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Pre-service early childhood teachers' perceptions of their playfulness and inquisitiveness

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Recognizing one's own playfulness is important for early childhood education (ECE) teachers, who are responsible for organizing and implementing child-initiated pedagogy in ECE centers. Playfulness research has focused on children's play and playfulness in workplaces, but playfulness as a part of ECE teachers' pedagogical and adaptive expertise is rarely studied. Using multiple playfulness and innovativeness instruments, first- and third-year pre-service ECE teachers' ($n = 208$) self-reported playfulness and inquisitiveness was examined. Correlation coefficients and Student *t*-tests were performed to examine the connections between playfulness, the facets of playfulness, and inquisitiveness, also between the first- and third-year pre-service ECE teachers. The results of the study show that playfulness, the facets of playfulness and inquisitiveness are connected. The results also show that although there were no statistically significant differences among the first- and third-year pre-service ECE teachers' playfulness and inquisitiveness, they had different orientations towards playfulness. Additional research is needed to explore how in-service teachers and pre-service teachers can learn playfulness and inquisitiveness as a part of their pedagogical expertise. The results are implementable for designing, developing and evaluating ECE teacher education.

KEYWORDS

adaptive expertise, early childhood education, early childhood teacher education, inquisitiveness, pedagogy, playfulness, pre-service teacher

1. Introduction

The benefits of play to children and playfulness to ECE teachers' work are agreed with researchers and practitioners (Singer, 2013; Canaslan-Akyar and Sevimli-Celik, 2022). Furthermore, expertise, particularly adaptive expertise is noted as it includes in the aims of the ECE teacher education programmes in Finland. According to Hatano and Inagaki (1986), adaptive experts use their knowledge and skills flexibly and innovatively in complex and varying situations. Playfulness as a pedagogical expertise has not gained scientific interest neither in the ECE teacher education nor in the work life, among in-service teachers. Play and playfulness are understood and realised in a variety way. In this article, we consider play and playfulness from the viewpoint of inquisitiveness, which also might be linked to ECE teacher's adaptive expertise. These concepts are central to evaluate pre-service teachers' playfulness and adaptive expertise and draw conclusions to the ECE teacher education programmes.

Researchers in the field agree that play itself is difficult to conceptualize due to its multidimensional nature, whereas the process of play, in turn, is considered much more important than its outcomes. The process of play enables children and adults across ages and cultural communities to achieve emotional joy and to engage in intrinsically motivating activities full of opportunities to be creative, have fun and learn to compromise (Sutton-Smith, 1997; Holmes, 2001; Sluss, 2015). Zosh et al. (2018) highlight that playful activities consist of a combination of active engagement, meaningful information, social interaction, iteration, and joy, while *playfulness* can be related to individual characteristics and capabilities to engage in interaction with others, resolve tensions in different social environments and demonstrate a preference for complexity and problem solving (Hyvönen, 2008; Kangas, 2010; Proyer, 2017). Current playfulness research has mainly focused on children's play and on adult playfulness (Proyer et al., 2019a) and provides evidence on playfulness having positive effects on a person's well-being and emotional state (Maynard et al., 2020), creativity and problem-solving skills (Le Hunt, 2017) as well as supporting individual's emotional intelligence (Hart and Holmes, 2022). All these benefits of playfulness are essential in ECE teachers' work. Promoting playfulness and children's play processes in ECE contexts can also be to teachers' advantage if the teachers themselves are playful and can use playfulness as a part of their pedagogical expertise in their work.

Playfulness can also be seen from different perspectives, for instance, as an attitude of mind (Pike et al., 2017), as curiosity (Proyer and Ruch, 2011), as cognitive, social and physical spontaneity (Lieberman, 1977), as a motivational factor (Bateson, 2015) and as a desirable character strength, including humour (Peterson and Seligman, 2004). According to Shen et al. (2014) playfulness could be considered as a personality trait with interconnected motivational and cognitive qualities, one of which is spontaneity. Being spontaneous with children is essential for an ECE teacher to be able to respond sensitively to children's needs and cognitive curiosity, not only in the creative curriculum context (Dodge and Colker, 1992) but in ECE daily practices based on child-initiated pedagogy (Kinos et al., 2016). In addition to spontaneity, ECE teacher needs to be inquisitive, which includes following characteristics: intellectual curiosity and desire to learn and understand (Proyer, 2017), ethics of equality and theoretical knowledge about child development (Kua et al., 2021). Furthermore, it includes ECE teachers to be innovative, curious, creative, and flexible in interactions with children and ECE team staff (Proyer, 2017; Pelgrim et al., 2022). We consider inquisitiveness as a part of an ECE teacher's adaptive expertise taking different behavioral forms of intellectual curiosity and desire to learn and understand (Proyer, 2017) challenging situations and making quick and strategically important decisions to refine, change and implement different strategies to meet children's needs (Toom and Husu, 2016; Männikkö and Husu, 2019; Kua et al., 2021).

Building on ongoing research and recent findings that consider the importance of teachers' playfulness in the field of early childhood education (Barnett, 2018; Canaslan-Akyar and Sevimli-Celik, 2022), our approach to playfulness is holistic, an embodied concept covering emotions, cognition, and physical and social aspects (Hyvönen, 2008; Kangas, 2010). The core functions of playfulness refer to well-being, humour and laughter, creativity, relationships, coping strategies and coping with stressful situations (Proyer, 2014), which are crucial in the work of ECE teachers. We consider playfulness and inquisitiveness as

an essential part of ECE teachers' pedagogical competence and adaptive expertise, as one of the key future competencies, which is important in life and work life, but particularly in early childhood education teachers' interactions and pedagogical practices (Siklander and Kangas, 2020). Despite the long history of playfulness research, playfulness and inquisitiveness have not considered as a part of pedagogical competence and adaptive expertise, nor have they appeared in the curricula of early childhood teacher education programmes. The aim of our research is to analyse first- and third-year pre-service ECE teachers' perceptions about their playfulness and inquisitiveness. It is assumed, that playfulness is naturally inherent in students who desire to educate themselves in the ECE field where playfulness and play are central phenomena in daily activities and interactions. Further, it is assumed that inquisitiveness is students' orientation towards adapting, modifying and applying their own or others understanding in rapidly changing everyday situations to meet children's need sensitively.

