

International Journal of Learning, Teaching and Educational Research
 Vol. 25, No. 9, pp. 238–264, September 2026
<https://doi.org/10.26803/ijlter.25.9.10>
 Received Jun 13, 2026; Revised Sept 03, 2026; Accepted Sept 08, 2026

National Policy on Preschool Teachers' Digital Competence in Finland, Sweden, and Norway: DigCompEdu as an Analytical Boundary Object

Yuzhi Tian* 

Baotou Teachers' College, Inner Mongolia
 University of Science and Technology,
 Baotou, Inner Mongolia, China

Citation:
 Tian, Y. (2026).
 National Policy on
 Preschool Teachers'
 Digital Competence in
 Finland, Sweden, and
 Norway: DigCompEdu
 as an Analytical
 Boundary Object.
*International Journal of
 Learning, Teaching and
 Educational Research*,
 25(9), 238–264.
<https://doi.org/10.26803/ijlter.25.9.10>

Abstract. Comparative research on teachers' digital competence has focused on compulsory schooling, leaving early childhood education and care largely unexamined. This study examines how national policy in Finland, Sweden, and Norway constructs the digital competence expected of preschool teachers. Nine national policy documents published between 2017 and 2024 (three per country) were subjected to directed qualitative content analysis, with the European Framework for the Digital Competence of Educators (DigCompEdu) serving as the analytic lens. Although the documents share a vocabulary of critical, responsible, and creative use, none is structured around DigCompEdu; divergence emerges as the dominant pattern. Norway supplies a school-oriented, non-statutory framework addressed to teachers. In the same period, Finland and Sweden embedded digital expectations within learner-facing curricula as collective responsibilities of the teaching team – an expectation Sweden subsequently withdrew in 2025. Normative framing also differs: Finnish policy conveys ambition, Norwegian policy emphasises precaution, and Swedish policy exhibits a restrictive turn reflected in the 2025 revised curriculum, a text outside the coded corpus but examined through a targeted post-corpus comparison. None of the three countries has developed a professional digital competence framework designed specifically for early childhood education and care teachers. DigCompEdu is employed here as an analytical boundary object – a stable external reference that renders the three national policy configurations comparable. Early-years policy guidance is, therefore, better grounded in the sector's own categories – pedagogical documentation, children's permission, and professional judgement – than in frameworks transferred from compulsory schooling.

Keywords: early childhood education; professional digital competence; curriculum; comparative policy analysis; DigCompEdu

*Corresponding author: Yuzhi Tian; jasminetiantian0@gmail.com

1. Introduction

Digital competence has become a policy priority across European education agendas (Redecker, 2017; Vuorikari et al., 2022). The European Framework for the Digital Competence of Educators (DigCompEdu) gives governments a shared conceptualization of educator competence, although the quality of technology use ultimately depends on teachers themselves (Tondeur et al., 2017). Still, digital competence, digital literacy, and related labels remain overlapping and sometimes conflicting (Spante et al., 2018).

Early childhood education and care (ECEC) align only partially with this agenda. Its play-based pedagogy prioritises all-round development over subject teaching, and preschool teachers mediate children's first encounters with digital technology. Although research on digital practices in ECEC research has expanded rapidly (Su & Yang, 2024), cross-country policy comparison remains scarce. Comparative studies have largely focused on compulsory schooling or initial teacher education (McGarr et al., 2021), while reviews of digital competence in ECEC itself note the lack of policy-level comparison (Su & Yang, 2024). This study compares Finland, Sweden, and Norway, which share a Nordic ECEC tradition of play, participation, agency, and equal access but have pursued distinct digital-policy trajectories. Accordingly, they are well-suited to the examination of convergence and divergence (Erstad et al., 2021) and to testing the applicability of a school-oriented framework within early-years provision.

1.1 Research Aims and Questions

The study pursues four aims. The first is to identify the national policy documents that articulate expectations for preschool teachers' digital competence in the three countries. The second is to compare these documents through the lens of DigCompEdu. The third is to examine how each system frames the value of digital technology, with particular attention to the Swedish policy trajectory culminating in the 2025 revision. The fourth is to assess what DigCompEdu contributes as an external analytical reference. Four research questions guided the study:

- RQ1:** Which national policy instruments articulate or frame expectations concerning preschool teachers' digital competence in Finland, Sweden, and Norway, and what form do these instruments take?
- RQ2:** Across the DigCompEdu-informed analytical dimensions, where do the three national policy configurations converge and where do they diverge?
- RQ3:** How was digital technology framed normatively in the three systems during 2017–2024, and how was the direction identified in the 2024 Swedish review reflected in the revised curriculum that took effect in 2025?
- RQ4:** What function does DigCompEdu perform as an analytical reference in this comparison?

Regarding RQ4, the DigCompEdu is treated as the study's analytical reference and boundary object: a stable external grid against which distinct national policy configurations become visible, rather than an instrument that the three systems employ. The analysis addresses policymakers and teacher educators concerned with distinguishing shared vocabulary from divergent instruments, as well as researchers examining the transfer of a framework beyond its original sector.

2. Literature Review

This section reviews the evolving concept of digital competence, the DigCompEdu framework and its critiques, Nordic ECEC digital policy, and the concepts of policy borrowing, translation, and enactment that inform the comparison.

2.1 The Evolving Concept of Digital Competence

The conceptualization of teachers' technology-related capabilities has shifted from an emphasis on ICT skills to digital literacy and digital competence. The latter predominates in Nordic and continental European scholarship, though definitions vary by region and source (Spante et al., 2018). The construct extends beyond tool use to encompass pedagogical, ethical, and professional practice, and remains multidimensional and context-bound (Pettersson, 2018; Skantz-Åberg et al., 2022). This flexibility allows national systems to embed their own commitments, while tighter definitions facilitate measurement and accountability. In ECEC, competence centres less on technical proficiency than on play, exploration, creativity, and safety (Palaiologou, 2016); recent Nordic research suggests that the construct remains unsettled even within one system (Meaney et al., 2025).

2.2 The DigCompEdu Framework and Its Critics

DigCompEdu maps educator competence across six areas and 22 competences, graded from Newcomer (A1) to Pioneer (C2). The framework covers all educational levels, including early years, and is intended to be used as an adaptable reference rather than an individual appraisal tool (Redecker, 2017). Standardised competence frameworks can narrow practice to measurable outcomes and diminish teacher autonomy (Adoniou & Gallagher, 2017; Ball, 2003); in ECEC, subject-teaching and individual-assessment categories can conflict with play-based pedagogy, especially in Area 4. DigCompEdu is embedded within a broader European architecture and has been applied to curricula and teacher education (Diković & Terlević, 2025; Undheim & Ploog, 2024; Vuorikari et al., 2022). Its adaptable design makes instances of poor fit analytically useful: national constructs can occupy the space its categories leave open.

2.3 Nordic ECEC and Digital Policy

Nordic ECEC emphasises play, children's agency, participation, and equal access, framing technology through rights, creativity, and critical engagement. Common values do not produce uniform policy: the three systems organise curricula differently (Erstad et al., 2021), with Nordic K-12 digitalisation described as a pliable boundary object rather than a single model (Olofsson et al., 2021). Research has largely focused on one country or on teacher education rather than national steering documents. Recent studies cover Norwegian teacher education, Swedish municipal development, and cross-national pre-service competence (Gallardo, 2025; Kewalramani et al., 2026; Madsen et al., 2023; Undheim & Ploog, 2024), while reviews suggest a growing but uneven field (Su & Yang, 2024; Zhang et al., 2026). A framework-based comparison of the three systems remains absent.

2.4 Policy Borrowing, Translation, and Enactment

Scholarship in comparative education explains how shared themes produce different policies. Phillips and Ochs (2004) trace borrowing from attraction and decision to implementation and internalisation, where ideas are adapted to the host system. Steiner-Khamsi (2014) likewise separates reception from domestic translation: because international standards are loosely defined, shared language can coexist with different policy effects. Policy texts also differ from practice: educational settings enact rather than simply implement policy, translating it under local conditions (Ball et al., 2012; Nolan & Molla, 2023). Documentary analysis, therefore, establishes the expectations, recommendations, proposals, and policy directions articulated in national documents, rather than teachers' enacted practices (Section 6.4). Together, these strands justify DigCompEdu as a comparative grid and delimit the claims made in Sections 4 to 6.

