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ECEC educators' Attitudes and Perceptions Toward and Supportive Role in children's Digital Gameplay: The Emotion Detectives Game as an example

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ABSTRACT

Today, digital games are considered important tools for learning, but using them in early childhood education and care (ECEC) has raised the question of educators' roles when children play an educational digital game. The aim of this study was to explore how ECEC educators differed in their attitudes and perceptions toward and ways of supporting children's digital gameplay and how these differences were associated with children's gameplay. The data were collected by interviewing seven ECEC educators in four ECEC groups in which 30 children aged 5–6 years played an educational Emotion Detectives game. The log data were also analyzed. *Research Findings:* Based on the differences in support discovered, the educators were found to represent two groups: *a non-supportive group* (NSG) and *a supportive group* (SG). Compared to the NSG, the children in the SG played more and were more successful in their gameplay. *Practice or Policy:* The findings of this study emphasize the importance of organizing regular gameplay sessions when children's development is supported using educational games and of monitoring that all children have opportunities to get enough practice by playing. In addition, educators need to familiarize themselves with the game to be able to discuss it with children, motivate them to play, and help on demand.

Introduction

Digital technologies are currently an essential part of many early childhood education and care (ECEC) curricula in several countries (Marklund, 2020; Slutsky et al., 2019). Therefore, educators are expected to utilize digital technologies as part of ECEC's daily practices with pedagogical goals in mind (Kjällander & Riddersporre, 2019; Magen-Nagar & Firstater, 2019; Marklund, 2020). Still, there has been a growing and polarized discussion regarding the use of digital technologies in ECEC (e.g., Dong, 2018). While some educators recognize that digital technologies provide opportunities for learning and playing (Enochsson & Ribaues, 2021; Genlott & Grönlund, 2016; Lindeman et al., 2021; Magen-Nagar & Firstater, 2019; Marklund, 2020; Morgan et al., 2016; Nilsen et al., 2018), others remain unconvinced of their pedagogical usefulness (Hatzigianni & Kalaizidis, 2018). Moreover, some ECEC educators even question the value of digital technologies and view them as incompatible with values and practices that support children's social and physical development in ECEC (Billington, 2016; Magen-Nagar & Firstater, 2019; Marsh et al., 2016; Slutsky et al., 2019).

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Despite reluctance among some ECEC educators, digital technologies have already been used among young children for more than 20 years to different degrees (Dezuanni et al., 2015). Still, previous studies suggest that ECEC educators have limited experience in using digital technologies in their practices (Dong, 2018; Mertala, 2017) and lack knowledge about how to integrate them into ECEC pedagogy (Aubrey & Dahl, 2014; Dong, 2018; Jack & Higgins, 2019; Vidal-Hall et al., 2020). Common ways of utilizing digital technologies in ECEC include the use of digital games, but we still lack a scientific understanding of how they are used in ECEC, as previous studies have mostly focused on school-aged children, young adults, or adults (Bado, 2019; Kangas et al., 2017). Moreover, when studies focus on using digital technologies in ECEC, digital games are mentioned only briefly (e.g., Mantilla & Edwards, 2019), and the impact of educators in enabling and supporting children's learning via gameplay has received limited attention (e.g., Kangas et al., 2017).

Furthermore, the increasing acceptance of digital games as an important tool for learning has raised the question of how digital games are used in ECEC and what an educator's role is in children's gameplay (e.g., Bado, 2019; Hanghøj & Brund, 2011; Saleme et al., 2020). This study shares this same interest but expands it to include educators' attitudes, perceptions, and impacts on children's gameplay concerning one educational digital game, the Emotion Detectives (ED) game, which was constructed to support children's social-emotional skills. In this study, educators' support is explored throughout the gameplay process, from orienting to gameplay to discussing it afterward. Moreover, associations between educators' support and children's gameplay activities are examined.

ECEC educators' Diverse Attitudes and Perceptions Toward the Use of Digital Games in ECEC

Studies have focused on ECEC educators' attitudes, perceptions, and beliefs toward the use of digital technologies in ECEC, indicating that they vary (e.g., Dong, 2018; Marklund, 2020; Mertala, 2019a; Vidal-Hall et al., 2020). In this article, we explore educators' attitudes toward the use of digital games in ECEC and their perceptions of their roles in supporting children's gameplay in ECEC. We define the concept of attitude with the help of Pickens (2005, pp. 44–45) tri-component model, which includes a person's feelings, beliefs, and ways of actions. For example, the way a person feels about an issue and what their beliefs are toward that issue make an individual behave in a certain way. In addition, we use the concept of perception to describe how a person understands and interprets different issues based on their previous experiences (see Pickens, 2005, p. 52); in the context of this study, issues refer to the use of digital technologies in ECEC. Although little is known about the use of digital games in ECEC, previous studies have shown that ECEC educators' attitudes and perceptions influence how digital technologies are used in ECEC (Blackwell et al., 2014; Bourbour & Masoumi, 2017; Edwards, 2016; Jack & Higgins, 2019; Kaimara et al., 2022; Kerckaert et al., 2015; Nuttall et al., 2015; Vidal-Hall et al., 2020).

