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Exploring early childhood educators' lived experiences in nurturing young learners' interests and talents through STEAM-based learning

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Abstract

This study explores early childhood education (ECE) teachers' lived experiences of nurturing children's interests and talents through STEAM (Science, Technology, Engineering, Arts, and Mathematics) learning. While previous research emphasises child outcomes, curricula, and teacher readiness, teachers' experiences in resource-constrained settings remain underexplored. Using a descriptive Husserlian phenomenological design, the study involved four Indonesian ECE teachers with at least one year of STEAM implementation experience. Data from semi-structured interviews, classroom observations, and supporting documents were analysed using Colaizzi's seven-step method. Four themes captured the essence of teachers' experiences: recognising routine play-based activities as STEAM; innovating with everyday and recycled materials despite resource constraints; shifting toward child-centred inquiry, positioning children as "little researchers"; and becoming facilitators who use open-ended questions and treat mistakes as learning opportunities. Across these themes, teachers described children's curiosity and preferred forms of expression as starting points for nurturing interests and emerging talents. Limited formal training and resources remained challenges. The findings provide an experiential account of how STEAM reshapes teachers' professional understanding and practice, without establishing measured improvements in children's talents. Sustained professional development, teacher learning communities, and institutional support are recommended to strengthen context-sensitive STEAM implementation and help teachers recognise and nurture children's diverse interests and emerging talents.

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1. Introduction

STEAM (Science, Technology, Engineering, Arts, and Mathematics) is an integrated learning approach that combines five disciplines into a coherent and meaningful learning experience (Belbase et al., 2022). The approach emphasises not only cognitive aspects, such as critical thinking and problem solving, but also children's creativity and capacity for expression through the arts. As Yakman (2008) explains, STEAM education provides

contextual learning experiences that are relevant to real life, helping learners to become innovative, reflective, and prepared for the challenges of the twenty-first century. Its strength lies in creating enjoyable and meaningful learning that encourages cross-disciplinary collaboration, although the meaning of the “A” and the ways in which the disciplines are integrated vary considerably across studies (Mejias et al., 2021; Perignat & Katz-Buonincontro, 2019).

In early childhood education (ECE), STEAM has distinctive characteristics because it must be adapted to children’s developmental stage, in which thinking is still largely concrete. According to McClure et al. (2017), early childhood is a critical period for STEM learning because children have natural curiosity, rich imagination, and a tendency to learn through direct exploration (see also Clements & Sarama, 2016). STEAM in ECE is therefore usually implemented through integrated play, simple experiments, and creative projects in which children learn science and mathematics while developing artistic and social skills. Learning focuses on the process of discovery rather than on final products, so that children are encouraged to experiment, ask questions, and draw conclusions from their own experiences.

Because this study concerns how teachers nurture children’s interests and talents, both terms require definition. Following Hidi and Renninger (2006), interest is understood as a psychological state of engaged attention and a developing predisposition to re-engage with particular content over time; in young children it is visible in sustained curiosity, repeated questioning, and voluntary return to an activity. Talent is understood developmentally, as in Gagné’s (2004) Differentiated Model of Giftedness and Talent, in which natural abilities are progressively transformed into systematically developed competencies through learning opportunities and environmental support. From this perspective, ECE teachers do not identify fixed talents; rather, they create conditions in which emerging interests can be noticed, sustained, and extended. These definitions guided the interview protocol (for example, questions about how teachers noticed and responded to children’s curiosity and preferred modes of expression) and served as sensitising concepts during analysis.

Despite this potential, implementing STEAM in ECE faces several challenges. Many teachers still have a limited understanding of the STEAM concept and of how to integrate it into age-appropriate learning activities. In addition, limited facilities, a lack of relevant learning media, and insufficient continuing professional development are frequently reported barriers. Survey research has shown that early childhood teachers vary considerably in their beliefs about their readiness to teach STEM, with a substantial group reporting relatively low readiness (Park et al., 2017). A further challenge is adapting STEAM curricula, which are generally designed for older children, to the needs and characteristics of young children, who learn through play and concrete exploration.

