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Play is the Base! ECEC Leaders' Views on the Development of Digital Pedagogy

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Abstract
The development of digital pedagogy in early childhood education and care (ECEC) is a relevant issue. The role of the ECEC leader in initiating and leading the development of digital pedagogy is important. The aim of this study was to explore the views of ECEC leaders on digital pedagogy and its development, as little research has been done on the subject. The data was collected in the context of continuing professional development for ECEC leaders in Finland. The data consists of 39 development plans that were drawn up by the participants and it was analyzed using qualitative content analysis. The research indicates that ECEC leaders hold diverse perspectives on digital pedagogy but acknowledge the significance of leadership in fostering staff digital skills, formulating a shared strategy, and involving children and the community. The findings suggest that digital pedagogy should be an inherent component of the fundamental mission of ECEC, which centers around play-based learning. The concept of play-based digital pedagogy (PBDP) is proposed as a framework for digital learning in ECEC.

Keywords Digital pedagogy · Early childhood education and care · Pedagogical leadership · Early childhood education leader

Introduction

The digitalization of education has become a current issue and an important way of delivering training, communication, and information sharing at all levels. The proliferation of digital devices requires educators to have an increasingly broad and sophisticated set of digital skills (European Union, 2017). In Finland, the policy objective is to raise the profile of Finnish ECEC as a more valued professional option and to deepen the understanding of digital pedagogy as a learning opportunity in ECEC. This means that in Finnish ECEC, technology is seen as one of the most important drivers of change for the future (Jokinen & Nieminen, 2019). To implement this change, learning environments related to digital pedagogy in ECEC and the digital competence of ECEC staff must be systematically developed.

Pedagogically, ECEC should be strongly child-centered, while the delivery of teaching and care needs to be implemented through teacher-led pedagogy. This means that the digital pedagogical competence of ECEC staff and the implementation of digital pedagogy in ECEC become important issues (Lindeman et al., 2021). While research shows that digital technologies are gradually becoming part of everyday life and pedagogy in ECEC (Dezuanni & Knight, 2015; Undheim & Jernes, 2020), new teaching practices such as e-learning, hybrid learning, and the appropriate use of technology in teaching also challenge ECEC staff to refine their thinking about teaching and learning (see Greenhow et al., 2021). The question of updating both pedagogical orientation and skills related to the use of technology becomes relevant. A wide variation in the digital pedagogical skills and knowledge of ECEC staff has been observed internationally (Enochsson & Ribaeus, 2021), as well as in the use of digital tools by ECEC teachers (Dezuanni & Knight, 2015). Implementing digital pedagogy requires both technological

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pedagogical content knowledge (TPACK) (Mishra & Koehler, 2006) and self-efficacy in developing teachers' technological skills and knowledge (Mannila et al., 2018). The teaching and learning culture implemented by teachers emerges from teachers' pedagogical orientation (Väätäjä & Ruokamo, 2021).

In the Finnish curriculum for ECEC, play is considered essential for learning and is supported with a systematic and goal-oriented approach to scaffold children into engaging in learning opportunities (Kangas & Harju-Luukkainen, 2022). In this study, we define digital pedagogy as the pedagogical use of digital technology from a socio-constructivist perspective, following Väätäjä and Ruokamo's (2021) summary. However, as play is the starting point for all pedagogical activities in ECEC (Finnish National Agency for Education [FNAE], 2022), it should also be the starting point for digital pedagogy. Kyllönen (2019) defines digital pedagogy as the teacher's knowledge and skills combined with technological competence. This requires that ECEC teachers have technological pedagogical skills and the ability to apply digital technologies appropriately to teaching goals and learning environments (Mishra & Koehler, 2006). In this study, we emphasize that in ECEC this should be interpreted through a play pedagogy orientation.

The study is set in a Finnish context. The Finnish Early Childhood Education Act (2018) defines ECEC as a planned and goal-oriented system of childcare, education, and care with a special emphasis on pedagogy. Its organization and provision must be based on the best interests of the child (Act on Early Childhood Education and Care 540/2018). Finland invests heavily in the development of ECEC and aims to ensure equality, quality, and accessibility of ECEC services throughout the country (Act on Early Childhood Education and Care 540/2018). In Finland, ECEC covers children aged 0–6 years. The aim is to ensure that every child can use age-appropriate digital tools safely and responsibly to participate in social and community activities. This is also reflected in the political will and actions taken, such as a significant increase in the number of training places for ECE and ECEC teachers. In Finland, ECEC pedagogy is led by the Leader of Early Childhood Education (ECEC leader) whose main task is pedagogical leadership (Fonsén & Parrila, 2016). Pedagogical leadership is strongly connected to pedagogical quality of ECEC. It is based on clear values and vision as well as on critical reflection of the implemented activities, which are above all based on effective evaluation tools. The process develops and guides ECEC towards the desired vision (Fonsén & Soukainen, 2020.) Like Fonsén and Parrila (2016), we see pedagogical leadership as an umbrella concept that includes various leadership tasks such as administrative and human resource management, but in this study, we focus only on **pedagogical leadership**. From the perspective of pedagogical leadership, the importance of digital pedagogy is to strengthen and support the development of digital pedagogical competences and the use of digital tools by ECEC staff (Kjällander & Riddersporre, 2019).

The aim of the study was to find out how Finnish ECEC leaders describe digital pedagogy and what they consider important in its development. There has been some research on early childhood teachers' views on digital pedagogy (Koivula & Mustola, 2017; Lindeman et al., 2021; Mertala, 2019a), but very little research on ECEC leaders' views on digital pedagogy. Since ECEC leaders are responsible for the pedagogy and its development in their units, it is important to study their views. This will help to understand the starting points from which digital pedagogy is implemented and to explore how the learning environment in ECEC can be improved (Lindeman et al., 2021) in terms of digital pedagogy.