In various educational contexts, most educators have positive attitudes toward digital educational games (Aubrey & Dahl, 2014; Fokides et al., 2018; Jack & Higgins, 2019; Kaimara et al., 2020; Kinnunen et al., ; Mertala, 2017), but there also exist quite opposite attitudes among ECEC educators. Assumptions about the nature of play-based pedagogy and the dominating ideology of traditional, non-digitalized play and learning have created tensions and confusion among ECEC educators (Palaiologou, 2016; Slutsky et al., 2019). In addition, a common belief is that children play digital games excessively at home (Magen-Nagar & Firstater, 2019; Mertala, 2019a; Nuttall et al., 2015; Slutsky et al., 2019; Vidal-Hall et al., 2020). For instance, according to the Zero to Eight research report (Rideout, 2017), American children younger than eight years spent, on average, 25 minutes a day playing digital games, totaling 2.5 hours of daily screen time. Therefore, some ECEC educators have a negative attitude toward children's sometimes very high engagement with digital technologies, especially non-educational digital games. Furthermore, some educators are concerned about the consequences of using digital games, such as games having negative influences on children's physical activity and verbal and social development (Dong, 2018; Dubicka et al., 2019; Hinkley et al., 2014;

Ralph, 2018; Slutsky et al., 2019; Vidal-Hall et al., 2020). Therefore, they believe that ECEC should be a technology-free space (Mertala, 2019b) and that ECEC educators should do their best to ensure that traditional play and social interactions are still included in young children's lives (Magen-Nagar & Firstater, 2019; Mertala, 2019b). Educators who have negative attitudes toward digital technology and who do not consider it a valuable tool in supporting children's learning may purposely avoid using digital technologies and prefer traditional hands-on, non-digital activities (Aldhafeeri et al., 2016; Hernwall, 2016; Palaiologou, 2016; Slutsky et al., 2019; Vidal-Hall et al., 2020).

In recent years, however, general attitudes toward digital games have started to become more positive (e.g., Kaimara et al., 2022; Kinnunen, 2022). According to previous research, attitudes toward digital educational games and perceptions of their usefulness in serving educational goals influence educators' behavioral intentions to use them (Kaimara et al., 2022; Sánchez-Mena et al., 2019; Vidal-Hall et al., 2020). Educators who have a positive attitude toward digital educational games emphasize the games' motivating and engaging role in children's learning. They also consider it important that children develop skills, such as collaboration, problem solving, and thinking, for future learning in a digital society (Beavis et al., 2014; Fokides et al., 2018; Kaimara et al., 2020). Those with positive attitudes toward the use of digital games also highlight the flexibility and adaptation of digital learning environments, which makes digital games suitable for different learners with individual skill levels (Beavis et al., 2014; Garneli et al., 2017).

Educators' Support Provided to children's Digital Gameplay

As digital games have mostly been considered to belong to children's free-time activities, ECEC educators have not been conscious of their own role in supporting children's gameplay (Thorpe et al., 2015; Vidal-Hall et al., 2020). Moreover, according to many studies, educators' attitudes, knowledge, and confidence in using digital technology influence their pedagogical practices, perceptions of their own roles, and the support provided for children's gameplay (Enochsson & Ribaues, 2021; Fenty & Anderson, 2014; Nikolopoulou & Gialamas, 2015; Slutsky et al., 2019; Vidal-Hall et al., 2020). In this study, the concept of support refers to educators' pedagogical practices of digital technology use, including their presence in gameplay sessions.

Due to polarized views, ECEC educators do not always support children's use of digital technologies as part of ECEC curricula (e.g., Magen-Nagar & Firstater, 2019; Slutsky et al., 2019). Furthermore, even though educators would, overall, have a positive attitude toward digital technology, their perceptions of their own roles may vary, and they may only have a few strategies to support children's use of digital technology (Dong, 2018; Vangsnes & Økland, 2015). Although high-quality games offer a well-designed learning environment, educators have a significant role in planning, organizing, and assessing learning in digital environments (Hernwall, 2016; Koskinen et al., 2014; Prestridge, 2017). For example, educators with positive attitudes can see digital technology as a pedagogical tool and can be more present during children's gameplay and support their gameplay in that way (Vidal-Hall et al., 2020). Thus, it is important to further explore ECEC educators' attitudes and associations of these attitudes with the educators' perceptions of their own roles, pedagogical practices, and the support they provide for children's digital gameplay.

Educators' support for children's gameplay can be described as a process that begins with planning and orientation to gameplay and extends to discussions after gameplay sessions (Bado, 2019; Hanghøj & Brund, 2011; Kangas et al., 2017). Consequently, Bado (2019) categorized educators' pedagogical activities into pre-game, game, and post-game stages. In addition, Hanghøj and Brund (2011) described an educator's roles to include those of instructor, playmaker, guide, and evaluator.

Before gameplay, at the pre-game stage, educators' role as an instructor begins with planning and organizing gameplay sessions and considering how the game is linked to other activities in early education (Bado, 2019; Hanghøj & Brund, 2011; Kangas et al., 2017). Furthermore, an educator's role is to orientate and familiarize children with the game content and to motivate children to play the educational game (Kangas et al., 2017).

During gameplay sessions, at the game stage, educators' presence and what they do when children are playing are key to the meaningful use of digital games with children and are essential to children's learning (Morgan et al., 2016). Hence, at the game stage, an educator has an active role as a playmaker and guide in tutoring, supporting, and scaffolding children's gameplay, such as by asking and answering questions, discussing the game, and guiding children's learning (Arnab et al., 2013; Barab et al., 2010; Chee & Tan, 2012; Hanghøj & Brund, 2011; Kangas et al., 2017; Plowman & McPake, 2013). Vidal-Hall et al. (2020) stated that educators need to be present for at least some of the playtime, and when present, educators can observe, help, encourage, praise, and support children when they encounter difficulties and in situations in which frustration easily arises (Plowman & McPake, 2013). In addition, during gameplay, educators play an active role as timekeepers, giving instructions, providing technical support, and ensuring that children are on task (Bado, 2019).

Finally, after gameplay sessions, at the post-game stage, an educator plays a significant role as an evaluator by discussing the game content with the children and thus connecting the learning experiences with the curriculum and learning goals (Hanghøj & Brund, 2011; Kangas et al., 2017). Previous studies have highlighted the importance of conversations related to gameplay and educators' active role in organizing possibilities for reflecting on the gaming process and learned content (Bado, 2019; Kangas et al., 2017; Mertala, 2019b; Sandvik et al., 2012).

