

Opinion

All the World's a Stage: Examining the Actors That Influence the Development of Primary Pre-Service Teacher Digital Competence in the Republic of Ireland

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Abstract: In accordance with contemporary educational policy, changes have been made to the requirements of initial teacher education (ITE) with the aim of promoting the development of digital competence among pre-service teachers (PSTs). This paper explores what it means for a primary PST to develop digital competence and posits that programmes of ITE should develop the digital teaching competence of PSTs, alongside positive attitudes toward digital technology use. This is a complex and under-researched process involving multiple actors, including higher education institution tutors, school placement tutors, and cooperating teachers. This research gap is addressed within this paper by examining these actors and unpacking the key issues which may prevent PSTs from developing and enacting digital teaching competence. It appears there is a lack of alignment across these actors, which may negatively impact the digital competence of PSTs. Consequently, we propose that the conceptualization of digital competence across programmes of ITE needs to be brought into alignment. Actions including the establishment of a shared vision of pedagogical use of digital technology, formal induction, and ongoing transformative professional learning for all actors across a programme of ITE are proposed if PSTs are to be enabled to develop the digital competence required by policy.



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1. Introduction

Digital technology use has become ubiquitous across all areas of society [1–3]. It should therefore be of no surprise that education policy documents at the international [4–6] and national levels (e.g., Republic of Ireland) [7,8] seek to develop the digital competence of learners so that they may thrive in a globally connected world. If these goals are to be achieved, teachers must play a pivotal part as designers and facilitators of learning activities that develop the digital competence of their learners. This presents a double challenge to teachers [9,10] as they must develop both the general digital competence required of citizens as well as the role-specific digital competence required to use digital technology as part of their teaching practice. Herein lies a key problem, as it has been reported that many in-career teachers feel unprepared or lack confidence in teaching using digital technology [4,11–13]. As is often the case [14], teacher education policy is tasked with providing a solution. In the Irish context, this solution can be seen in changes to the accreditation standards for teachers [15] which add a requirement for pre-service teachers (PSTs) to develop digital competence within programmes of initial teacher education (ITE). Such a change to ITE policy is not unique to the Irish context, with similar requirements introduced in other jurisdictions (e.g., Norway, Slovenia, Turkey) [16]. The intended result of these changes is that PSTs will join the teaching profession with the digital competence required to use digital technology as part of their teaching practice. However, evidence suggests that this goal is currently not being realized.

While it is sometimes presumed that PSTs possess digital competence by virtue of growing up with digital technology (the popular ‘digital natives’ misconception [17]), the familiarity, use, and skill of PSTs in using digital technology are not uniform [18]. Rather, it appears that the digital competence of PSTs applies to a narrow range of specific use cases (e.g., social media) and specific digital technology (e.g., smart phones) [19]. Moreover, individual differences in the digital competence of PSTs upon entry to programmes of ITE can be anticipated. This underscores the importance of supporting all PSTs in developing the digital competence required for their role as teachers, irrespective of their existing level of digital competence. Variance in the digital competence of PSTs following ITE as reported in recent systematic literature reviews [10,20] evidences that this is not a straightforward process. As numerous actors across multiple sites of practice (which, in turn, are shaped by external forces such as curriculum and policy), are involved in the development of PST digital competence, this is a highly complex process. Changes to the requirements of ITE are an important first step to improving the digital competence of PSTs; however, the process through which this is achieved requires further research in order to deepen understanding of the actors involved as well as their interactions.

The original contribution of this paper is its examination of the actors influencing the development of primary PST digital competence within a programme of ITE in order to address a gap in the research literature. The paper begins by discussing what it means for a primary PST to develop digital competence before examining the range of influences acting upon them, including HEI tutors, placement tutors, cooperating teachers, and other PSTs. The paper then proposes next steps toward supporting the development of primary PST digital competence, informed by a novel conceptual framework. Specific reference is made to the Republic of Ireland context; however, the lessons learnt can also be applied more broadly across contexts including the European Union, the United Kingdom, and North America.