2. Theoretical framework

2.1. ECE teacher playfulness

Finnish ECE teachers are educated in a Bachelor of Arts (Education) degree programme in Teacher Education Departments at universities. At the Finnish universities, teacher education is based on The Map of Teacher Competence (Multidimensional Adapted Process Model of Teaching, MAP; Metsäpelto et al., 2022), where teachers' core competences include a knowledge base of teaching and learning, cognitive skills, social skills, personal orientations and professional well-being. The aim of the ECE teacher education programme is to imbue professionals with a high level of pedagogical expertise, as well as teachers' ethics that include valuing dignity, truthfulness, fairness, responsibility and freedom. These skills are essential, since legislation (Act on Early Childhood Education and Care, 540/2018) and the National Core Curriculum for Early Childhood Education and Care (Finnish National Agency for Education, 2022) determine that ECE teachers are responsible for pedagogy in a child group, and have pedagogical leadership in their staff teams and are responsible for pedagogical development (Heikka et al., 2022; Heikkinen et al., 2022). From a broader perspective, research on the teamwork and innovation research reveals that well-working teams have practices supporting creativity and different forms of play to full utilize members' potential (Nisula et al., 2014; Kinder et al., 2018). Successful organizations could not rely only on their personnel's ability to be innovative but also encourage them into play and playfulness (Bateson and Martin, 2013), not only for material outcomes, but also for joy and collaboration, which can in turn positively influence subjective levels of well-being and work satisfaction (Proyer et al., 2019b). Building on the teamwork research results, we could argue that playfulness is similarly an essential component for ECE teachers in their role of pedagogical team leader. Playfulness is a resource for shared joy and creativity; as such, it is also crucial in creating social relationships with children (Singer, 2013) and team staff.

Teacher playfulness research has shown that educators in different institutions and of different ages assess their playfulness rather highly, and this seems to be consistent over the years (Siklander et al., 2022). In the field of early childhood teacher education research, Melasalmi

et al. (2023) examined pre-service ECE teachers' written reflections regarding the use of playfulness in their future work. The results showed that pre-service ECE teachers' agentic playfulness mirrored a relational and tensious space consisting of three domains: teacher-initiated agentic playfulness, child-centered agentic playfulness, and community-shared agentic playfulness. The first domain, teacher-initiated, is dominant, which tells pre-service teachers' uncertainty about their playful pedagogical skills and routine expertise as they have a need to focus on themselves and on directing and controlling children. Shin (2022) examined pre-service ECE teachers' perceptions of playful learning by analyzing their reflective reports. The results showed that in teacher education, the pre-service teachers learned to value play through playful pedagogical activities and positive experiences facilitated their sense of a learning community. Similarly, Jung and Jin (2015) found that play-related coursework was related to pre-service ECE teachers' intentions to integrate play in their practices. Based on these research findings, it could be argued that in ECE teacher education programs it would be essential to expose the pre-service teachers to the theoretical knowledge about teacher playfulness as well as assess their own playfulness in practicums during early childhood teacher education.

From the perspective of child-initiated pedagogy, especially in the infant and toddler child groups, fundamental research has been conducted by Jung (2011), who found that teachers' playfulness resets psychological safety in the group. During quality play time and in daily practices, a teacher's playfulness has shown to be of great pedagogical importance in building up shared understanding and close relationships with children by using (non)verbal behaviors including nuances and cues to spontaneously, sensitively and responsively meet small children's needs. Teachers' playful behavior, especially spontaneity and silliness relates to greater playfulness in children (Connery et al., 2010; Pinchover, 2017). However, teachers' playfulness or willingness to utilize playfulness in their pedagogical approaches can be restricted by the national educational culture underlining academic skills and knowledge acquisition which could cause pressure to stay on teacher-directed activities and not to use child-initiated activities (Canaslan-Akyar and Sevimli-Celik, 2022; see also Rentzou et al., 2019).

Play is a natural activity for children, involving enthusiastic sounds, imitating the sounds of a car, and screaming for joy. This can sometimes cause irritation in adults who do not understand the importance of children's play for their development and learning. In this respect, Barnett's (2018) longitudinal study revealed worrying results showing teachers stigmatizing playful and noise-making boys and even transferred their negative perceptions to the peers and to the children themselves. It is well-known that stigmatizing affects potentially and negatively children's psychological well-being and academic performance, even later in life (Guarneri et al., 2019; Price and Hollinsaid, 2022). In Finnish early childhood education, the teacher as a pedagogical leader is responsible for creating and maintaining an inclusive atmosphere in a child group to ensure the children's needs are recognized and sensitively responded (Okkolin et al., 2018) by ECE team staff. The ECE teacher's high internal motivation to engage in the learning process with children, and willingness to sensitively meet an individual child's needs by using creativity, pretend play and innovative methods organizing daily practices, are signs of ECE teacher's playfulness (Tegano et al., 1999) and respecting children's rights established by the United Nations. This

is important, since free play and playful learning seems to minimize children's anxiety and facilitate the development of their social skills (Hirsh-Pasek et al., 2009; Guirguis and Longley, 2022) and also support children's academic achievement (Randolph et al., 2016; Kangas et al., 2017). Teacher's pedagogical practices as well as sensitive guidance of pre-school children's play is beneficial for learning vocabulary (Toub et al., 2018) and other academic skills. These findings indicate that the well-being and success of children reinforce teacher's motivation (Kangas et al., 2017; Männikkö and Husu, 2019).

2.2. Teachers' adaptive and routine expertise with playfulness and inquisitiveness

Working with children is at the heart of ECE teachers' work, even though their working days may be full of complex situations that unfold simultaneously, and sometimes even challenging interactions with adults and children (Karila and Kinos, 2012; Urban, 2012; Ukkonen-Mikkola and Fonsén, 2018). Teachers are required to have knowledge about child development, pedagogical leadership and team staff collaboration in order to balance their work demands. ECE teacher expertise is not only related to teaching and pedagogy but also building and maintaining the sociocultural context of the child group (Griffiths, 2013). Anthony et al. (2015) suggested that a teacher's expertise should be considered as a component of professionalism. According to Evans (2011), professionalism consists of behavioral, attitudinal and intellectual components. The behavioral component relates to a teacher's everyday work, especially how they use their skills and competencies to organize playing and learning situations. The attitudinal component consists of teachers' motivations about their work, how their values and ethics are manifested in their interactions with colleagues and children, and their work satisfaction and well-being. The intellectual component relates to teachers' knowledge base and structures, as well as their competencies to analytically interpret interactions among children and between adults and children (Evans, 2011).