According to research published thus far (Kangas et al., 2017), only half of educators have adopted a pedagogically active role in children's gameplay processes. Moreover, they may actively use pedagogical strategies to support children's digital gameplay, such as providing resources, modeling, and setting up gameplay environments (Dong, 2018). Bado (2019) revealed that educators' practices mostly focused on pre-game and during game stages, such as orientating to game contents, being a timekeeper, or providing technical support during gameplay, whereas discussions after gameplay were minimal. Still, only few studies have focused on an educator's ways of supporting children's gameplay process when children play an educational digital game (e.g., Bado, 2019; Kangas et al., 2017); therefore, more research is needed to increase knowledge about educators' roles and instructional practices before, during, and after gameplay. Of special interest is to examine how different kinds of support are linked to different kinds of game play outcomes.

In addition to adult's support, studies (Israel-Fishelson & Hershkovitz, 2020; Ronimus et al., 2014) state that game-related factors, such as children's progress in the game and the presence of rewarding elements can increase their motivation to play. Although playtime as such has not been a crucial factor in estimating the impacts of serious games (Clark et al., 2016; McTigue et al., 2020), young children require adult's support to achieve their targeted gameplay dose each week, which is crucial for improving their skills (Clark et al., 2016; McTigue et al., 2020). In line with this, in the study conducted by (Löytömäki et al., 2024) on the same serious game used in the current study, children who played for an average of 7.5 hours during the eight-week intervention period, with slightly over half of that time spent with a parent, demonstrated significant improvement in their emotion discrimination and social-emotional skills.

Research Questions

Digital technologies are an essential part of ECEC curricula in many countries (Marklund, 2020; Slutsky et al., 2019). ECEC educators are aware of the curriculum guidelines, but some ECEC educators have negative attitudes toward the use of digital technologies, especially digital games, in ECEC (Magen-Nagar & Firstater, 2019; Slutsky et al., 2019). In addition, educators' attitudes influence the pedagogical use of digital games in ECEC (Magen-Nagar & Firstater, 2019; Sánchez-Mena et al., 2019; Vidal-Hall et al., 2020). Moreover, many ECEC educators are not necessarily conscious of their own roles in children's gameplay and lack pedagogical practices to support children's use of digital games in ECEC (e.g., Bado, 2019; Dong, 2018; Kangas et al., 2017; Marklund, 2020). More research is needed to determine how educators' support affects children's use of and benefits of playing digital games. Therefore, the aim of this study was to explore how educators differ in their attitudes and perceptions of their own roles in children's gameplay and in their ways of supporting children's gameplay.

Two main research questions were formulated:

- (1) How do ECEC educators differ in their attitudes toward and perceptions of their own roles in children's digital gameplay and in the way they concretely support gameplay in the context of the ED game?
- (2) Are possible differences in ECEC educators' attitudes, perceptions of their own roles, and concrete support for children's digital gameplay related to children's use of and success in playing the ED game?

Methods

Data for this study were collected as part of an intervention utilizing a Finnish digital online game called "Emotion Detectives" (ED game; Huttunen et al., 2015). The data of the present study consist of semi-structured interviews with ECEC educators and log files of the ED game.

Participants

The participants of this study included seven ECEC educators ($n = 7$) and 30 children (see Table 1) aged 5–6 years ($N = 30$, 16 females) from four early education groups at three day care centers in Finland. The leaders of the day care centers were randomly approached—two day care centers using the earlier contacts of the researchers and one without any previous co-operation. The leaders asked their personnel if they were interested in participating in this study, and then sent to researchers contact information of the employees who were interested. All participating educators were willing to try out a game designed to support children's social and emotional skills.

The training of the educators varied from childcare providers ($n = 3$) to ECEC teachers ($n = 3$), with one being an ECEC special education teacher. The children, their parents, and the teachers of the child groups were first informed about the study and the game and their rights to withdraw from the study at any time (Gallagher, 2009; Graham et al., 2015). Written informed consent was obtained from the parents and teachers, and an oral assent was obtained from the children. Parents/caregivers were asked to complete a questionnaire on background data concerning e.g., their educational level. Educators were asked to provide background information about the child group (e.g., the number of children needing special support in the early education groups in question). ECEC practitioners and parents were asked to be sensitive to their children's willingness to play the game to ensure their voluntary participation (Gallagher, 2009; Graham et al., 2015).

The Emotion Detectives Game and Organizing the Gameplay Sessions in ECEC

The Emotion Detectives Game

The aim of using the ED game was to support the social-emotional development of children aged 5–12 years. In this article, we only briefly describe the content and functions of the game, as its structure has already been explained in a more detailed manner in previous publications (Löytömäki et al., 2024).

Table 1. Demographic information of the children and their parents.

	Mean	Mdn	SD	Range
Children's age	6.00	5.92	0.54	5.00–6.92
Mother's educational level ^a	2.19	2.00	0.81	1–3
Father's educational level ^a	1.52	2.00	1.03	0–3

Parent's educational level was available only for 21 mothers and fathers.

^aParent's education was coded by using a four-point scale (0 = Basic education, 1 = Vocational education, 2 = Lower education degree, 3 = Higher education degree).

The storyline of the ED game describes the joint activities of the player and the virtual character. The role of the virtual character is to encourage children to play by providing supportive feedback and guiding the child's thinking by asking questions. The aim of a player is to collect fame points by practicing their emotion recognition skills when accomplishing so-called "office tasks" and by solving different social situations in so-called "field tasks" (Huttunen et al., 2018; Koivula et al., 2017; Lipponen et al., 2018; Löytömäki et al., 2024)

In office tasks, a player practices their emotional skills by discriminating emotions from facial expressions and tones of voices and in some tasks also by matching them with each other. The tasks include e.g. memory games, puzzles, and exercises in which a player needs to discriminate the same emotions from different people's faces. To successfully complete an office task, the player needs to discriminate one basic emotion (such as happiness or sadness) at a time. In the field tasks, the player is required to solve problems in social situations such as loneliness, bullying or fear, that have evoked emotions in the game characters. All the field tasks follow the same basic structure of three levels, where players must 1) discriminate the emotion in question, 2) identify the reason for that emotion and, 3) to resolve the situation in a socially constructive manner (Huttunen et al., 2018; Koivula et al., 2017; Löytömäki et al., 2024). Compared to the office tasks, the field tasks are more demanding, as a player needs to discriminate the relevant emotion in a specific social context, interpret the reasons for the other's emotions, and solve social situations constructively.