This paper employed a systematized search strategy [21] with initial searches conducted using the electronic index databases: Academic Search Complete, British Education Index, EBSCOhost, Education Research Complete, ERIC, and APA PsychArticles. Key terms, and their synonyms, employed included ‘initial teacher education’, ‘primary’, ‘pre-service teacher’, ‘digital’, ‘competenc*’, ‘digital technology’, and ‘school placement’. Furthermore, as digital technology continues to evolve, with consequential changes to schooling contexts and ITE programmes, the search strategy excluded digital technology-focused articles published prior to 2012. An exception to this was the inclusion of a number of seminal (i.e., highly cited) texts.

2. Digital Competence

The term ‘digital competence’ has become polysemous, as it holds different meanings depending on the field and background of the reader [22]. This presents the first challenge in developing the digital competence of PSTs; a range of definitions and scales designed to measure the digital competence of teachers exist within the research literature [23]; varying terms including digital competence, digital skill, and digital literacy are used interchangeably to refer to broadly the same concept [10,24]. As the term digital competence is used in curriculum and education policy documents in the European Union and Republic of Ireland [5,7,8], the term ‘digital competence’ is used in this paper for consistency.

The next challenge is in unpacking what it means for a PST to develop digital competence. In recent years, there has been a significant increase in the research literature relating to the digital competence of teachers [24]; a subset of which is attempting to define the role-specific skills, attitudes, values, and knowledge required of a teacher. Notably, but perhaps unsurprisingly, there is a growing emphasis on the pedagogical uses of digital technology within these role-specific definitions. This is illustrated in the following recent examples: ‘...the set of skills, attitudes and knowledge required by educators to support student learning in a technologically rich world, design and transform classroom practices and enrich their own professional development’ [25] (p. 399). ‘It is a more complex pedagogical concept than mere technical efficacy. It involves a series of dimensions and aspects

linked to forms of pedagogical representation of technology in the classroom, learning, and teacher training' [26] (p. 70). Whilst it is important to be wary of presenting a false dichotomy between pedagogy and technology [27], these definitions serve to illustrate the ongoing challenge in defining the digital competence required of a PST. While a similar emphasis upon pedagogy is present, there is no agreed consensus on a definition [10,20]. This definitional challenge is further compounded by ongoing advances in digital technology which create a need for new technical skills and understandings which impact society and citizenship (e.g., mobile devices, social media, artificial intelligence), and, consequentially, education in an increasingly post-digital age [28,29].

One solution to this definitional challenge is to adopt a framework or model of teacher digital competence which attempts to capture the complexity of this concept [30]. The popularity of this solution is demonstrated by the range of available digital competence frameworks for educators [28,31–35] as well as a growing number of studies designed to validate [36,37] or compare [38]) digital competence frameworks, scales, and instruments. The range of frameworks available has the potential for further theoretical confusion. The work of Starkey [20] provides a valuable means of classifying and organizing digital competence frameworks into three categories of what it means for a PST to develop digital competence: generic digital competence, digital teaching competence, and professional digital competence. Table 1 presents an overview of the three categories of PST digital competence adapted from Starkey [20].

Table 1. Overview of categories of PST digital competence.

	Generic Digital Competence	Digital Teaching Competence	Professional Digital Competence
Educational context:	Introduction of digital technology.	Integration of digital technology.	Infusion of digital technology across the work of a teacher.
ITE programme aim:	Technical knowledge to use technologies for teaching.	Knowledge of how to apply digital technology to enhance or replace established teaching practices.	Knowledge of how to be a teacher in a digitally infused schooling system.
PST ability to:	Use presentation, creative, collaborative, and communication software. Use hardware such as cameras and printers.	Teach using digital technology. Evaluate teaching decisions critically. Teach learners who are using digital technology.	Teach using digital technology. Manage digital learning environments. Use systems and tools in the professional work as a teacher.

The first category, generic digital competence, includes skills that are not specific to teaching or the professional practice of a teacher [20] (p. 41); e.g., managing online files, touch typing, use of presentation and word-processing software, internet searches, and online communications. Such skills could apply to anyone using digital technology for learning or working, as they largely mirror international policy recommendations on the digital competence required of all citizens such as those from the Council of Europe [39].