3. Methodology

This section sets out the design and corpus, the analytical procedure, cross-language comparison, the basis of comparability, and the limits of the design.

3.1 Design and Document Corpus

This documentary study examines policy texts as artefacts of national priorities (McCulloch, 2004; McGarr et al., 2021; Mogalakwe, 2006). Although fieldwork would address enactment, RQ1–RQ4 concern what the documents prescribe, recommend, propose, or frame, for which non-reactive documents provide comparable evidence (Bowen, 2009). Documents were collected from ministry and agency portals in Finland, Norway, and Sweden, whose archives were checked for higher-level instruments.

Figure 1 summarises three inclusion rules: documents had to be nationally official, dated 2017–2024, and to address ECEC or its containing education sector together with digital technology, or supply the highest-level national digitalisation context for that sector. Portal searches combined national-language and English terms for preschool, kindergarten, and ECEC with digital competence, digitalisation, curriculum, framework, and strategy, and were rechecked before submission. Nine documents qualified, three per country (Table 1). Document codes F1–F3, S1–S3, and N1–N3 are defined in Table 1; identifiers such as FIN-16 and SWE-18 refer to numbered entries in the analytical log (Appendix 2). Lower-order guidance, local reports, and subordinate strategies were excluded, yielding a purposive corpus.

The revised Lpfö 18 – in force from 1 July 2025 – fell outside the DigCompEdu coding corpus. It was instead subjected to a targeted post-corpus comparison, examining how the restrictive direction identified in S3 was reflected in the enacted 2025 curriculum. That comparison covered the presence and frequency of selected terms, changes in modal wording, age-related provisions, and the legal status of the enacted text; it was not entered into the DigCompEdu coding (Swedish National Agency for Education [Skolverket], 2025). It is cited by author-date rather than a corpus code, received no analytical category, and is referenced

in Sections 4.2.4 and 6.2 as the enacted curriculum that followed the 2024 review, reflected its restrictive direction, and added government-level provisions [S3].

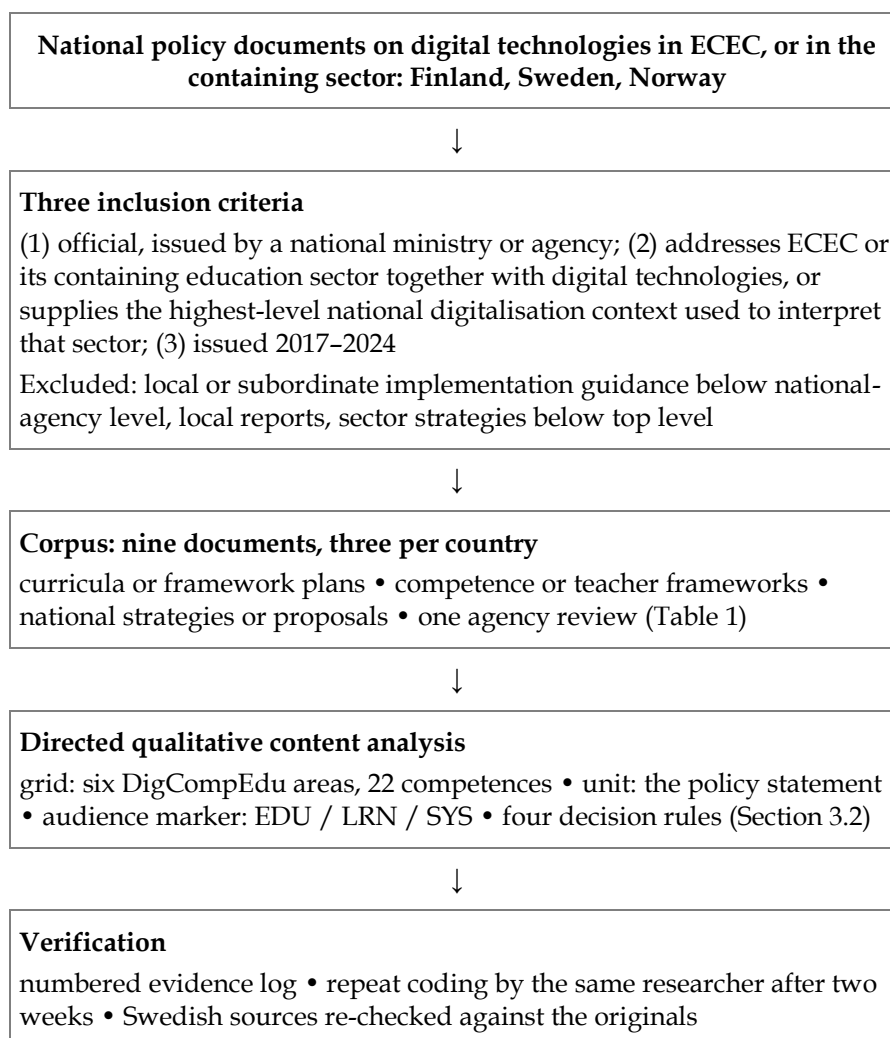


Figure 1: Document selection and analysis procedure

3.2 Analytical Procedure

DigCompEdu supplied the six areas and 22 competences used in the analysis (Redecker, 2017; Appendix 1), functioning as an analytical reference rather than a scoring grid. The unit of analysis was a policy statement: a sentence or distinct clause concerning educator or learner digital competence, the pedagogical use of digital technology, or system-level conditions and policy framing relevant to that competence. Infrastructure-only statements were logged at system level without a competence. Each unit was recorded verbatim with document code, location, audience marker, an area where the fit was defensible, and where possible a specific competence.

Assignment followed four rules. First, the grammatical subject typically determined the audience marker: EDU for educator action, LRN for child outcomes staff support, SYS for governance, infrastructure, or professional development (Figure 1; Appendix 2); a dual marker was applied when a staff duty

was realised through a child outcome, as in FIN-16. Second, coding followed the action's purpose, so documentation involving a tablet entered Area 4 rather than Area 2. Third, ambiguous statements were double-coded and reviewed. Fourth, constructs without a clean sub-competence match were assigned at area level only when the fit was defensible and were retained as native constructs, including Norway's *dømmekraft* [judgement] and Sweden's *adekvat digital kompetens* [officially rendered "adequate digital skills"]; when no area fit was defensible, the statement was retained as a system-level native statement without DigCompEdu assignment, as in SWE-18. This procedure made instances of poor fit with a play-based tradition visible rather than forcing them into the framework (Section 6.3).

An initial reading mapped each text; closer reading extracted relevant passages and grouped them by area and audience. Partial fit with school-oriented categories was treated as a finding. Document handling was guided by Scott's criteria, authenticity, credibility, representativeness, and meaning (Mogalakwe, 2006). The labels in Table 2 are interpretive summary judgements, not quantitative thresholds. Convergence (C) was recorded when all three systems expressed a substantively comparable orientation, divergence (D) when instruments or normative directions differed materially, and C/D when a broad common orientation coexisted with important differences in scope, legal force, or policy design.

One researcher conducted the analysis, with three safeguards employed: categories fixed in advance; a numbered audit log that linked every coding decision to source, location, audience, and competence (Appendix 2, Tables B1–B3); and a second coding pass after a two-week interval. No agreement coefficient is reported, because it would reflect only intra-coder consistency. The second pass exposed instability between Areas 3/6 and 2/4, prompting refinement of the four rules. Once the rules had been clarified, the complete evidence log was reviewed again to ensure consistent application to all entries. The full evidence log is available from the author on reasonable request.

3.3 Cross-Language Comparison and Translation

The term "preschool teachers" is used throughout as a comparative shorthand: the national documents address somewhat distinct professional audiences, including qualified teachers, staff teams, kindergarten personnel, and, in Norway's PfdK, school-oriented teacher roles. Cross-language comparison was treated as an analytical problem in its own right (Phillips & Ochs, 2004). Seven of the nine documents have official English versions; S2 and S3 are Swedish-only. Terms are not equivalent: *adekvat digital kompetens* is officially rendered 'adequate digital skills' [S1], while Norwegian *digital dannelse* [digital formation] appears as 'digital bildung' [N2]. Originals are retained wherever connotations matter.