The game has a detailed scoring system through which a player earns points after completing each task. The accumulation of points differs between office and field tasks, and a player is credited with points from each task only once. When having enough fame points, players can earn more tools to proceed to the next level of the game (Koivula et al., 2017). After all the tasks have been accomplished and the game is over, a diploma is earned.

The full and freely available online version of the ED game includes tasks that require literacy. For this study, the ED game was recoded into a research version, which was suitable for the 5–6-year-old participants, who were not able to read. This meant that altogether, 10 tasks with emotional vocabulary were excluded from the research version of the game. In addition, one task was left out of the quantitative analysis because it was designed only to increase the attractiveness of the game and not to develop children's social-emotional skills.

Organizing of the Gameplaying Sessions

The educators were asked to prompt the children to play the game in their early education group for eight weeks, with the expected weekly time for single play being 1–2 hours and 15–30 minutes for pair-play. In addition, the children were prompted to play the game at home with their parents. The ECEC educators were not given any specific instructions regarding how to organize the gameplay sessions or guide children's play at the day care center. In one group, the children could choose with whom to play, but in the other groups, the educators allocated the children into pairs for pair-play.

Data

Semi-Structured Interviews

After the intervention, all seven ECEC educators participating in the study were interviewed using a semi-structured interview design. The voice-recorded interviews were organized face-to-face at day care centers by the first author (six interviews) and a research assistant (one interview). The total duration of the interviews was 239 minutes (mean 34 minutes per interview; standard deviation 7.86; range 23–42 minutes). The topics of the interview included general attitudes toward using digital devices in ECEC, practical organizing of gameplay sessions, educator's perceptions of their own roles in children's gameplay, support provided for children's gameplay, and educator's perceptions of the ED game used in the present study (see supplementary material for interview questions). A semi-structured interview with open-ended questions was chosen because it allows an interviewer to discuss and ask for more information on any topic (Brinkman, 2020; Ryan et al., 2009). This enabled, for

example, gaining detailed information from ECEC groups about the practicalities regarding the intervention period organized.

Game Log Data

To gather the game log data, each child was provided with four player accounts: two for single play, one for pair-play, and one for playing with a parent at home. A second single-play account was given if a child completed the game with the first single-play account before the end of the eight-week playing period. With the second single-play account, the game was restarted.

The game log data obtained from all the play accounts consisted of statistics on, for example, total playtime, number of tasks successfully accomplished, and fame points earned. Total playtime was accumulated from all play accounts, and it was utilized in the analyses as one of the outcome measures. Successfully played tasks meant tasks that were completed and from which points were earned. The fame points were categorized by task type (field/office task). The total number of tasks completed, the time used for playing the two task types, the field and the office tasks separately, and the points earned were expressed in relation to the total playtime of the first used single-play account only, which was perceived to best represent the progress of the children's skills without a practice effect influencing the results.

Data Analyses

Mixed methods were used in the analyses: a qualitative approach (inductive content analysis) for analyzing the interviews of the educators and a quantitative approach for exploring the game log data. The contents of the interviews were explored to identify the possible reasons for the differences in implementing the play intervention in the ECEC context. It was anticipated that there would be differences between the ECEC groups in the implementation of the intervention, which could lead to a shorter total playing time. It was also assumed that some educator-related factors would be related to such differences. The inductive content analysis (Kyngäs, 2019; Mikkonen & Kyngas, 2019) of the interviews began by transcribing the interviews and pseudonymizing all the names and other characteristics of the data with which the interviewees or the children could be identified. The transcriptions (totaling 65 pages, ranging from 6–11 pages per interview) were then carefully read through several times. The contents were classified into two thematic categories: educators' attitudes toward and perceptions of their own roles in children's gameplay and the support provided by educators. The analysis was primarily conducted by the first author, but the analysis coding and categorizations were reviewed along with the last author. Moreover, the transcriptions and all phases of the inductive content analysis were discussed within the research group. The small discrepancies that emerged were resolved by discussion.

The quantitative game log data were analyzed using SPSS program's version 26. The children's gameplay activities were explored by analyzing the total playtime, playtime when using the single-play account, number of successfully played (completed) field and office tasks, and scores obtained for the field and office tasks. The Mann–Whitney U test was used to compare educators allocated into two groups on the basis of their interview responses, and then these groups were compared as a function of children's gameplay time and their scores retrieved from the game log data. The effect sizes were reported using Cohen's *d* (Cohen, 1992; Lenhard & Lenhard, 2016).

Results

The first research question examined how ECEC educators differed in their attitudes and perceptions and the ways in which they supported children's playing of the game. The phases of the gameplay process, namely, the phases before, during, and after the gameplay, were used in organizing observations related to educators' attitudes, perceptions of their own roles, and ways of supporting gameplay. Two different groups emerged when examining the interview data, and

based on the differences, the educators were considered to belong to two distinctive groups: the *non-supportive group (NSG)* ($n = 4$ educators) and the *supportive group (SG)* ($n = 3$ educators). Educators in the NSG were working in two ECEC groups of the total of four taking part in this study, while the educators in the SG were working in the other two ECEC groups. The educators were identified as forming two groups as a research result of the present study. During the intervention, the children stayed in their own day care groups with their educators. Table 2 illustrates the differences between the two groups of educators, which are next described in detail, along with excerpts drawn from the interview data.

The two groups of educators identified differed in their attitudes toward and perceptions of their own roles in the children's gameplay. Their attitudes and perceptions seemed to be associated with the support they provided to the children throughout the gameplay process. Example 1 illustrates the differences in educators' attitudes and perceptions:

EXAMPLE 1. The Educators' attitudes toward and perceptions of their own roles during the children's gameplay.