Researchers in the field of educational psychology and expertise use the term "occupational expertise" to describe a person's ability to perform both routine and non-routine tasks at work (Billett et al., 2018). Routine tasks do not so much require analytical thinking and creativity as they do common sense, also termed practical intelligence (Sternberg, 2017), which is what one needs to know to succeed in work and life in general. Non-routine tasks in turn demand creativity and a desire to resolve uncertainty (Beghetto, 2017). Moving away from routine tasks to non-routine tasks requires adaptive expertise, which Hatano and Inagaki (1986) distinguished conceptually from routine expertise. When integrating research of adaptive and routine expertise (Hatano and Inagaki, 1986; Bereiter and Scardamalia, 1993; Chi, 2006; Siklander and Impiö, 2019) with research on playfulness and how teachers approach play in pedagogical contexts (Hyvönen, 2011; Kangas et al., 2017; Bowers et al., 2020), we can offer the following descriptions of ECE teacher's routine and adaptive expertise:

1. Teachers as routine experts prefer teacher-initiated activities, when they experience having control over children and situations. They want to situate themselves at the centre of pedagogical activities, neither relying too much on children

nor considering their opinions. Their emotional and pedagogical engagement in playful processes is rather low. They would rather stick to existing practices in which they feel competent and comfortable while solving familiar and practical problems. They prefer playful pedagogy from a cognitive perspective with the teacher leading. The more the teacher leads, the fewer possibilities children have to be actively engaged. The children's free play is valued but teachers are not engaged in play, only supervising and controlling children's behavior.

- Teachers as adaptive experts allow and afford play, and their emotional and pedagogical engagement in playful processes is high. They can merge theoretical and practical knowledge into their pedagogical actions while keeping play playful. These teachers value play as an arena for social interactions, friendship and competences, and as a means for children to be creative. They see play as a developmental process, not only as the play and game at hand. Playful play (Bateson, 2015) and mature play (Bodrova and Leong, 2003) describe play resulting from teachers' adaptive and playful pedagogical expertise through active engagement to support children's play.

The description above could be considered as dichotomous from the point of view of utilizing theoretical knowledge of child development when designing playful pedagogy to support children's learning. Expertise is not only a question for selecting appropriate forms of play seen as spectrum (Zosh et al., 2018) but also part of teacher's pedagogical competence to justify why to use, for example, dramatic play or guided play as a teaching strategy. There are occasions in the small children classrooms that a teacher's plan needs to be altered rapidly if the children are not engaged in the activities. Teachers, as adaptive experts, recognize, prioritize and sensitively respond in real time to students' emergent understanding and emotional stance, whereas teachers with routine expertise prioritize the implementation of lesson plans and provide tips and information for students without feed-up guidance (Bowers et al., 2020). One characterization of adaptive experts is teachers' flexibility in interactional situations calling for reasoning and restructuring previous knowledge and prior experiences (Bohle Carbonell et al., 2014). Teachers' adaptive expertise can also be characterized by a varying emphasis on a fixed versus open teaching orientation (Männikkö and Husu, 2019; Rissanen et al., 2019). That is to say, routine and adaptive expertise has similar, but not the same, basic components, and they differ in their knowledge representation with the organization and abstraction of knowledge (Bohle Carbonell et al., 2014). Adaptive experts can flexibly use different types of knowledge, as well as cognitive, metacognitive, social and emotional strategies in their daily practices (Xiang et al., 2022).

As the social interactions that occur in daily life at ECE centres are complex, uncertain and ambiguous, teachers' adaptive expertise is characterized by non-linearity, interconnectedness and self-organization (Xiang et al., 2022). Adaptiveness can also be seen as an individual's ability to adjust one's reactions in response to environmental changes (Bohle Carbonell et al., 2014) and to use adequate strategies, including playfulness, to solve problems and relieve tensions (Siklander and Impiö, 2019). Adaptive ECE teachers are flexible, inventive, spontaneous and creative, even in sudden, unexpected situations (Hatano and Inagaki, 1986; Bereiter and

Scardamalia, 1993). These aspects of adaptive expertise, as well as openness to novel experiences, have also been recognized as important in creativity and playfulness. ECE teachers' playfulness can also be viewed through the lenses of Proyer's four facets of playfulness—Other-directed, Lighthearted, Intellectual and Whimsical (OLIW)—and interpret them as teachers' actions (Proyer, 2017; Proyer et al., 2018, 2021; Siklander et al., 2022), presented in Table 1.

Playfulness as Other-directed (OR) refers to the interactional and social side of playfulness (Table 1; (Proyer, 2017; Proyer et al., 2018; Siklander et al., 2022)). Teachers design processes and environments that support children's mutual belonging, engagement, co-operation and collaboration. Teachers recognize playfulness and use it when it emerges in playful situations. Further, teachers release tensions, create a positive atmosphere and good feelings, and encourage and inspire children in their activities. Light-hearted (LH) playfulness indicates teachers whose minds are light, curious and open to new experiences. They approach new situations with trust, joy and calmness, showing humour and ease. LH teachers can act spontaneously and use improvisation in novel and sudden situations by trusting themselves and their pedagogical competences. Intellectual-creative (IE) playfulness is close to cognitive playfulness. IE suggests that teachers enjoy having opportunities to play with ideas, particularly when facing problems or inventing something new. They want to be real role models for children on how to use and express IE playfulness in daily practice. IE playfulness can be developed by exposing oneself to situations where IE is useful; for instance, throwing oneself at problems and innovation challenges. Whimsical playfulness (W) refers to teachers who are flexible in many ways: they are ready for experiments; they actively break rules and existing practices to create and accept the new, odd and unusual. In fact, they are interested in exceptional people, practices and other issues. Whimsical playfulness

TABLE 1 OLIV model of playfulness interpreted as teacher's actions (modified based on Proyer, 2017; Proyer et al., 2018; Siklander et al., 2022).

OLIV facets	Description of teacher's actions
Other-directed Interactional and social side of playfulness	Teachers use their playfulness in designing interactional and collaborative activities. Teachers use playfulness that emerges in interactional situations. Teachers create positive atmosphere.
Lighthearted Mental side of playfulness	Teachers are curious and open to new ideas and experiences. Teachers rely on their playful pedagogy in any situations. Teachers are spontaneous in novel situations and their mind is light.
Intellectual-Creative Cognitive side of playfulness	Teachers like to play with ideas and create something new. Teachers like to solve problems. Teachers show their intellectual and creative playfulness in daily activities.
Whimsical Adaptive side of playfulness	Teachers adapt flexibly into new situations. Teachers are interested in odd and exceptional children, events and activities. Teachers break rules and create new practices.

helps teachers to perceive issues that are hidden or not so obvious (Proyer, 2017; Proyer et al., 2018; Siklander et al., 2022).

