	4.9	2.94	1.35
The education programme has given me an understanding of ethical issues related to the schools' and pupils' use of social media	7.7	4.2	12.0	25.4	28.9	21.8	4.29	1.44

Note. *Developed by Instefjord and Munthe (2017, p. 42).*

The items "Teachers at my university/college have taught me how to use digital tools" and "Teachers at my university/college are good role models for the use of digital tools for teaching" received the following mean scores, respectively: (M = 3.27) and (M = 3.11). Two other items valued with low scores by the pre-service students were the ones related to digital competence for assessing pupils and administrative work (M=2.92) and (M=2.94). The item exploring whether the extent of emphasis on digital competence is different in campus education and during field practice was scored with a fairly high score (M = 4.17). The results showed that the majority of pre-service teachers labeled their own digital competence as high (72.5%). Finally, the students mostly agreed that they were taught enough about ethical issues in the use of social media at school (M = 4.29).

Differences in perceived digital competence depending on the type of university

To answer the second research question interrogating if the type of university matters in terms of professional digital competence development, an independent samples t-test was conducted with pre-service teachers' overall scores derived from the perception scale. Before starting with the t-test, the normality of data was checked through the Kolmogorov-Smirnov test ($p > .05$). The results of independent sample t-test done with the pre-service teachers' overall scores in the scale according to the type of university were examined to explore possible differences between the pre-service teachers' perceived levels of digital competence from the state (n= 74) and foundation (n=68) universities (see Table 2).

Table 2. *T-test for Differences in Perceived Digital Competence according to the Types of Universities*

Group Statistics				
Type of university	N	Mean	SD	SEM
State	74	28.79	5.667	.556
Foundation	68	34.82	4.713	.764

The results of independent sample t-test showed that the preservice teachers' overall perceived levels of professional digital competence (M= 34.82, SD= 4.71), who were from the foundation universities, were significantly higher than the pre-service teachers' (M= 28.79, SD= 5.67) coming from the state university $t(140)= -5.86$, $p<0.01$. Pre-service teachers from foundation universities seemed more positive about the education they received on campus (M= 4.34) and during practicum (M= 4.13) targeting the enhancement of digital skills compared to the ones studying at a state university (M= 3.27; M= 3.11).

Results of the focus group interviews

To answer the third research question, qualitative data from three focus group interviews were analyzed to explore pre-service teachers' views on how professional digital competence is addressed in teacher education. Through inductive coding using NVivo 12, a total of 63 initial codes were generated during the first cycle of open coding. These codes were then categorized and merged based on semantic similarity, frequency, and conceptual relevance, resulting in three overarching themes: digital competence during campus education, digital competence in the practicum, and perceived benefits and drawbacks of using ICT in education (Table 3).

Table 3. *Themes and Related Dimensions Identified Through Focus Group Analysis*

Main Theme	**Subthemes / Dimensions (Example Codes)**
1. Digital Competence during Campus Education	• Lack of modeling by instructors • Use of outdated materials • Minimal hands-on practice
2. Digital Competence during the Practicum	• Mentor teachers avoiding tech use • Disconnection between theory and practice • Limited infrastructure
3. Benefits and Drawbacks of ICT Use in Education	• Increased student motivation • Gamification potential • Internet issues • Student distraction

Digital competence during campus education

Throughout the interviews, the pre-service teachers frequently addressed the teacher education program they received on campus for many issues. They stated that in the first and second year of their university education, they had two ICT related courses presenting recent diverse technology to be used in teaching. However, they did not seem pleased about the way they were taught as the instructors mostly favored lecturing theoretical information about the use of ICT tools.

> We were exposed to a great amount of information about several ICT tools during the courses we took during the first two years, whereas we were not provided with practical opportunities at all. (P10 from a state university, Focus Group Interview 3)

> The ICT courses we had in the first half of our university education were full of information, but we were supposed to just follow what the teacher shared on the board. (P2 from a state university, Focus Group Interview 1)

While the pre-service teachers were identifying their university teachers regarding the use of ICT in teaching, they found the teachers' integration of instructional technology into their teaching practice very limited. Just few participants stated that they had some university teachers who considerably utilized ICT tools and were good role models for digital competence.

> One of my teachers at university is very interested in using digital tools while teaching. He always tried to include a digital application in his classes, and we enjoy his classes more and feel motivated. (P5 from a foundation university, Focus Group Interview 2)

> I think age does not really matter to be digitally improved. We have a young instructor who is probably familiar with the importance of integration of ICT tools in teaching; however, she has a very traditional teaching style without any attempt to use technology. (P9 from a foundation university, Focus Group Interview 3)

When it comes to the facilities and resources their universities offer to improve digital competence, the students from the state university complained about classrooms lacking functional modern technology and the crowded classes hindering a fruitful interaction between the students and teachers during any digital training. On the contrary, the pre-service teachers from the foundation universities seemed satisfied with their technologically equipped and medium-sized classes.