I have just placed the children to play, and if they have had any questions, I have helped them. (NSG 005)

I should have familiarized myself more with the game so that I could have then helped children with playing. (NSG 006)

Overall, the [educator's role] is to organize the gameplay times and get children to play (...), but I think that equally important, or, in fact, actually even more important, is the way you motivate and participate in the gameplay and encourage children to play. (SG 001)

As the example shows, the educators in the NSG saw gameplay as the children's free-time activity and, therefore, were not familiar with the game contents. They also viewed the game design as a learning environment and perceived that their roles during gameplay were only to prepare the computers and help on demand. In contrast, the educators in the SG were familiar with the game contents and viewed their roles as overall participating in the children's play before and during gameplay by organizing and motivating children and being with them at playtime. Accordingly, the educators' interest in the game before gameplay influenced their perceptions of their roles during gameplay.

The educators' support in different parts of the gameplay process was observed before gameplay in how the play sessions were planned and organized and how the educators motivated and encouraged the children to play. Their support was also observed during gameplay in terms of whether the educators were present at playtime and how they discussed the play. The children were mostly provided with regular opportunities to play the game. However, there were differences between the educators' procedures applied in situations where the children were either motivated to play or not and whether the educators looked after whether the children had reached their weekly targeted playtime or not. Example 2 illustrates the most significant points in which the two groups identified differed in support provided for children's gameplay:

EXAMPLE 2. Support provided by the educators.

We could have tried to organize more gameplay situations because if some children did not play enough, it was because we forgot to let them play when they were present at the group. We should have remembered to set the gameplay times and perhaps somehow motivate the children more to play, but, actually, I do not know how we could have done that. (NSG 003)

We did not have such children who would have asked to play, so in our group, we [the educators] asked whether the child wanted to play and then they said yes. So, we did not have any plans like these and these [children] will play today. (NSG 005)

Of course, the child, who does not want to play, shows that he does not want to play and will not play, and then it is difficult for [the educator] to lure him to play for a while. (NSG 005)

Table 2. Main concepts, sub-concepts, and concepts formed based on the educators' interviews focusing on children playing the ED game.

		Examples of open codes	
Main concepts	Phases of the gameplay process ^a	Sub-concepts	
<p>Educators' attitudes and perceptions toward their roles in supporting children's gameplay</p>	<p>Before the gameplay</p>	<p><i>The educators' interest in familiarizing themselves with the game</i></p>	<p><i>Educators (n = 3) representing the Supportive group (SG)</i></p> <p>Were familiar with the game either by playing themselves or watching the children's playing.</p>
	<p>During the gameplay</p>	<p><i>The educators' perceptions of their own roles in the children's play</i></p>	<p>The educators saw their role not only in organizing the gameplay sessions but also in motivating and being present during children's gameplay sessions.</p>
<p>Support provided by the educator</p>	<p>Before the gameplay</p>	<p><i>Planning and organizing the gameplay sessions</i></p>	<p>Organized and supervised the children's weekly gameplay sessions.</p> <p>Allocated gameplay sessions in advance into the weekly schedule and prepared computers ready for gameplay.</p>
	<p>Before and during the gameplay</p>	<p><i>Motivating and encouraging children to play</i></p>	<p>A single educator was responsible for overseeing that all children's targeted playtime was reached. Supported the children's engagement, created togetherness, and rewarded children for reaching the weekly playtime goals.</p> <p>Children's motivation to play varied albeit all accomplished their weekly gameplay sessions.</p>
	<p>During the gameplay</p>	<p><i>An educator's presence during the play sessions</i></p>	<p>Were available and at least partly present during the gameplay sessions.</p> <p>Were more often present during the pair play than during the single play sessions.</p>
	<p>During and after the gameplay</p>	<p><i>Discussing the game and playing it</i></p>	<p>Children discussed gameplaying with adults. Some educators even planned short teaching sessions related to playing.</p>

^aThe phases before, during, and after the gameplay are used here for clarity. They correspond with the concepts of pre-game, game, and post-game stages by Bado (2019).

Mostly I had planned the gameplay times and had added them to our daily schedule, e.g., the half of the group plays the game, and the other half has language exercises, and so the children sort of knew the [daily schedule], and it was nice that I asked them who wants to play first, and then I chose the first four children. (SG 007)

But after that, when the children started to be unwilling to play, we thought of how we could fill the weekly playtime and asked children what they would like to do when the weekly playtime is full and what kind of award they would like to have after that. (SG 001)

As these examples illustrate, in the NSG, the gameplay sessions were not organized in advance; therefore, the educators sometimes forgot to organize them. Due to time challenges and challenges related to the children's absence from day care, the educators of the NSG prioritized single-play times to fulfill children's weekly playtime. In addition, the educators let the children choose whether to play the game and did not try to make the gameplay session interesting for the children before asking about their willingness to play. On the contrary, in the SG, the gameplay sessions were planned beforehand, and the educators made a commitment with the children that everyone would play (e.g., they created a reward system with the children to motivate them to play).

Furthermore, the two groups differed in the ways in which the game was discussed during and after the gameplay sessions. Example 3 illustrates these differences:

EXAMPLE 3. Discussing the game and playing.

The children did not discuss a lot about the game besides when they were playing next to each other. They could tell quickly which task they're playing. But, otherwise, the game did not manifest itself in children's discussions. (NSG 006)

The game did not raise any [thoughts] that children would have come to talk to us about. (NSG 005)

When they were playing, they wanted to come and tell the adult what they had achieved and then say it to other [children] as well. The thing is that they had to say their accomplishments out loud and even run from other room to tell about them and then continue playing. (SG 002)

They were more like planned teaching situations, but sometimes, children also discussed the game, for example, during the lunch or transitions, but mostly, they were situations in which I discussed the game with some children while other children were playing. (SG 007)

This example shows that the children in the NSG did not discuss the game at times other than when playing, and the educators did not encourage the children to discuss the game after gameplay. In contrast, the children in the SG discussed the game in situations other than play sessions, and the educators even planned situations to discuss the game content.

