Journal of Childhood, Education & Society
Volume 6, Issue 2, 2025, 249-270
DOI: 10.37291/2717638X.202562555
ISSN: 2717-638X
Research Article

Organizing digital competence development in preschools: Professionals' insights from three Swedish municipalities

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Abstract: This article contributes to the understanding of how digital competence development (DCD) for preschool educators is organized across three Swedish municipalities, focusing on communal preschools and drawing on participants' experiences. With a case study approach, the research addresses the growing need for DCD to integrate digital technology into pedagogy in preschool. Continuing professional development like this can be initiated and shaped through various methods, including formal education, courses, and programs. Another often more efficient approach is to support and enhance continuous, day-to-day learning in the workplace. However, in-depth research on such workplace learning and practice is lacking despite ongoing debates on digital tool use in early childhood education. Fifteen interviews with operational developers, development leaders, principals, and information and communication technology (ICT) educators serve as the basis for this study. Billet's theories on workplace learning frame the analysis, studying the organizing of DCD through the interdependence between possible learning opportunities (affordances) and the influences it has on individuals' agency (engagement) within the cases. Findings highlight that ICT educators played a pivotal role in coaching and shaping professional development, suggesting that the learning opportunities available to staff were significantly influenced by the motivation and engagement of self-driven individuals, along with principal prioritization and municipal vision. This study also shows the availability of DCD through collegial cooperation, dedicated support groups and networks. The study underscores the importance of workplace learning for enhancing preschool educators' digital competence and proposes practical strategies to facilitate staff support.

Article History
Received: 19 December 2024
Accepted: 27 April 2025

Keywords
Continuing professional development; Digital competence; ICT educators; Preschool educators; Workplace learning

Introduction

Digitalization has changed Early Childhood Education and Care (ECEC) policies, emphasizing digital competence as crucial for preschoolers in the 21st century (United Nations Convention on the Rights of the Child [UNCRC], 2021; United Nations Educational, Scientific and Cultural Organization [UNESCO], 2022). This capability to engage technically, meaningfully, and critically with digital technology (Ilomäki et al., 2016) underscores the necessity for preschool educators to undergo digital competence development (DCD) to integrate digital technology (e.g. tablets and robots) in the pedagogical practice and craft suitable activities (Otterborn et al., 2019; Thorpe et al., 2015). While studies have shown that preschool educators' digital teaching skills are improved through teacher training (Blackwell et al., 2016; Dong, 2018; Kerckaert et al., 2015), little is known about how this developmental support is organized in local preschool settings to improve such workplace learning (cf. Schachter, 2015). This paper examines the organizing of DCD in three Swedish municipalities, theoretically framed as continuing professional development and analyzed using workplace learning theories.

In ECEC research, debates on the effects of digital tools have persisted for over a decade but have decreased recently (Furenes et al., 2021; Plowman & McPake, 2013). In Sweden, there is instead a growing debate on "screen time in preschool" (Government Offices of Sweden, 2023a, 2023b). In 2017, the Ministry of Education and Research (2017) implemented the *Swedish National Digitalization Strategy for the School System* to develop digital competence among pupils and preschoolers. The curriculum was revised to

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emphasize that children should be given opportunities to develop adequate digital competence and critical attitudes toward digital technology (Swedish National Agency for Education [SNAE], 2018). A new strategy proposed in 2022 aimed to enhance education and equality through digital tools (SNAE, 2022a), but the Minister for Schools rejected it. Following researchers in neuroscience, psychology, and psychiatry, who highlighted digital tools' negative effects on concentration and language learning (Government Offices of Sweden, 2023a, 2023b; Karolinska Institutet, 2023). However, educational researchers emphasized their benefits for cognitive development and learning (Stockholm University, 2023; University of Gothenburg, 2023). Recently, the Swedish National Agency for Education (SNAE, 2024) proposed the non-compulsory use of digital tools in preschools, emphasizing teacher evaluation of "teaching tools" and replacing "digital competence" with "technology development".

As politicians and academics debate the use of digital technology, preschools face ongoing technological advancements (Masoumi, 2015, 2021; Samuelsson et al., 2022). Management is tasked with addressing how preschool teachers should approach and enhance their digital skills in educational practices.

In this study, the focus is on DCD in the workplace. This form of continuing professional development is defined here as in-service training or activities designed to enhance educators' dispositions, knowledge, and skills to improve their work and teaching practice (Sheridan et al., 2009). Most learning in work is tightly bound to the work itself and thus often goes on quite unnoticed (Billett, 2004). However, workplace learning may be boosted by professional development activities, such as modeling, coaching and questioning (Billett, 2010). This study addresses how organized staff support unfolds naturally in local preschool settings through the accounts of staff with different professional positions. In contrast, previous research has often focused on researcher-initiated and researcher-led activities in both Swedish (e.g. Forsling, 2023; Fridberg et al., 2023; Hernwall, 2016; Landwehr Sydow et al., 2021) and international contexts (e.g. Bittner et al., 2018; Bittner et al., 2020; Chen & Price, 2006).

This study draws on theories of workplace learning (Billett, 2002, 2011), which focus on the relational aspects of *workplace affordances* and *individual engagement* to define, understand and analyze workplace learning. Workplace affordances concern aspects of the environment individuals perceive as offering them opportunities to participate and learn, and individual engagement involves here the influences it has on individuals' agency to partake. Hence, the aim of this study is to contribute to the understanding of how digital competence development is integrated into preschool educators' everyday work based on the experiences of involved professionals. The research questions are:

1) How is the DCD organized for preschool educators within the municipal frameworks?
2) What commonalities and variations exist in workplace affordances and the influences on individual engagement in the context of organizing DCD for preschool educators as perceived by the professionals?
3) What implications do the key components of the organizing have for preschool educators' workplace learning?

Digital Competence Development in Early Childhood Education Settings

ECEC research has evolved from questioning the use of digital technology to exploring its effective utilization for children's learning (Masoumi, 2015). This is followed by studies on today's digital technology in ECEC, which encompasses various tools like screen-based technology (e.g. tablets), non-screen-based technology (e.g. projectors), exploratory technology (e.g. digital microscopes), and Internet of Toys (e.g. robots) (Undheim, 2022). Despite this, research addressing pedagogical work with digital technology often overlooks workplace learning. This leaves little known about how DCD is organized for preschool educators in daily practice. However, a study by Wadel and Knaben (2022) shows how preschool staff's general learning happens. It is often through teaching methods, ideally with teachers working together in groups to develop activities. Yet, it remains challenging to integrate joint reflection into daily practices. The authors underline how development processes often lack systematic approaches or clear visions. Furthermore, reflections tend to be limited to meetings and discussions on curriculum and professional

literature, not translating easily into practical change (Wadel & Knaben, 2022). In preschools, information is shared through both formal channels like staff meetings and informal means like spontaneous interactions (Cramer et al., 2022). Staff often seek advice from colleagues they perceive as knowledgeable based on job title or camaraderie. About half of the staff share insights from external professional development with colleagues, mostly informally due to time constraints (ibid.). Thus, relationships play a significant role in educators' adoption of new practices and knowledge, with barriers including a lack of shared goals, knowledge, psychological safety, and poor communication (cf. Douglass, 2019).