Addressing these barriers requires a comprehensive approach that includes building teacher capacity, developing appropriate curricula, and providing institutional support. Continuing professional development is key, focusing not only on STEAM content but also on developmentally appropriate pedagogical strategies. Brenneman et al. (2019),

for example, describe a preschool STEM professional development model that combined content knowledge with coaching and practice-based support across diverse settings. In addition, developing simple and innovative learning media, establishing teacher learning communities, and collaborating with higher education institutions can strengthen STEAM implementation in practice.

Several studies support the value of STEAM and STEM in ECE. In a review of empirical studies, Wan et al. (2021) found that research on early STEM education has concentrated on children's learning and on intervention programmes, while teacher-focused studies have dealt largely with beliefs, attitudes, and professional development. Sullivan and Bers (2019) highlighted the role of developmentally appropriate technology, such as ScratchJr, in enriching early learning experiences. However, most research has focused on children's learning outcomes or on curriculum development, and few studies have explored the experiences of teachers as the principal implementers of learning.

Teacher-focused STEAM research in ECE has so far concentrated mainly on teachers' beliefs, readiness, and responses to professional development (Brenneman et al., 2019; Park et al., 2017), typically through surveys or programme evaluations. What remains largely unknown is how teachers themselves live through the process of implementing STEAM in everyday classrooms: how they come to understand STEAM in relation to their existing practice, how they make sense of constraints and devise responses to them, and how they experience the changes in their role while trying to nurture children's interests and talents. Qualitative research on these first-person experiences has been called for (Bagiati et al., 2010), yet such studies remain scarce, particularly in Indonesia, where many ECE teachers have encountered STEAM through the dissemination of the *Kurikulum Merdeka* (Independent Curriculum) and enact it with limited resources. This study extends prior research by moving from what teachers believe about STEAM to what the experience of enacting STEAM means to them, and by identifying the essential structure of that experience through descriptive phenomenological analysis. A deeper understanding of teachers' experiences will provide valuable insights for designing more effective training and professional support. Accordingly, the study addressed two research questions:

RQ1. What is the meaning and essential structure of ECE teachers' lived experiences of nurturing young children's interests and talents through STEAM-based learning?

RQ2. What strategies do ECE teachers describe using to address the challenges they encounter in implementing STEAM-based learning?

2. Method

2.1 Research Design

This study used a qualitative approach with a phenomenological design to explore ECE teachers' lived experiences of nurturing children's interests and talents through STEAM-based learning. Specifically, it adopted descriptive (Husserlian, or transcendental) phenomenology, which seeks to describe the essential structure of a phenomenon as it is experienced by those who live through it, rather than to interpret it

through a pre-existing theory (Giorgi, 2009; Moustakas, 1994). Two philosophical assumptions underpin this choice: that lived experience is a legitimate source of knowledge in its own right, and that researchers can approach the essence of an experience by deliberately setting aside (bracketing, or *epoché*) their prior assumptions while attending to participants' descriptions (Tufford & Newman, 2012). Colaizzi's (1978) method of analysis belongs to this descriptive tradition, which makes it consistent with the study's design (Morrow et al., 2015). As Creswell and Poth (2018) note, phenomenological research seeks to describe the common meaning for several individuals of their lived experiences of a concept or phenomenon.

This design allowed the study to explore how ECE teachers construct meaning from their experiences of implementing STEAM, how they perceive its influence on children's development, and how they navigate the complexity of integrating multiple disciplines in age-appropriate ways. According to Moustakas (1994), phenomenological research focuses on describing what participants have in common as they experience a phenomenon, which is consistent with this study's aim of understanding teachers' shared experience of implementing STEAM. The design also made it possible to examine both the textural dimension (what the teachers experienced) and the structural dimension (how, that is, in what conditions and contexts, they experienced it), providing a comprehensive understanding of the phenomenon.

Researcher positionality and bracketing. In a descriptive phenomenological approach, researchers need to distinguish participants' descriptions from their own expectations about STEAM. The analysis therefore treats the teachers' accounts as descriptions of lived experience and identifies theoretical explanations as researcher interpretations. Bracketing provides a methodological orientation for examining prior assumptions rather than claiming that interpretation is free of researcher influence (Tufford & Newman, 2012).