In summary, the educators in the NSG group gave the children opportunities to play every day, but they did not especially motivate the children to play or keep track of whether the children reached their targeted weekly playtime. In contrast, the educators in the SG group planned the time for the gameplay sessions beforehand and checked that each child had the opportunity and time to play to reach their targeted playtime. In addition, the educators in this group motivated the children to play and discuss the game with them.

When assigning participants to the SG and the NSG groups, their actions in organizing the gameplay sessions, specifically their concrete activities in motivating and supporting children's playing, were crucial. In other words, their participants' expressed attitudes and overall conceptions concerning digital games played a minor role in the grouping. In the SG group, participants' attitudes and actions were mostly aligned (both positive), whereas in the NSG a few participants reported a positive attitude but did not express any activity in organizing or supporting children's gameplay. Additionally, there were fewer discussions about the game among children in the NSG group, which further validated the grouping.

Next, the characteristics of the two groups are described in detail. There were 15 children in both groups, but compared to the NSG, there were significantly more girls in the SG. The two groups did not differ in the children's age, number of children in need of special support (as reported by the parents), or number of children who, according to the educators, received special support. The descriptive statistics are presented in [Table 3](#) and children's age and

Table 3. Descriptive statistics of the two groups.

	Non-supportive group (NSG) <i>n</i> = 15	Supportive group (SG) <i>n</i> = 15	χ^2
Gender (girls)	11	5	4.82*
Number of children with the need of special support ^a	5	4	1.94
Number of children who received special support ^b	2	4	0.68

^aParental report of child's need of special support (0=no need of support, 1=need of support in at least one out of seven developmental skill areas, such as language or attention).

^bTeacher report of special support in daycare (0 = no support, 1 = support).

* $p < .05$.

Table 4. Children's age and parents' education level of the two groups.

	Non-supportive group (NSG)			Supportive group (SG)			<i>U, Z</i>
	<i>Mean</i>	<i>Mdn</i>	<i>SD</i>	<i>Mean</i>	<i>Mdn</i>	<i>SD</i>	
Children's age	5.96	5.92	0.45	6.05	5.91	0.63	102.50, -0.42
Mother's education level ^a	2.40	3.00	0.74	1.67	1.50	0.82	23.00, -1.83
Father's education level ^a	1.47	2.00	1.13	1.67	1.50	0.82	41.00, -0.32

Parent's educational level was available only for 21 mothers and fathers.

^aParent's education was coded by using a four-point scale (0 = Basic education, 1 = Vocational education, 2 = Lower education degree, 3 = Higher education degree).

parent's education level of the two groups are presented in Table 4. No difference between the two groups was found in parents' educational levels (see Table 4).

Differences in children's Gameplay Behavior Between the Two Groups of Educators

To answer the second research question, we explored whether differences in educators' support for children's digital gameplay were related to children's gameplay activities and success in playing the ED game.

The gameplay activities of the two groups are described in Table 5. Overall playtime is reported first, after which the accumulated playtime in a single play with the first play account is presented. The Mann-Whitney U test showed that the groups differed significantly from each other in all overall playtime measures. When compared to children in the NSG, children in the SG spent more time playing alone, with another child, and with a parent. Consequently, the SG outperformed the NSG in total playtime. The average total playtime in the SG was approximately twice as long as in the NSG and was almost twofold to threefold for single play, when playing with a pair, and when playing with an adult. The effect sizes between the two groups, measured with Cohen's *d*, were large in all these overall playtime measures.

When examining gameplay activity by single playtime measures, the Mann-Whitney U test showed that the two groups differed from each other in all measures related to the field tasks (i.e., playtime, number of tasks successfully played through, total fame point score of the field tasks, and the share of playtime used for playing the field tasks in relation to the total playtime). Children in the SG played longer and were more successful in their field tasks compared to the play performance of the NSG. The effect sizes varied between moderate and large. The two groups did not differ from each other in any of the measures related to playing the office tasks (i.e., playtime, number of tasks successfully played, and fame point score accumulated from office tasks).

Because there was a significant gender difference between SG and NSG (SG group having more girls), we examined the effect of gender on playtime, number of successfully played tasks, and fame

Table 5. Descriptive statistics of gameplay activity in the two groups separately for overall playtime and single-play time (with the first play account).

	Non-supportive group (NSG)				Supportive group (SG)				U, Z	Effect size ^b
	Mean	Mdn	SD	Range	Mean	Mdn	SD	Range		
Overall playtime (min)										
Total	439.73	409.00	176.27	114–808	789.53	758.00	110.53	663–1028	10.00, -4.25***	-2.38
Single-play (both play accounts)	313.93	310.00	133.97	95–471	503.87	508.00	48.86	443–628	23.00, -3.71***	-1.88
Pair-play	54.33	49.00	37.04	0–97	142.00	129.00	30.29	109–216	0.00, -4.67***	-2.59
Adult	71.73	79.00	79.02	0–254	143.87	140.00	79.29	0–279	56.50, -2.33*	-0.91
Single-play playtime (min) (the first play account)										
Total	293.00	299.00	115.65	95–466	365.00	353.00	100.74	205–541	76.50, -1.49	-0.66
Field tasks	116.60	107.00	55.60	44–207	166.20	159.00	37.46	89–249	52.50, -2.49*	-1.05
Office tasks	80.07	87.00	47.17	26–149	76.40	61.00	40.52	33–145	109.00, -0.15	0.08
Share of time used for field tasks ^a (percent)	60.39	59.15	11.40	39.09–87.84	69.43	65.88	11.81	51.67–84.98	65.00, -1.97*	-0.78
Number of tasks successfully played through										
Field tasks	32.13	35.00	16.04	11–59	45.00	44.00	7.57	26–55	52.50, -2.49*	-1.03
Office tasks	21.00	22.00	12.82	5–51	21.73	19.00	10.73	11–51	109.50, -0.13	-0.06
Fame point score										
Field tasks	363.33	360.00	228.94	45–585	552.67	585.00	80.86	305–585	65.00, -2.28*	-1.10
Office tasks	120.00	105.00	55.91	30–210	156.00	145.00	38.04	115–240	66.50, -1.91	-0.75

^aShare of playtime used for field tasks in relation to the total playtime in single play (the first play account).^bEffect sizes are reported using Cohen's *d*.* $p < .05$, *** $p < .001$.

point scores. No differences were found between boys and girls, except in pair-play playtime, with girls playing more than boys ($U = 42.50$, $Z = -2.89$, $p = .004$).