Our research questions are: (1) How do ECEC leaders describe the current stage of digital pedagogy in their unit? (2) What do ECEC leaders consider important in the developing of digital pedagogy? The data was collected during a 15-credit national continuing professional development program for Finnish ECEC leaders which was conducted remotely. More specifically, data was collected in the program's optional part, "Pedagogical leadership: development of learning environments and digitalization", which was designed and implemented by the two authors of this study.

Theoretical Review

Play-Based Digital Pedagogy in ECEC

The process of designing digital pedagogy starts with defining the objectives of the pedagogy, which means identifying its purpose and goals (Väätäjä & Ruokamo, 2021). Digital pedagogy, as defined by Sailin and Mahmor (2018, p. 146), refers to the appropriate integration of digital technology into teaching practices, whereby the technology acts as a tool to enhance the learning process (OECD, 2017). As play is the basis of pedagogy in ECEC (FNAE, 2022), digital technology is integrated into children's play and play activities. However, creating technology-enhanced learning environments requires the adoption of new teaching practices (Greenhow & al., 2021), and the pedagogical versatility of ECEC teachers is crucial for the flexible adaptation of technology into teaching. Väätäjä and Frangou (2021) argue that the use of digital technology in pedagogy should be designed to integrate it into the overall learning process. Leaders in ECEC have an important role to play in this process by ensuring that staff have ample opportunities to

collaborate and develop pedagogies that meet the needs of both the child and the evolving society.

Farquhar and White (2014) suggest that pedagogy, from a philosophical perspective, is an intersubjective, fundamentally ethical, and creatively shared experience that is context-bound in nature and based on interactive encounters in time and space. Moss and Petrier (2002, 141) divide pedagogy into three domains - social, legal, and practical - that influence its implementation in learning environments, including social influences and conditions, policies, training and in-service training of ECEC teachers, curricula and related supports (Slot, 2018; Hujala et al., 2012). In addition, the day-to-day solutions adopted by ECEC teachers play an important role. In practice, pedagogy is a planned and goal-oriented institutional and professional activity that aims to consciously influence children's development, learning, and well-being by interacting with the goals, content, methods and learning environments of ECEC (Ukkonen-Mikkola & Fonsén, 2018).

Väätäjä and Ruokamo (2021) propose a socio-constructivist model of digital pedagogy based on research literature, where digital pedagogy is defined as the pedagogical use of digital technology. The model consists of three dimensions: pedagogical orientation, pedagogical practices, and digital pedagogical skills. Pedagogical orientation is related to the teacher's perception of effective teaching and learning methods, which can be child- or teacher-centered. This orientation is reflected in digital pedagogical practices, which should prioritize student engagement, problem solving and the collaborative development of higher-level thinking skills. Digital pedagogical skills are a prerequisite for teachers to integrate digital technologies into their teaching, and support from the work environment is crucial in this regard (Väätäjä & Ruokamo, 2021).

To successfully implement digital pedagogy, teachers must possess a thorough understanding of play pedagogy in ECEC and sufficient technological skills. Undheim and Jernes (2020) stress that teachers need to understand how to effectively integrate technology into pedagogical practice. Their study identified three key pedagogical strategies that ECEC teachers use to guide children's use of technology: inviting dialogue, explaining practices, and providing instructions for desired outcomes. Ylikörkkö (2022) highlights the importance of the ECEC teacher's pedagogical skills and choices in creating a space for children's participation in every encounter. However, these encounters are influenced by the surrounding culture and institution, which both limit and enable the continuous development of children's participation. Play is the foundation of ECEC, combining key factors that promote learning, such as enthusiasm, collaboration, and challenge (FNAE, 2022). Disney et al. (2021), highlight the importance of peer learning and self-reflection in digital play. Therefore, ECEC staff must ensure that all children have the necessary conditions for play, and they must also document and observe play (FNAE, 2022).

Despite the growing importance of digital technology in ECEC, the concept of digital pedagogy has not yet been explicitly included in the Finnish national ECE curriculum or the Early Childhood Education Act (540/2018). Instead, the curriculum emphasizes transversal competences, including multi-literacy and information and communication technology (ICT) skills. These skills are instructed to be developed using digital devices in various activities such as play, exploration, movement, artistic experimentation, and content production, both individually and in collaboration (FNAE, 2022). Transversal competences are not just values and attitudes, but also encompass the ability to apply knowledge and skills appropriately in different contexts (FNAE, 2022). In addition, the same document groups the key contents and objectives of pedagogical activities into five learning areas. One of these areas is "Getting to know and work in my environment", which introduces the use and operation of IT equipment, while emphasizing the importance of safe use of equipment.

To foster digital pedagogy, collaboration between ECEC staff and children is crucial. Children should be empowered and encouraged to take responsibility for their own learning, and self-management skills should be strongly supported (Greenhow et al., 2021). Koivula and Mustola (2017) argue that digital technology represents a new, uncharted territory that transcends generations. However, this offers an opportunity to create a coherent pedagogy where generations can come together around technology. It is essential that parents engage in shared digital pedagogical goals and practices, and that access to digital devices is equitable both in ECEC and at home (Greenhow et al., 2021).

Learnings Environments and Pedagogy in ECEC

The Finnish National Agency for Education (2022) defines the learning environment in the Finnish National Curriculum for Early Childhood Education and Care as including spaces, places, communities, practices, tools, and materials that promote children's development, learning, and interaction. Raittila and Siippainen (2017) emphasize the relational and procedural aspects of the learning environment, which are shaped by the physical environment, individual interpretations, and communal definitions. The learning environment supports the implementation of diverse pedagogies. In Finland, ECEC pedagogy is founded on a culture and environments that encourage children's participation and play (Act on ECEC 540/2018; United Nations, 1989), where participation involves children interacting with others and

influencing their social environment (Turja & Vuorisalo, 2017).