When it comes to the involved professionals in organizing DCD, studies show how principals play a key role in implementing digitalization plans and supporting teachers (Liu et al., 2014). They are also responsible for ensuring the accessibility of digital resources, time, and structure for effective learning (Ng, 2015). Forms of support provided could entail courses, workshops, training, coaching or mentoring (Elek & Page, 2019). Learning digital competence can be significantly enhanced through the guidance of specialized coaches or experts who provide pedagogical support for using digital technology (SNAE, 2022b). In Sweden, these experts are often referred to as information and communication technology (ICT) educators (in Swedish: IKT-pedagoger) (ibid.). ICT educators could be considered to have a middle leader position and be considered change agents (Avidov-Ungar & Shamir-Inbal, 2017). Teachers in a middle position (e.g. teacher leaders, development teachers), with their closeness to the pedagogical practice compared to principals and external consultants, have been shown in Sweden to lead to preschool improvement by exercising different strategies and considering the context (Nehez et al., 2022; Rönnerman et al., 2017). Avidov-Ungar and Shamir-Inbal (2017) elaborate on ICT educators' multifaceted role, which encompasses personal and professional knowledge, as well as technological, pedagogical, organizational, and leadership knowledge. The last two are crucial for acting as change agents, but all aspects influence their practice. They must balance pedagogical leadership and self-directed learning to enhance their competencies while collaborating with principals to integrate vision and develop support programs.

Workplace affordances and the influences on individual engagement with the organizing DCD, as perceived by professionals, are described in various ways. Pettersson (2018) presents Swedish ICT educators' and school leaders' perceptions of the components leading to a supportive organization for digitalization. She identifies two organizational approaches that digitally competent schools have: a structure-oriented school, emphasizing formal structures like courses, and a culture-oriented school, prioritizing collegial learning. In common was the creation of space for change, with development happening through greater political goals rather than local policies. The difference was that the responsibility was more top-down for the first mentioned and the latter bottom-up (the teachers themselves). However, some studies (Dwyer et al., 2019; Marklund, 2015, 2022) suggest preschool educators do not necessarily change their practice even with perceived high support from the management and positive attitudes toward such educator training. Interested staff instead frequently engage in self-education through online resources and networking opportunities. As reported in a New Zealand study (Irons & Hartnett, 2020), preschool educators can rely on ICT educators rather than prioritize their learning, share knowledge, and neglect provided learning materials due to time constraints, perceived importance, or motivation.

Previous research highlights also some key aspects of organizing DCD and its content, introducing as well as possible implications. Initiatives usually consist of hands-on experiences with digital tools and reflections between colleagues and a coach (Cowan, 2019; Magnusson, 2023). The practice may improve when the coach considers preschool educators' prior knowledge and skills, using collegial learning and critical reflections as a method for support, as well as guiding them in situ when they use digital technology in their pedagogical activities (Chen & Chang, 2006; Elek & Page, 2019). Few studies explore the daily coaching approach. Yet, what is known is that the relationship between the coach and the preschool educators can affect their engagement. For example, in one Australian study (Colmer, 2017), the preschool staff participated less actively in the learning activities when the coach had a strong power position. It appears that coaches who accept feedback from educators and have an open attitude facilitate more teacher

change (El-Hamamsy et al., 2021). But coaches also experience scheduling conflicts, challenging learners, and depend on other coaches' support to develop their coaching (Schachter et al., 2024).

To summarize, the literature presents the possibilities and barriers for workplace learning, following organizational change, but also highlights how the ICT educators' role is central to the support and how educators' agency affects the everyday work and actualization of practice change. A gap in research is the understanding of how this DCD happens in everyday practice and what this coaching may entail, especially in a Swedish context. More investigation is needed on this in ECEC settings, as intended in this study.

Theories on Workplace Learning

In ECEC research, workplace learning theories do not have a prominent place (cf. Schei & Nerbø, 2015; Sheridan et al., 2009). Importantly, workplace learning is not to be confused with work-based education or work-integrated learning. Instead, the equivalent is discussed in terms of *professional learning* or *professional development* (Hodkinson & Hodkinson, 2005). Other terms exist (e.g. teacher learning) with differences being made or used interchangeably (Ng, 2015). In a broad sense, the terms entail professionals' continual involvement in novel learning experiences and the exercise of new knowledge in practice to uphold the occupational tasks and by engaging in critical self-reflection (Avby, 2016). This paper focuses on digital competence development, which is a form of *continuing professional development*. As previously defined, DCD is hence the in-service training or activities aimed at enhancing educators' dispositions, knowledge, and skills to improve their work and practice (Sheridan et al., 2009). From a broader theoretical perspective, which frames the study, all forms of teacher development support become what shapes *workplace learning* in preschool.

This study applies Billett's (2002, 2011) theoretical framework of workplace learning, which highlights the interdependency of both workplace affordances and individual agency, to understand and study employees' learning. *Workplace affordances* are the extent of available possibilities for individuals to partake in and learn during their work practices, which are influenced by social, organizational and cultural factors (Billet, 2002; Hager, 2011). Personal relations and different workplace hierarchies affect the distribution of learning opportunities and employees' access (Billett et al., 2004). Learning through continuing professional development can occur within everyday work activities and/or intentional learning strategies such as modeling and coaching (Billett, 2002, 2023). Besides these forms of support and guidance, other affordances can be artifacts, tools, procedures, values and norms (ibid.). Workplace affordances in the forms of participants, interactions and relationships continuously transform as they are always occurring in a social context (Billett et al., 2004).

Individual engagement refers to how individuals exercise their agency in work practices, shaped by their personal histories and subjectivities, including competence, values, and beliefs (Billett, 2002, 2011). This engagement reflects how individuals perceive and respond to workplace affordances, which frame their opportunities for learning and interaction (ibid.). In comparison, in educational research, teacher agency has not been thoroughly conceptualized but could be understood as the ability to recognize these affordances in a circumstance (e.g. a teaching activity) and should be cultivated through teacher training (Aspbury-Miyanishi, 2022). Yet, for teachers to make decisions in their practices, they need a certain degree of autonomy and institutional support (ibid.).

This study focuses specifically on the affordances influencing individual engagement, as perceived by professionals interviewed. Engagement manifests in proactive learning behaviors, such as experimenting with practices, seeking guidance from colleagues, building professional relationships, and navigating institutional norms (Billett, 2010). However, these actions may not always align with managerial objectives or workplace conditions, especially if institutional support for learning is lacking (Billett et al., 2004).

The framework has been criticized for separating individuals' agency and social aspects (Hager, 2011), but as Billett (2002, 2011) stresses, it is the *interdependency* of affordances and individual engagement

that forms workplace learning. Learning is neither simply individual nor social. Expertise is also relational, as it exists within specific knowledge fields and social practices and not as an individual competence (Billett, 2010).

Hence with workplace learning theory, the understanding and potential improvement of DCD can be enhanced as the experiences of the participants and the support conditions are studied.