DeepL produced first-pass translations of S2 and S3 (DeepL SE, 2026). Every analysed passage was checked against the Swedish source and re-checked after two weeks, with all coding decisions based on the original wording. No independent translator was involved, so claims based on the Swedish documents are advanced cautiously, and Section 4.2 reproduces the original wording for

weight-bearing claims. The audit log makes these interpretations traceable, not risk-free.

3.4 Comparability of the Corpus

Functional equivalence, rather than formal equivalence, was the basis of comparison: each text was matched by its authoritative position in national policy, and differences in document type or legal status were treated as evidence. Finland and Sweden use ECEC-specific curricular texts, whereas Norway's Professional Digital Competence Framework (PfdK) covers school teaching and teacher education. The PfdK was retained because it is the only systematic teacher framework among the three and is read alongside the Framework Plan; the mismatch supports the finding that none of the three countries has a professional digital competence framework designed specifically for ECEC teachers. N3 functions primarily as a system-level contextual document rather than as an instrument articulating expectations for ECEC teachers; therefore, only statements relevant to the comparative system layer were coded from it.

Legal status also varies and cuts across rather than clearly separates the three systems. F1 and N1 are enacted and binding; S1 was binding during the corpus period and was subsequently superseded by the revised curriculum in force from 1 July 2025. The Finnish competence descriptions are designated support material that the issuing agencies state does not bind teachers [F2]; the PfdK is non-statutory guidance [N2]; and the two national strategies set direction without binding force [F3, N3]. Sweden's 2022 proposal [S2] was subjected to consultation but later abandoned (Swedish Parliament, 2024), while the 2024 review [S3] shaped the 2025 Lpfö 18 (Skolverket, 2025). Adoption and rejection are, therefore, evidence of policy direction.

3.5 Trustworthiness and Limitations

The safeguards correspond to Lincoln and Guba's (1985) criteria of credibility, dependability, confirmability, and transferability. In single-researcher document analysis, transparent and auditable procedure—not an inter-coder coefficient—supports trustworthiness (Bowen, 2009). The study has four principal limitations. First, it analyses high-level policy texts and describes the expectations and policy directions they articulate, rather than the practices enacted in settings (Section 6.4). Single-researcher coding leaves unresolved alternatives where statements span areas; criteria may drift over the course of a long analysis, and the prior boundary-object argument may have made confirming evidence more salient. Decision rules and repeat coding contain but do not eliminate these risks. Investigator triangulation was unavailable.

Two Swedish documents lack independent translation verification, a limitation that is particularly consequential when modal verbs distinguish mandate from encouragement (Sections 3.3 and 4.2). The corpus also covers only three Nordic countries and top-level instruments, thereby limiting regional generalisation. The broad finding of textual reversal in the Swedish case remained stable across the repeat coding, although finer area assignments were more interpretive. Re-analysis in the source languages would strengthen them.

4. National Cases

Each system is presented under matched headings. Claims from the corpus carry a bracketed source code; interpretation beyond it is marked as such.

4.1 Finland

Finland's framework rests on the National Core Curriculum for ECEC [F1] and the Competence Descriptions 2.0 [F2], with national digitalisation policies to 2027 supplying the system layer [F3]. The Competence Descriptions were aligned with the 2014 curriculum reform, extending an integrated, ministry-led tradition into ECEC rather than a separate professional framework [F2]. Section 6.2 interprets this continuity, which is shared with Sweden, as one source of the divergence from Norway's teacher instrument. Finland does not organise competence according to the six DigCompEdu areas but according to four of its own: practical skills and personal production; responsible and safe use of ICT; information management and inquiry-based and creative work; and interaction [F2].

4.1.1 Professional responsibilities

Finnish policy positions staff as active mediators of children's digital experiences: they are expected to model appropriate everyday use and to employ the digital services relevant to a child's ECEC. The role extends to the home, where staff keep guardians informed and explain how children's data are handled [F2].

4.1.2 Pedagogical practice

Play is prioritised. Staff are supposed to draw on the gameful elements of digital environments, examine the logic of games with children, and modify or invent games [F2]. Digital environments also support pedagogical documentation [F2]. Technology is treated as a means rather than an end. Digital tools appear in documentation, play, interaction, exploration, and art within a participatory learning environment [F1].

4.1.3 Safety and ethics

Finnish policy gives the most explicit treatment of this domain and adopts a rights-based orientation. Staff must follow data-protection rules, respect the child's privacy when publish their pictures and works, and seek the child's permission in advance [F2, FIN-16]: even very young children are treated as rights-holders. At system level, providers are responsible for secure environments that meet data-protection law [F3].

4.1.4 Professional development

Provision for teachers' own growth stays modest at unit level: staff are expected to join training that promotes digital competence when possible [F2]. Nationally the tone is stronger, with competence to be built systematically through needs-based continuing education [F3]. The ambition is national, but the unit-level guidance is more qualified; the phrase 'where possible' leaves the implementation gap open; Sections 6.2 and 6.4 return to this asymmetry.

4.2 Sweden

Sweden's framework rests on the Curriculum for the Preschool, Lpfö 18, which incorporated digital competence into the curriculum under the phrase *adekvat digital kompetens*, rendered officially as 'adequate digital skills' [S1]. Ambition was sustained: in December 2022, Skolverket submitted a proposed national digitalisation strategy for 2023–2027 [S2]. The government did not proceed, commissioning instead the review reported in May 2024 [S3], whose restrictive direction was reflected in the curriculum that entered into force from 2025, with additional age-based provisions introduced at government level (Skolverket, 2025). Like Finland, Sweden located these expectations during the corpus period in a national curriculum rather than a separate professional standard, a choice which Section 6.2 traces to a preference for team-based over individual accountability [S1].

4.2.1 Professional responsibilities

Lpfö 18 places responsibility on the preschool teacher and the work team: teachers are responsible for teaching, while the work team creates conditions in which children can communicate, document, and convey ideas through many forms of expression, with and without digital tools [S1]. The final phrase is significant: from the outset, Swedish policy treats digital tools as one option among several, not a medium that teachers are required to use.

4.2.2 Pedagogical practice

According to Lpfö 18, each child should be able to use digital tools in ways that stimulate development and learning [S1]. The framing is conditional and sparse: neither detailed digital pedagogy nor particular tools are named, leaving much to the work team. Research beyond the corpus indicates that this leaves substantial interpretive work to practitioners, who report wide variation in how tablets and related tools are used and a desire for clearer direction (Kjällander & Frankenberg, 2018; Otterborn et al., 2019; Palmér & Sjöwall, 2026).

4.2.3 Safety, ethics, and the critical attitude

A critical and responsible attitude is central to the Swedish approach: children should develop such an attitude towards digital technology so that in time they can identify opportunities, grasp risks, and weigh information [S1]. This emphasis on judgement rather than technical skill is the element the later revision retained.

4.2.4 The reflective, then restrictive, turn

The Swedish case turns on a reversal over time, documented carefully because two documents exist only in Swedish (Section 3.3). Four textual moves carry it. First, the review proposed deleting *digital* and *digitalisering* [digitalisation] from all eight places where they occur [S3, SWE-18], a count the review itself provides [S3]. Second, deletion was not simple erasure: most consultation responses objected to losing digitalisation as a concept, so the agency introduced the broader *teknikutveckling* [technological development] and replaced *digitala verktyg* [digital tools] with the wider *läriverktyg* [learning tools] [S3]. Third, it held that methods and tools must be evaluated and selected based on *vetenskaplig grund och beprövad erfarenhet* [a scientific basis and proven experience], the formula of the Education Act [S3, SWE-01]. Fourth, it recorded a tension of its own: an essentially screen-

free requirement could obstruct inclusion for children needing special support [S3].

The reversal was not consensual. Of 74 responses on removing *digitalisering*, 59 opposed it, and the Discrimination Ombudsman held that making digital tool use non-compulsory would obstruct children's equal rights [S3]. The agency declined to regulate by age; it also declined to write *skärmfri* [screen-free] into the curriculum for want of a definition [S3]. The text that was ultimately enacted went further: the regulation in force from 1 July 2025 does not compel teachers to use digital learning tools, restricts children under two to analogue tools, and stipulates that at other ages non-analogue tools be used with great restraint (Skolverket, 2025). The age rule that the agency had declined to propose was added at government level.