The second category, digital teaching competence, refers to teachers' abilities and skills in integrating digital technology into their professional practice. This moves beyond generic digital competence and involves three specific aspects of the work of a teacher: integrating digital technology into existing pedagogical practice, being able to select and critique which digital technology to use, and being able to plan and teach learners who are using digital technology for learning [20] (p. 41). The widely researched and utilized Digital Competence Framework for Educators (DigCompEdu) [33] is an example of a digital teaching competence framework. DigCompEdu emphasizes the pedagogical uses of digital technology by teachers and learners, while implicitly highlighting that digital teaching competence is an ongoing process. Notably, digital teaching competence relates to contexts where digital technology is being introduced or integrated into the practice of teachers.

The third category, professional digital competence, differs from the previous categories insofar as it relates to the work of teachers in a 'digitally infused schooling education system' [20] (p. 52). That is to say, it refers to contexts where digital technology is an integral part of a teacher's professional practice as opposed to being introduced or integrated into existing practices. Professional digital competence is a relatively new concept and, as such, is not clearly defined [40]. Nevertheless, five aspects of professional digital competence recur in the research literature: technological proficiency, pedagogical compatibility, social awareness [20], attitudes to technology use, and professional engagement [40]. The Norwegian Professional Digital Competence Framework for teachers (PDCF) [41] is an example of a professional digital competence framework. Notably, PDCF highlights (1) the importance of generic digital competence of teachers as a 'prerequisite' in order to develop their learners' digital competence [41]; (2) an emphasis upon the ethical use of digital technology which encompasses both the teacher's use of digital technology as well as supporting learner use; and (3) that a teacher's digital competence is not static, but, rather, must be an ongoing practice in line with developments in technology. As this does not reflect the reality of present practice in the RoI (e.g., [11,12]) or for most teachers and systems of education around the world [42] it might be best considered as a direction of future development as to what it will mean for a PST to develop digital competence.

Critically, each category represents an increasingly complex and pedagogically focused conceptualization of the digital competence of a PST. These categories would appear to align with different contexts of technology availability and use in schools, i.e., initial introduction, integration into existing practices, and infusion across all areas of the work of the teacher. Starkey's categories suggest a hierarchical development of the digital competence of a PST; i.e., generic digital competence could be considered a prerequisite to developing their digital teaching competence. Digital teaching competence, in turn, will most likely serve as the foundation for the development of their professional digital competence. It is highly likely that conceptualizations of digital competence will change over time in line with ongoing developments in both digital technology and society. This, in turn, may lead to the creation of new categories of digital competence of teachers (including PSTs). It may therefore be prudent for providers of ITE to develop what McDonagh and colleagues refer to as the attitudinal dimension, or an 'openness to exploring new digital technology' [28] (p. 13), alongside developing the digital teaching competence of PSTs. This may better enable them to maintain and develop their digital competence in line with advancements in technology after they have entered the teaching profession. Thus, in unpacking what it means for a PST to develop digital competence, this paper concludes that it is vital for programmes of ITE to develop the digital teaching competence of PSTs (e.g., through alignment with the DigCompEdu framework), while also developing positive attitudes toward digital technology use. However, as this is a highly complex process, the following section examines the influences upon both the digital competence and the attitudes of PSTs toward digital technology use.

3. Influences upon Pre-Service Teacher Digital Competence

To conduct a thorough examination of the influences upon the development of PST digital competence, it is necessary to situate this section within a national context. In the Republic of Ireland (RoI), individuals who wish to become a primary school teacher have two main pathways to complete their initial teacher education: the four-year undergraduate (concurrent) Bachelor of Education programme, or the two-year postgraduate (consecutive) Professional Master of Education programme which follows an undergraduate degree in any discipline [15].

As shown in Table 2, programmes of primary ITE are divided between three areas: (1) Foundation and Professional Studies, (2) School Placement, and (3) Discretionary Time, which can differ by ITE provider. As also shown, PSTs spend a proportionally large amount of time in school settings. The term School Placement (SP) is used in the RoI context to describe the time spent by PSTs in school settings. SP is about more than PSTs spending

time within classrooms; rather, it presents an opportunity for PSTs to develop and acquire skills, including pedagogical use of digital technology in an authentic classroom setting, while assuming increasing responsibility for the role of teacher [43–46]. The influence of SP on the digital competence of PSTs cannot be understated, as SP experiences have been repeatedly identified by PSTs as the most effective part of their ITE, regardless of the programme of ITE [47].