2.2 Participants and Context

The participants were four ECE teachers in Indonesia who had implemented STEAM in their teaching for at least one year. Participants were selected through purposive, criterion-based sampling so that they could describe sustained experience of the phenomenon. All participants were women aged 28–45 years, with 5–15 years of ECE teaching experience. They are referred to as T1–T4 to protect their anonymity. The study focuses on their experiences of integrating STEAM into everyday early childhood teaching in resource-constrained settings.

The rationale for a small sample rests on the narrow study aim and the specificity of the participants' experience, consistent with the concept of information power (Malterud et al., 2016). All four teachers had at least one year of STEAM practice and could discuss the phenomenon directly. These features support an intensive descriptive inquiry; they do not establish saturation or demonstrate that each teacher contributed equally to every theme.

Ethical considerations centred on voluntary participation, informed consent, confidentiality, and the right to withdraw without penalty. Informed consent was

obtained from the participating teachers before data collection, following an explanation of the research aims and procedures. Participants are identified by codes T1–T4, and quotations are presented without personal identifiers. Classroom activities and children's work are reported without information that could identify individual children. Participants were given the opportunity to review their interview transcripts for accuracy and clarification.

2.3 Data Collection

Data were collected through in-depth semi-structured interviews, classroom observations, and supporting documents. Interviews were the primary source for the phenomenological analysis. Interviews lasted 60–90 minutes and were conducted in Bahasa Indonesia in a private setting at the school (Figure 1). The interview guide addressed teachers' experiences of implementing STEAM, perceived responses of children, implementation challenges, strategies for adapting activities, and reflections on their role. Interviews were audio-recorded with consent and transcribed verbatim in Bahasa Indonesia. The quotations reported in this article were translated into English by the author. Follow-up clarification and participant review supported the interpretation of the accounts.

Figure 1

Interview Session With a Participant During Data Collection



Note. Participants' faces have been blurred to protect their anonymity.

Classroom observations and supporting documents provided contextual information for interpreting the interviews. Observations focused on the integration of STEAM elements, teacher–child interactions, children's expressions of curiosity and engagement, and the learning environment and materials. Field notes recorded classroom activity and contextual details. Supporting documents included lesson plans, samples of children's work, assessment records, and STEAM-related resources. These sources contextualised the interview accounts; the quotations presented in the Results remain

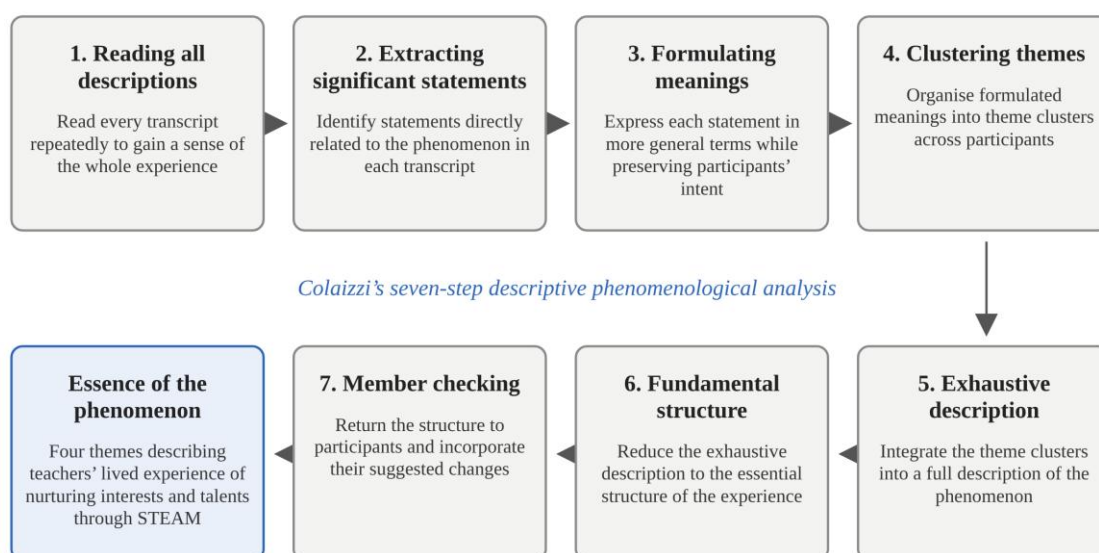
interview evidence unless an observation or document is explicitly identified. Indicators such as spontaneous questions and repeated attempts are interpreted as expressions of interest, rather than as measurements of established talent.