The lexical change is measurable: *Digitalisering* and *adekvat digital kompetens* have disappeared from the enacted curriculum, *digital* is used once, and *lärverktyg* [learning tools], absent in 2018, appears 11 times. Term counts are case-insensitive exact-string searches with every match checked in context; the 2018 counts come from the corpus [S1] and the 2025 counts from the enacted text outside it (Skolverket, 2025). Where Lpfö 18 recommended giving children an understanding of digitalisation in their daily lives [S1], the revised text refers instead to an understanding of the *teknikutveckling* [technological development] they encounter in daily life (Skolverket, 2025).

4.2.5 Professional development

At system level Sweden frames the decisive capacity as pedagogical judgement: staff need competence to decide when and how digital resources should be used [S2, S3]. Beyond this the corpus is sparse on teachers' own development: the Swedish documents state what staff must be able to judge, not how that capacity is to be built. Across the period, the Swedish conception shifts from helping children use tools towards evidence-based judgement about whether to use them at all.

4.3 Norway

Norway is unique in maintaining a dedicated professional framework for teachers. Alongside the Framework Plan for Kindergartens [N1], it maintains the PfdK [N2], naming seven areas: subjects and basic skills; school in society; ethics; pedagogy and subject didactics; leadership of learning processes; interaction and communication; and change and development. The PfdK traces these areas to the 2006 Knowledge Promotion reform; Section 6.2 interprets its creation as a state-led project treating digital competence as a profession-wide standard rather than a curricular duty [N2]. One important caveat is required (Section 3.4): the PfdK addresses school teaching, not ECEC, and the Framework Plan's ECEC guidance is brief.

4.3.1 Professional responsibilities

The Framework Plan addresses staff directly: they shall be actively involved with children when using digital tools, exercise sound digital judgement, remain alert to copyright, analyse sources critically, and safeguard privacy [N1]. The PfdK

requires teachers to use digital arenas to build relationships with pupils, guardians, and colleagues, and to manage their own professional digital identity [N2, NOR-08], an expectation that lacks any match in the Finnish or Swedish ECEC documents.

4.3.2 Pedagogical practice

The Framework Plan requires staff to let children explore, play, learn, and create through digital forms of expression and to use digital tools inventively, while coupling this with restraint: ‘Staff shall be actively involved with the children when using digital tools’, and ‘Digital tools must be used with care and not become a dominant practice. Kindergartens shall exercise sound digital judgement and help the children develop an early ethical understanding of digital media’ (Norwegian Directorate for Education and Training, 2017, p. 44) [N1, NOR-18]. The PfdK frames teaching as the selection, critical evaluation, and integration of digital resources on pedagogical and subject-didactic grounds [N2].

4.3.3 Safety, ethics, and digital judgement

The PfdK stipulates that teachers should teach rules on intellectual property, privacy, data security, and source criticism, and ‘develop and administer their own digital identity’ conscious of its bearing on professional identity (Kelentrić et al., 2017, p. 6) [N2, NOR-08]. Digital judgement (*dømmekraft*), together with digital bildung, is a distinctive feature of the Norwegian framing.

4.3.4 Professional development

Norway was unique in operationalising its teacher framework as an instrument for professional development: the PfdK’s change-and-development area treats professional digital competence as a lifelong process [N2]. Research beyond the corpus indicates that this competence develops unevenly, shaped as much by initial teacher education and local mentoring as by the PfdK’s areas (Kewalramani et al., 2026). The national strategy restates Norway’s ambition to be a leading digital nation, though it says little about ECEC teachers [N3].

5. Comparative Findings

Table 1 inventories the corpus. Table 2 compares six dimensions: three themes from Section 4 (professional development, resources and pedagogy, and safety and ethics), assessment as developed in Section 6.1, and two transversal dimensions, the primary location of expectations and normative framing. Appendix 1, Table A1 presents the six DigCompEdu areas as operationalised in coding.

Table 1: The nine-document corpus

Country	Code	Document	Level	Status
Finland	F1	National Core Curriculum for ECEC (OPH-700-2022) (Finnish National Agency for Education, 2022a)	Curriculum	Enacted
	F2	Competence Descriptions 2.0 (Finnish National Agency for Education, 2022b)	Competence descriptions	Guidance; non-statutory
	F3	Policies for the Digitalisation of Education and Training (Finnish Ministry of Education and Culture, 2023)	National strategy	Strategy; non-statutory
Sweden	S1	Curriculum for the Preschool, Lpfö 18 (Skolverket, 2018)	Curriculum	Enacted (corpus period); superseded 2025
	S2	Proposal for a National Digitalisation Strategy (Skolverket, 2022)	National strategy	Proposal; not adopted
	S3	Review of Digitalisation in the Preschool Curriculum (Skolverket, 2024)	Agency review	Review; non-statutory
Norway	N1	Framework Plan for Kindergartens (Norwegian Directorate for Education and Training, 2017)	Framework plan	Enacted
	N2	Professional Digital Competence Framework (PfDK; Kelentrić et al., 2017)	Teacher framework	Guidance; non-statutory
	N3	National Digitalisation Strategy 2024–30 (Norwegian Ministry of Digitalisation and Public Governance, 2024)	National strategy	Strategy; non-statutory (society)

Note. The Level column records each document's type; the Status column records its legal force. 'Enacted' means in force and binding within its system; 'guidance; non-statutory' marks a reference or support document with no binding force – the status assigned by the issuing agencies to the Finnish competence descriptions [F2]; 'strategy; non-statutory' marks a national strategy setting direction without binding force, while '(society)' indicates one addressed to society rather than ECEC; 'proposal; not adopted' marks an agency proposal government did not carry forward; 'review; non-statutory' marks an agency review carrying no binding force of its own. S2 was circulated for consultation and not taken forward; the restrictive direction proposed in S3 was reflected in the revised Lpfö 18, in force from 2025, with additional age-based provisions introduced at government level (Section 4.2.4). N2 addresses educators across levels rather than ECEC alone and remains current. Seven documents were analysed in official English versions; S2 and S3, having none, were machine-translated with DeepL and checked against the Swedish originals (Section 3.3).

Table 2 answers RQ2 and, in its final row, RQ3.

Table 2: Cross-national comparison of preschool teachers' digital competence policies

Dimension	Finland	Sweden	Norway	Pattern
Primary location of expectations	Curriculum plus ECEC competence descriptions	Curriculum; no dedicated teacher framework	Framework plan plus a school-oriented teacher framework	D
Professional development	Modest locally; systematic nationally	Sparse; no explicit professional-development provision	Lifelong competence as a framework area	D
Resources and pedagogy	Play-based; gameful elements; documentation	Conditional; with and without digital tools	Creative use on didactic criteria; restraint	C/D
Assessment (Area 4)	Pedagogical documentation	Evaluation of provision, not of the child	Documentation and feedback	C*
Safety and ethics	Data protection; child permission before publishing	Critical attitude; analogue-first, restrictive turn	Digital judgement (<i>dømmekraft</i>); <i>bildung</i>	C/D
Normative framing	Ambition; rights-based equity	Reversal: optimism to restraint	Precaution within digital-leadership rhetoric	D

Note. C = convergence; D = divergence; C/D = mixed. The Assessment row is marked C* because none of the three requires summative individual testing; read against Area 4, all three redirect attention towards pedagogical documentation, feedback, or evaluation of provision. The Swedish entry in the Normative framing row rests on S3 together with the post-corpus 2025 curriculum subjected to a targeted textual comparison (Section 3.1). Section 6.1 reads this as the developmental logic of ECEC rather than framework-driven standardisation.

Read against RQ1, Table 1 shows the three systems locating preschool teachers' digital competence in different instruments: a curriculum plus ECEC competence descriptions in Finland, a curriculum without a dedicated teacher framework in Sweden, and a framework plan plus a school-oriented teacher framework in Norway. Read against RQ2, Table 2 shows convergence only in the assessment row, mixed patterns in the resources and ethics rows, and divergence in the primary-location, professional-development, and normative-framing rows. Read against RQ3, its final row records the three normative framings taken up in Section 6.2.