The learning environment is an integral part of the operational culture of ECEC. According to the ECEC Curriculum (FNAE, 2022), operational culture refers to the ways of doing things that have been shaped by cultural, historical, and interactive factors. Parrila and Fonsén (2016) describe it as based on the interaction between social values, governance systems, and ECEC actors. Schein's (1989) three levels of culture of action provide further insights into operational culture. The outermost level includes visible behaviors and artifacts such as spaces, equipment, and physical structures. The middle level consists of expressed values, which are articulated in ECEC policy documents and in what different actors say. The deepest and most challenging level consists of the values and basic assumptions of the different actors. These include the conscious and unconscious attitudes of staff and the various discourses of ECEC (see Sevón et al., 2021).

To develop learning environments effectively, Mishra and Koehler's (2006) TPACK Framework provides a useful structure for promoting individual competence and establishing a shared approach to working. In this framework, finding a balance between knowledge, skills, and ways of working is crucial. This means ensuring that technology is managed and used competently alongside pedagogical expertise, to ensure that the technology is used effectively and appropriately for teaching content and objectives, while considering the context (Koehler et al., 2014). Achieving this requires a careful analysis of the existing operating culture, including infrastructure, organizational culture, and pedagogy, to identify how they support new instructional practices and digitality and identify essential changes (Kontturi & Seppänen, 2020).

Alila (2020) underscores the central principle that guides the work of ECEC leaders, which is the primacy of the child's interests. Early childhood education must define its role in guiding and preparing children to become members of the digital society and in developing critical thinking skills towards media and technology (Mertala, 2019a; Koivula & Mertala, 2020). Children's relationships with technology are shaped by their experiences in both formal and informal environments (Koivula & Mustola, 2017), and their knowledge and skills, as well as their perception of technology, are developed as part of everyday experiences and play. Consequently, in ECEC, digital pedagogy is integrated with play-based education (Lindeman et al., 2021) and the technological-pedagogical environment (Mishra & Koehler, 2006; Koehler et al., 2014) to form a digital learning environment. Arnott (2016) stresses that children's relationships with technology are developed through the interactive relationship between children, adults, technological devices, and the cultural context of the ECEC unit. It is apparent that digital pedagogy and play-based learning environments are strongly intertwined in ECEC.

Pedagogical Leadership in ECEC

Leadership in ECEC is currently undergoing significant changes due to national and international changes and increasing expectations of leaders (Heikka et al., 2021; OECD, 2021). Recent reforms, such as the Early Childhood Education Act (540/2018), the Finnish National Curriculum for Early Childhood Education (FNAE, 2022) and the Criteria and Recommendations for Quality Assessment in Early Childhood Education (Finnish Education Evaluation center, 2018), aim to integrate ECEC into the education system, promote systematic pedagogy, and foster a culture of lifelong learning (Eerola-Pennanen et al., 2017; Fonsén et al., 2021).

Pedagogical leadership involves providing quality education in terms of the curriculum, learning environment, and child development, as well as continuous evaluation and increasing family involvement (Abel et al., 2017). However, ECEC leadership can seem contradictory and embody different discourses (Fonsén et al., 2021). Several studies (Fonsén et al., 2021; Soukainen, 2019) highlight that creating a shared understanding between different actors is a key prerequisite for successful leadership. Heikkinen et al. (2021) also underscore that municipal management structures and practices have a significant impact on the implementation of pedagogical leadership. Thus, functional, and well-established leadership structures at the municipal level support leadership, which in turn supports the work, job satisfaction and developmental attitude of leaders (Nurhonen et al., 2021).

In the changing landscape of ECEC, effective leadership and creating a participatory organizational culture are becoming increasingly important. Fonsén and Parrila (2016) argue that the primary objective of pedagogical leadership is to facilitate the growth, learning, and well-being of children through high-quality pedagogy. They stress that quality pedagogy necessitates pedagogical leadership, leadership skills, and a broader discussion of values in Hujala et al. (2020) highlight that the Finnish National Curriculum for ECE (FNAE, 2022) emphasizes the role of leaders in fostering a culture of continuous improvement and renewal within the working community. Additionally, leaders are responsible for supporting the development of the work community into a learning community, where knowledge is developed and shared. According to a study by Hill et al. (2020), teachers are confident in their ability to learn new technologies and have a positive attitude towards the use of technology. They state that if teachers are given the opportunity to learn new

technologies, they may become more confident in using them, which in turn makes them more likely to use technology in their teaching. Overall, developing a participatory organizational culture requires pedagogical leadership, which involves goal-oriented and systematic management, evaluation, and development of an ECEC unit.

Methodology

In this study, we use textual data to answer our research questions. Krippendorf (2019) defines content analysis as a research technique that enables the creation of replicable and reliable inferences about contexts that are described textually. The data for this study was collected from ECEC leaders who participated in the training course for 'Digital Learning Environment Development and Digitalization' (N = 39), This training course was part of a wider 15-credit continuing professional development for ECEC leaders in 2021–2022, which was delivered in modules and each module had its own responsible teacher. The training course represented 2 credits and consisted of two training afternoons and a development task presented in the study. Each respondent (N = 39) represents a different ECEC unit from different parts of Finland. The data were collected from the written descriptions of the digitalization development plans of the ECEC leaders who participated in this voluntary component.