2.4 Data Analysis

Data analysis followed Colaizzi's (1978) seven-step phenomenological method, which is designed to extract the essence of lived experience from qualitative data (Figure 2). The process began with reading all participants' descriptions to gain a general sense of the whole experience. Significant statements directly related to the phenomenon were then extracted from each transcript, ensuring that all relevant experiences were captured. These significant statements were formulated into meanings, carefully preserving participants' original intent while expressing them in more general terms.

Figure 2

Colaizzi's Seven-Step Analysis Procedure as Applied in This Study



Note. Adapted from Colaizzi (1978).

The formulated meanings were organised into theme clusters, which were then integrated into an exhaustive description of the phenomenon. This description was reduced to the fundamental structure of the experience, representing the essence of the teachers' lived experience of implementing STEAM. Member checking was then carried out by returning the fundamental structure to the participants to validate the accuracy of the researcher's interpretation, and the changes suggested by participants were incorporated into the final description of the essence of the phenomenon.

An example illustrates the analytic progression. T1 described realising, after a socialisation session, that familiar classroom activities already applied STEAM principles. The formulated meaning was recognition of established play-based practice through a newly encountered conceptual framework. This meaning was grouped under re-seeing

familiar practice through a new conceptual lens and contributed to Theme 1, professional recognition of existing practice. Across the analysis, significant statements and formulated meanings were organised into clusters and synthesised into the four themes reported below.

Analytic interpretations were checked against the source accounts to preserve the relationship between significant statements, formulated meanings, and theme labels. Meanings concerning children's responses were distinguished from meanings concerning teachers' professional roles. The resulting themes describe shared patterns in the accounts without implying that every participant expressed every element in the same way.

Trustworthiness was considered in relation to credibility, dependability, confirmability, and transferability (Lincoln & Guba, 1985). Participant review and the comparison of interview accounts with contextual sources supported credibility. An explicit example of the progression from statement to theme makes the interpretation open to scrutiny. Distinguishing participant quotations from researcher interpretations supports confirmability. Description of the participant group and the implementation context enables readers to assess relevance to other settings. NVivo was used to organise the qualitative material; interpretation remained the responsibility of the researcher.

3. Results

This phenomenological study explored ECE teachers' lived experiences of implementing the STEAM approach. Analysis using Colaizzi's (1978) seven-step framework identified four main themes that represent the essence of the teachers' experience. Each theme is presented with a statement of the theme, evidence from participants (T1–T4) and, where relevant, from observations and documents, followed by the researcher's interpretation. Researcher-generated labels are introduced explicitly as interpretations and are distinguished from participants' own words, which appear in quotation marks. Taken together, the themes describe one essential structure: the teachers came to experience STEAM not as a new programme added to their work but as a new way of seeing and organising what they already did, one that placed children's curiosity at the centre and required them to redefine their own role.

3.1 Theme 1: Professional Recognition of Existing Practice

Teachers experienced a significant moment when they realised that the practices they had long used already integrated elements of STEAM, even though they had not recognised this conceptually or systematically. This is illustrated by the following interview excerpt:

"I first got to know the STEAM approach when there was a socialisation session on the *Kurikulum Merdeka*. What was interesting was that, after attending the session, I only then realised that the activities we had often done in class already applied the principles of STEAM; we just did not know them by that name." (T1, interview)

The quoted account supports the interpretation that naming STEAM helped T1 recognise continuity with her existing practice. It does not establish that all four teachers experienced the same realisation or that lesson plans changed after the socialisation session.

This finding shows how formal knowledge can give legitimacy and structure to sound intuitive practice. T1 had for years carried out activities such as water play, simple crafts, and light experiments with the children. However, these activities had been based on pedagogical intuition and experience, without a clear theoretical framing.

When the *Kurikulum Merdeka* socialisation introduced the concept of STEAM, the teacher described a sudden realisation, which is interpreted here as a moment of professional recognition. She did not merely acquire a new label for her practice but began to understand why that practice was effective. Analytically, this process can be read through Nonaka and Takeuchi's (1995) distinction between tacit and explicit knowledge: the teacher's tacit knowledge of how to engage children became explicit, and therefore open to reflection and deliberate planning, once it was connected to the STEAM framework. This reading is the researcher's interpretation; the teachers themselves spoke of "realising" and "not knowing the name".