Table 2. Primary ITE programme balance in the Republic of Ireland.

	Undergraduate (Concurrent)	Postgraduate (Consecutive)
Length of programme	4 years (240 ECTS ¹)	2 years (120 ECTS)
(1) Foundation and Professional Studies	55% (132 ECTS)	50% (60 ECTS)
(2) School Placement	25% (60 ECTS) (30 weeks ²)	40% (48 ECTS) (24 weeks ²)
(3) Discretionary Time	20% (48 ECTS)	10% (12 ECTS)
Approximate graduates per year [48]	1000	870

Notes: ¹ ECTS, European Credit Transfer and Accumulation System; ² refers to number of weeks spent by PSTs in school settings.

PSTs in the RoI engage with two ‘primary sites of practice’ during their programme of initial teacher education [15]: (i) the Higher Education Institution (HEI), where PSTs primarily engage with HEI tutors; and (ii) schools, where PSTs engage in SP experiences facilitated by the SP tutor and cooperating teacher. Whilst it is likely that many PSTs may be directly or indirectly influenced by other actors (e.g., resulting from a school’s culture or attitude toward digital technology [49,50]), the focus of this study is upon the actors with whom all PSTs will be directly influenced over the course of their programme of ITE. An overview of the primary sites of practice, and associated actors, is provided in Figure 1.

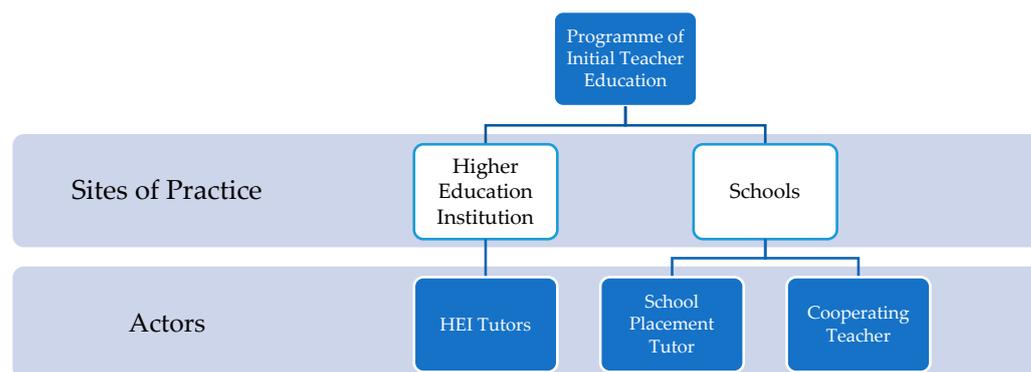


Figure 1. Primary Sites of Practice of ITE programmes within the RoI.

3.1. HEI Tutors

As HEI tutors are the primary actors with whom PSTs interact while engaging with their programme of ITE, it can be expected that they will have a significant influence upon PSTs. Indeed, the impact of HEI tutor practice upon the digital competence and attitudes of PSTs is well established, with this primarily attributed to PST observations of HEI tutor practice [32,51]. Use of digital technology by HEI tutors is a product of their professional beliefs and experiences and is mediated by the culture of the HEI. The need for institutional-level initiatives targeting HEI tutors’ digital competence has been acknowledged for many years; indeed, the development of such initiatives was listed among a series of specific

recommendations made in a report by the European Commission's High Level Group on the Modernization of Higher Education [52]. DigCompEdu has provided the opportunity for HEIs to take a more consistent, European-wide approach to the development of such initiatives. Indeed, as part of the CUTE (Competences for Universities—using Technology in Education) project, a number of HEIs across Europe have engaged in various small-scale interventions aimed at enhancing the digital competence of their teaching staff, all of which are embedded in the DigCompEdu framework (see <https://cutetoolkit.ku.dk>, accessed on 1 September 2023, for examples). The 'MoodleMunch' professional learning community is another example in operation across a range of HEIs in the RoI [53,54].