The Swedish Context

Preschool in Sweden is voluntary, yet 86% of children (0-5 years) are enrolled, with 70% attending public preschools (SNAE, 2023a). Sweden has a national, regional, and local governance structure, with 21 counties and 290 municipalities, each with its own elected council (Government Offices of Sweden, 2015). Municipalities, while adhering to national laws, have autonomy in managing local administration and education departments that concern resources, child welfare, preschools, schools, and staff training. The departments also supervise private preschools (The Education Act [Skollag (SFS), 2010:800], 2023). Education departments have different divisions, each with its council board and a steering group. *Operational developers* and *development leaders* can work in these divisions. Their work tasks can differ by municipality, but generally, they oversee the pedagogical systematic quality work and contact with principals. The former works more with routines and productivity with a control function, and the latter is more process-oriented, focusing on the implementation and development of practices (cf. Nehez et al., 2022). Locally, the *principal* is responsible for the pedagogical development of the preschool. The *preschool teachers* (in Swedish: förskollärare) have a bachelor's in early childhood education and are responsible for the education. They work together with *childcare attendants* (in Swedish: barnskötare), who usually have a high school diploma. This text uses the term preschool educator for these two work titles. All staff follow the preschool curriculum (SNAE, 2018, 2024).

The Education Act (SFS 2010:800, 2023) states that education providers must offer training for their staff. Municipalities arrange this based on needs, interests, and legislation that makes certain training mandatory. The Swedish Association of Local Authorities and Regions (SALAR) is an employers' organization representing and supporting local governments, including all Swedish municipalities and regions (SALAR, 2023a). Time for teacher training is negotiated between SALAR (2013) and the teachers' union. Each teacher is entitled to an average of 104 hours of training during their regulated working time each school year. Training can be organized by staff or external providers, but from September 1 of 2025, a national professional development framework for principals, teachers and preschool teachers will be established, with a qualification system for certified teachers and preschool teachers (SNAE, 2025).

In March 2019, SALAR (2023b), on behalf of the government and in collaboration with the Swedish National Agency for Education, introduced the national action plan *#skolDigiplan* for digitalization of the educational system. This plan outlined management responsibilities and provided guidelines for training. According to SALAR (2019), training can be led by first teachers, meaning teachers with the responsibility to mentor or ICT educators. In an investigation (SALAR, 2018) on 1049 preschools, 36% had some kind of ICT educator, 17% almost did and 10% had not planned such support. Note that 6540 Swedish public preschools exist (SNAE, 2023a).

Method

A case study design (Yin, 2018) was used to present three municipalities' (cases) organizing of DCD at the municipal level. This enables the possibility to study "contemporary phenomenon (the "case[s]") in depth and within its real work context, especially when the boundaries between phenomenon and context may not be clearly evident" (ibid., p. 15). In this way, the under-researched organizing of DCD can be described and analyzed respectively for each municipality and yet compared regarding patterns and key components.

Context of Study

This study includes participants from three Swedish municipalities (see Table 1). The municipalities are situated within the East region in Sweden and all vary in size, organization, resources and job positions.

Table 1
Statistics of the Municipalities

Year 2022	**Municipality A**		**Municipality B**		**Municpality C**	
Municipality size (residence) (n)	**242 000**		**160 000**		**102 000**	
	Public	Private	Public	Private	Public	Private
Distribution of preschool types (%)	47	53	81	19	77	23
Full-time staff with preschool teacher education (%)	37	32	42	26	34	17
Children attending early education (age 1-5) (%)	63	37	87	13	89	11
Children per full-time staff member (n)	5,6	5,2	5,2	4,8	5,5	4,8

Note. Data from official statistics (rounded numbers) by the Swedish National Agency for Education (SNAE, 2023b).

Data Collection and Material

Several municipalities' top management and public preschools were contacted after browsing their web pages and choosing those that presented their pedagogical work with digital technology and described different organizing of DCD. For practical reasons, nearby areas were first contacted, with the first three municipalities that showed interest being selected for the study. The snowball sampling method (Cohen et al., 2018) was also used to find, contact and include professionals who were not explicitly written on the webpage, such as development leaders and ICT educators.

The study is based on 15 semi-structured interviews (Cohen et al., 2018) with various professionals (see Table 2). Interviewed ICT educators held a central role, overseeing support for an entire preschool area, unlike their counterparts, the "local" ICT educators, who were in charge of only their preschool. One pilot interview was conducted with someone who had worked previously as a development leader in another municipality until 2019. The data was collected in two time periods: from the end of November 2022 until the middle of February 2023 and from the end of October 2023 until the beginning of December 2023. A second round of interviews was conducted to evenly distribute participant numbers between municipalities, as municipality C had fewer participants after round one.

Each interview was around 60-105 minutes long. Seven of the interviews were physical meetings and the rest were online interviews. The interview guide included questions on general work experiences, their professional role, the structure of educator training, resources, development opportunities, and political debate. All interviews were audiotaped and transcribed. The author's comments were enclosed in square brackets in interview excerpts to clarify or improve readability. In transcriptions, the author was named the interviewer, and interviewees were named by code names.

Table 2
Participants and Background Data

Municipality	**Name**	**Professional positions**	**Preschool**	**Years in position**	**Education**
A	A1	Development leader	-	17	Preschool teacher
	A2	Principal	Aster	11	Childcare attendant
	A3	ICT educator		10	
	A4			10	
	A5			7	
B	B1	Operational developer	-	2	Preschool teacher
	B2		-	< 1	Upper secondary teacher
	B3	ICT educator	Buttercup	6	Preschool teacher
	B4	Principal	3 preschools (incl. Bluebell)	13	
	B5	ICT educator	Bluebell	6	
C	C1	ICT educator/coordinator	-	< 1	Preschool teacher
	C2	Principal	7 preschools (incl. Cosmos)	3	

C3	ICT educator	Cosmos	4	Childcare attendant
C4	Vice principal	2 preschools	< 1	Preschool teacher
C5	ICT educator	Camellia	4	

Note. For anonymity reasons, general names are used for titles and groups. Despite the same work title here or in real life, the work tasks and organization of the roles differ to some extent. Pseudonyms are used for the preschool names.

Data Analysis

The study followed a four-step qualitative content analysis approach (Cohen et al., 2018), starting with thorough transcript readings and memos as recommended by Yin (2018) for case study analysis. Next, the theoretical concepts of *workplace affordances* and *individual engagement* (Billett, 2002, 2011) were used to identify patterns in the organizing of DCD in each case, leading to codes being formed from the interview data. Coaching, time, and digital tools exemplified workplace affordances, while individual engagement was coded through utterances on affordances affecting staff agency, as perceived by interviewees, like knowledge-sharing, values, and autodidactic learning. Thirdly, the coded data were grouped into themes by analyzing the interdependence of workplace affordances and engagement (Billett, 2002). The themes named and structured the cases, and were supported by interview excerpts and visual representations. All this formed the empirical accounts of the organized DCD as presented in the findings and addressed the first research question. Finally, themes were compared to highlight commonalities and variations in the organizing of DCD, addressing implications for preschool educators' workplace learning and answering research questions two and three in the discussion chapter. Patterns, codes, and themes were continuously reviewed against transcriptions to ensure comprehensive data representation (Cohen et al., 2018).

Ethics

The study design was approved by the Swedish Ethical Review Authority (2022-03252-01) and the author followed all of the ethical requirements. Written informed consent was obtained from all participants and they were asked to respond to the transcript to clarify or exclude something if needed. The participants were also asked to comment on the draft of the findings. This enhanced the validity and reliability of the research (Cohen et al., 2018). The author continuously wrote field notes for self-reflection to reduce potential bias from their background in preschool education, as they had previously worked many years in Swedish preschools. For example, the author initially expected the participating preschools to use more technology than the average preschools. Still, with the notewriting, they could remind themselves not to focus on generalization, as this was not the aim of the study. While semi-structured interviews could provide more in-depth answers from the interviewees, to minimize interview bias, the author used peer debriefing and an interview guide (Cohen et al., 2018). The author's background also facilitated access to the educational setting and helped establish a more non-hierarchical interview environment.