3.2 Theme 2: Resourceful Innovation Under Resource Constraints

Implementing STEAM led teachers to use considerable creativity in making the most of limited resources, turning constraints into occasions for innovation through the use of simple, readily available materials. This is evident from the following excerpt:

"We try to find materials that are no longer used, or that are easy to obtain and not dangerous for children. For example, used plastic bottles can become containers for experiments, used cardboard can become construction material, or kitchen ingredients such as flour, salt, and water can become interesting media for exploring science." (teacher interview)

The materials named in this account illustrate repurposing across exploration and construction activities. Their availability and perceived suitability were central to the teacher's explanation; the excerpt does not establish that every participant faced identical resource constraints.

This finding points to what the teachers experienced as a paradox: limited resources prompted rather than prevented creative solutions. The teacher quoted above faced conditions common to many ECE teachers in Indonesia, namely limited budgets and minimal access to modern teaching materials, while still being expected to provide high-quality learning.

Rather than being an obstacle, these limitations encouraged a habit of looking at everyday objects for their educational potential, which is labelled here as "resourceful repurposing". The label is the researcher's own; it summarises the teachers' repeated descriptions of seeing used bottles as "containers for experiments" and cardboard as "construction material".

In the context of STEAM, budget limitations were described by the teachers as pushing them to understand the essence of each STEAM component. Because they could

not rely on expensive equipment or ready-made materials, they needed to think more carefully about the scientific principles and pedagogical purposes behind each activity. In the teachers' accounts, this made learning more meaningful, contextual, and focused on fundamental understanding rather than on the use of modern tools.

3.3 Theme 3: A Reported Shift Toward Child-Centred Inquiry

The teachers described the STEAM approach as changing the dynamics of learning from teacher-centred knowledge transmission toward child-centred knowledge construction. In their accounts of earlier practice, the teacher was the main source of knowledge and children received information passively; in their descriptions of STEAM activities, children were positioned as active investigators and partners in building understanding, engaging directly in exploring, asking questions, experimenting, and discovering concepts through concrete experience. This is illustrated by the following excerpt:

"The children are very active and directly involved in the whole activity. They are not just spectators; they really become 'little researchers'. What was interesting was their expressions of amazement and joy when they saw the two substances separate again by themselves after being shaken. They asked, 'Why does that happen, Miss?', 'Let me shake it again', or 'Wow, it looks like a real flag!'" (teacher interview)

In this account, the children's questions, requests to repeat the shaking, and comparison with a flag are examples of curiosity and repeated exploration as described by the teacher. They are reported as interview evidence rather than as independently observed behaviour.

This theme captures how the teachers experienced the change in their classrooms. Because the study did not compare practice before and after STEAM implementation, the shift is reported here as the teachers' experience rather than as a demonstrated transformation. In the teachers' descriptions, the change concerned not only activities and materials but also their view of how learning should take place. They described their classes as becoming closer to a community of inquiry (Lipman, 2003), in which teachers and children investigate together, and children are seen not as empty vessels to be filled but as active builders of knowledge who learn through direct experience and social interaction.

In the interview account, children acted as "little researchers" who observed phenomena, asked questions, repeated actions, and explored possible explanations. The teacher linked children's emerging interests to these moments: curiosity arose during the activity and was sustained when children could repeat the experiment ("let me shake it again"). This account illustrates the teacher's interpretation of children's engagement; it does not independently demonstrate learning gains or lasting changes in individual interests.

3.4 Theme 4: The Evolving Role of the Teacher as a Learning Facilitator

Implementing STEAM required teachers to develop stronger facilitation skills, so that their role shifted from "provider of knowledge" to "facilitator of learning": guiding

without controlling, supporting without dominating, and teaching without always telling. This is shown in the following excerpt:

“Our role as teachers is to be facilitators and active companions without dominating the activity too much. We keep asking open-ended questions to spark their curiosity, such as ‘What do you see?’, ‘How does it feel?’, ‘What happens if you shake it again?’. What matters is creating a conducive atmosphere in which every child feels safe to experiment, to ask questions, and even to make ‘mistakes’, which can actually become valuable learning.”
(teacher interview)

The questions in the excerpt invite children to observe, describe sensory experiences, and repeat an action. The teacher also presents a safe atmosphere for experimentation as part of facilitation. This account supports an interpretation of responsive guidance, but does not show how consistently these practices occurred across teachers or sessions.