As the majority of these initiatives are in their infancy, their overall impact remains largely unknown, and contemporary research findings indicate that most HEI tutors, despite having self-reported high levels of generic digital competence, are not confident in pedagogical uses of digital technology. Low levels of digital (teaching) competence have been reported [55–57], specifically in modelling the use of digital technology to enhance learning in schools [32]. This presents a dilemma, as the digital competence of PSTs is influenced by the practices utilized by HEI tutors. Within the research literature, three areas reportedly influence an HEI tutor's use of digital technology within their teaching practice: access to digital technology, their digital competence, and attitudes toward digital technology [32,58–62]. These areas broadly align with the seminal work of Ertmer, who proposed that the integration of digital technology by teachers into their teaching practice is 'often limited by external (first-order) and internal (second-order) barriers' [63] (p. 47). Access to digital devices, training, and support are classified as external (first-order) barriers, as they are considered easily measured and resolved, provided funding is allocated. The greater challenge is in overcoming second-order barriers through altering the deeply ingrained personal and professional beliefs of TEs. This requires sustained professional learning and the development of a shared vision across a programme of ITE, such that there is consistent modelling and pedagogical use of digital technology for teaching, learning, and assessment by HEI tutors across a programme of ITE.

There is currently limited understanding of the professional development of HEI tutors in ITE specifically, including the process of induction [64,65]. Approaches to induction of HEI tutors vary widely, with some HEIs providing doctoral programmes in teacher education for potential HEI tutor candidates [66], while the majority rely on the informal transition of candidates from classroom teachers to HEI tutors [51]. This does not account for the cohort of HEI tutors with no classroom teaching experience. In the absence of a formal induction programme, the research literature suggests that an HEI tutor's attitudes and approaches to digital technology use within their work with PSTs would be dependent upon past classroom experiences as well as upon the expectations modelled by colleagues within the HEI. This is potentially problematic for two reasons: (1) programmes of ITE have been described as a collection of 'loose expert organizations' [47] (p. 3) where HEI tutors may not necessarily share a vision or shared understanding of the use of digital technology within the programme of ITE. Therefore, they may not utilize consistent approaches. (2) The attitudes toward, and use of digital technology, by in-career teachers has been repeatedly reported as low [11,12,67–70], which lessens the likelihood of future use. Therefore, the research literature would suggest that where HEI tutors have access to digital devices, they may not have the relevant confidence or digital competence to make pedagogical use of digital technology for teaching, learning, and assessment or to support PST use of digital technology in school-based practice.

3.2. School Placement Tutors

The school placement (SP) tutor is a professional engaged by a programme of ITE to support and mentor PSTs and evaluate their practice [46]. SP tutors are generally either HEI tutors involved with the programme of ITE or casual staff specifically hired to support SP [45,71]. It is worth noting that casual staff working as SP tutors are often retired teachers or principals, with McGarr and Ó Gallchóir suggesting that these may have limited personal

experience of using technology in their teaching practice [71]. Regrettably, there is a lack of research examining the experiences and perspectives of casual SP tutors in the RoI. International research suggests that many SP tutors have very little formal preparation for their role [72–75], with scholars positing that this results from an assumption that a successful teacher can naturally take on the role of a successful SP tutor. Thus, similar to the reliance of novice HEI tutors upon previous classroom teaching experience (where applicable), there is a high likelihood that in the absence of formal training, SP tutors will reinforce classroom practice which reflects their own beliefs, attitudes, and classroom experiences [76]. It follows that there is variance in the attitudes and experiences of digital technology use among SP tutors. Given this, along with the number of SP tutors a PST will encounter across their programme of study, there is a strong possibility they will encounter dissonance, as SP tutors may hold conflicting beliefs and attitudes relating to digital technology. This is problematic, as the direct influence of the SP tutor on the use of digital technology by a PST on SP has been widely reported [71,77]. Furthermore, this influence is not limited to interactions where digital technology is specifically discussed, rather, all interactions between SP tutors and PSTs have the potential to impact upon their attitudes, beliefs, and intentions. The issue is even more complex when the power SP tutors hold as module examiners or ‘quality assurance agents’ [78], and the accompanying implications for PST grades, are taken into consideration. A further outcome of the SP tutor’s role in the assessment of SP is that PSTs may experience a perceived need to demonstrate the types of theory and practice covered within the programme of ITE in order to satisfy the perceived preferences of the SP tutor [79].