Figure 2 places the document hierarchy of Table 1 alongside the convergence–divergence pattern of Table 2, rendering both immediately visible.

Panel A. Document hierarchy (Table 1) – binding force within each system: the enacted instrument at top, the non-binding instruments below it in no fixed order		
Finland	Sweden	Norway
F1 Core Curriculum for ECEC <i>Enacted – binding</i>	S1 Curriculum (Lpfö 18) <i>Enacted – binding in corpus period; superseded 2025</i>	N1 Framework Plan <i>Enacted – binding</i>
F2 Competence Descriptions 2.0 <i>Guidance; non-statutory – not binding</i>	S3 Agency review <i>Review; non-statutory – not binding</i>	N3 Digitalisation Strategy <i>Strategy; non-statutory (society)</i>
F3 Digitalisation Strategy <i>Strategy; non-statutory</i>	S2 National digitalisation proposal <i>Proposal; not adopted – not binding</i>	N2 PfdK teacher framework <i>Guidance; non-statutory – not binding</i>

Panel B. Convergence (C) and divergence (D) across the six dimensions (Table 2)	
Primary location of expectations	D – divergence
Professional development	D – divergence
Resources & pedagogy	C/D – mixed
Assessment (Area 4)	C* – convergence (with the Section 6.1 caveat)
Safety & ethics	C/D – mixed
Normative framing	D – divergence

Note. Panel A orders each system's documents by the Status column of Table 1. Panel B carries the pattern column of Table 2 (C convergence, D divergence, C/D mixed, C assessment convergence read with the Section 6.1 caveat).*

Figure 2 : Document hierarchy and convergence–divergence pattern

6. Discussion

The discussion proceeds in four steps: the points of convergence among the three systems, the points of divergence, the analytical work performed by DigCompEdu, and the limits of what the corpus can claim about practice.

6.1 Convergence: A Shared Lexicon and the Reshaping of Assessment

Across the corpus, recurring vocabulary includes critical, responsible, and creative uses of digital technology, signalling a degree of alignment even without common structures or standardisation. Area 4 exposes the limit: DigCompEdu

emphasises learner assessment, but the documents redirect it to pedagogical or institutional documentation rather than individual summative tracking. Because such testing is already alien to play-based ECEC (Palaiologou, 2016), the misfit of the school-oriented category itself constitutes the stronger finding. This pattern is consistent with resistance to early-years performativity (Ball, 2003). The shared lexicon is compatible with soft-governance influence from a wider European digital-policy environment, though the corpus does not demonstrate direct adoption of DigCompEdu (McGarr et al., 2021; Redecker, 2017). This vocabulary recurs across the national texts, while its binding meaning remains nationally defined, a pattern consistent with policy-translation theory (Phillips & Ochs, 2004).

6.2 Divergence: Path-Dependent Instruments and Normative Friction

Beneath the shared lexicon, the three systems diverge in how they build instruments and in what they take technology to be worth, and these differences sit uneasily with the borrowing model. The corpus cannot trace Phillips and Ochs's (2004) four stages – from attraction through decision and implementation to internalisation – as an empirical sequence, because it records outcomes rather than the deliberations behind them. It shows selective national translation of a wider European vocabulary, without documented adoption of DigCompEdu itself, and, in Sweden, a movement the sequence does not anticipate: a reversal after implementation.

Norway's teacher framework [N2] grew out of a state-led project to treat digital competence as a professional attribute, with two limitations: its guidance status makes the most elaborated teacher instrument also the least binding, and its school orientation (Section 4.3) leaves practitioners to reconcile school-centred categories with play-based pedagogy.

During 2017–2024, Finland and Sweden primarily located digital expectations in learner-facing curricular instruments, framed as responsibilities of the teaching team rather than a dedicated professional framework [F1, S1]. The difference is not only stylistic: it reflects a policy design that situates responsibility within the local work team rather than within an individual professional standard. Finland's split-level treatment of professional development [F2, F3] follows the same logic.

Differences regarding the value of technology are more pronounced, complicating the idea of a single Nordic model. Finland links digital ambition to economic competitiveness and rights-based equity [F3]: one register treats it as human capital, the other as a condition of the child's participation and protection [F2, FIN-16]. The rights register produces the corpus's most concrete staff expectations. Norway works on two tracks: N3 supplies a system-level digital-leadership rhetoric, while the ECEC and teacher-framework documents call for restraint. Within those documents *dømmekraft* links N1 and N2 (Sections 4.3.1 and 4.3.3) as a professional and pedagogical construct rather than a technical skill, treating technology as a risk for the educator's judgement to manage.

Sweden is the sole case in which policy reverses, becoming stricter than its own agency had proposed (Section 4.2). The reversal shows the normative dimension of policy to be independently mobile: a system can retain the European vocabulary while inverting a direction that the vocabulary never fixed. Norway achieved comparable restraint without any reversal, through *dømmekraft* [N1, N2].

The Swedish documents frame the shift primarily in developmental and public-health terms, citing WHO guidance on sedentary behaviour for under-fives [S3]. Evidence outside the corpus provides additional political context. Following the 2022 change of government, the incoming centre-right coalition made a return to print, handwriting and reading a signature policy priority and allocated SEK 176 million in 2024 and SEK 480 million in 2025 for printed literature (Government Offices of Sweden, 2022, 2024). The timing suggests that party alternation and ministerial priority, rather than a rereading of the framework, contributed. Within the corpus, national paths appear to be shaped more by domestic pedagogical argument and developmental concern than by convergence towards European frameworks.

6.3 DigCompEdu as a Boundary Object, not a Shared Script

DigCompEdu functions as this study's analytical reference, not a script that the three systems follow: none of the nine documents is built around it. Finland works from its own core curricula, with four areas keyed to the 2014 basic-education curriculum [F2]; Norway's seven-area PfdK traces digital judgement to the 2006 Knowledge Promotion reform [N2]; Sweden worked, until the 2025 revision, from the relative idea of *adekvat digital kompetens* [S1]. Where European instruments surface, as in Finland's system-level strategy, the reference is to the EU Digital Education Action Plan and related regulation [F3] rather than to DigCompEdu.

RQ4, therefore, concerns who uses the framework and for what analytical purpose. The mapping is broad but external: most educator- and learner-facing statements could be assigned at area level, though some lacked a clean sub-competence match, and infrastructure-only statements were logged at system level without one (Section 3.2), yet none of the three organises its own expectations that way. The term is used as an analytical extension of the boundary-object concept (Star & Griesemer, 1989), not as a claim that national policy communities coordinated through DigCompEdu: stable enough to hold one shape across the three readings, open enough that each system's own constructs occupy the space its categories leave. What it bridges is analytical rather than institutional: not the three countries, which move in parallel, nor the European agenda and the national traditions, which the texts do not connect, but this comparison and the three bodies of policy it examines. Figure 3 sets out that structure: one analytical reference above, three national policy configurations below, and no horizontal link.

European layer: DigComp 2.2, the EU Digital Education Action Plan, and DigCompEdu (Redecker, 2017) as the educator-focused framework within that wider architecture. None of the nine documents is organised around DigCompEdu itself.



DigCompEdu functions in this study as an analytical boundary object: it is employed as a stable comparative grid. The grid foregrounds a recurring lexicon of critical, responsible, and creative use across the corpus. The vertical relation it establishes is the study's own analytical reading, not a documented act of policy adoption.



National policy configurations revealed through the grid			
	Finland	Sweden	Norway
Primary location	Curriculum and ECEC competence descriptions [F1, F2]	Curriculum only; no dedicated teacher framework [S1]	Framework plan and the PfDK, school-oriented guidance [N1, N2]
Own ordering	Four national areas from the 2014 basic-education curriculum [F2]	No separate competence taxonomy; expectations carried by a relative curricular standard until 2025	Seven areas from the 2006 Knowledge Promotion reform [N2]
Native construct	Pedagogical documentation [F2]	<i>Adekvat digital kompetens</i> [officially rendered "adequate digital skills"] [S1]	<i>Dømmekraft</i> [judgement]; <i>digital dannelse</i> [formation] [N1, N2]
Framing	Ambition and children's rights	Reversal towards restraint	Precaution



No horizontal link: the three sit within a wider European digital-policy environment; the selected documents contain no explicit evidence of direct borrowing between them (Sections 6.2 and 6.5).