Case Setting

In the training course the ECEC leaders created a digital environment development plan for their unit, which had eight sections: vision, **digital pedagogy**, culture, capacity, team, collaboration, funding, and evaluation. The foundation of the learning task was based on Apple Leadership's (2017) *Elements of Leadership* materials and was modified by adding a section on digital pedagogy. These eight elements were considered to provide a solid foundation for the development task for the participants. From the development plans built around these eight elements, the section on digital pedagogy was selected for further research analysis. The research goal was to understand the participants' perspectives on the development of digital pedagogy through the development tasks, guided by the research questions.

This study examines the digital pedagogy section of the development plans prepared by ECEC leaders. The dataset consists of the digital pedagogy sections of digital environment development plans (N = 39). To prepare their development plans, participants were provided with a digital PowerPoint template that included eight pre-defined sections and guiding questions. For the digital pedagogy section, leaders were requested to provide concrete examples of how digital pedagogy is currently implemented in their own units and how it should be further developed and integrated into the existing culture of the unit. Respondents provided free form descriptions and were also asked to describe the pedagogical activities of the ECEC where digital technology is a natural part of the activities and the growing environment of the child, and how pedagogical cooperation is built between the home, ECEC, and other stakeholders.

Participants

The development plans were found to be diverse in content and scope. In handling the data, ethical issues were carefully considered, with the data being pseudonymized to remove identifying information and distributed to three researchers for analysis (Roth & von Unger, 2018). In relation to the background variables, it is worth noting that all respondents, except for one, were female. Among the development plans, three of them were created by pairs. Table 1 shows the distribution of participating ECEC Leaders' units by region in Finland. The regions of Southwest Finland, North Karelia, Satakunta, Northern Finland and Central Ostrobothnia each had one ECEC unit represented so these are grouped under 'other regions'. To maintain anonymity, we have chosen not to provide specific location data. However, it is noteworthy that the Finnish regions are widely represented. Other background variables, such as unit size or leadership experience, were not considered relevant to examine in the analyzed material. Instead, the focus of the study was on ECEC leaders' descriptions and development plans for their own units.

Respondents were told about the survey and its purpose, and that only a selected part of the development plans would be used, namely the digital pedagogy development areas. They were also told that the selected areas would be used anonymously. Participants had the possibility to refuse the use of the development plan for research purposes. The relevance of the timeliness of the study was highlighted because it provides important new knowledge from the perspective of leaders in the development of digital pedagogies. The data was pseudonymized in such a way that one of the researchers extracted descriptions of digital pedagogy from the development plans, removed all identifying information from description, such as any references to location within description, and replaced the removed information with a combination of letters X, indicating, for example, that the

Table 1 Regional distribution of ECEC leaders' units

Uusimaa	South-Savo	Central Finland	North-Savo	Pirkanmaa	Päijät-Häme	Lapland	South Ostrobothnia	other regions
4	6	9	5	2	2	3	3	5

section had mentioned the name of an ECEC unit or specific location. An anonymized file was then created, from which all identifying information had been removed. The other researchers analyzed only the number coded, anonymized survey data. The data is kept only in the files used by the researchers for two years after the end of the study, behind passwords. To increase reliability, the survey results are written in such a way that the researchers refer, for example, to several, some or most respondents, and quotations are used only very carefully so that the respondent cannot be identified (Roth & von Unger, 2018).

Data Analysis

The analysis was initiated by consolidating the development plans into a single file. From this file, the sections related to digital pedagogy were extracted into a separate document (16 pages). Each leader's responses were then coded with the prefix 'L' and a sequential number to signify their respective situations (e.g., L1, L2, L3…). This formed the fundamental dataset for the analysis, and the initial set of categories, totaling 11, emerged from this dataset. Subsequently, we searched for descriptions in the base material relevant to the research questions and compiled them into a separate table, (18 pages). Only those descriptions that were pertinent to the questions were extracted from the base material. This step led to the emergence of seven additional categories, such as "digital pedagogy as part of children's everyday activities" and "digital learning environments as a means of storing or presenting children's outputs by adults." The descriptions were then further divided into subcategories using typical descriptions. For instance, an excerpt from the text that read, "the development and use of varied learning environments in which children experience, experiment, wonder, explore and observe together, using a variety of means and methods, the things that interest them and their interests" (11) was placed in the category described by the text, "children can use digital equipment freely and in a guided manner, exploring and producing in a variety of ways." Next, we created descriptive texts for the various subcategories, and subcategories with similar content were combined to form higher-level main categories. The classification and naming of categories were discussed among the researchers several times during the analysis. It should be noted that the survey data was in Finnish, and only the quotes presented in the results were translated into English. Table 2 provides an example of the analysis of the main category "Child participation," which includes only a few examples (4/14 and 4/11) from the data.

Results

In table 3, we present the results of the survey. The results reflect the views of ECEC leaders. We identified a total of five subcategories for survey questions in the descriptions provided by ECEC leaders, as presented in Table 3. However, a factor that somewhat emerged in the responses was the resources of newly built ECEC units, meaning that these units were equipped with new technology. Nevertheless, the focus of interest was on descriptions and plans regarding digital pedagogy.

Early Childhood Education and Care Leaders' Views of Digital Pedagogy

Child Participation

Most of the ECEC leaders described digital pedagogy as multi-level and the perception of child participation appeared to be divided. Several ECEC leaders (N = 14) described child-centered pedagogies in the use of digital devices. In these cases, leaders agreed that 'children and educators are encouraged to use a variety of digital tools and methods to enrich their play, movement, exploration, and artistic experiences' (L28). The leaders of these units stressed the importance of engaging children by guiding them to use digital devices in productive and creative ways and that ´digital devices are one part of supporting and facilitating teaching and learning´ (L8). Children are seen as courageous users of digital devices and digital methods are seen as enriching play. The potential of multicultural education was also identified as 'digital devices are also widely used to support the language and other learning of Finnish as a second language - children and as tools for pedagogical documentation' (L29). The importance of giving every child the opportunity to experiment and wonder with digital tools was stressed.