In other words, adaptive expertise, together with playfulness, enables teachers to respond rapidly to the changing realities of the ECE child group, which requires a balance between children's individual needs and innovating situational solutions for teaching practices (Wetzel et al., 2015). Innovativeness can be defined as a teacher's willingness to change (Hurt et al., 1977; Goldsmith, 1991), and as openness to experience and adjusting activities (Goldsmith and Foxall, 2003). Innovativeness is needed when a teacher's theoretical knowledge about child development needs to be put into practice in rapidly changing situations and novel situations with children, as it reflects teacher's ethics of equality and cognitive flexibility to meet children's need sensitively (Kua et al., 2021). These characteristics of individual ECE teacher, ECE teacher's work and children's learning environment are related to characteristics of adaptive expertise (Pelgrim et al., 2022). Inquisitiveness as a component of teachers' expertise takes different behavioral forms of intellectual curiosity and desire to learn and understand (Hogan and Hogan, 2007; Proyer, 2017). In other words, inquisitive ECE teachers have a strong interest for learning about many different things about the domain and children, they are open-minded and engaged for child-centred (see, Zosh et al., 2018) and child-initiated pedagogy (Kinos et al., 2016).

Developing ECE pre-service teachers' adaptive expertise in higher education courses requires knowledge from the domain and practices to solve open problems accompanied by reflection (Wetzel et al., 2015) as adaptive experts generally have good self-monitoring and reflection skills (Chi, 2006). In addition, engaging in design thinking in ECE teacher education can cultivate adaptivity in pre-service teachers (Jordan, 2016). This is based on the notion that designing is a professional practice in ECE teachers' work. Teachers create experiences for children's playing, learning and wellbeing by designing, for instance, play and other activities, and by focusing on children's learning and their special needs, environments and interactions with caregivers and colleagues. Further, planning skills should be connected with decision-making skills when developing adaptive expertise (Köning et al., 2020). Anthony et al. (2015) showed that practice-based pedagogy is crucial in learning adaptive expertise, as well as in experiments, risk-taking and noticing pre-service teachers' thinking. As Finnish early childhood teacher education includes practicums, which is central to the curriculum, these notions could be considered for developing adaptive experts in the field of ECE.

To summarize, playfulness, inquisitiveness and adaptive expertise could be considered essential for ECE teachers' orientation towards teaching and learning with children, as well as pedagogical leadership. There is inadequate previous research concerning how aware pre-service ECE teachers are of their own playfulness and how inquisitive they perceive themselves. Thus, our aim is to examine pre-service ECE teachers' perceptions of their playfulness and inquisitiveness. The research questions are as follows:

1. How playful and inquisitive do pre-service ECE teachers perceive themselves?
2. Is there a connection between the playfulness, the facets of playfulness and inquisitiveness?
3. Are there differences between first-year and third-year pre-service ECE teachers' playfulness, the facets of playfulness and inquisitiveness?

3. Materials and methods

3.1. Participants

The participants of the study were first-year and third-year pre-service ECE teachers ($N=207$). The background information, namely age, gender and previous working experience in ECE, was not gathered as we considered them not relevant for the posed research questions. The decision is supported by the EU's General Data Protection Regulation (GDPR), the Finnish National Board on Research Integrity TENK (2012, 2023) guidelines and APA 7 ethical instructions. According to these instructions, all information about participants not related to the research questions should not be asked.

Through our administrative information, we know that generally our pre-service teachers are 21–49 years-olds, and majority of them are female. Therefore, to avoid compromising the anonymity of male participants, we did not ask the participants' gender for background information. Some of participants were just graduated high school and some of the have been working or are currently working as kindergarten nurses or substitute ECE teachers (especially the third-year pre-service teachers). We could say that the participants in this study are representative of the general information about Finnish pre-service ECE teachers.

3.2. Data gathering

The pre-service teachers were asked to fill in the playfulness online questionnaire as a part of their course assignments during their obligatory online teaching sessions, which, due to COVID-19 restrictions, were held via Zoom: thus, third-year pre-service teachers completed the questionnaire in autumn semester 2020, while the first-year pre-service teachers completed it in spring semester 2021. The pre-service teachers were given 15 min to fill in the questionnaire, and their consent to use their anonymous answers as data was asked at the end of the questionnaire.

3.3. Online questionnaire

The online questionnaire is based on earlier studies and surveys by Glynn and Webster (1992), Hurt et al. (1977), Staempfli (2007), and Proyer (2012). In this article, we report on the three measurements included in the online questionnaire. The *Short Measure of Adult Playfulness* (SMAP) (Proyer, 2012) is a five-item questionnaire for the assessment of playfulness in adults. All items are positively keyed, and answers are given on a 4-point scale (1 = strongly disagree, 2 = disagree, 3 = agree and 4 = strongly agree) (Proyer and Ruch, 2011). The items were translated into Finnish. Proyer (2012) reported a one-dimensional solution of the SMAP data and high internal consistencies. The alpha-coefficient in this study was 0.72; thus, based on the mean value of all SMAP items, a new sum variable named *playfulness* was calculated and variable means were used to replace missing values. For the research question 3, the differences between the first- and third-year pre-service ECE teachers' playfulness were explored with the Student t-test.

The second instrument measuring playfulness was *Adolescent Playfulness* (APF20) (Staempfli, 2007). In response to the statement,

“Please indicate how you would perceive yourself on the items listed below,” the participants were asked to rate themselves on a 6-point scale, ranging from “I strongly disagree” (score “1”) to “I strongly agree” (score “6”). For these items, the principal component analysis was conducted and rotated to the Varimax criterion. The items were translated into Finnish. The alpha coefficient in the study was 0.89. The three factor scores were used to create new sum variables, titled *other-directed* ($\alpha=0.90$), *physical playfulness* ($\alpha=0.90$) and *whimsical* ($\alpha=0.77$). The sum variable titles were inspired by Proyer’s (2017) model of adult playfulness. The main categories and principal components with alpha values are reported in Table 2. For the research question 3, the differences between the

first year and third year pre-service ECE teachers’ other-directed, physical, and whimsical playfulness were explored with the Student *t*-test.

The third instrument used in the survey was Glynn and Webster’s (1992) *Adult Playfulness Scale* (APS), which explores individual differences and personality traits. According to Proyer (2017), APS has some theoretical and methodological shortcomings that could challenge interpretation of the results. As our aim was to explore the pre-service teachers’ perceptions of their own playfulness and inquisitiveness, this part of the online questionnaire is not reported in this article.