Discussion

The aims of this study were, first, to explore how ECEC educators differed in their attitudes toward and perceptions of their own roles and ways of supporting children's gameplay and, second, to determine how these differences were associated with children's gameplay behaviors. Based on the attitudes, perceptions, and support provided to children during gameplay, it was found that the educators could be divided into two groups: the NSG and the SG. The children's gameplay behavior differed depending on the group. Compared to the NSG, the children in the SG played more, both alone and with a pair, and were more successful in their gameplay.

First, the educators' attitudes toward and perceptions of their own roles in children's gameplay were seen to reflect how they were interested in the game and what their actions were with children's gameplay. The educators in the NSG were unfamiliar with the game, prioritized non-digital play in ECEC, and viewed their roles as merely to prepare the computers for gameplay and help on demand. In contrast, the educators in the SG familiarized themselves with the game and participated in the children's gameplay sessions. The findings also revealed differences in ways of supporting children's gameplay before, during, and after the play sessions. In the NSG, the educators did not plan gameplay sessions beforehand and did not try to motivate children to play, such as by discussing the game or making the gameplay session interesting. In the SG, the educators' support consisted of planning the gameplay sessions into a weekly schedule, being present at playtimes, and creating a motivating and positive atmosphere for gameplay, such as by discussing the game with the children and supporting children's engagement to reach their targeted weekly playtime.

Previous studies confirm that educators' attitudes toward the use of digital technology vary and that these attitudes are associated with educators' perceptions of their own roles, pedagogical practices, and support provided for children's gameplay (Dong, 2018; Slutsky et al., 2019; Vidal-Hall et al., 2020). The findings of the present study are consistent with previous studies, which show that some educators are not conscious of their own roles in supporting children's gameplay and lack pedagogical practices in using digital technologies in ECEC, perceiving their roles as only preparing computers or tablets ready for gameplay (Bado, 2019; Dong, 2018; Fenty & Anderson, 2014; Kangas et al., 2017; Lindeman et al., 2021). Moreover, educators may also consider educational games as a learning environment that supports children's learning with the help of, e.g., a virtual character, which, for example, gives feedback and encourages children to try more to develop their skills. This implies that educators require more knowledge of how to support children's digital gameplay. While some educators of the present study were still unfamiliar with how to support children's digital gameplay processes, other educators had good pedagogical practices (e.g., they motivated the children, were present during the gameplay sessions, and discussed the game with the children). Moreover, previous studies corroborate educators' active roles throughout the gameplay process, especially the importance of conversations with children (Arnab et al., 2013; Barab et al., 2010; Mertala, 2019a).

Second, the findings of this study revealed that differences in the educators' attitudes, perceptions of their own roles, and support provided were associated with differences in the children's gameplay behaviors. Compared to the children in the NSG, the children in the SG had longer playtimes and were more successful in their play. The longer playtimes can be explained by the support provided by the educators. In the NSG, educator support was limited only to support provided during gameplay sessions. In the SG, the educators were committed to supporting the children's whole gameplay process, beginning with orientating to the game contents, organizing the gameplay sessions, motivating the children to play, continuing to be present at playtime, and finally discussing the game afterward. In addition, the educators in the SG organized and supervised gameplay so that each child reached their targeted gameplay dose each week. The regularity of gameplay and an adult's interest in children's gameplay support children's game-based learning. Previous studies (Kangas

et al., 2017) have highlighted the importance of adult support; however, the findings of this study showed that less than half of educators considered that supporting children's gameplay does not mean just letting the children play and helping only on demand with technical problems or literacy challenges. Moreover, some educators expressed that they were surprised about how much support the children needed while playing the game, which also implied that they were unsure of their roles in the children's gameplay.

Another difference related to the children's play behaviors between the two groups was the accumulated duration of pair-play. In the SG, the average pair-play time was almost twice as long as in the NSG. The children in the SG were also more successful in the field tasks. There are several possible explanations for this result. First, this result could be explained by the support provided by the educators. In this study, the educators' presence in pair-play sessions led to successful pair play and longer pair-play times in the SG, whereas in the NSG, the educators were not present at pair-play times, and the pair-playtimes were shorter. Many previous studies have highlighted the meaning of collaborative and noncompetitive peer play, which is supported by educators (Hillström, 2014; Lawrence, 2017; Marklund, 2020). Adult's presence during gameplay sessions is important and associated with longer pair-play times because the adults who are present can support children with difficulties and situations in which frustration easily arises (Plowman & McPake, 2013). Moreover, in the NSG, the educators experienced challenges in organizing playtimes, and due to time-related challenges, they prioritized single playtime to fulfill the children's weekly playtime allotments.

Second, the differences in the children's pair-play time can also be explained by earlier studies concerning the same participants (Koivula et al., 2017; Lipponen et al., 2018). A previous study concerning the same children's pair-play revealed that some children had numerous conflicts and disagreements during pair-play and were therefore unwilling to play with their assigned partner (Lipponen et al., 2018). These children belonged to the NSG identified in the present study. On the contrary, as Lipponen et al.'s (2018) study showed, children who played with a friend had a shared goal and good motivation to advance in the game. They represented children in the SG group. These findings align with previous studies highlighting that, in comparison to individual gameplay, competitive and collaborative gameplay affect children's motivation to play and result in the strongest mastery of goal orientation (e.g., Plass et al., 2014). In the present study, the children in the NSG group could not choose a child as a play partner, whereas in the SG group, they were allowed to do so. In future intervention studies, the child groups researched would need to be comparable in terms of having a free choice of play partner. The method of assigning a play partner most probably affected the results of the intervention.