On the other hand, many leaders (N = 11) described digital pedagogy as a technology used by ECEC staff to document and record children's play, outputs, and activities: 'children regularly document their activities by taking pictures and videos. The output is published on the unit's own Facebook website' (L4), and 'children use devices less often' (L14). Many described that pedagogically, children were mainly allowed to use the devices in a guided way, for example to take pictures, with many interpreting that 'it seems that the adult does not want or dare to hand over the device to the child to actively do something' (L14). In terms of child participation, these descriptions suggest that the child is passive in relation to the use of technology and the pedagogy is teacher centered. The child is the recipient of images, stories, and videos. However, the leaders of

Table 2 Example quote

First categorization	Categorization description of text citation	Reduction	First main categories	Main category
Digital pedagogy is part of children's everyday activities	'Children have free access to digital devices in early childhood education and pre-school education. Children are encouraged, according to their age, to learn how to use pads (opening and closing them, etc.), as well as to video, photograph, draw, search for information, write, listen to audio books and music, code, move, play, etc.---' L8 '---Appears as the development and use of varied learning environments in which children experience, experiment, wonder, explore and observe together, using a variety of means and methods, the things that children are interested in and their interests' L11 'Recording different sounds with young children. What their own speech, water taps or rasps sound like. When the child takes the photo himself, he/she can realize and experience that he is a participant and not just that he/she is being photographed. You get to record things that are important to you, instead of an adult guessing what to record.' L27 'Children and educators make bold and varied use of different digital tools and methods to enrich play, movement, exploration, and artistic experience. Digital methods can meet children's diverse needs and provide new tools for educators to support children' L28	Children can use the digital equipment freely and in a guided way, exploring and producing in a variety of ways Child is guided to use digital equipment in a variety of ways through exploration and self-interest Child is guided in the use of digital equipment in a productive and varied way, with an exploratory approach and an emphasis on participation Exploring together and enthusiastic staff children are guided to use digital equipment in a productive way and participation is emphasized in diverse learning environments	Child guided participatory user (n = 14)	Child participation
Digital learning environments as a tool for storing or presenting children's output by adults	´Familiarizing children with the use of computers by writing and drawing their own outputs, which are sent to parents for electronic viewing. We also learn how to search for information safely and learn good working habits from the start. ' L4 'Making videos of outings or special days, e.g., working on a Christmas video for carers: children took pictures of a shadow theatre. Their storytelling and songs were recorded.' L39 'Educators use digital devices for documenting, such as taking pictures and sometimes, rarely, making videos. Children use them less often. Children are allowed to use the device mainly when the task is, for example, to take a picture of something beautiful on an outing. It seems that the adult does not want or dare to hand over the device to the child for functional activities. 'L14 'Through digitalization, e.g., photography, the part of the play that cannot be preserved except in images can be preserved and shared: different constructions, children's performances, moments that children consider significant.' L21	Learning to search for information is an important skill that involves documenting and communicating activities and publishing them Child is guided to use the camera, the educator records children's stories and songs Educator documents children's activities and play. The child is supervised to use the camera Children's meaningful moments and play are saved as memories digitally	The educator as a documenter and recorder of the child's daily activities (n = 11)	

these units described documentation as an important way of preserving and recording children's play, wishes, and opinions by recording meaningful events during the day. 'Digitalization allows play to be recorded and shared, for example, performances and constructions that children find meaningful' (L21). Digital pedagogy is a versatile and well-justified teacher-led approach, as ECEC teachers apply it in the most creative and child-centered way. 'During PE lessons, children have played PE videos, and been in a "virtual world". Using tablets, children play educational games, listen to music and stories. Phones are used for quick information retrieval, for example outdoors, and for taking photos' (L19).

In line with Väätäjä and Ruokamo's (2021) socio-constructivist model of digital pedagogy, ECEC leaders acknowledged the importance of adopting a pedagogical orientation towards technology use and adapting pedagogical practices accordingly, whether in a child-led or teacher-led manner. The importance of ensuring the necessary conditions for play as well as documenting it digitally (Undheim & Jernes, 2020) were identified as digital pedagogy practices. Some ECEC leaders highlighted digital pedagogy practices that emphasize children's participation, agency, and thinking skills (Väätäjä & Ruokamo, 2021). However, descriptions generally emphasized play-based learning and activity defined through the ECEC teacher's expertise (Undheim & Jernes, 2020).

Digital Communication and Collaboration

Half of the ECEC leaders described digital pedagogy as an environment that enables communication and collaboration between those involved in a child's education such as '[a] community that encourages play, interaction and

Table 3 Summaries of the results

ECEC Leaders' Views of Digital pedagogy	ECEC Leaders views of the development of a digital pedagogy
Child participation Some emphasize that it enriches children's **play** and creativity and emphasize guiding children to use digital tools in a productive way, while others see it mainly as a tool to document and record children's activities and **play** leading to a more teacher-centered approach and passive participation of children.	***Systematic approach to development*** Emphasizing the importance of modern learning environments that integrate digital pedagogy as an objective, but currently, its use to support **play** and learning is sporadic, and leaders recognize the need for long-term planning and investment in versatile and durable equipment to support children's development.
Digital communication and collaboration An environment that promotes communication, **play** and collaboration between staff, families, and children, with digital devices serving as an important communication platform.	***Development as learning together*** Recognizing the varying digital skills of staff is a challenge for the development of digital pedagogy, but at the same time, it offers an opportunity to learn together. Staff's digital pedagogical skills are best developed through collaboration and **play** with children. Technology can be utilized to add value to **play**. Emphasizing long-term planning is important to integrate digital pedagogy into the objectives and learning environments of ECEC.
	Development as joint participation There is a need to create a shared vision for the ECEC curriculum based on a **play-based** approach, implement device plans and foster staff enthusiasm and digital skills through mentoring and training, with a gradual move towards a coherent learning culture in digital pedagogy. The design process should be based on children's **play** ideas. Engaging parents through training on digital tools and fostering collaboration between ECEC staff and stakeholders are seen as essential to achieving community-based education.