The fourth instrument applied in the survey was Hurt et al.’s (1977) *innovativeness scale*, of which the following seven items were used: (1) I am generally cautious about accepting new ideas; (2) I rarely trust new ideas until I can see whether the vast majority of people around me accept them; (3) I am aware that I am usually one of the last people in my group to accept something new; (4) I find it stimulating to be original in my thinking and behavior; (5) I tend to feel that the old way of living and doing things is the best way; (6) I am challenged by ambiguities and unsolved problems; and (7) I often find myself sceptical of new ideas. The participants were asked to rate how each statement in general best described themselves on a 6-point scale (1 = strongly disagree, 2 = somewhat disagree, 3 = slightly disagree, 4 = slightly agree, 5 = somewhat agree, 6 = strongly agree). The alpha coefficient in the study was 0.65. For the items, the principal component analysis was conducted and rotated to the Varimax criterion. Based on the results of the principal component analysis for two factors, a new sum variable titled *inquisitiveness* was performed. The inquisitiveness variable consisted of the reversed items 1, 2, 3 and 7, and the alpha coefficient was 0.81. Pallister and Foxall (1998) have reported the psychometric properties of Hurt et al.’s (1977) scale. The differences between the first year and third year pre-service ECE teachers’ inquisitiveness was explored with the Student *t*-test.

The Pearson correlation coefficient was used for testing the relation between playfulness, other-directed, physical and whimsical playfulness, and inquisitiveness, among the first- and third-year pre-service ECE teachers. In addition to the self-reports, the online survey consisted also an open qualitative question concerning how pre-service teachers could use playfulness in their work. The results of the 159 qualitative question responses are reported in Melasalmi et al. (2023).

4. Results

4.1. Pre-service teachers’ perceptions of their playfulness and inquisitiveness

As a response to the first research question, the results show that generally, the respondents considered themselves playful people, but a small minority (5%) did not recognize their playfulness. Only one-fifth (20%) of the respondents reported that their friends would not describe them as playful people, or that they would not frequently do playful things in their daily lives. In addition, they did not feel that it is easy to change from a serious to a playful frame of mind. One-third of the pre-service ECE teachers (35%) did not think that they sometimes completely lose track of time when they are engaged

TABLE 2 Main categories and principal components of the APF20.

Main categories	Principal components	Alpha
Other-directed		0.90
	1. I like to play and horse around with my friends	
	2. When I hang out with friends, we usually like to play around	
	5. By being playful it is easier to get along with people	
	6. I like to interact with people in a playful way	
	7. I like to make people laugh	
	8. I feel comfortable joking around with others	
	9. I like to imagine myself and other people in funny situations	
	14. I laugh and smile a lot	
	15. My friends can tell when I am having a good time	
	16. In most situations I express my emotions freely	
	17. I like to clown around	
	18. I can usually find something to laugh and joke about in difficult situations	
Physical playfulness	19. I like to tell funny stories	
	20. I can find something comical or humorous in most situations	
Whimsical		0.77
	3. I like to be active physically	
	4. Being physically active keeps me stimulated and motivated	
	10. I like to play with ideas	
	11. I have an active imagination	
	12. I like to imagine myself as being different people or different characters	
	13. I like to sing and hum out loud when I am happy	

in playful activities. The descriptive statistics of SMAP items are presented in Table 3.

A deeper investigation of the respondents' playfulness showed that the pre-service ECE teachers valued social interactions, creating positive atmosphere and good feelings with humour. The pre-service teachers also considered physical activity as a way to keep oneself stimulated and motivated. However, the pre-service ECE teachers find it a bit challenging to imagine themselves as being a different person or different characteristics ($M=4.01$, $SD=1.32$), or to find something to laugh and joke about in difficult situation ($M=4.33$ $SD=1.15$). The descriptive statistics of the APF20 are presented in Table 4.

To get an understanding how inquisitive the pre-service teachers perceived themselves, they were asked to assess their cognitive flexibility, curiosity and desire to learn. The results show that minority of pre-service teachers (11%) reported being cautious about accepting new ideas and (14%) being wary of trusting new ideas until most people around them had accepted the ideas. Most of them (91%) did not consider being the last one in a group to accept a new idea and almost half of them (47%) found it stimulating to be original in their thinking and behavior. Minority of the pre-service ECE teachers (5%) found the old ways of living and doing things better than those of today and two pre-service teachers out of five (40%) reported to be challenged by ambiguities and unsolved problems. The minority of respondents (7%) perceived themselves as sceptical towards new ideas. The descriptive statistics are reported in Table 5.

4.2. Connection between the playfulness, the facets of playfulness and inquisitiveness

For the second research question, the results show that the playfulness ($M=3.10$, $SD=0.44$), the facets of playfulness, namely other directed playfulness ($M=5.01$, $SD=0.59$), physical playfulness ($M=5.30$, $SD=0.77$) and whimsical playfulness ($M=4.94$, $SD=0.60$) as well as inquisitiveness ($M=4.18$, $SD=0.88$) were assessed relatively high. The playfulness, the facets of playfulness (other directed, physical and whimsical playfulness) and inquisitiveness had statistically significant correlations with each other (Table 6). Inquisitiveness had a statistically significant and weak relationship with playfulness

($r=0.24$, $p<0.01$), other-directed ($r=0.28$, $p<0.01$), physical ($r=0.17$, $p<0.05$) and whimsical ($r=0.22$, $p<0.01$) playfulness. A statistically significant and moderate relationship was found between the pre-service ECE teachers' playfulness and other-directed playfulness ($r=0.58$, $p<0.01$), as well as playfulness and whimsical playfulness ($r=0.48$, $p<0.01$). There was also a positive relationship between playfulness and physical playfulness ($r=0.14$, $p<0.05$).

TABLE 4 Descriptive statistics of APF20.