Note. Bracketed codes identify corpus documents (Table 1). The constructs in the national row are those that do not map neatly onto any single DigCompEdu sub-competence. The middle row represents this study's analytical reference, not an instrument from which the three systems work; the vertical links are analytical rather than instances of documented adoption.

Figure 3: DigCompEdu as an analytical boundary object

The concepts that resist the framework's sub-competences show this most clearly, flagged as native constructs during coding (Section 3.2): Norway's *dømmekraft* [N1], Sweden's *adekvat digital kompetens* [S1], and Finland's pedagogical documentation [F2] each hold meanings that do not map neatly onto a single sub-competence. The Norwegian pair offers the clearest case: *dømmekraft* is presented in the PfdK alongside digital bildung, the PfdK's official English version rendering *digital dannelse* [N2], both drawing on the Nordic tradition of bildung [formation of the whole person], an ethical register not fully captured by any single DigCompEdu competence. The mismatch itself constitutes the finding.

6.4 From Policy Text to Practice

The corpus sets out the expectations each system articulates for its teachers, rather than the practices that teachers subsequently enact. Settings enact rather than implement policy (Ball et al., 2012; Nolan & Molla, 2023), so the text–practice gap is not measurement error but a distinct object of study, running in either direction: local elaboration beyond a text, or resistance where a requirement sits awkwardly with routines.

Empirical work suggests the gap is substantial in all three systems (Kewalramani et al., 2026; Kjällander & Frankenberg, 2018; Otterborn et al., 2019; Palmér & Sjöwall, 2026; Pihlaja & Kangas, 2023). Finland illustrates one documentary mechanism at the local-policy level: of 269 local ECEC curricula, 23 per cent reproduced the national wording without elaboration (Pihlaja & Kangas, 2023). This finding yields a testable proposition: when a system leaves interpretation to the work team, variation between settings may be wider than when a teacher framework states expectations. This study cannot test it.

The corpus also stops at national instruments, with scant mention of the municipal layer that carries much of the responsibility for professional development (Gallardo, 2025). The study traces a direction of policy development rather than a settled state.

6.5 Implications and Recommendations

Three implications follow from the analysis. First, given the absence of a professional digital competence framework designed specifically for ECEC teachers (Sections 3.4 and 6.2), early-years guidance should be grounded in the categories already current in the sector: pedagogical documentation rather than individual assessment, children's participation and informed consent, and professional judgement concerning whether a digital tool is appropriate. Second, the Finnish requirement that staff seek a child's permission before publishing images or work [F2] offers a policy example for comparative consideration of the child as rights-holder; a related communication responsibility toward guardians is also articulated (Section 4.1.1), though such communication can render children largely invisible (Wahlgren, 2024).

Third, data-protection guidance should be stated in operational terms: while the corpus identifies data protection as a staff duty [F2, F3, N1], it does not specify the concrete competences this duty entails. Three corresponding priorities follow for teacher education. Initial preparation should treat selecting and rejecting digital

tools as a core element of professional judgement rather than as a secondary skill attached to tool training [N2] (Skolverket, 2025). Continuing development should address in-service staff, because the research base remains heavily weighted toward pre-service teachers (Su & Yang, 2024) and should include digital ethics and operational data-protection practice.

At the Nordic level, the selected documents contain no explicit evidence of direct borrowing between the three systems, and a regionally developed early-years reference point would, therefore, be better aligned with their shared pedagogical conditions. Internationally, comparative work on pre-service early childhood teachers reports comparable unevenness in what digital competence means (Madsen et al., 2023); studies applying European frameworks outside the region meet the same school-derived categories (Diković & Terlević, 2025). Any system that extends a school-oriented framework to early childhood without adaptation may encounter a similar mismatch (Su & Yang, 2024).

Three research directions follow. Multi-site ethnographic research is needed to examine how far the intentions articulated in these texts survive contact with everyday practice. Longitudinal tracking of the Swedish revision would show whether it alters practice or remains largely linguistic. Finally, as generative artificial intelligence enters early-years settings, the frameworks face a further test of conceptual fit: none of the nine documents anticipates such tools (Tanik Önal et al., 2026). A future revision of DigCompEdu could productively address this emerging gap.

7. Conclusion

This study investigated how Finland, Sweden, and Norway construct preschool teachers' digital competence in national policy, and what DigCompEdu contributes as an external analytical reference. Reading nine documents against DigCompEdu reveals a structural duality: a shared European lexicon over path-dependent divergence. Norway articulated ECEC-level expectations through the binding Framework Plan, complemented by a school-oriented, non-statutory teacher framework. During 2017–2024, Finland articulated these expectations through the curriculum and the non-statutory ECEC competence descriptions, while Sweden incorporated them in the curriculum as responsibilities of the teaching team.

Normative framing differs further, from Finnish ambition through Norwegian precaution to a Swedish reversal: the curricular expectation that children be enabled to use digital tools was removed from the curriculum in force from 2025 – the only documented reversal identified in this study. DigCompEdu operates not as a template that the three systems follow but as an analytical boundary object, making distinct national policy configurations visible while leaving the instruments themselves separate. The constructs that did not map neatly onto its sub-competences – notably *dømmekraft*, *adekvat digital kompetens*, and pedagogical documentation – most clearly exemplify these configurations. The central implication is that none of the three possesses a professional digital competence framework designed specifically for early childhood teachers. Early-years

guidance would, therefore, be better grounded in the sector's own categories – pedagogical documentation, children's permission, and professional judgement – than in those transferred from schooling.

Acknowledgements

The author received no funding, declares no conflict of interest, and thanks reviewers for comments.

8. Declaration on the use of generative AI and AI-assisted technologies.

DeepL (DeepL SE, 2026) produced first-pass English translations of the two Swedish-only documents, which were checked against the originals (Section 3.3). Claude (Anthropic, 2026) was used for language polishing and for citation, reference, and consistency checks on the manuscript and on the response to reviewers. This is distinct from the professional language editing required before final submission, which was carried out by a human editor using the Track Changes feature in Microsoft Word. Neither tool coded the policy documents, generated or interpreted research content, designed the study, or formulated arguments or conclusions. The author reviewed all output, made every analytical judgement, accepts full responsibility, and does not credit an AI system as an author.

9. References

- Adoniou, M., & Gallagher, M. (2017). Professional standards for teachers – What are they good for? *Oxford Review of Education*, 43(1), 109–126.
<https://doi.org/10.1080/03054985.2016.1243522>
- Anthropic. (2026). *Claude (opus 4.8)* [Large language model]. <https://claude.ai>
- Ball, S. J. (2003). The teacher's soul and the terrors of performativity. *Journal of Education Policy*, 18(2), 215–228. <https://doi.org/10.1080/0268093022000043065>
- Ball, S. J., Maguire, M., & Braun, A. (2012). *How schools do policy: Policy enactments in secondary schools*. Routledge. <https://doi.org/10.4324/9780203153185>
- Bowen, G. A. (2009). Document analysis as a qualitative research method. *Qualitative Research Journal*, 9(2), 27–40. <https://doi.org/10.3316/QRJ0902027>
- DeepL SE. (2026). *DeepL Translator* [Machine translation software]. <https://www.deepl.com/en/translator>
- Diković, M., & Terlević, M. (2025). Digital competence in initial (preschool) teacher education. *Društvene i Humanističke Studije* [Social Sciences and Humanities Studies], 10(1(27)), 481–498. <https://doi.org/10.51558/2490-3647.2025.10.1.481>
- Erstad, O., Kjällander, S., & Järvelä, S. (2021). Facing the challenges of “digital competence”: A Nordic agenda for curriculum development for the 21st century. *Nordic Journal of Digital Literacy*, 16(2), 77–87. <https://doi.org/10.18261/issn.1891-943x-2021-02-04>
- Finnish Ministry of Education and Culture. (2023, April 25). *Digital transformation supports equal opportunities for learning and development – new common policies to increase cooperation*. Publications of the Ministry of Education and Culture. <https://okm.fi/en/-/digital-transformation-supports-equal-opportunities-for-learning-and-development-new-common-policies-to-increase-cooperation>
- Finnish National Agency for Education. (2022a). *National core curriculum for early childhood education and care 2022* (Regulation OPH-700-2022). <https://www.oph.fi/sites/default/files/documents/National%20core%20curriculum%20for%20ECEC%202022.pdf>