inclusion— '(L13). Digital platforms and tools allow children's play to be shared with their homes by videoing children's play or recording the output of children's play. It was also defined as an administrative tool for ECEC staff, a pedagogical documentation tool and an interface between staff and families. Communication between ECEC and the home via digital devices was seen as a very important part of the interpretation of digital pedagogy. The communication platform between the home and the ECEC unit was interpreted as part of the unit's digital pedagogy. 'We produce almost all information [name of the digital platform] that is sustainable and allows interaction with homes. At the same time, [name of the digital platform] serves as a communication tool between the kindergarten and the home for daily group activities. It is also used to record childcare times and to fill in holiday questionnaires' (L32). It was defined as a digital communication platform that serves as an enabler for sharing pedagogical documentation and as a channel for interaction. This had been reinforced by recent exceptional circumstances, as one respondent described: 'Thanks to Corona, remote conversations in ECEC have increased and will in the future at least partly replace traditional conversations' (L24). Several described that the COVID 19 pandemic had led to remote contact with families, and new practices were to be maintained. Pedagogical documentation has been diversified using technology. By emphasizing the role of digital platforms and the communication methods they enable, ECEC leaders emphasized the potential to create space for children's participation and play in various ways, with the unit's organizational culture playing a crucial role (Ylikörkkö, 2022). Additionally, ECEC leaders underscored the significance of involving families and caregivers in digital goals (Greenhow et al., 2021).

ECEC Leaders Views of the Development of a Digital Pedagogy

Systematic Approach to Development

According to the ECEC leaders, modern learning environments were a prerequisite for the development of digital pedagogy. They should be developed in such a way as to achieve the objectives of play-based ECEC. Digital pedagogy should be seen as one of the objectives of ECEC and should therefore form the basis for the development of learning environments. Currently, digital pedagogy is implemented through iPads without being integrated into ECEC objectives and learning environments, as described by one respondent: 'The digital learning environment is still taking shape because our environments are old, and the technology is not built to support digitalization' (L25). As a result, its use to support play and learning appeared to be sporadic.

Most leaders highlighted the digital pedagogical skills of ECEC staff as an important resource. Many respondents also considered staff technology and security skills to be important. They, therefore, stressed the importance of training staff and strengthening their digital pedagogical skills. Maintaining and developing digital pedagogy was seen as an ongoing process. It unanimously requires adequate training provision and resources. Leaders saw their own role as important in this regard, and professional development as facilitated by encouraging staff to try new approaches and to share their skills and knowledge. Several respondents also described technological solutions as defining digital pedagogy. Resources are proving to be an influential factor in the versatile use of technology. The platforms used

for some services are outdated and no longer serve today's needs. At their best, they were rich in modern equipment and a wide range of applications; at their worst, they had single computers and problems even with internet access. In those units where there were enough tablets, children were also involved in production and the use of devices was a natural part of everyday life. 'The iPad, on the other hand, is a pedagogical tool, where different applications are used as the situation requires' (L1).

Most stressed that incorporating digital pedagogy into ECEC objectives requires long-term planning. Before purchasing equipment, it should be clear how it will support children's development, play and learning. They should also consider the diversity and wide usability of learning environments. As one leader described it, 'Again, this needs to be planned for the longer term to acquire versatile and durable equipment for ECEC staff and pre-school use' (L34). In these cases, leaders were aware that the limited stock of equipment made it difficult to develop a digital learning environment. The development of digital pedagogy and its decoupling from other learning environments was noted. However, leaders were not able to define digital pedagogy in a way that would fit naturally into learning environments and ECEC pedagogy.

Early childhood leaders emphasized the important role of the leader in ensuring a unit's supportive organizational culture for the use of technology and sufficient resources (Nurhonen et al., 2021). The descriptions convey the emphasis that ultimately, the leader is responsible for ensuring that the unit implements play-based, child-centered teaching based on the ECEC curriculum (Fonsén & Parrila, 2016). Leaders in the field acknowledged the importance of developing the technological-pedagogical skills of their staff (Mishra & Koehler, 2006) and the leader's role in providing adequate training opportunities (Ailila, 2020; Hill et al., 2020).

Development as Learning Together

It is noteworthy that several ECEC leaders saw the digital divide between generations of ECEC staff as both a challenge and an opportunity for the development of digital pedagogy. In many units, a large part of the staff belongs to an age group that is not familiar with the digital environment, especially its diversity. Digital pedagogy was therefore associated with specific individuals and 'some groups do not benefit in any way, so children are in unequal positions!'' (L33), supporting the finding in the previous chapter that digital pedagogy is disconnected from other learning environments. There was also still considerable variation in the digital skills of ECEC staff. To the extent that some leaders reported that 'some staff found learning to use digital devices challenging or even undesirable '(L29) and, therefore, had low levels of uptake. This was seen as slowing down the development of digital pedagogy, but on the other hand it provided an opportunity for learning together. However, many leaders saw teams with strong digital pedagogy pioneers as inspirational. As one respondent described, they 'inspire team members to implement diverse and child-engaging digital pedagogies while developing their own skills' (L29). Many saw learning as a reciprocal and complex process of making and discovering together, where both ECEC staff and children can safely test their own limits and develop their skills. Collaborative activities were seen as a resource: 'Technology can be used to add value to play, exploration, movement, and artistic experiences and expression. --- The joy of shared learning supports community and team building' (L10).