Findings

This section presents the three municipalities' characteristics of the organizing of preschool educators' DCD. The institutional conditions are described to provide the reader with an empirical account based on the professionals' descriptions, to later present and discuss the key components of the cases in the discussion.

In all municipalities, the preschools had access to a similar range of digital tools, such as projectors, models of small robots, green screens, computer tablets, computers, and small microscopes (with and without screens), but the amount and use of tools differed.

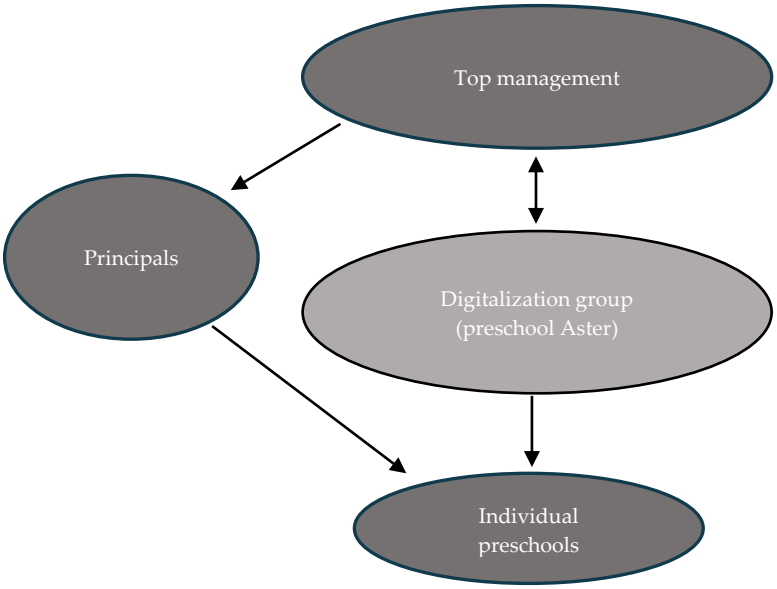
Case I: The Innovative Municipality

Municipality A is classified as a large municipality with approximately 242 000 residents. The organizing of support starts through communication and implementations by the top management or by the digitalization group from preschool Aster. The decisions reach the principals and then the individual preschools (Figure 1). From the top management, four development leaders have the task of overseeing the digital systems and strategic development based on the national digitalization strategy, teacher training,

and supporting principals. One of them is in contact with the digitalization group. The preschools are divided into four areas, each overseen by a manager. In each area, there are 15-20 preschool principals, each responsible for one to three preschools.

Figure 1

Overview of the Organizational Context in Municipality A



Innovative and Experimental Vision and Approach

A key component of the municipality's organizing of DCD was their innovative and experimental vision and approach to enhance preschool educators' learning. This initiative began over a decade ago, involving the introduction of new digital tools to preschools and the evaluation of pedagogical applications. Along with converting two newly built preschools to specialize in ICT to lead the development, preschool Aster was one of these institutions. As presented by the development leader, innovation and experimentation were valued and part of their vision for support.

> We were quite early with buying iPads (…) we began distributing them to observe the outcomes. So [we have] a little more experimenting [approach] (…) It's probably a bit dangerous to say that, but we do it under controlled conditions (development leader, A1).

Following this, they invested various resources but "under controlled conditions" from top management. During the establishment of preschool Aster, the principal created a digitalization group with preschool educators interested in digital pedagogical tools to stimulate collegial cooperation and learning. Today, the digitalization group has monthly meetings to develop the pedagogical work and consists of the principal and three preschool educators with this ICT educator role. Despite the municipality decentralizing most support in recent years and discontinuing the specialized profile, preschool Aster offers to coach preschools, driven by their ongoing interest but still in dialogue with top management. In the preschool, the innovative and experimental approach exists in everyday practice:

> I am permissive, when they present thoughts and ideas, I very rarely decline them. Instead, I tend to think: "Yes, try it out." If it turns out that: "This wasn't suitable for us at the preschool. No, but then we know. We've tried it." (principal, A2).

Likewise, the digitalization group, principals and the management team have been introduced and supported by the head preschool manager to try new technology. The digitalization group tried VR headsets but did not introduce them in preschool due to the recommended age restriction. The development leader explained:

> Our head preschool manager is a very innovative leader (…) "What is new and how do we understand this?" (…) We have tried out VR headsets in the management group (…) We gathered all the principals on a training day when they got to try out operating drones (…) Just as you should encourage the educators to dare to try out different tools

> together with the children, we as leaders and principals need to be challenged (development leader, A1).

As mentioned here, the vision guided the use, evaluation, and regulation of digital tools in the municipality by top management and at preschool Aster.

Resources and Ad-hoc Implementations

Preschool Aster has a digital atelier, equipped with rooms containing digital tools such as a green screen setup and programming resources. In collaboration with the development leader, they have established in the preschool a makerspace, which is a collaborative workspace for creative work that integrates technology, conducted workshops with study visits to their digital atelier, and provided coaching to other preschool staff. These initiatives, except the study visits, received top management funding. About half of the municipality's preschools have participated in these workshops, but only preschools from other municipalities visit today. The municipality also offers online and in-person courses through external lecturers and recorded lectures from the digitalization group.

The possibility of having this makerspace at preschool Aster comes as a result of juxtaposing conditions. First, it has available space due to a smaller number of children, while at the same time, it is a modular building and will eventually be deconstructed. This leaves the future of the initiative in a delicate state. The municipality's vision and encouragement for innovation have led to an openness, but ad-hoc implementations. As previously mentioned, the ongoing investment of resources has occurred, here reported as funds, tools, time and coaching, even when the progress was unclear.

The digitalization group mentioned an ongoing try-out of establishing a learning community with other preschools through the makerspace by offering study visits there. The makerspace concept is still under development, as there has been some misunderstanding of its purpose and use. Furthermore, collegial cooperation beyond the digitalization group has been difficult to create. There have been fewer than expected visits due to the coronavirus pandemic and overall low coaching requests. While the municipality supports the development of the makerspace and has arranged a study visit to another municipality's makerspace and discusses ways in which the idea can be better marketed, the ad-hoc implementations and the abundance of affordances revealed instead struggle with the individual engagement of other staff.

Regulations and Expectations

The formalized regulations were specified digital competence guidelines. On a municipality level, the digitalization steering document was discussed between development leaders, preschool area managers, and the head preschool manager to see how it connects pedagogical practice, budget and political directives. On a preschool level, the digitalization group was currently updating their preschool's operational plan, which concerns how they should work with digital technology and address the pedagogical work, e.g. not using words like "playing games". As for ICT educators' learning, it was usually curated by them attending the annual teacher conference event about digital technology called Scandinavian Education Technology Transformation (SETT), their meetings, lectures, and reading books, but mostly through social media where they searched for new knowledge and inspiration. They, in turn, evaluated the ongoing work at the preschool, coached, and offered workshops:

> I don't come in and control, it's about having workshops with our colleagues so that they get a sense of "what are the things we're working on? Where am I in this?".
>
> (---)
>
> It's about us making sure that all those [new staff members] who come into the preschool get the same amount of information and get a lot of knowledge and skills from what we can offer (…) That you learn (…) We also look at how we work with digital technology in each division (...) We give each other feedback (ICT educator, A5).