This finding highlights one of the most challenging yet meaningful changes in STEAM implementation, namely the shift in the teacher’s role. The teachers described it not as a technical change but as one that touched their professional identity. Previously they had seen themselves as knowledge experts who explained concepts clearly, maintained classroom order, and ensured that the curriculum was delivered; in STEAM learning they described themselves as facilitators, and they judged success by the extent to which children were actively learning, thinking critically, and exploring.

This new role demanded different skills. Teachers described having to tolerate uncertainty, ask open-ended questions that prompt children to think, and judge when to give direction and when to let children discover for themselves. The approach also changed how mistakes were viewed: not as failure but as a natural part of learning. In the teachers’ accounts, attending to which questions and materials held a particular child’s attention was also how they came to notice individual children’s emerging strengths, for example the repeated interest in shaking the oil-and-water mixture described in Theme 3. This episode illustrates situational interest and persistence; it is not sufficient evidence of an established individual talent.

4. Discussion

This phenomenological study identified four main themes that together describe ECE teachers’ lived experiences of implementing STEAM. Each theme reflects the cognitive, emotional, and professional dynamics experienced by teachers during pedagogical change. This section relates each theme to the literature, confirming or qualifying previous findings, addresses the two research questions, and identifies the study’s contribution to knowledge on STEAM-based ECE.

The first theme, professional recognition of existing practice, shows that teachers experienced a significant moment when they realised that their established practices already contained elements of STEAM. This realisation prompted reflection and a new sense of confidence. It is consistent with Schön’s (1983) account of reflective practice, in

which professionals' knowing-in-action becomes available for deliberate improvement once it is named and examined, and with Nonaka and Takeuchi's (1995) model of knowledge conversion from tacit to explicit form. The increase in confidence the teachers described can be understood through Bandura's (1997) theory of self-efficacy: recognising that one has already succeeded at a task is a form of mastery experience, the most powerful source of efficacy beliefs. This contrasts with reports that many early childhood teachers feel unready to teach STEM (Park et al., 2017) and suggests that professional development that begins by recognising what teachers already do well may be more productive than programmes that present STEAM as entirely new.

The second theme, resourceful innovation under resource constraints, shows that STEAM implementation stimulated teachers' creativity in making the most of limited resources by using local materials and designing experiences relevant to children's lives. This is consistent with an integrative review by Acar et al. (2019), which concluded that constraints often stimulate creativity, although very tight constraints can also inhibit it. The teachers' capacity to adapt materials to new purposes also resembles what Hatano and Inagaki (1986) called adaptive expertise, that is, a flexible understanding of why procedures work that allows them to be adapted to new conditions. Resourcefulness should nonetheless not be treated as a substitute for adequate provision, since the same teachers named limited resources as a continuing challenge.

The third theme describes a reported shift from transmissive toward constructive learning. The teachers' accounts of children as "little researchers" who ask "why" questions and repeat experiments are consistent with sociocultural views of learning, in which children build understanding through activity and interaction with more knowledgeable others (Vygotsky, 1978), and with evidence that young children are capable of substantive science and mathematics learning when activities are well designed (Clements & Sarama, 2016). Because this study did not measure child outcomes, it cannot show that the approach improved learning; rather, it adds an experiential perspective to an outcome-focused literature (Wan et al., 2021). In relation to the study's focus on interests and talents, the theme suggests that STEAM activities gave teachers repeated opportunities to observe what triggered and sustained individual children's curiosity, which corresponds to the triggered and maintained situational phases of interest development (Hidi & Renninger, 2006). In Gagné's (2004) terms, these are the learning opportunities through which natural abilities may begin to develop into talents.