Digital pedagogy should be seen as an integral part of the promotion of other ECEC objectives such as social skills, learning, play, and participation. 'In our unit's teaching, the digital learning environment is experienced through play and interaction' (L25). Describing their role, ECEC leaders emphasize the importance of encouraging the work community to develop a shared culture and foster innovation. In well-equipped units, iPads were seen as pedagogical tool. Indeed, many suggested that staff's digital pedagogical skills are best developed by working together and playing with children, as one leader summarized, "play and interaction is the way we work" (L20). But at the same time, the leader saw the need for development and the need for interaction also in the use of digital devices, as "we still have to learn digital pedagogy; children are sometimes smarter than us in the use of devices" (L20).

Identifying staff competences as a generational issue was also seen as key to development (Koivula & Mustola, 2017). Digital pedagogy should be included in the ECEC learning environment approach precisely so that it can create a learning environment where children and adults together develop digital pedagogy. The descriptions provided by ECEC leaders highlighted the use of technology in children's play (Lindeman et al., 2021) and the creation of a learning environment using technology based on shared play between staff and children and children's informal knowledge (Koivula & Mustola, 2017). When it comes to the development of digital learning environments, ECEC leaders highlight its importance in promoting children's learning in various settings (FNAE, 2022) and utilizing digital technology to enhance versatile and comprehensive competence (FNAE, 2022). The development task is also seen as an opportunity to create a new learning space for children and ECEC teachers, where technology can be safely taught and utilized through play (Koivula & Mustola, 2017; Hujala et al., 2020).

Development as Joint Participation

Some leaders noted that ECEC has lagged in the technological development of primary education and that the whole of ECEC needs to 'jump on board'. Rather than being viewed as a pioneer of digital change, ECEC was considered more of a successor to primary school. Some respondents described the absence of digital pedagogy in the daily activities of the unit and described the digital learning environment as currently seeming rather narrow. They described the lack of a shared vision or the fact that the shared vision is still being developed as a limiting factor. However, as a prerequisite for development, the leaders of these units identified the creation of a shared vision, a plan for equipment purchases and the strengthening of staff enthusiasm and digital skills through, for example, mentoring and regular digital induction. They stressed the importance of moving 'step by step' (L7) towards a common learning culture change in relation to digital pedagogy. 'Children's interests and play ideas form the basis of activity planning. The intentional and systematic daily routines of ECEC are made visible to families, community members, decision-makers, etc.' (L3).

Many also highlighted that digital environments were a good way to support parental involvement: 'When children and adults learn more, they have more opportunities to have a voice and make more choices' (L15). They highlighted the need to involve parents by training them to use digital tools. Cooperation between ECEC staff and different stakeholders was seen as important, and the goal of inclusion was extended to parents. These leaders recognize that creating a common understanding of goals is important in leadership (Soukainen, 2019). In this joint development ECEC leaders should follow the interests of the whole unit, and consider the policies of all staff, homes but also partners and the municipality. In the development of digital learning environments, ECEC leaders highlighted the importance of having a shared strategy and vision (Heikkinen et al., 2021) that also considers children's play ideas and interests. Technological change and its management pose a challenge for ECEC leaders (Heikka et al., 2021), but they recognize the importance of developing a unit's organizational culture that allows everyone to have an impact and is safe, and supports the well-being of both staff, children, and families (Fonsén & Parrila, 2016) also in the development of digital learning environments.

Discussion

This study examined the views of ECEC leaders on digital pedagogy and its development. In terms of technological development, ECEC has lagged behind primary education. However, there is a pressing need for ECEC to catch up and embrace digital change. The findings suggest that ECEC units view digital pedagogy as a natural part of children's learning environment through play but recognize the need for staff and resources that are knowledgeable in digital pedagogy and technology. Additionally, digital pedagogy is viewed as having the potential to enhance collaboration between home and ECEC, but more effort is needed to create effective digital pedagogy learning environments.

The first research question focused on how ECEC leaders described digital pedagogy. The results revealed that digital pedagogy was perceived as children's authentic participation and freedom to use technology in play, as well as an activity in which only ECEC teachers use technology in learning environments (Väätäjä & Ruokamo, 2021). While child participation varied across ECEC units, the importance of play and learning activities was emphasized. The results show that the concept of digital pedagogy is interpreted broadly and digital communication platforms between parents and staff were also interpreted as part of digital pedagogy.

In our second research question, we examined the considerations of ECEC leaders regarding the importance of developing digital pedagogy. First, we identified the need for a systematic approach to digital pedagogy development. The responses indicated a disconnect between digital pedagogy and other ECEC goals and learning environments. Connecting digital pedagogy with ECEC requires a profound transformation in the values and fundamental assumptions of the entire organizational culture (Schein, 1989). Otherwise, the use of digital pedagogy will remain superficial and disconnected from other objectives such as inclusion and play. Second, ECEC development underscored the significance of digital pedagogy in collaborative learning. The intergenerational gap in digital literacy was seen as both a challenge and an opportunity, consistent with previous studies (Koivula & Mustola, 2017). The study emphasizes the role of ECEC teachers in promoting digital pedagogy (Undheim & Jernes, 2020), along with the importance of adequate technological resources and staff competencies. Third, the analysis revealed that development occurs through joint participation. The findings indicate that the development of digital pedagogy should be viewed broadly as part of the social service function of ECEC, supporting parental involvement and societal equality (FNAE, 2022).