3.3. Cooperating Teachers

The cooperating teacher is the actor with whom the PST has the most direct contact on SP and has a large potential influence upon digital competence and attitudes of PSTs [80,81]. An important contextual factor is the absence of any requirement upon schools in the RoI to provide SP opportunities [82]. Consequentially, there exists a ‘loose informal partnership’ [83] (p. 208) where schools volunteer to host PSTs but are not formally involved in their assessment. This results in what Farrell refers to as an overburdened ad hoc system of cooperation [77,84]. As cooperating teachers generally do not receive formal training in mentoring [85,86], it is unsurprising that they have been found to be unaware of the scope of their mentoring role [87–89], with the role described as largely unstructured and more akin to informal support and guidance [90]. This has implications, as in the absence of adequate induction and training there is a risk that cooperating teachers will rely upon their beliefs, attitudes, and classroom experiences [87], which may not align with the practice promoted in the programme of ITE, including use of digital technology. This is crucial, as it has direct implications for the mentoring, direction, and modelling provided by cooperating teachers, which is reportedly the ‘most critical factor’ [91] influencing PST practice. PSTs have been found to replicate the approaches and practices used by their cooperating teacher. Even in situations where PSTs identified the low levels of digital technology use by the cooperating teacher as an aspect of a lesson where the learning of pupils could be improved upon, PSTs chose to replicate those same approaches rather than improve the lesson by employing approaches which included more innovative uses of technology [92]. This apparent preference of PSTs to reflect the approaches and practices of the cooperating teacher over the innovative practices developed within their programme of ITE is directly related to what Edwards described as a process of ‘bidding down’ [78]. This involves PSTs, in consultation with the cooperating teacher, opting against using more innovative or challenge practices advocated within their programme of ITE in favour of teaching practices with an apparent lower risk of failure. This notion of the cooperating teacher guiding PSTs toward ‘safer’, but less innovative practice, is of particular concern when digital technology is considered. As generally low levels of digital technology use by in-career teachers have been reported [91], there is a likelihood that PSTs may be led to ‘bid down’ the use of digital technology in an effort to avoid what are believed to be ‘obvious obstacles’ [78]. This, in

turn, may lead to PSTs who resultantly do not receive adequate opportunity to develop their digital teaching competence in an authentic setting. The converse is also possible. Where a cooperating teacher is digitally competent, it could positively impact the attitudes and digital competence of a PST. Evidently, the cooperating teacher is an actor who has the potential to greatly impact upon PST digital competence.

Following this examination of the actors influencing PSTs, it appears that there is a lack of alignment across this system. HEI tutors, SP tutors, and cooperating teachers are operating as individuals in silos, rather than as a collective—a finding echoed in the work of Gorman and Furlong [83]. In addition, due to an absence of a formalized model of partnership, there is limited opportunity for triadic dialogue to occur between the PST, SP tutor, and cooperating teacher [93]. It is possible that PSTs may resultingly undergo a three-directional tension between the beliefs and expectations of the SP tutor, the cooperating teacher, and the expectations of the programme of ITE. Resulting from these tensions is a potential underdevelopment of the digital competence of PSTs [71], as PSTs revert to their well-established lay theories of education [94]. As each actor has a powerful influence upon the development of PST digital competence, this has huge potential negative consequences. Namely, if any of these actors present strong negative beliefs or attitudes relating to digital technology use, it may lead to lower levels of PST digital competence or the development of negative beliefs and attitudes toward digital technology use.