The fourth theme concerns the evolution of the teacher's role from instructor to learning facilitator, which required teachers to be more responsive, reflective, and adaptive to children's learning needs. The open-ended questioning and calibrated support the teachers described correspond to the classical notion of scaffolding (Wood et al., 1976), in which adults adjust their assistance to what the learner can do independently. The teachers' uncertainty about when to intervene also echoes the tensions identified in research on STEAM practice, where integration across disciplines places new demands on teachers' judgement (Perignat & Katz-Buonincontro, 2019). Professional development for STEAM should therefore address not only content and activity ideas but also facilitation

skills and the adjustment involved in sharing control with children (Brenneman et al., 2019).

In answer to RQ1, the essence of the teachers' experience was a re-seeing of their own practice: STEAM gave a name and a rationale to what they already did, and in doing so placed children's curiosity at the centre and redefined the teacher as a facilitator. Nurturing interests and talents was experienced less as identifying gifted children than as noticing and extending each child's curiosity during open-ended activities. In answer to RQ2, the strategies the teachers described were repurposing everyday and recycled materials, asking open-ended questions, and allowing mistakes as part of learning.

4.1 Limitations

This study has several limitations. First, because it used a phenomenological approach with a small number of participants, its findings are contextual and are not intended to be generalised to all ECE teachers. The experiences reported were shaped by individual backgrounds, school cultures, and differing institutional support. In addition, data collected through interviews and observations are interpretive and depend on participants' openness and on the researcher's sensitivity in interpreting meaning. Potential researcher bias remains, although it was minimised through reflexivity and triangulation.

Second, the study focused on teachers' subjective experiences and did not directly examine the effects of STEAM implementation on children's development; statements about children's engagement therefore represent teachers' perceptions, supplemented by limited observation, rather than measured outcomes. Third, no data were collected on practice before STEAM implementation, so changes in practice are reported as experienced by the teachers rather than demonstrated. In addition, the limited duration of the study did not allow long-term changes in STEAM practice to be captured. Longitudinal or mixed-methods studies are therefore recommended to examine how this pedagogical change develops over time and how it relates to children's learning.

5. Conclusion

This phenomenological study identified four themes that together represent ECE teachers' lived experiences of implementing STEAM. Their shared essence is that STEAM was experienced as a new lens on existing practice, one that placed children's curiosity at the centre of learning and redefined the teacher's role.

First, recognising that their existing practice already contained STEAM elements was the starting point of the teachers' professional change and gave them confidence and motivation to innovate. Second, the teachers experienced resource constraints as a prompt for, rather than only a barrier to, pedagogical creativity, using local materials and the surrounding environment to create contextual learning experiences. Third, the teachers reported a shift from transmissive toward constructive learning in which children act as active participants who build understanding through exploration and discovery.

Fourth, the teachers described their role evolving from transmitter of knowledge to adaptive and reflective facilitator, requiring skills such as asking open-ended questions, reading children's responses, and creating a safe space for mistakes. With respect to children's interests and talents, the teachers' accounts suggest that STEAM activities nurture interests chiefly by giving teachers repeated occasions to notice and extend each child's curiosity and preferred modes of expression. Three practical recommendations follow: professional development should begin by helping teachers recognise the STEAM principles already present in their practice (Theme 1); schools and local authorities should support, rather than rely on, teachers' resourcefulness by providing basic materials and preparation time (Theme 2); and training should model facilitation strategies, including open-ended questioning and responding to children's interests, through classroom-based coaching and teacher learning communities (Themes 3 and 4).

Statements and Declarations

Funding:

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Competing Interests:

The author declares that she has no financial or non-financial competing interests relevant to this study.

Ethics Approval:

Participation was voluntary, and participants were informed of their right to withdraw without penalty. Informed consent was obtained before data collection, and quotations are reported using participant codes (T1–T4) without personal identifiers.

Informed Consent:

All participating teachers gave informed consent before data collection, including consent to the audio recording of the interviews.

Data Availability:

The anonymised interview transcripts supporting the findings of this study are available from the author upon reasonable request.

Author Contributions:

The author conceived and designed the study, collected and analysed the data, and wrote and revised the manuscript.

Declaration of Generative AI Use:

No generative AI tools were used in the analysis of the data or in the writing of this article. NVivo was used only to organise the qualitative material, and all interpretations are the responsibility of the author.

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