- Finnish National Agency for Education. (2022b). *Competence descriptions 2.0: Digital competence in early childhood education and care and pre-primary education*. <https://eperusteet.opintopolku.fi/#/en/digiosaaminen/8706410>
- Gallardo, M. (2025). Organizing digital competence development in preschools: Professionals' insights from three Swedish municipalities. *Journal of Childhood, Education and Society*, 6(2), 249–270. <https://doi.org/10.37291/2717638X.202562555>
- Government Offices of Sweden. (2022, October 18). *Sweden's new Government*. Government of Sweden. <https://www.government.se/press-releases/2022/10/swedens-new-government/>
- Government Offices of Sweden. (2024, February 8). *Government investing in more reading time and less screen time*. Ministry of Education and Research. <https://www.government.se/articles/2024/02/government-investing-in-more-reading-time-and-less-screen-time/>
- Kelentrić, M., Helland, K., & Arstorp, A.-T. (2017). *Professional digital competence framework for teachers*. Senter for IKT i utdanningen. <https://www.udir.no/in-english/professional-digital-competence-framework-for-teachers/>
- Kewalramani, S., Yang, W., Dardanou, M., & Hatzigianni, M. (2026). Exploring professional digital competence in Norwegian ECEC. In S. Kewalramani, W. Yang, M. Dardanou, & M. Hatzigianni (Eds.), *Digital competence development in early childhood professionals: Harnessing the INSPIRE model* (pp. 85–111). Routledge. <https://doi.org/10.4324/9781003604013-8>
- Kjällander, S., & Frankenberg, S. J. (2018). How to design a digital individual learning RCT-study in the context of the Swedish preschool: Experiences from a pilot-study. *International Journal of Research and Method in Education*, 41(4), 433–446. <https://doi.org/10.1080/1743727X.2018.1470161>
- Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Sage Publications.
- Madsen, S. S., O'Connor, J., Janeš, A., Klančar, A., Brito, R., Demeshkant, N., Konca, A. S., Krasin, S., Saure, H. I., Gjesdal, B., Ludgate, S., Jwaifell, M., Almuhtadi, R., & Thorvaldsen, S. (2023). International perspectives on the dynamics of pre-service early childhood teachers' digital competences. *Education Sciences*, 13(7), Article 633. <https://doi.org/10.3390/educsci13070633>
- McCulloch, G. (2004). *Documentary research*. RoutledgeFalmer. <https://doi.org/10.4324/9780203464588>
- McGarr, O., Mifsud, L., & Colomer Rubio, J. C. (2021). Digital competence in teacher education: Comparing national policies in Norway, Ireland and Spain. *Learning, Media and Technology*, 46(4), 483–497. <https://doi.org/10.1080/17439884.2021.1913182>
- Meaney, T., Severina, E., Undheim, M., & Granone, F. (2025). Defining professional digital competence of early childhood teachers working with mathematics. *Nordisk Barnehegeforskning [Nordic Early Childhood Education Research]*, 22(2), 241–259. <https://doi.org/10.23865/nbf.v22.702>
- Mogalakwe, M. (2006). The use of documentary research methods in social research. *African Sociological Review*, 10(1), 221–230. <https://doi.org/10.57054/asr.v10i1.3673>
- Nolan, A., & Molla, T. (2023). Equity in early childhood education: Policy framing, translation and enactment. In R. J. Tierney, F. Rizvi, & K. Ercikan (Eds.), *International encyclopedia of education* (4th ed., pp. 93–98). Elsevier. <https://doi.org/10.1016/B978-0-12-818630-5.04098-7>
- Norwegian Directorate for Education and Training. (2017). *Framework plan for kindergartens: Contents and tasks* (Regulation FOR-2017-04-24-487).

- <https://www.udir.no/contentassets/7c4387bb50314f33b828789ed767329e/framework-plan-for-kindergartens--rammeplan-engelsk-pdf.pdf>
- Norwegian Ministry of Digitalisation and Public Governance. (2024). *The digital Norway of the future: National digitalisation strategy 2024–2030* (Publication No. D-2006 E). <https://www.regjeringen.no/en/documents/the-digital-norway-of-the-future/id3054645/>
- Olofsson, A. D., Lindberg, J. O., Young Pedersen, A. Y., Arstorp, A.-T., Dalsgaard, C., Einum, E., Caviglia, F., Ilomäki, L., Veermans, M., Häkkinen, P., & Willermark, S. (2021). Digital competence across boundaries – Beyond a common Nordic model of the digitalisation of K-12 schools? *Education Inquiry*, 12(4), 317–328. <https://doi.org/10.1080/20004508.2021.1976454>
- Otterborn, A., Schönborn, K., & Hultén, M. (2019). Surveying preschool teachers' use of digital tablets: General and technology education related findings. *International Journal of Technology and Design Education*, 29(4), 717–737. <https://doi.org/10.1007/s10798-018-9469-9>
- Palaiologou, I. (2016). Children under five and digital technologies: Implications for early years pedagogy. *European Early Childhood Education Research Journal*, 24(1), 5–24. <https://doi.org/10.1080/1350293X.2014.929876>
- Palmér, H., & Sjöwall, M. (2026). Swedish preschool teachers' views on and use of digital technology in preschool education. *Journal of Early Childhood Education Research*, 15(1), 1–23. <https://doi.org/10.58955/jecer.156170>
- Pettersson, F. (2018). On the issues of digital competence in educational contexts: A review of literature. *Education and Information Technologies*, 23(3), 1005–1021. <https://doi.org/10.1007/s10639-017-9649-3>
- Phillips, D., & Ochs, K. (2004). Researching policy borrowing: Some methodological challenges in comparative education. *British Educational Research Journal*, 30(6), 773–784. <https://doi.org/10.1080/0141192042000279495>
- Pihlaja, P., & Kangas, M. (2023). Varhaiskasvatussuunnitelma osana ohjausjärjestelmää: Tieto- ja viestintäteknologian käytön ja digitaalisen osaamisen kontekstointi [The ECEC curriculum as part of the steering system: Contextualising the use of ICT and digital competence]. *Journal of Early Childhood Education Research*, 12(2), 1–33. <https://doi.org/10.58955/jecer.v12i2.119663>
- Redecker, C. (2017). *European framework for the digital competence of educators: DigCompEdu* (Y. Punie, Ed.; EUR 28775 EN). Publications Office of the European Union. <https://doi.org/10.2760/159770>
- Skantz-Åberg, E., Lantz-Andersson, A., Lundin, M., & Williams, P. (2022). Teachers' professional digital competence: An overview of conceptualisations in the literature. *Cogent Education*, 9(1), Article 2063224. <https://doi.org/10.1080/2331186X.2022.2063224>
- Spante, M., Hashemi, S. S., Lundin, M., & Algers, A. (2018). Digital competence and digital literacy in higher education research: Systematic review of concept use. *Cogent Education*, 5(1), Article 1519143. <https://doi.org/10.1080/2331186X.2018.1519143>
- Star, S. L., & Griesemer, J. R. (1989). Institutional ecology, 'translations' and boundary objects: Amateurs and professionals in Berkeley's Museum of Vertebrate Zoology, 1907–39. *Social Studies of Science*, 19(3), 387–420. <https://doi.org/10.1177/030631289019003001>
- Steiner-Khamsi, G. (2014). Cross-national policy borrowing: Understanding reception and translation. *Asia Pacific Journal of Education*, 34(2), 153–167. <https://doi.org/10.1080/02188791.2013.875649>