4. Where to from Here?

With digital competence emphasized across education policy internationally, programmes of initial teacher education are tasked with developing the digital competence of PSTs so that they may enter the teaching profession with the role-specific digital competence required to facilitate the development of learner digital competence. This paper has explored what it means for a primary PST to develop digital competence and posits that while it is vital for programmes of ITE to develop the digital teaching competence of PSTs (e.g., through alignment with the DigCompEdu framework), it is also equally important to develop positive attitudes toward digital technology use so that PSTs may be more likely to continue developing their digital competence in line with inevitable advancements in technology, research, and society. Cognizant of education policy changes aimed at developing aspects of digital competence in the RoI, which Butler and Leahy refer to as ‘a disconnected series of initiatives’ [95] (p. 47), this paper further unpacked the key issues or barriers which may prevent PSTs from developing and enacting digital teaching competence within their professional practice. Consequently, the programme of ITE must be brought into alignment. To achieve this, the actors influencing all PSTs (i.e., HEI tutors, SP tutors, cooperating teachers) must be enabled to act in concert such that they model digital teaching competence while also holding expectations of pedagogical use of digital technology by PSTs. Resulting from the previous examination of actors influencing development of PST digital competence, Figure 2 presents a visual representation of the next steps proposed by this paper. The remainder of this section discusses these proposed next steps.

4.1. HEI Tutors

In order for HEI tutor practice to be adapted or redefined to make pedagogical use of digital technology, tutors must be aided in overcoming first- and second-order barriers [63]. The provision of digital technology can be relatively easily facilitated by higher education institutions (provided funding is made available); however, this must be accompanied by ongoing professional learning, ongoing support, and time if HEI tutors are to redevelop their practice in ways which meaningfully embed digital technology and enable deeper engagement and reflection by PSTs [96–98].

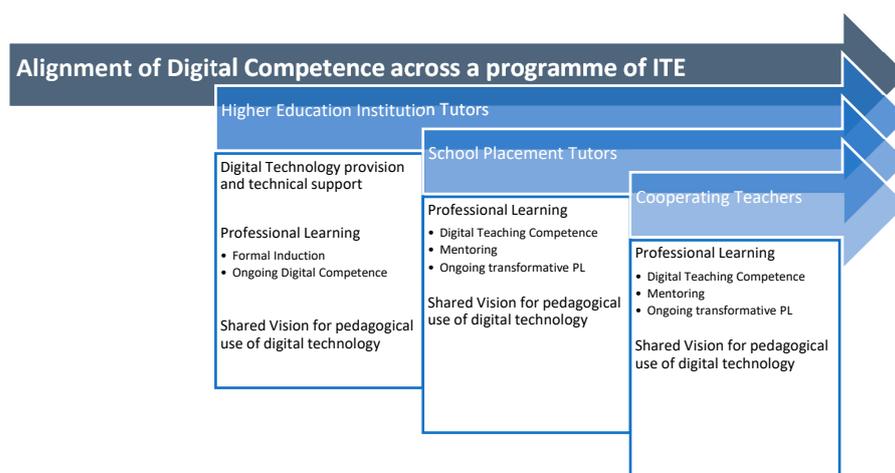


Figure 2. Proposed next steps in supporting the development of primary pre-service teacher digital competence.

To this end, and to facilitate addressing second-order barriers [63], it is proposed that digital competence be brought into alignment across a programme of ITE. This may be supported by establishing a shared vision for the pedagogical use of digital technology across the programme of ITE. This vision would include specifics as to how digital teaching competence would be reflected in the signature pedagogies utilized by HEI tutors. Signature pedagogies signal the cultures and values of a profession [99]. In the context of this paper, they refer to the pedagogical approaches used by HEI tutors to prepare PSTs to work as a teacher through enacting knowledge and theory in a professional practice setting. Signature pedagogies are composed of three dimensions; the first, surface structure, refers to the operational acts of teaching [99]. In the case of ITE, the first dimension relates to the approaches used by a teacher educator within the programme of ITE that are directly observable by a PST, e.g., whether or not digital technology is utilized. The second, deep structure, refers to assumptions about how best to impart knowledge and skills, whereas the third, implicit structure, refers to a moral dimension comprised of beliefs, values, and dispositions of the profession [99] (p. 55). Choices by HEI tutors of what does or does not contribute to the signature pedagogies of a programme of ITE are equally important, as they serve to signal to PSTs what knowledge and approaches are (or are not) valued in the profession. That is to say, whether consciously or unconsciously, the depth of use, or non-use, of digital technology by HEI tutors can signal to PSTs how they should value use of digital technology, and it is therefore vital that there is alignment of signature pedagogies utilized across a programme of ITE.