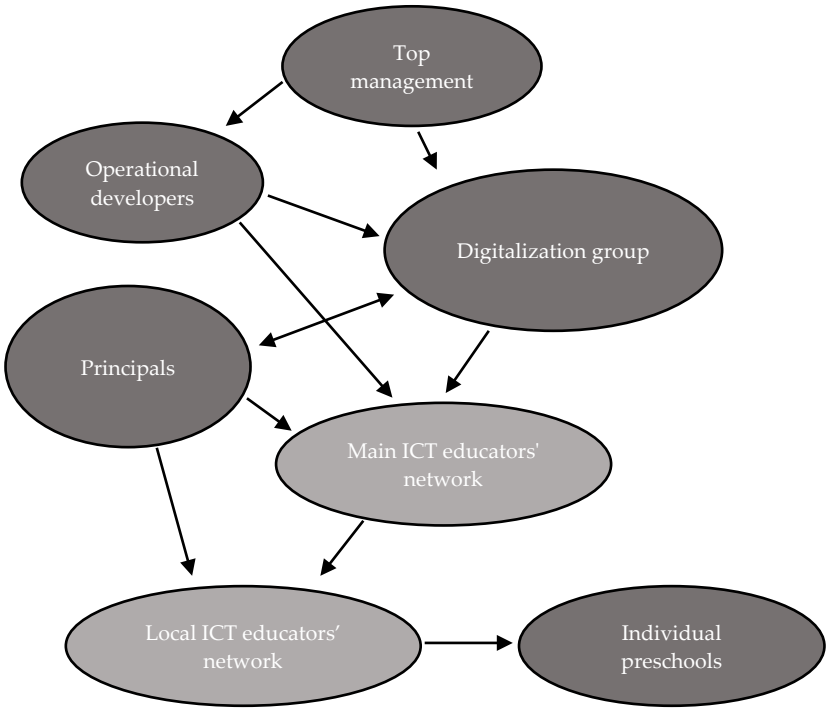
It was, however, reported that any other staff member should be able to take on the responsibility of coaching during study visits, but that had not been the case. Thus, significant reliance and expectations were placed on these ICT educators by staff, or in general, the digitalization group put efforts into

providing support, whether requested by preschool educators or top management. Yet encouraged as this aligned with the innovative vision.

Case II: The Development-oriented Municipality

Municipality B is characterized as a metropolitan area with a population of 160 000 residents. The DCD is centrally administrated, indicating a top-down approach (Figure 2). From top management, two operational managers oversee the strategic work with principals, following a digitalization plan. The operational developers take directions from top management and handle maintenance, routines, and in-between processes, including specific educator training. They provide instructions to the digitalization group and the main ICT educators' network. The digitalization group is run by top management through their coordinator of digitalization and one of the operational managers. Members are one principal representative from each of the six preschool areas. They meet regularly to discuss developmental strategic questions and share information with the other principals, who influence decisions with feedback, e.g. the digitalization action plan. Creating a more direct exchange. The group gives instructions regarding the support to the main ICT educators. The principals manage one to five preschools and oversee their ICT educators. The main ICT educators meet in their network but are also the pedagogical leaders of their local ICT educator network. After the local ICT educators receive support, they are responsible for providing DCD at their preschool.

Figure 2
Overview of the Organizational Context in Municipality B



Systematic Vision and Structure for Development and Regulation

The municipality is development-oriented and uses a systematic vision and structure for development to improve pedagogical work in education, which includes the above-mentioned divisions, teams, and roles. This approach provides them with the conditions for sharing information and regulating support, as stressed by the operational developers.

> The preschool has (…) a very good development organization. How something can come from the top [management] and then there are conditions for it to be spread to all levels because that's the challenge when you're so far away from the organizations, when changes are to be made or something new is to be implemented (operational developer, B2).

For example, the structure of the ICT educator networks. Each preschool area has two main ICT educators responsible for supporting their local ICT educators through meetings held three to four times per semester. Preschools with more than five to six divisions have two local ICT educators. The main ones meet two to three times per semester in a network led by the digitalization coordinator, working on tasks from the digitalization group, such as giving feedback on the digitalization action plan. They share updates and assign tasks in their local networks, often using materials and speech scripts from the operational developers. They offer workshops, usually only for the main ICT educators, but exceptions occur, like when all principals and ICT educators were trained on their new digital platform. The structure was to ensure and control that the same information and support were received, the operational developers explained.

Autodidactic ICT Educators and Collegial Cooperation

In the municipality, tasks and information are delegated, yet principals and main ICT educators have significant autonomy to organize workshops and meetings. This autonomy sometimes results in a perceived low agency for main ICT educators to support the local ones, as it depends on their capability. Before being officially appointed to their role, many have gained recognition by self-learning and supporting colleagues. This influenced their involvement and the training they offered. While the development-oriented structure was intended to provide similar support across the preschool areas, the reliance on these autodidactic ICT educators raised some issues:

> B3 (ICT educator): No one educates the main ICT educator.
>
> Interviewer: You are not offered any professional development?
>
> B3: Well, in some ways we get some, and in some ways, we do not (…) We have attended various workshops and then it turns out that there are main ICT educators who do not really know these things, and then maybe you should start there (…) Now we have started to make use of each other (…) it is otherwise a little strange as it would require that you have this enormous [individual] knowledge (…) Some teams have had difficulties on finding main ICT educators.

Not only tackling their formal responsibility, they also took on more self-initiatives to improve collegial cooperation and local ICT educators' digital competence and pedagogical leadership.

> We have had various kick-offs, teamwork sessions and workshops. Before, it was more that I and one other presented content. So now the last workshop (…) we said: "Today we are going to work with green screen" and then we split them into small groups. "What can we do (…) and what is the pedagogical purpose?"
>
> (---)
>
> If I ask a local ICT educator: "How's it going at your place?" I expect them to talk about their preschool, not just their division (…) They *must* keep track of the situation (…) (ICT educator, B3).

As presented above, more available learning opportunities could exist for the network members and subsequently the staff through this direct guidance.

Coaching and Resources

The role was sometimes less important. Instead, the focus was on dividing the workload between the main or local ICT educators for staff to get more individual coaching. But this option depended mostly on the principal's decision. One example is the extra workshops they offered for staff who wanted to learn more about the new documentation tool. These meetings also stimulated collegial cooperation as attendees reportedly shared their practices and ideas. Despite these resources, the professionals reported as well that the preschool educators with the greatest need did not always attend or request support. Showing different individual engagement for coaching. A principal mentioned motivating the staff.

> B5 [main ICT educator] (…) conducts a lot of training sessions (…) because many persons feel scared (…) saying: "I can't do this." Then I say: "No, but if you buy a machine at home (…) you don't just let it sit on the counter; you try to use it. And that's what you should do here (…) Because the more you use it, the more confident you'll become" (principal, B4).

Yet, spontaneous interactions or coaching requests did occasionally happen.

> Staff are working with different amounts of the documentation tool and digitally, so everyone works with that. But

> with digital tools, I feel I need to remind them. “Please use them, they're here available in boxes, and show the children.” Now, there was a preschool educator last time who said: “But I don't know how to do it. I want us to meet for an hour and you show me how (…) Where do I plug in the cable? What does the app look like?" (ICT educator, B5).