The study reveals that the implementation of digital pedagogy in ECEC is uneven due to inadequate technical resources. This presents a challenge for the comprehensive development of competencies (FNAE, 2022) in ECEC. The vision for ECEC (Jokinen & Nieminen, 2019) suggests that virtual education could coexist with traditional ECEC, offering children the opportunity to participate in ECEC through digital means. The study found a significant gap between the

digital pedagogical views of ECEC leaders and educational policy's vision of the future of ECEC (Jokinen & Nieminen, 2019). However, the study highlights the potential for participatory digital pedagogy learning environments and acknowledges children's role as participatory and playful technology users. Results show that digital pedagogy is a broad concept that encompasses not only the use of technology in teaching, but also digital communication between parents and staff. Digital pedagogy is seen as a resource for knowledge and skills for ECEC staff, but adequate technological equipment is also essential. Prioritizing the development of staff competencies, ECEC leaders place emphasis on this area.

We conclude that the development of digital pedagogy should consider the following aspects. First, it is crucial to make visible the underlying values and attitudes that shape the operating culture of the entire ECEC unit (Parrila & Fonsen, 2016), as they influence both the overall orientation of the unit and the individual pedagogy of each staff member in various learning environments. Second, the role of leaders in creating a shared culture and a culture of action is emphasized, as development is an ongoing task for the entire community (Ylikörkkö, 2022). Leaders must provide opportunities for professional growth and discussion among staff to promote a shared vision of digital pedagogy. Third, developing digital pedagogy as part of the pedagogical orientation of ECEC teachers (Väätäjä & Ruokamo, 2021) requires a culture in which digital learning environments are identified, concepts are clearly understood, and adequate knowledge, skills, and material resources are available (Undhem & Jernes, 2020). Continuing learning in ECEC is also important for successful implementation of digital pedagogy.

It is important to highlight that the integration of digital pedagogy in ECEC is rooted in prioritizing children's well-being based on ethical standards (Gilutz, 2020). Children do not necessarily need new technologies to learn and explore the world. Instead, they learn through play and interaction with their peers. Moreover, ECEC leaders should have a comprehensive understanding of how young children engage with technology in the digital age, considering both teaching and learning perspectives (Levin & Lundie, 2016; Ylikörkkö, 2022). To effectively implement digital pedagogy in their institutions, ECEC leaders must closely connect digitalization with children's everyday lives. This approach aligns with the child-centered, child-inclusive, child-activating, and play-based principles established by the Act on Early Childhood Education and Care (540/2018). The Finnish ECEC Curriculum is built on values that emphasize the importance of play in all activities. Consequently, the design of digital pedagogy should also be guided by play-based pedagogy. In our study, we specifically focus on the role of play in the context of digital pedagogy. We propose that ECEC leaders would benefit from framing digital pedagogy as inherently play-based, naming it PBDP (Play-Based Digital Pedagogy) to guide their development efforts.

Based on our research, we propose the concept of Play-Based Digital Pedagogy (PBDP) and its further exploration as a framework for developing digital learning environments in ECEC. We argue that play serves as the foundation for introducing digital culture in ECEC, making PBDP a novel approach to leadership in digital pedagogy. Our findings suggest that shared leadership, grounded in common cultural principles, is crucial for the advancement of digital pedagogy. By integrating digital pedagogy as a natural part of ECEC through everyday activities, it becomes a shared objective. We recommend further exploration of the PBDP perspective as an important area for future research. Ideally, digital pedagogy would seamlessly blend into children's daily lives in ECEC, offering opportunities to shape their worldview and foster their participation in digital culture.

There are limitations to this study. First, the survey data is rather limited. The aim of qualitative research is to describe and understand the research phenomenon in depth, and therefore the size or quantity of the data is not a direct measure of reliability (Patton, 2002). On the other hand, the leaders participating in the study were from different parts of the country, which ensured that the study population was very heterogeneous and provided a broad range of views. Second, we do not highlight contextual factors in the survey, such as the size of the unit, whether it is a newly built and equipped unit or an old unit with resource constraints. This was limited by the requirement for anonymity. Therefore, the factors underlying the responses have not been broken down, although they may contribute to the responses. However, the purpose of the study is fulfilled through this analysis. Credibility is strengthened by the researcher triangulation, in which the three researchers first independently went through the analysis of the data and then the analysis was discussed and refined (Korstjens & Moser, 2018). As two of the authors also acted as course implementers, the data were fully anonymized. The training component was short in duration and was conducted remotely, thus the trainers did not get to know the trainees and did not have any previous knowledge of them. During the research, we have sought to engage in critical self-reflection, which involves explaining our own preconceptions and attitudes.

Conclusions

The commitment of ECEC leaders to pedagogical leadership within their units is evident from their views. They are aware that the implementation of digital pedagogy is dependent on the competence of the staff, and that ECEC teachers need training and support to develop their digital pedagogy. They recognize that resources and up-to-date technology are important factors in this process. Highlighting the importance of the leader's role, ECEC leaders emphasize the creation of a shared digital culture that enables the implementation of the play-based and child-centered approach of the ECEC curriculum, along with the significance of collaborating with families. Many platforms have already become a natural part of ECEC communication and connection with families. However, the process is still in its early stages in many units, and the implementation of digital pedagogy in ECEC units in Finland is not consistent. This is influenced by the economic policies made at the municipal level, the uneven competence of staff, and the lack of adequate technology. However, in the development plans of ECEC leaders, the emphasis is on community and a bold perspective on how technology can be a natural and playful tool that serves children's development in various ways and is integrated into the educational and caregiving tasks of ECEC. Shared play and children's ways of expressing themselves through play can also guide the direction of digital pedagogy. ECEC leaders' broad, future-oriented vision and collaborative strategies are important in developing digital pedagogy.

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