With a shared vision established, the professional learning of HEI tutors must be considered. It is proposed that HEI tutors complete a formal induction upon appointment to the role as a first step toward a sustained transformative programme of professional learning. Alongside the technical and administrative elements of induction and professional learning, HEI tutors should be supported in adopting the signature pedagogies utilized across the programme of ITE. Beyond a formal induction process, all HEI tutors should be supported to engage in regular professional learning in line with advancements in technology and digital competence research. This should involve collaborative inquiry characterized by critical dialogue and public sharing of work as well as discussions of, and revisions to, the programme's shared vision. In order to develop the beliefs, digital competence, and practice of HEI tutors, it is proposed that professional learning communities be established [100]. Such communities would ideally be aligned to a digital competence framework, such as DigCompEdu [33], so as to maintain an emphasis upon pedagogical uses of digital technology.

4.2. School Placement Tutors and Cooperating Teachers

To enable the alignment of digital competence across a programme of ITE, it is important that the vision for the pedagogical use of digital technology be shared by SP tutors and cooperating teachers. To this end, it is proposed that SP tutors and cooperating teachers would receive a formal programme of induction from HEI tutors. This initial training would support both actors in developing their digital teaching competence as well as aligning their signature pedagogies with those utilized across the programme of ITE. This is not to suggest a wholly top-down approach; rather, it is proposed that the vision of a programme of ITE would become a shared enterprise for HEI tutors, SP tutors, and cooperating teachers. Moreover, it is proposed that SP tutors and cooperating teachers received ongoing transformative professional learning in line with advancements in technology and digital competence research, such that alignment across the sites of practice of ITE is maintained [15].

As mentoring of PSTs is at the heart of the role of both SP tutor and cooperating teacher, it is proposed that both be provided with the necessary professional learning to support PSTs in critically reflecting upon their teaching experiences. This is to enable them to support PSTs in talking about their professional practice in ways which go beyond surface descriptions and, instead, make connections between their practical experiences and the theory and approaches developed within the programme of ITE [101]. In addition to connecting theory and practice, PSTs must be supported to connect the preparations they have made within the context of their programme of ITE and the implications of these upon their classroom practice [47]. It is intended that as a result of additional training in mentoring, SP tutors and cooperating teachers will be better able to support PSTs to develop skills through action and develop greater knowledge, beliefs, and attitudes toward innovative practices than could be achieved through the signature pedagogies of TEs alone. As echoed in national and international research literature [83,86,102–104], models of HEI–school partnerships need to be evolved and adequately resourced that allow for HEI tutors, SP tutors, and schools to bridge potential theory–practice divisions in relation to digital competence and to ensure that there is a shared consensus around how PSTs can be appropriately supported.

4.3. Future Research

This paper reported upon an examination of the research literature relevant to the development of PST digital competence. Resultantly, three recommendations for future research are proposed. First, the majority of recent studies examining the digital competence of PSTs rely solely upon quantitative measures, e.g., [9,105]; it is recommended that the voice of PSTs be included in future studies through utilization of a qualitative measure. Such an approach could serve to facilitate deeper understanding of what digital competence means to PSTs and how the digital competence of a PST is influenced. Second, this paper posited the importance of developing both the digital teaching competence (e.g., through alignment with the DigCompEdu framework) of PSTs, while also developing positive attitudes toward digital technology use. To further examine any potential relationships between digital competence and attitudes of PSTs, it is proposed that a future study examine both the digital (teaching) competence and attitudes or intentions of PSTs in the RoI to use digital technology in their professional practice. Third, recent studies [106,107] have examined differences in the digital competence of PSTs at different stages of a programme of ITE; however, a cross-sectional rather than longitudinal approach was utilized. It is proposed that a longitudinal study which tracks the digital competence of PSTs across the duration of their programme of ITE could enable researchers to better understand the changing digital competence and attitudes of PSTs toward pedagogical digital technology use.

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