- Su, J., & Yang, W. (2024). Digital competence in early childhood education: A systematic review. *Education and Information Technologies*, 29(4), 4885–4933. <https://doi.org/10.1007/s10639-023-11972-6>
- Swedish National Agency for Education (Skolverket). (2018). *Curriculum for the preschool, Lpfö 18* (SKOLFS 2018:50). <https://www.skolverket.se/download/18.6bfaca41169863e6a65d897/1553968298535/pdf4049.pdf>
- Swedish National Agency for Education (Skolverket). (2022). *Förslag till nationell digitaliseringsstrategi för skolväsendet 2023–2027* [Proposal for a national digitalisation strategy for the school system 2023–2027] (Ref. 2022:1293). <https://www.skolverket.se/download/18.64ce3790183ff475a6421d8/1673428945704/pdf10849.pdf>
- Swedish National Agency for Education (Skolverket). (2024). *Översyn av området digitalisering i förskolans läroplan* [Review of the area of digitalisation in the preschool curriculum] (Ref. 2023:2730). <https://www.skolverket.se/sok-publikationer/publikationsserier/regeringsuppdrag/2024/oversyn-av-området-digitalisering-i-forskolans-laroplan>
- Swedish National Agency for Education (Skolverket). (2025). *Läroplan för förskolan, Lpfö 18 (reviderad 2025)* [Curriculum for the preschool, Lpfö 18 (revised 2025)] (SKOLFS 2025:23). <https://www.skolverket.se/sok-publikationer/publikationsserier/styrdokument/2025/laroplan-for-forskolan---lpfo-18-reviderad-2025>
- Swedish Parliament. (2024). *Svar på skriftlig fråga 2023/4:853: Nationell strategi för skolväsendets digitalisering* [Answer to written question 2023/4:853: National strategy for the digitalisation of the school system]. https://www.riksdagen.se/sv/dokument-och-lagar/dokument/svar-pa-skriftlig-fraga/nationell-strategi-for-skolvaseandets_hb12853/
- Tanik Önal, N., Önal, N., & İlhan, A. G. (2026). Artificial intelligence in early childhood classrooms: Insights from in-service and pre-service teachers. *European Early Childhood Education Research Journal*. Advance online publication. <https://doi.org/10.1080/1350293X.2025.2610619>
- Tondeur, J., Aesaert, K., Pynoo, B., van Braak, J., Fraeyman, N., & Erstad, O. (2017). Developing a validated instrument to measure preservice teachers' ICT competencies: Meeting the demands of the 21st century. *British Journal of Educational Technology*, 48(2), 462–472. <https://doi.org/10.1111/bjet.12380>
- Undheim, M., & Ploog, M. (2024). Digital competence and digital technology: A curriculum analysis of Norwegian early childhood teacher education. *Scandinavian Journal of Educational Research*, 68(6), 1105–1120. <https://doi.org/10.1080/00313831.2023.2204109>
- Vuorikari, R., Kluzer, S., & Punie, Y. (2022). *DigComp 2.2: The digital competence framework for citizens* (EUR 31006 EN). Publications Office of the European Union. <https://doi.org/10.2760/115376>
- Wahlgren, C. (2024). Visible activities, invisible children: Preschool digital communication in Sweden. *Contemporary Issues in Early Childhood*. Advance online publication. <https://doi.org/10.1177/14639491241301739>
- Zhang, L., Yang, C., & Zheng, Y. (2026). Digital competence for sustainable education of pre-service teachers: A systematic literature review (2014–2024). *Frontiers in Psychology*, 16, Article 1710983. <https://doi.org/10.3389/fpsyg.2025.1710983>

Appendix 1: Analytical Framework

Each document was read in full and searched for statements concerning staff or teachers and digital technologies. Each relevant statement was extracted into a spreadsheet log and assigned a DigCompEdu area where the fit was defensible and, where possible, a specific competence (Redecker, 2017), together with an audience tag. The six areas and audience tags listed below formed the fixed analytical categories, which were defined in advance rather than drawn from the data. Table A1 presents the operationalised categories and policy cues.

Table A1: The six DigCompEdu areas as operationalised for analysis

DigCompEdu area	Scope used in analysis	Typical policy cues
1 Professional engagement	Organisational communication, professional collaboration, reflective practice, and continuing professional development of staff.	staff training; communication with guardians; peer collaboration
2 Digital resources	Selecting, creating or modifying, and managing, protecting and sharing digital content and tools.	selecting tools; creating materials; copyright; data protection
3 Teaching and learning	Using digital tools to structure and guide teaching, guidance, collaborative and self-regulated learning.	staff use of tools; guiding children's use; play-based use
4 Assessment	Assessment strategies, analysing evidence, and feedback and planning, read in ECEC as documentation and evaluation of provision rather than child assessment.	pedagogical documentation; follow-up; evaluation of the education
5 Empowering learners	Accessibility and inclusion, differentiation and personalisation, and actively engaging learners.	accessibility; special support; child as active agent
6 Facilitating learners' DC	Information and media literacy, communication, content creation, responsible use, and problem solving by children.	source and media criticism; safe use; creating content

Audience tags. Each extract was tagged EDU (educator or staff-facing, e.g. "staff shall"), LRN (learner-facing, what children are enabled to do and staff must support), or SYS (system or governance level, e.g. infrastructure, funding, national professional development). Where a statement implied both an educator action and a child outcome, the primary grammatical subject normally set the tag and the secondary reference was noted; a dual marker was used where an educator duty was realised through a learner outcome or participation right, and statements with no defensible area match were retained as system-level native statements.

Dependability procedures. The dependability of this single-researcher analysis rests on the procedures set out in Section 3: categories fixed in advance, a

numbered source-referenced log, and repeat coding after a two-week interval, with trustworthiness resting on auditable procedure (Bowen, 2009).

Appendix 2: Illustrative Analytical Decisions

The examples below illustrate the interpretive judgements behind the analysis, not a quantitative coding scheme: each shows why a statement was read into a given DigCompEdu area and audience marker. They are drawn from the full analytical log, where identifiers such as FIN-11 index the entries. Tables B1–B3 present the illustrative decisions for Finland, Sweden, and Norway, respectively.

Finland

Table B1: Illustrative analytical decisions – Finland

ID	Area	Audience	Policy statement (paraphrased)	Analytical rationale
FIN-11	2.3	EDU	Staff know and follow data-protection and information-security rules.	Educator action on protecting data, Area 2.3; subject is staff, EDU.
FIN-16	6.4	EDU/LRN	The child is asked for permission before pictures and products are published.	Responsible, safe participation and rights, Area 6.4; a staff duty realised through the child's participation right, hence EDU/LRN.
FIN-14	4.3	EDU	Digital environments serve pedagogical documentation and support development and learning.	Feedback and planning, Area 4 (4.3), realised as documentation; staff practice, EDU.

Sweden

Table B2: Illustrative analytical decisions – Sweden

ID	Area	Audience	Policy statement (paraphrased)	Analytical rationale
SWE-10	6.1/6.4	LRN	Children develop a critical, responsible attitude towards digital technology, seeing opportunities and risks.	Media and information literacy plus responsible use, Areas 6.1/6.4; child outcome, LRN.
SWE-01	2.1	EDU	Strengthen the teacher's responsibility for evaluating and choosing tools, digital or analogue.	Selection and evaluation of resources, Area 2.1; subject is the teacher, EDU.

ID	Area	Audience	Policy statement (paraphrased)	Analytical rationale
SWE-18	no clean match	SYS	The terms <i>digital</i> and <i>digitalisering</i> [digitalisation] are proposed for removal from all eight places where they occur.	System-level policy framing, not an educator or learner competence; no clean DigCompEdu match, retained as an SYS-native statement supporting the finding that the framework does not fully fit.

Norway

Table B3: Illustrative analytical decisions – Norway

ID	Area	Audience	Policy statement (paraphrased)	Analytical rationale
NOR-08	1 (area level)	EDU	The teacher develops and manages their own professional digital identity.	Professional engagement and identity, Area 1; teacher competence, EDU. No single clean sub-competence, flagged as a native construct.
NOR-18	6.4	SYS/EDU	Digital tools must be used with care and must not become a dominant practice.	Responsible, measured use, Area 6.4; framework-level instruction to staff, SYS/EDU.
NOR-37	6.4	EDU	The teacher contributes to pupils' digital judgement and a responsible digital identity.	Fostering responsible use and judgement, Area 6.4; teacher action, EDU.

Note. Finnish and Norwegian examples are paraphrased from official English versions; the Swedish examples are the author's translations checked against the originals (Section 3.3).