Item	n	M	SD	Skewness	Kurtosis	CITC
Item 1	208	5.27	0.81	-0.71	-0.62	0.59
Item 2	207	4.87	0.95	-0.58	-0.09	0.61
Item 3	208	5.27	0.81	-0.81	-0.19	0.29
Item 4	208	5.30	0.77	-0.84	0.03	0.30
Item 5	208	5.10	0.75	0.17	0.34	0.54
Item 6	208	5.00	0.85	-0.52	-0.15	0.68
Item 7	206	5.59	0.66	-1.65	2.56	0.57
Item 8	208	5.19	0.84	-1.26	2.94	0.58
Item 9	208	4.57	1.09	-0.45	0.013	0.58
Item 10	207	5.07	0.87	-0.85	0.68	0.60
Item 11	208	5.06	0.94	-0.75	-0.05	0.41
Item 12	207	4.01	1.32	-0.26	-0.88	0.41
Item 13	208	4.80	1.15	-1.02	0.85	0.40
Item 14	208	5.35	0.77	-0.89	-0.08	0.44
Item 15	207	5.48	0.65	-0.87	-0.31	0.49
Item 16	208	4.73	1.03	-0.54	-0.12	0.34
Item 17	207	4.71	1.04	-0.55	0.06	0.74
Item 18	207	4.33	1.15	-0.45	-0.20	0.56
Item 19	208	4.76	1.07	-0.74	0.25	0.64
Item 20	206	4.77	0.99	-0.66	0.46	0.64

Item1 = I like to play and horse around with my friends, 2 = When I hang out with friends, we usually like to play around, 3 = I like to be active physically, 4 = Being physically active keeps me stimulated and motivated, 5 = By being playful it is easier to get along with people, 6 = I like to interact with people in a playful way, 7 = I like to make people laugh, 8 = I feel comfortable joking around with others, 9 = I like to imagine myself and other people in funny situations, 10 = I like to play with ideas, 11 = I have an active imagination, 12 = I like to imagine myself as being different people or different characters, 13 = I like to sing and hum out loud when I am happy, 14 = I laugh and smile a lot, 15 = My friends can tell when I am having a good time, 16 = In most situations I express my emotions freely, 17 = I like to clown around, 18 = I can usually find something to laugh and joke about in difficult situations., 19 = I like to tell funny stories., 20 = I can find something comical or humorous in most situations [In Finnish: 1 = Minusta on mukavaa leikkiä ja pelleillä ystäväni kanssa., 2 = Ollessani ystäväni kanssa, on meistä yleensä mukavaa pelleillä/pelehtii., 3 = Minusta on mukavaa olla fyysisesti aktiivinen., 4 = Fyysinen aktiivisuus pitää minut motivoituneena ja virkeänä., 5 = Leikkillisuus edistää ihmisten kanssa toimeen tulemistä., 6 = Pidän siitä, että saan olla leikkillisillä tavoilla ihmisten kanssa vuorovaikutuksessa., 7 = Minusta on kivaa saada ihmiset nauramaan., 8 = Tunnen oloni rennoksi vitsaillessani ihmisten kanssa., 9 = Minusta on mukavaa kuvitella itseni ja muutkin ihmiset hassuihin tilanteisiin., 10 = Minusta on kiva leikkiä ideoilla., 11 = Mielikuvitukseni on aktiivinen., 12 = Minusta on kiva kuvitella itseni joksikin toiseksi ihmiseksi tai eri tyyppiä., 13 = Laulan ja hymisen ääneen mielelläni silloin kun olen iloinen., 14 = Nauran ja hymyilen usein., 15 = Ystäväni huomaavat kun olen hyvällä tuulella., 16 = Useimmissa tilanteissa näytän vapaasti tunteeni., 17 = On kiva pelleillä., 18 = Löydän usein vaikeissakin tilanteissa nauramisen tai vitsin aihetta., 19 = Kerron mielelläni hauskoja tarinoita., 20 = Löydän useimmista tilanteista koomisuutta ja humoristisuutta] (Staempfli, 2007).

TABLE 3 Descriptive statistics of SMAP.

Item	n	M	SD	Skewness	Kurtosis	CITC
Item 1	208	3.3	0.57	-0.15	-0.65	0.60
Item 2	207	3.2	0.63	-0.25	-0.04	0.53
Item 3	207	3.1	0.58	-0.03	-0.17	0.53
Item 4	206	3.1	0.71	-0.37	-0.18	0.36
Item 5	206	2.8	0.78	-0.05	-0.52	0.43

CITC = corrected item total correlation. Item 1 = "I am a playful person"; 2 = "Good friends would describe me as a playful person"; 3 = "I frequently do playful things in my daily life"; 4 = "It does not take much for me to change from a serious to a playful frame of mind"; 5 = "Sometimes, I completely forget about the time and am absorbed in a playful activity" (Proyer, 2012). [Items in Finnish: 1 = "Olen leikillinen"; 2 = Hyvät ystäväni kuvaavat minua leikkilisenä henkilöinä"; 3 = "Teen säännöllisesti leikkilisiä asioita arjessani; 4 = "Minun on helppo vaihtaa vakavista ajatuksista leikkiliseen mielentilaan"; 5 = "Joskus unohdan ajan kulun ollessani uppoutunut leikkelyyn"].

TABLE 5 Descriptive statistics of innovation scale.

Item	n	M	SD	Skewness	Kurtosis	CITC
Item 1 (R)	207	3.81	1.11	-0.07	-0.46	0.55
Item 2 (R)	206	3.79	1.21	-0.28	-0.45	0.52
Item 3 (R)	207	4.85	1.00	-0.95	1.08	0.55
Item 4	205	4.44	0.94	-0.32	0.27	0.16
Item 5 (R)	207	4.39	1.15	-0.52	-0.28	0.08
Item 6	207	4.10	1.17	-0.67	0.11	0.18
Item 7 (R)	206	4.29	1.14	-0.50	-0.33	0.54

CITC=corrected item total correlation. R=reversed item. Item 1 = I am generally cautious about accepting new ideas; 2=I rarely trust new ideas until I can see whether the vast majority of people around me accept them; 3=I am aware that I am usually one of the last people in my group to accept something new; 4=I find it stimulating to be original in my thinking and behavior; 5=I tend to feel that the old way of living and doing things is the best way; 6=I am challenged by ambiguities and unsolved problems; 7=I often find myself sceptical of new ideas. [In Finnish, 1 = Olen yleensä varovainen, kun pitäisi hyväksyä uusia ideoita; 2 = Pystyn yleensä luottamaan uusiin ideoihin vasta sitten kun suurin osa ympärilläni olevista ihmisistä on hyväksynyt ne; 3 = Olen tietoinen siitä, että olen usein yksi viimeisimmistä ihmisistä ryhmässäni, joka hyväksyy jonkun uuden idean tai asian; 4 = Minusta on stimuloivaa olla omaperäinen ajattelussani ja toiminnassani; 5 = Mielestäni entisaikojen elämisen ja tekemisen tavat olivat parempia kuin nykyiset; 6 = Pidän ongelmanratkaisusta ja monimutkaisista haasteista; 7 = Huomaan usein olevani skeptinen uusien ideoiden suhteen].

TABLE 6 Descriptive statistics and Pearson correlation coefficients between sum variables of playfulness and inquisitiveness.