> Our instructors do not use ICT tools very often. When they use any, we still do not benefit from it in depth as we always have some technical problems in the classroom. (P4 from a foundation university, Focus Group Interview 1)

> In our material design course, our teacher tried to show us how to create digital teaching tools. However, when we try to develop some similar ones, not all of us can get feedback from the teacher, as our class population is quite high. (P1 from a state university, Focus Group Interview 1)

> I feel lucky about the physical conditions we have at university in terms of technological environments. I think the administrators pay a lot of attention to what technology the students are able to benefit from on campus. For example, there are some smart labs around the campus where we can get exposed to new diverse technology at any time. (P6 from a foundation university, Focus Group Interview 2)

Digital competence in the practicum

About the experiences they had during practicum in terms of professional digital competence, pre-service teachers mentioned inadequate and unsatisfactory guidance from their mentor teachers. What they mostly criticized about the field practice was quite limited interaction between them and their mentor teachers.

> Even though my mentor teacher saw how much I struggled with the interactive board while doing my micro-teaching, she did not explain to me how to use it correctly. (P3 from a state university, Focus Group Interview 1)

> I can guess how loaded my mentor teacher's schedule is. However, mentoring me with effective guidance and corrective feedback is also an important part of her schedule. (P12 from a state university, Focus Group Interview 3)

About developing digital competence during the practicum, most of the pre-service teachers did not mention positive thoughts. They considered that their mentor teachers are mostly poor role models in the use of ICT in teaching.

> I don't think my mentor teacher is a good role model for digital competence. He merely follows the course book during the entire class, and his students do not seem motivated. (P11 from a state university, Focus Group Interview 3)

> Throughout the whole education term, my mentor teacher used a digital application only once in class. Her students were very eager to join, and they had a lot of fun while learning. She should include more digital resources in her lesson plans. (P7 from a foundation university, Focus Group Interview 2)

Another point mentioned by the pre-service teachers was the discrepancy between their university education and field practice in terms of the emphasis on digital competence. They said that their mentor teachers assume they already have enough ICT knowledge, and they should integrate several instructional technologies during their micro-teaching, whereas they are not informed about the use of ICT in depth in campus education.

> My mentor teacher criticized me for not having included any web tools while doing my microteaching. He believed my teaching could have been more interactive if I had utilized one. However, my university supervisor checked my lesson plan beforehand and did not make any recommendation to include an ICT tool. (P3 from a state university, Focus Group Interview 1)

Pre-service teachers' attitudes towards digitalization of education

From all the interviews, it was inferred that almost all pre-service teachers believed in the effectiveness of integration of ICT tools in teaching practice. They stated that particularly K-12 students are disposed to learn through digitized activities. They get motivated and attend more if they are taught via digital tools. They mentioned several popular applications they know

which can be used to revise the topic, to manage the classroom, particularly young learners, to create conversation groups, to play educational games, etc. They added that all those applications make teaching more visualized and comprehensible for the students; consequently, the amount of student participants increases.

> Besides the ICT tools mentioned at university, I always surf on the internet to discover recent enjoyable educational tools, and I try to include them in my teaching. I am sure I will always have digital activities in my lessons when I officially start teaching as they are certainly beneficial. (P9 from a foundation university, Focus Group Interview 3)

> When I observed my mentor teacher having a class with his primary school students, I realized they learn better and faster if he provides them with some digital gamification. Therefore, I think the use of ICT is effective and should be increased more. (P5 from a state university, Focus Group Interview 2)

Although the pre-service teachers were mostly positive about the use of ICT in education, they came up with some drawbacks as well. For example, they stated that if the selection of used digital resources is not done carefully, it probably results in failure without any educational gain. In addition, sometimes the use of ICT through individual devices may lead to classroom management problems as the teacher cannot control all students' screens.

> For a group work activity, my mentor teacher allowed her students to use their personal smartphones; however, after a while, some students seemed not to engage in target activity but spent time on something else. (P3 from a state university, Focus Group Interview 1)

> In a class with young learners, my mentor tried to use a digital game to teach numbers. When some students did not answer correctly and get points, they refused to give in, and the teacher had to end it. (P12 from a state university, Focus Group Interview 3)

Discussion

This study set out to explore how professional digital competence (PDC) is developed within Turkish initial teacher education (ITE) programs and how senior ELT pre-service teachers perceive their preparedness. The results from both quantitative and qualitative instruments indicated widespread dissatisfaction among pre-service teachers regarding ICT-related training, both on campus and during field practice. This aligns with earlier Turkish studies (e.g., Koc & Bakır, 2010; Özen, 2013), which have long emphasized the gap between policy-level curricular objectives and actual practice in teacher training.