In sum, the educators' support and successful peer play led to children's longer playtimes and more successful play. In addition, longer playtimes also reflect the children's motivation to play. The findings of this study highlight the significance of educators' support during children's entire gameplay process and show that support is associated with children's gameplay behaviors. It is important that children get enough regular practice by playing, especially when using an educational game designed to support their learning. As previous studies have stated, educators play a significant role in planning, organizing, and assessing learning in well-designed digital environments (Hernwall, 2016; Koskinen et al., 2014; Prestridge, 2017).

Limitations of the Study

One limitation of the study is that it was not possible to observe educators in their daily work or how they organized, supported, and discussed gameplay with the children. In addition, the parents' interest in the ED game and the support they provided for their children's gameplay at home might have influenced the children's willingness to play the game. The educators' views were explored through interviews, but sometimes, the participants respond with what they think the researcher wants to hear or may not be conscious of or remember all the means they have used to support the children during the gameplay process. For example, in this study, some ECEC educators explained that short game playtime was due to the children's unwillingness to play the game, but they did not actually consider

their own practices to motivate or enable the children's gameplay. In future research, it would be important to observe educators' practices when using digital games in ECEC.

Although digital technologies have already been used in ECEC for two decades (Dezuanni et al., 2015), using laptop computers and an online educational game was still new to some educators participating in this study. Moreover, digital devices were mentioned in the Finnish National Core Curriculum of ECEC (2022) for the first time only a few years ago, so the pedagogical use of digital devices has also been new to many ECEC educators. Furthermore, we should have asked about the educators' own digital competence, their ages, and their amount of work experience, which, according to the literature, all have an effect on educators' attitudes toward digital technologies and their use in ECEC (e.g., Slutsky et al., 2019; Vidal-Hall et al., 2020).

Although we found associations between educators' attitudes and practices and children's gameplay activities, due to the limited number of participants we cannot generalize these findings to all educators. In any case, we were able to identify interesting differences among the educators in their attitudes and practices, and the children's gameplay activities were statistically significantly different in the SG compared to the NSG. However, concerning differences in the pair-play time between the SG and NSG, it is not possible to rule out the possible effect of gender. A larger sample is needed in future studies to simultaneously examine the effects of gender and educators' attitudes and practices on children's gameplay activities. In addition, an intervention study with a larger number of participants is needed to determine whether a change in educators' pedagogical practices would change children's gameplay activities and learning when using educational games.

Conclusions

The purpose of this study was to explore how ECEC educators' attitudes, perceptions of their roles, and support provided for children's digital gameplay were associated with children's gameplay activities. This study showed that educators' attitudes toward and perceptions of their own roles vary, and this variation is related to the support they provide for children's gameplay. Moreover, this study illustrates how educators' support is related to children's gameplay activities. Although many previous studies (e.g., Jack & Higgins, 2019; Sánchez-Mena et al., 2019; Vidal-Hall et al., 2020) have confirmed the association with educators' attitudes and support, this study showed the undeniable importance of adult support, as the children played the same educational game but received different kinds of support depending on their ECEC educators' procedures. This type of setting also provides a realistic view of how the use of digital educational games varies in ECEC groups, depending on educators' attitudes and knowledge of their roles in supporting children's gameplay and how to use digital educational games in ECEC with pedagogical goals in mind.

The findings of the present study increase knowledge about how to successfully support children's gameplay when using digital educational games in ECEC. The procedures implemented by the educators of the SG showed that a good and effective practice of supporting children's gameplay covers the whole gameplay process. As the first step, it is important that the educator familiarizes oneself with the game content and guidelines, which include tips for discussing the game with the children. Second, educators' responsibility is to organize regular gameplay sessions and ensure that every child has opportunities to play. Third, motivating children to play and enabling them to get enough practice by playing is as essential as discussing the game with them. Finally, educators' presence and support given in technical problems, difficult tasks, or whenever frustration arises are important ways of support during the gameplay. Moreover, educators should also discuss the game and gameplaying with parents and encourage them to play at home with their children.

The findings also showed that some educators still have negative attitudes toward using digital games in ECEC, even educational ones, and do not consider them a valuable tool in supporting children's learning, which might also reflect that there are still outdated perceptions of digital

technology's negative influences on children's development and health. As such, rather than engaging in a debate on whether digital technology should be used, the focus should be on how digital technology, especially digital games, can be used in ECEC to fulfill learning goals (Kjällander & Riddersporre, 2019; Mertala, 2019b). We know that changing negative attitudes will take time, but the findings indicate that ECEC educators need more guidance and knowledge regarding how to support children's digital gameplay in ECEC with pedagogical goals in mind. It is important to pay attention to educators' digital competence, how they see their own roles, and what they concretely do when they implement digital educational games in ECEC. The method of using digital devices, especially digital educational games, pedagogically in ECEC should be considered in pre-service and ECEC educators' in-service education. As educators' consciousness and digital competence increase, their attitudes toward digital devices might change in a more positive direction.

In game-based interventions, the educators play an important role in supporting children's social-emotional learning by providing them the necessary time and tools to train and learn social-emotional skills. The self-regulation skills of young children, such as those aged 5 to 6 who participated in the present study, are not yet at a level that ensures goal-directed behavior leading to persistent training and, therefore, their learning. Professionals comprehend the needs and developmental trajectories of children, leading to more mature and socially acceptable behavior. The study's findings indicate that educators' active role and support increase children's playtime and the number of successfully completed tasks, which may also enhance children's emotional skills. However, whether the increased activity and success in the game results in larger changes in children's emotional and behavioral skills in the SG group compared to the NSG group, remains open.

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