Variable	M	SD	1.	2.	3.	4.	5.
1. Playfulness	3.10	0.44	-				
2. Other directed playfulness	5.01	0.59	0.58**	-			
3. Physical playfulness	5.30	0.77	0.14*	0.25**	-		
4. Whimsical playfulness	4.94	0.60	0.48**	0.66**	0.14*	-	
5. Inquisitiveness	4.18	0.88	0.24**	0.28**	0.17*	0.22**	-

* $p < 0.05$, ** $p < 0.01$.

4.3. The differences in playfulness, the different facets of playfulness and inquisitiveness between pre-service teacher groups

The results for the third research question show that there were no statistically significant differences among the pre-service teacher groups between the first-year ($M = 3.3$, $SD = 0.57$) and the third-year ($M = 3.4$, $SD = 0.57$; $t(206) = -0.09$, $p = 0.93$) pre-service teachers' playfulness. Also, there were no statistical differences regarding facets of playfulness between the first-year pre-service teachers' other-directedness ($M = 4.96$, $SD = 0.64$), physical playfulness ($M = 5.26$, $SD = 0.79$), whimsical playfulness ($M = 4.91$, $SD = 0.58$) and the third-year pre-service teachers' other-directed playfulness ($M = 5.06$, $SD = 0.53$; $t(206) = -1.25$, $p = 0.21$), physical playfulness ($M = 5.34$, $SD = 0.74$; $t(206) = -0.92$, $p = 0.36$) and whimsical playfulness ($M = 4.96$, $SD = 0.61$; $t(206) = -0.29$, $p = 0.77$). Further, based on the Student t -test results, there were no statistical differences between the first-year pre-service teacher's inquisitiveness ($M = 4.06$, $SD = 0.89$) and the third-year pre-service teacher's inquisitiveness ($M = 4.29$,

TABLE 7 Pearson correlation coefficients between sum variables of playfulness and inquisitiveness for first- and third-year pre-service ECE teachers.

Variable	1.	2.	3.	4.	5.
1. Playfulness	-	0.59**	0.29**	0.53**	0.25*
2. Other directed playfulness	0.58**	-	0.37**	0.77**	0.32**
3. Physical playfulness	-0.01	0.08	-	0.23*	0.30**
4. Whimsical playfulness	0.43**	0.54**	0.05	-	0.22*
5. Inquisitiveness	0.24*	0.23*	0.02	0.22*	-

The results for the first year pre-service ECE teachers are shown above the diagonal. The results for the third year pre-service ECE teachers are shown below the diagonal. * $p < 0.05$. ** $p < 0.01$.

$SD = 0.87$; $t(206) = -1.94$, $p > 0.05$). Since no statistical differences between the first- and third-year pre-service ECE teachers' playfulness, facets of playfulness and inquisitiveness were not found, the bivariate Pearson's correlation between research variables was calculated for both groups separately (Table 7).

The both groups had a moderate and statistically significant correlation between playfulness and other-directed playfulness ($r = 0.59$, $p < 0.01$ and $r = 0.58$, $p < 0.01$ for the first- and third-year pre-service teachers). Interestingly, there were moderate and statistically significant correlations between all playfulness measures and inquisitiveness among first-year pre-service teachers (Table 7). Further, among the first-year pre-service teachers there was a strong correlation between playfulness and whimsical playfulness ($r = 0.53$, $p < 0.01$), and other-directed and whimsical playfulness ($r = 0.77$, $p < 0.01$).

For the third-year pre-service teachers, there were moderate and statistically significant correlations between all other playfulness measures and inquisitiveness, except physical playfulness: between playfulness and inquisitiveness ($r = 0.24$, $p < 0.05$), between other-directed playfulness and ($r = 0.23$, $p < 0.05$) inquisitiveness, and between whimsical playfulness and inquisitiveness ($r = 0.22$, $p < 0.05$). Among the third-year pre-service teachers, there was a moderate correlation between playfulness and whimsical playfulness ($r = 0.43$, $p < 0.01$), and other-directed and whimsical playfulness ($r = 0.54$, $p < 0.01$).

5. Discussion and implications

Play and playfulness are at the heart of daily activities and interactions in early childhood education and care. Guided by national curriculum and ethical values, the ECE teacher needs playfulness, inquisitiveness and adaptive expertise to sensitively meet an individual child's needs and to engage in learning processes with children. Playfulness or inquisitiveness has not been considered as an essential part of ECE teachers' pedagogical expertise, nor does it appear in the Finnish curriculum of early childhood teacher education programmes. The study aimed to examine pre-service ECE teachers' perceptions of their own playfulness and inquisitiveness, and possible differences between first- and third-year pre-service ECE teachers' perceptions. The first research question focused on the pre-service teacher's perceptions of their playfulness and inquisitiveness. The participants thought themselves playful, which is in line generally with other educators (Siklander et al., 2022). There were, however, a minority of

pre-service teachers who did not recognize their playfulness. It could be that these pre-service teachers viewed play as children's activity and did not consider playfulness as part of ECE teacher's pedagogical expertise (Tegano et al., 1999). On the other hand, previous research has shown that perceptions of one's own playfulness illustrate a personality trait that enables one to frame everyday experiences and situations, ways of thinking and personal interests (Proyer et al., 2018). Regarding the results of pre-service ECE teachers' inquisitiveness, the pre-service ECE teachers reported cognitive flexibility as well as valuing being spontaneous and creative in their thinking. Flexibility, spontaneous and creative thinking in sudden, unexpected situations have been considered as aspects of cognitive playfulness (Proyer, 2017; Proyer et al., 2018; Siklander et al., 2022) and characteristics of adaptive expertise (Hatano and Inagaki, 1986; Bereiter and Scardamalia, 1993). The second research question concerned the connection between the playfulness, the facets of playfulness and inquisitiveness. The results indicate that playfulness, facets of playfulness and inquisitiveness are related to each other, although the physical playfulness was most weakly connected to all other components. It could be that physical playfulness is not seen as important among adults as it is among adolescents (Staempfli, 2007). The results, however, strengthen our approach to playfulness as holistic phenomenon covering emotions, cognition, and physical and social aspects (Hyvönen, 2008; Kangas, 2010).