A significant disparity was observed between students from state universities (M = 28.79) and foundation universities (M = 34.82), echoing Bayram and Seels's (1997) findings that institutional funding structures shape access to technological resources. The state university was reported as having more crowded classes, which leaded to a lack of individualized instruction for students regarding modern ICT tools. This was consistent with the findings of Heublein et al. (2009), who claimed that large class sizes have detrimental effects on students' learning environments. Because they can readily engage with their university professors in a technologically enhanced setting, pre-service teachers at foundation universities were viewed as being in a far better position. Similar disparities have been noted in other contexts; for example, Tondeur et al. (2012) found that institutional culture and investment significantly

predict pre-service teachers' exposure to digital tools. Thus, this structural inequality is not unique to Türkiye but appears to be a global challenge in aligning teacher education with technological demands.

One of the more striking results concerns the mismatch between participants' self-perceived digital competence (M = 4.20) and their evaluation of ICT instruction (M = 3.11). This gap reflects what Instefjord and Munthe (2017) describe as "digitally confident but pedagogically unsupported" pre-service teachers. While pre-service teachers often possess basic digital literacy, this does not necessarily translate into pedagogical digital competence, that is, the ability to integrate digital tools meaningfully into instruction. Çuhadar and Yücel (2010) similarly reported high self-confidence in digital skills among Turkish pre-service teachers, yet this confidence is rarely reinforced by structured, practical training opportunities.

The qualitative findings support this claim. Themes such as "digital competence during campus education" and "digital competence in the practicum" revealed limited modeling by university instructors and mentor teachers. This resonates with the findings of Gudmundsdottir and Hatlevik (2018), who also observed that a lack of effective modeling hinders pre-service teachers' ability to integrate ICT into practice. Moreover, the participants' frustration with the inconsistency between university courses and practicum expectations confirms what Huong et al. (2020) and Atay (2007) emphasized the need for coherent, collaborative partnerships between higher education institutions and practicum schools. Without alignment, digital competence becomes fragmented and superficial.

The third theme, "benefits and drawbacks of using ICT in education," highlighted participants' belief in the motivational potential of digital tools—especially gamification and interactive applications. This perception aligns with Vannatta and Beyerbach (2000), who found that pre-service teachers view ICT to enhance learner engagement. However, the drawbacks identified such as internet issues and inconsistent classroom implementation—are consistent with findings by Tondeur et al. (2012), who reported that contextual barriers often outweigh positive attitudes when institutional support is lacking.

While some Turkish studies (e.g., Çebi & Reisoğlu, 2020) report more optimistic perspectives among pre-service teachers regarding ICT integration, the present study suggests that such positive views may be contingent on institutional context. Participants from foundation universities expressed more favorable experiences, pointing to modern digital infrastructure and support services, whereas their peers from the state university cited outdated tools and overcrowded classrooms. This reinforces the claim by Heublein et al. (2009) that class size and infrastructure quality directly affect digital instruction outcomes.

Ultimately, the findings suggest that while individual digital readiness may be increasing, systemic readiness remains uneven. This mirrors the broader tension identified by Røkenes and Krumsvik (2014), who argue that national-level curricular reforms often fail to translate into meaningful institutional change without targeted support, faculty training, and coherent mentorship.

Conclusion, Limitations and Further Research

This study examined how professional digital competence (PDC) is integrated into Turkish initial teacher education (ITE) programs by analyzing the perceptions of senior ELT pre-service teachers. The findings point to a clear gap between institutional policies that emphasize digital transformation and the actual implementation of PDC training in both university courses and

practicum schools. Although many pre-service teachers reported confidence in their personal digital skills, they expressed dissatisfaction with the limited modeling and insufficient practical guidance provided by university instructors and mentor teachers. Differences between state and foundation universities also contributed to unequal learning opportunities, highlighting the significance of infrastructure and financial resources in ensuring fair access to digital education. This study highlights the urgent need for stronger alignment between teacher education curricula and classroom practices to ensure that professional digital competence is effectively modeled, practiced, and embedded across both coursework and practicum experiences.

The study offers meaningful insights, but it is important to acknowledge certain limitations. First, the research was confined to ELT programs in three universities in Istanbul, which restricts the generalizability of the results. Second, the data were based on self-reported perceptions and focus group discussions, which may not fully capture actual competence levels or classroom practices. Third, the cross-sectional design of the study does not allow an assessment of changes over time in terms of training quality or digital preparedness.

Future studies could broaden the scope by including teacher education programs from other regions and subject areas to provide a more comprehensive picture of PDC development across Türkiye. Longitudinal designs would make it possible to trace how digital competence evolves throughout teacher education and continues into professional practice. In addition, the use of classroom observations or digital portfolios could provide richer evidence by aligning self-reported perceptions with real-world teaching practices.

Disclosure Statement

No potential conflict of interest was reported by the authors.

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