Providing coaching, hence, was an important affordance offered by the ICT educators, but it was also described by the interviewees that preschool educators valued the support differently. This led to previous or current difficulties in attendance in the local network, with colleagues commenting such as: “Are you going away again?”.

Communication and Work Culture

The municipality’s intended development happened through group exchanges and as the trust strengthened between involved staff. The importance of relationship building and communication for learning was evident in how it was needed for information and knowledge sharing to occur and to create this development-oriented structure and vision of support. In the beginning, individuals kept the information for themselves, hindering development and staff learning. This can still be an issue, for example, when ICT educators change.

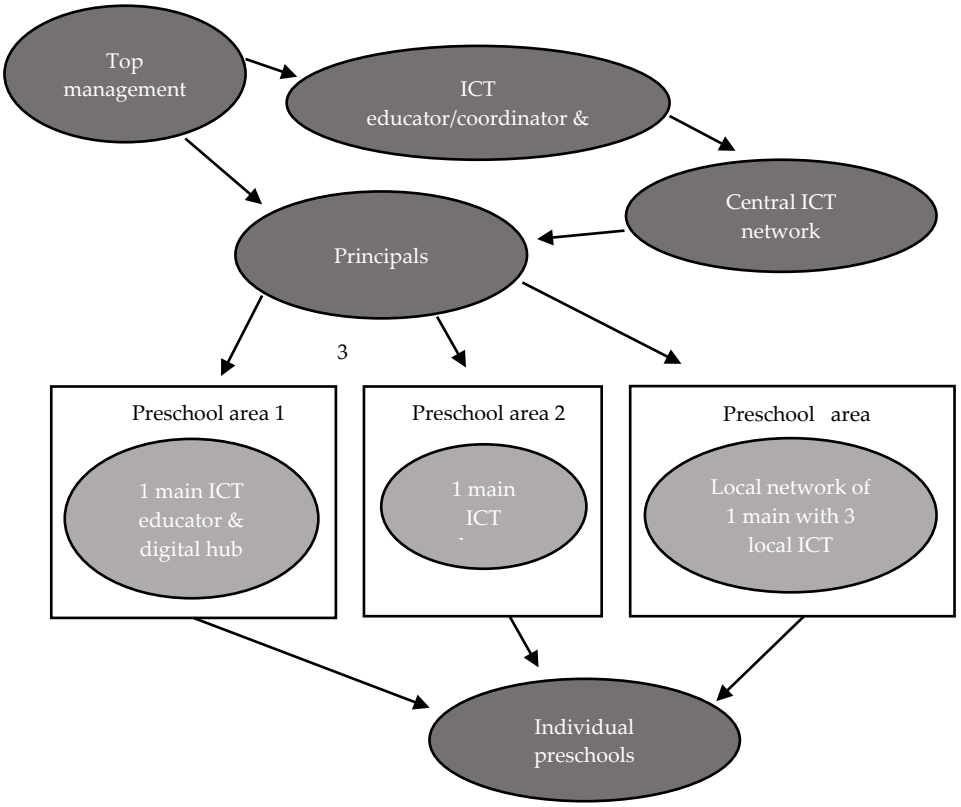
> The biggest challenge (…) is getting the information out (…) when you are such a large organization (…) It doesn't happen in a week, it may take two or three weeks before the educator at the farthest end gets it because it is so complex. Even though we have our development organization, which still partially works (…) It has recently gained new momentum because they are starting to realize that it is a good organization to get information and learning out (operational developer, B1).

Establishing this change to a cooperative work culture in the municipality had taken years to develop. However, this approach was utilized by the professionals to ensure accessibility to learning and to eventually reach all staff.

Case III: The Hub-based Learning Municipality

Municipality C is medium-sized with 102 000 residents and uses a semi-centralized approach for DCD to preschool educators (Figure 3). Top management gives directions to the principals and their full-time ICT educator/coordinator. The latter works alongside two "pedagogistas", experts in using materials, and one "atelierista", an expert in art expression. They are in charge of a central hub, which is an atelier and workspace for creative work, including workshops regarding various subjects and digital technology. The coordinator runs a central ICT network consisting of a system engineer and 13 main ICT educators, one from each area. They meet monthly. The network aims to support and inspire members, facilitating information sharing, knowledge development, and regulation of educator training. Principals meet with top management, get input from the network, and facilitate educator training by allocating time for workshops. Despite organizational differences in each preschool area, participation in workshops is centrally and locally prioritized for staff, with some preschools having their digital hub (workspace for digital tools), only one ICT educator, or local ICT networks.

Figure 3
Overview of the Organizational Context in Municipality C



Hub-based Learning as Vision and Approach

The municipality employs this "hub-based learning" vision and approach to develop and regulate staff learning by arranging various hub-based meetings. The coordinator explains:

> We've structured it so that we, the ICT network, are like a cogwheel with a plan (…) technicians (…) principals and operations manager (…) We are like three cogwheels interlocking, with me as the hub in the middle to coordinate (…) We have 13 preschool areas, where some areas have seven preschools, and some just one preschool but with twelve divisions. The situation varies greatly, and that's why we believe it's important (…) to interlock [all] so that everyone has the same access to information and opportunities (ICT educator and coordinator, C1).

The coordinator decides on the content for the central ICT network by considering members' suggestions, scheduling study visits, and occasionally inviting external professionals. Each preschool area presents its methods and activity tips. Members view the network as the hub of learning while stressing collegial cooperation and individual interest for this learning to occur.

> I haven't taught myself. Instead, you have to have an *interest* in digitalization to learn, I think, and that I had before [getting the role]. But then we have this ICT network in the municipality (…) That way, we have gotten a lot of professional development. Like new [stuff] all the time that we try to convey to our colleagues (ICT educator, C5).

As for regulations, this network created an action plan for pedagogical work with digital technology in the municipality, indirectly defining the basic level of digital competence required by preschool staff. For example, they use portable microscopes for magnification and deeper knowledge and Puppet Pals (app) for language development by creating stories. Each principal still has the autonomy to organize pedagogical work while considering these specified digital competence guidelines. Political debates have sparked discussions on guideline changes in the network, such as not using tablet screens for children under two and instead using projectors. This change is already underway in at least the preschool area 2, where vice principal C4 works.

Planned Workshops and Resources

Aside from the network, other hub-based meetings were the workshops. The municipality had a schedule for workshops to enable staff to visit the central hub, but local workshops were also scheduled in the preschool areas. ICT educators presented a list of available workshops for the central hub, and staff signed up if interested. For example, some preschool staff visited with children to try out iMovie, a film editing app. Staff might be asked to present what they learned during an all-staff meeting. The local workshops were, for example, held in preschool area 2 every sixth Friday based on staff requests. Preschool area 1 had regular visits from their seven preschools with child groups to their digital hub, a workspace for digital technology activities, and workshops that only staff attended. In preschool area 3, the content and structure were decided in monthly local network meetings as the ICT educators offered support at their respective preschools. Using workshops was described as an effective approach to provide staff with coaching but also stimulate collegial cooperation and learning:

> After this workshop [when working as an ICT educator], I haven't gotten any questions about this app and they use it (…) That's why we plan workshops, it seems to be something that works in our organization, so we can keep doing it, to enable development amongst the staff regarding ICT and teaching in ICT.
>
> (---)
>
> We check also who they are, that they do not work in the same division (…) It's a puzzle [to organize it], but it works (C4, vice principal).