As a response to the third research question, no statistically significant differences between the first- and third-year pre-service teacher groups were found. It could be that national entrance exam based on the MAP – model of teacher competence (Metsäpelto et al., 2022) results homogeneity among pre-service teachers at some respect. However, it seems that the groups had distinctive orientations towards playfulness, facets of playfulness and inquisitiveness. The first-year pre-service teachers' perceptions of their playfulness interpreted in the spirit of Proyer's (2017) OLIW model could indicate that they value approaches to meet the children's needs. Further, regarding Staempfli (2007) the first-year pre-service teachers' playfulness includes humorous aspects, which is central to Lieberman's (1977) conceptualization of playfulness. Their playfulness was also connected with inquisitiveness, which could indicate the first-year pre-service teachers are willing to use their cognitive playfulness to assure children's learning and well-being. Similarly, the third-year pre-service teachers' playfulness orientation was related to the interactional and social side of playfulness as well as to adaptivity and inquisitiveness considered as a strong interest for learning about many different things about the domain and children (see Zosh et al., 2018). Following by the idea of interactional theories, which combine situational factors with the trait approach (Woszcynski et al., 2002), we can conclude that ECE pre-service teachers can recognize certain personal qualities in themselves (e.g., cognitive fluidity, vivid imagination, silliness). Our results do not, however, discuss whether the pre-service teacher know how to use their personal qualities or how to consider playfulness and inquisitiveness as a resource in their future profession (Singer, 2013; Kangas et al., 2017).

5.1. Ethical considerations

We have endeavoured to meet Finnish research excellence criteria for research involving human participants on ethical principles regarding

autonomy, self-determination and privacy by following the EU's General Data Protection Regulation (GDPR) and the Finnish National Board on Research Integrity TENK (2012, 2023) guidelines. In addition, based on the APA 7 ethical instructions, we did not include any background information variables, such as age, prior education or working experience in early childhood education, which were not relevant for the research questions posed in this study. The participants were asked to fill in the questionnaires as a part of their course assignments during their obligatory online teaching session, but submitting answers as a research data was voluntary. The participants were informed that their decision whether to participate in the study would not influence their grades. At the end of the questionnaire, the participants were asked to consent to the use of their anonymous answers for research purposes. However, the research area would benefit if the research interest would also focus on the different background variables like age, gender, prior education level and prior working experience in ECE.

5.2. Limitations

There are several limitations in our study. First, our measurements of playfulness relied only on pre-service ECE teachers' self-reports, and it could be asked if their assessment of their own relatively high playfulness might be explained by the social desirability. As a future ECE teachers, they could overestimate their playfulness and intellectual curiosity and flexibility due to their understanding of a good teacher qualities: a teacher needs to be a humorous and creative person who is committed to meet children's needs sensitively and who emphasizes play as a central phenomenon in the daily activities and interactions with children. It could have been possible to add an open question and ask the respondents to define playfulness, and then compare their conceptualizations with the self-report results. Another limitation of our study is that the online questionnaire included several instruments reported in previous studies combining different theoretical perspectives and concepts. Aiming to combine inquisitiveness, playfulness and adaptive expertise calls for theoretical discussion and methodological development among researchers. Furthermore, it could be argued that the usage of Staempfli's (2007) APF20 instrument does not produce reliable results since the measurements are targeted to adolescence and our respondents were adults, which could decrease the validity of the study.

5.3. Future directions and implications

In our study, we have proposed that ECE teachers' playfulness and inquisitiveness are components of adaptive expertise as essential for effective teaching and learning in ECE settings. We have combined theoretical perspectives of playfulness, inquisitiveness as innovativeness and cognitive playfulness to understand how these issues are related to adaptive expertise. Inquisitiveness and playfulness as teachers' expertise takes different behavioral forms of intellectual curiosity and desire to learn and understand children's needs as well as adaptation in changing situation all of which are needed in implementing child-initiated pedagogy. Implementing child-initiated pedagogy is challenging because it requires an ECE teacher to step out of routine expertise (Hatano and Inagaki, 1986) and reconsidering teacher-initiated pedagogy. The continuum from teacher-initiated

pedagogy to child-initiated pedagogy (Kinos et al., 2016) in relation to playfulness, inquisitiveness and expertise (routine and adaptive) is worth analysing in more detail, including a recognition of the affordances and inhibitors of the facets of playfulness (Proyer, 2017; Proyer et al., 2018; Siklander and Kangas, 2020). However, the role of inquisitiveness in constructing adaptive expertise would require additional studies and more sophisticated research methods.

We suggest that playfulness and inquisitiveness should be implemented in ECE teacher education programmes by integrating playfulness and playful learning methods into the curriculum and by allowing student teachers to: (1) recognize their playfulness, (2) label and evaluate it as an attitude, approach, trait, performance and as a pedagogy, and (3) direct their playfulness towards the development of their personal playfulness-based pedagogy. ECE teacher education programmes should represent good examples for students concerning how playfulness is a part of learning at any age. Teachers' playfulness does not decline as they get older (Siklander et al., 2022), but solely having playfulness as a trait does not prepare a pedagogically playful teacher. ECE pre-service teachers should learn better skills for using playfulness and inquisitiveness in their future work. However, we need additional research on how teachers and pre-service teachers can learn playfulness and inquisitiveness as a part of their pedagogical expertise (Siklander and Impiö, 2019). In addition, it is important that teacher educators in the ECE domain participate in and study research-based education, including how courses, methods and environments could better equip ECE pre-service teachers for playful adaptive expertise.

Future research could focus on pre-service ECE teachers' playfulness in action with children and team staff during practicums; this could bring new insights into teachers' playfulness. Further, it would be essential to examine whether there is a relation between pre-service ECE teachers' playfulness and the pedagogical ways to facilitate children's playful play (Bateson, 2015), mature play (Bodrova and Leong, 2003) and guided play (Toub et al., 2018). There is a need to harness multi-methodological designs to explore "teacher playfulness in action." One innovative approach could be to use mobile eye-tracking (e.g., Pérez-Edgar et al., 2020) to reveal the kinds of interactions and playful situations to which pre-service ECE teachers notice and how this is related to their teacher-initiated or child-initiated pedagogy. By getting insights how pre-service teachers build their own expertise through playfulness and inquisitiveness, could also advance our understanding of the requirements for ECE teacher education to support the pre-service teachers' growth towards adaptive expertise and implementation of child-initiated pedagogy.

Data availability statement

The datasets presented in this article are not readily available because the data has been gathered anonymously but the participants

are not requested to give a permission to use the data outside the research group. Requests to access the datasets should be directed to tarja-riitta.hurme@utu.fi.

Ethics statement

Ethical approval was not required for the studies involving humans because the participation in the study was volunteered and the adult participants were asked to consent to the use of their anonymous answers for research purposes. Further, the study was designed to meet Finnish research excellence criteria for research involving human participants on ethical principles regarding autonomy, self-determination and privacy by following the EU's General Data Protection Regulation (GDPR) and the Finnish National Board on Research Integrity TENK (2012, 2023) guidelines. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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