However, the preschool arrangement was affected by the principal's granted time for the ICT educators. The local ICT educators typically had less time (e.g. 1-2 hours) for this role compared to the main one (e.g. 1-2 workdays), who also worked more closely with the principal and visited the preschools if needed.

Coaching and Values

Besides hands-on workshops, the professionals emphasized individual coaching as it addressed the specific needs of preschool educators. The principal of the digital hub explained that their ICT educator, who also handles administrative tasks instead of working with child groups, could tailor coaching sessions once she had more time for this role. She explored how the preschools operated, conducted visits, kept contact, and provided activities at the digital hub relevant to ongoing pedagogical work.

> [Before] it became more like a "happening" [single event]. That you [staff] came to the digital hub and worked there, but that it might not be transferred to the context that you worked with in your preschool or your division (principal, C2).

Here, the principal raised awareness of how the workshops needed to be aligned with the wants of staff for practical change to occur. Yet, the available coaching was not always desired by staff, colliding with their values or understanding of their needed knowledge and the learning demands from the management.

> C3 (ICT educator): You meet some resistance. But it has become less (…) It sounds awful to say: "You have no choice". But it's a bit like that. It's in the curriculum.
>
> (---)
>
> Interviewer: Do you make sure that all the staff have a meeting with you at some point?
>
> C3: Yes, as for now, with this "Book Creator" [app]. It [the workshop] was for everyone. Someone said: "Ah, but I can [this already]". "Nah," I said. "I want you to come anyway because you might learn something new." And they have done that.

Despite this negotiation or conflict of interest, this hub-based learning was described as working well in the municipality, ensuring digital competence development, according to the interviewees. For example, new workshops could also be suddenly suggested, and staff could participate:

> Let's say a work team (…) does not contact me often. Then I can contact them: "Oh my, I hear you work with this. Would you like me to visit you and show you how the microscope works so you can use it in your project?" Someone

rarely says "No" (ICT educator, C5).

The ICT educators overseeing the pedagogical work and creating a psychologically safe environment and good communication were thus important for new learning to happen, as it could make staff participate more actively.

Conclusion and Discussion

The study aimed to contribute to the understanding of how digital competence development is integrated into preschool educators' everyday work based on the experiences of involved professionals, through three cases. By using a workplace learning theoretical lens (Billett, 2002, 2011), the results revealed recurring components across all cases, each with different significance in their context. The identified workplace affordances were *collegial cooperation and coaching*, *availability of resources* and *specified digital competence guidelines*. When it comes to individual engagement, it was distinguished as influenced and led by *variations in vision and values*, *communication strategies* and *autodidactic professionals*. The interdependency of these will be presented and discussed here to address the commonalities and variations between the cases, and the implications it has for preschool educators' workplace learning.

Workplace Affordances for the Development of Digital Competence

Collegial cooperation and coaching were key workplace affordances across the municipalities and occurred regularly in different settings. Dedicated groups and networks were considered avenues for DCD, with ICT educators offering coaching and workshops. These interactions and coaching practices provided many opportunities for staff to learn in everyday work through support and guidance (cf. Billett, 2002, 2023; Billett et al., 2004). Many preschool educators were directly involved in DCD by taking on ICT educator roles. Similar to a recent study (Schachter et al., 2024), they stressed learning through the support of fellow coaches. Although investment in these roles varied, only municipality C had a full-time ICT educator/coordinator and one dedicated to a digital hub. The others had workdays or hours for the role. They arranged activities to promote collegial learning among staff and reportedly facilitated learning by also considering their needs and prior knowledge. However, critical reflection with staff was less mentioned compared to with group/network members, though it can enhance practices (Chen & Chang, 2006; Elek & Page, 2019). Coaching the staff in their daily practices was desirable by ICT educators, but not necessarily done unless requested. Most support was through prearranged meetings and workshops.

The *availability of resources* such as access to digital tools and funding was fundamental for DCD and expressed as basic affordances in all three cases. As shown in other studies (Cowan, 2019; Magnusson, 2023), the workshops offered were hands-on experiences and discussions, like the activities in municipality C's central hub and municipality A's makerspace and digital atelier. The municipalities' organizing of resources followed a combination of what Pettersson (2018) names a "goal-and-structure-oriented school" and a "culture-oriented school" approach. For example, the first approach occurred through the formalized groups, roles and meetings, like the study visits held by the digitalization group in municipality A and the ICT educator networks in municipality B. Still, some investments were more culture-oriented such as the hubs in municipality C, functioning for staff to meet and cooperate more freely. Municipality A reported, though, difficulties in creating their makerspace into a learning community for the preschools. Considering how workplace affordances are bound by social context (Billett, 2002, 2011), for staff to get involved in such practices, the resources are important but not enough. The preschool culture needs to change and make learning communities the norm, like how workshops (hub-based learning) are prioritized in municipality C. Otherwise, it becomes a limited affordance for the majority of staff, as in the case of information not being shared right away in municipality B. In municipality A, preschool Aster struggled, in general, to make other preschools interested in their learning activities without their previous formalized and centralized structure. Underlining the effects municipal priorities can also have on staff's use of resources (cf. Billett, 2002, 2023).

The differences in organizing support in the municipalities primarily stemmed from how the management team exercised control of the resources. In municipality A, experimentation was highly

valued and digital tool use was less regulated compared to the other municipality. In municipality B, it was more centralized, with even speech scripts being provided to ICT educators, and in municipality C, the ICT coordinator oversaw the pedagogical work on a central level but the principals were in charge of their areas while considering central guidelines. All municipalities had *specified digital competence guidelines*, like action plans or directions, to regulate, steer and evaluate developmental support for preschool educators and digital use. For instance, the content in municipality C's guidelines included activities with tablets, but was going through potential policy changes impacted by the political climate on screen time. Although screen-based technology was only one form of digital technology used in their preschools (cf. Undheim, 2022). The guidelines acted hence as procedures to ensure and restrict some learning and practices (cf. Billett, 2002, 2023; Le et al., 2023). Foremost by specifying which digital technologies preschool children should explore and indirectly what staff need to learn to use. However, it did not address how it translates into preschool educators' learning. Instead, the principals in the study had a crucial role in executing the digitalization strategies and supporting educators (cf. Liu et al., 2014; SNAE, 2018). This became evident in how they arranged the resources like time. ICT educators' capacity to provide support depended on their prioritization, but the principals also had top management support, which may not always be the case in municipalities (cf. Ng, 2015).

Affordances Influencing Individuals' Engagement in the Support

The results showed *variations in the vision and values* of DCD between preschool educators and top management. The municipal visions for the pedagogical work and support raised expectations on the engagement of staff, e.g. to work innovatively in municipality A, inform and spread knowledge amongst colleagues for the development-oriented organization to work in municipality B, and participate in hub-based learning by signing up and joining offered workshops in municipality C. While a systematic approach can enhance workplace learning, clear visions are also important (Wadel & Knaben, 2022). The vision was not explicitly addressed with staff but mainly between management and ICT educators, e.g. in the group and network meetings. Workplace hierarchies can naturally restrict insight into certain practices, like management decisions, which can affect employees' engagement with available affordances (Billett et al., 2004). The municipalities' visions and learning objectives were reported to collide sometimes with staff's as they valued the development practices differently. There were accounts of preschool educators' resistance or lack of interest in the support, e.g. how staff in municipality C did not want to attend some workshops. Another example is how local ICT educators, in municipality B, improved their attendance in their network meetings once their colleagues found it valuable for them to go. As Billett (2002) stresses, organizational factors and personal relations influence participation in learning opportunities. Management needs to consider various forms of support for employees' preferred learning styles, but also assess the current practices, resources, and organizations before introducing more support (Le et al., 2023).

The findings show that the amount of support depended on requests from preschool educators, but those needing it most often requested less. Still, some instances were recounted when preschool educators took the initiative to get coaching, requiring cooperation with their wishes. Direct guidance happened this way (Billett, 2004, 2010). Seeking individual support and advice can be difficult without close relationships and psychological safety, which are essential for new practices and learning (Cramer et al., 2022; Douglass, 2019). The engagement in the support was reported to be affected by the *communication strategies*. Professionals improved relationships by communicating ideas and promoting the municipality's vision indirectly, often during resistance, to encourage certain "learning behaviors", such as valuing experimentation, educator training, information dissemination and knowledge sharing. ICT educators or principals were the closest advocates. In municipality B, a principal described motivating the staff to try out practices and arranging for the ICT educator to have workshops for them to experiment. In municipality C, the principal mentioned that staff started developing practices after the ICT educator from the digital hub began visiting and maintaining contact with them while considering their specific practice. An ICT educator from another preschool area mentioned being able to contact staff to offer support

spontaneously. In line with previous research, the communication and relationships between ICT educators and preschool staff were important for practice change (Colmer, 2017; El-Hamamsy et al., 2021).

The ICT educators had significant freedom to design workshops, giving them high agency. They gained their position and mandate through prior self-learning and motivation to help colleagues. Organizing for DCD relied, thus, on *autodidactic professionals* and their commitment. Those already interested in digital technology often pursue self-education using online resources and networking (Dwyer et al., 2019; Marklund, 2015, 2022), like these cases. Similar to previous studies (Nehez et al., 2022; Rönnerman et al., 2017), the middle position of ICT educators offered unique possibilities. The findings suggest that their leadership knowledge and organizational knowledge were as important as their pedagogical knowledge of digital technology for creating good conditions for preschool educators' learning (cf. Avidov-Ungar & Shamir-Inbal, 2017). Not considering all three aspects lowered workplace affordances for staff, like in municipality B, how local ICT educators sometimes needed to be reminded by the main ICT educators to oversee the learning progress of all staff and not only their division. Having ICT educators was described as central for DCD to the degree that for example, other educators would not take on the duties of doing workshops in municipality A or how, despite knowledge differences among main ICT educators in municipality B, there was a pressure to be this "expert" without necessarily getting a formal education. Expertise is expressed in social practices and not individual competence, according to Billett (2010), which is why learning in everyday work should not only fall on individuals (experts) and without the consideration of the relational aspects of their role and coaching.

In conclusion, DCD was available through collegial cooperation and coaching through dedicated groups and networks, with differences being in the municipal vision and the control of resources. This impacted support arrangements along with principal prioritization, affecting ICT educators' capability to offer support. The values of preschool educators did not always align with the municipalities' visions and thus influenced their agency to try new practices, impacting learning opportunities. Psychological safety and good communication were important for providing staff with coaching and for them to seek support, meaning individual engagement did not occur only by offering workshops or even individual coaching. In addition, despite the municipalities offering resources and regulating content through, e.g. policy documents and workshops, the workplace learning context was based mostly on ICT educators' motivation and commitment, as much of the support depended on their knowledge, communication skills, and relationship-building with staff.

Limitations and Strengths

A limitation of this study was that only interviews were conducted without observations of the educator training in the municipalities and the perceptions of the preschool educators receiving the support. This could have provided more contextual knowledge of workplace affordances and individuals' engagement in practice. However, the interviews provided an exploration of the experiences of organizing DCD from involved professionals in different municipalities, especially insights into the real-world setting, which is lacking in previous research. Most ICT educators also had this role as part of their preschool educator position.

Practical Implications and Future Research

The findings of this study contribute to increased knowledge of DCD in preschools and how it is organized. The study has the potential to support decision-makers, principals, ICT educators and preschool teachers in developing current practices. Not least, the findings highlight the importance of recognizing workplace learning as an effective tool to improve preschool educators' digital competence and to provide opportunities for children to develop their digital competence. In this study, the organizing of support for the pedagogical use of digital technology in Swedish preschools is depicted alongside the diverse municipal regulations governing its use. The empirical accounts can hence provide another discussion in the debate on "screen time" (cf. Government Offices of Sweden, 2023a, 2023b), showing how digital tool use is more planned and restricted than may be understood in these public debates and the significance of DCD for preschool educators to use digital tools as "teaching tools" (cf. SNAE, 2024). The results also

confirm previous research on issues with the integration of digital technology in preschool and its relation to staff's interests (cf. Marklund, 2015, 2022). This could highlight how educators' agency concerning workplace affordances needs to be more problematized in ECEC professional development research (cf. Aspbury-Miyanishi, 2022). In summary, the findings demonstrate the variability in organizing support and conditions for workplace learning. To effectively facilitate such learning among preschool educators, management at both the municipality and preschool levels must consider the interdependence between available resources and staff engagement in the workplace. This includes specifically addressing practical aspects:

- To foster greater collegial interactions and cooperation, thereby enhancing opportunities for workplace learning, it is essential to create learning communities, e.g. through networks and groups. However, DCD should not solely rely on these meetings or group members. Rather, the learning communities should function as a way to encourage experimentation both in the use of digital tools and the format of support and in creating a sharing culture in preschool.
- Attention should also be directed toward cultivating psychological safety, building relationships, and improving communication between ICT educators and preschool educators. These efforts can facilitate more spontaneous exchanges and incite educators to seek advice.
- Lessen reliance on autodidactic ICT educators and lower implicit work demands by offering more support and education for the ICT educator role. Especially, before recruitment.
- Create open discussions on management expectations for preschool educators' learning to address agency, values, and engagement of affordances. Formulate together a vision and action plan at preschool.

The author recommends that future research expand on these findings by examining everyday workplace learning micro-processes through preschool observations and preschool educator interviews, focusing on their perceptions and individual engagement. By introducing workplace learning theories in ECEC research, the author hopes to broaden the research field of teacher professional development and learning.

Declarations

Authors' Declarations

Acknowledgements: The author would like to thank all the participants in the study and for the valuable comments on the first draft of the paper from the research group *Organization Pedagogics* and other colleagues at the Department of Education, Stockholm University.

Authors' contributions: This is a single-authored paper.

Competing interests: The author declares that there are no competing interests.

Funding: Funded by Stockholm University.

Ethics approval and consent to participate: The study design was approved by the Swedish Ethical Review Authority (2022-03252-01) and the author has followed all the ethical requirements.

Publisher's Declarations

Editorial Acknowledgement: The editorial process of this article was completed under the editorship of Dr. Stamatios Papadakis through a double-blind peer review with external reviewers.

Publisher's Note: Journal of Childhood, Education & Society remains neutral with regard to jurisdictional claims in published maps and institutional affiliation.

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