

TEACHER PEDAGOGICAL PRACTICES IN L-STEAM PLAY: A CASE STUDY IN EARLY CHILDHOOD EDUCATION

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Abstract

Teacher pedagogical practices play an important role in shaping meaningful learning experiences in early childhood education, particularly during L-STEAM play, which integrates literacy, science, technology, engineering, arts, and mathematics. During play, teachers do not merely organize activities but continuously build learning contexts, respond to children's ideas and needs, provide appropriate support, and make pedagogical decisions based on the dynamics of the learning process. However, previous studies have often examined specific aspects of teacher practice, such as scaffolding, interaction, guided play, or STEAM implementation, separately. Less attention has been given to how these practices operate as interconnected components during L-STEAM play. This study explores how teacher pedagogical practices are enacted during L-STEAM play and how these practices facilitate the emergence of creative behavior among young children. A qualitative case study was conducted at an early childhood education center implementing L-STEAM play. The study involved five teachers who facilitated L-STEAM activities across five learning centers, while children aged 5–6 years were observed within their natural play activities. Data were collected through non-participant observations, semi-structured interviews with teachers, and document analysis. The data were analyzed using the interactive model of Miles, Huberman, and Saldaña. The findings identified five interconnected pedagogical practices: establishing the play context, providing adaptive scaffolding, developing pedagogical interaction, making responsive pedagogical decisions, and facilitating learning reflection. These practices did not operate as isolated strategies but formed an integrated, adaptive, and child-centered pedagogical system. Through this interconnected process, teachers created opportunities for children to express ideas, explore possibilities, try alternative approaches, solve problems, communicate their thinking, and develop creative ideas during L-STEAM play. The study contributes an empirically grounded conceptual model of teacher pedagogical practices in L-STEAM play that highlights the interconnected nature of contextualization, scaffolding, interaction, pedagogical decision-making, and reflection in facilitating the emergence of creative behavior in early childhood.

Keywords: Early Childhood Education, L-STEAM Play, Teacher Pedagogical Practices, Creative Behavior

INTRODUCTION

Early childhood education emphasizes learning experiences that support children's development through active participation, exploration, and interaction. Within this context, play provides an important pedagogical space in which children can explore ideas, communicate with others, solve problems, experiment with materials, and construct meaning from their experiences. Rather than functioning merely as a recreational activity, play creates opportunities for children to engage with people, materials, and ideas in ways that support the development of thinking, creativity, communication, and collaboration. The quality of these learning experiences, however, depends not only on the activities or materials provided but also on how teachers interpret children's responses and enact pedagogical practices throughout the learning process. Teacher pedagogical practices refer to the professional actions through which teachers facilitate children's learning by providing support, building interactions, responding to children's ideas and initiatives, and making pedagogical decisions within specific learning situations. In early childhood education, these practices extend beyond the delivery of predetermined instruction. Teachers continuously observe children's participation, interpret their emerging needs and interests, determine appropriate forms of support, and adjust their actions as learning unfolds. Thus, pedagogical practice can be understood as a contextual and dynamic process through which teachers create opportunities for children to explore, think, communicate, and

develop ideas during play. This understanding is consistent with the focus of the present study, which examines teacher practices as they emerge within the ongoing process of L-STEAM play.

The implementation of L-STEAM, integrating Literacy, Science, Technology, Engineering, Arts, and Mathematics, provides a context in which children can engage in interdisciplinary learning through play. L-STEAM activities create opportunities for children to investigate phenomena, experiment with materials, develop and test ideas, solve problems, communicate their thinking, and represent their experiences in different ways. However, the educational potential of L-STEAM does not depend solely on the integration of disciplinary content or the design of learning activities. Teachers also play a central role in facilitating children's participation and responding to the ideas, questions, difficulties, and possibilities that emerge during play. Therefore, understanding L-STEAM pedagogy requires attention not only to what children do but also to how teachers enact pedagogical practices throughout the learning process. This perspective can be understood through sociocultural approaches to learning. Vygotsky (1978) emphasized that children's development is mediated through social interaction and cultural tools. Learning occurs through participation in socially organized activities in which children receive support that enables them to extend their current understanding and capabilities. Wood, Bruner, and Ross (1976) further conceptualized scaffolding as temporary and responsive support that assists learners in accomplishing tasks beyond their independent capabilities. In early childhood education, Siraj-Blatchford (2009) highlighted Sustained Shared Thinking as a process in which teachers and children collaboratively engage with ideas and construct meaning through extended interaction. Flerer (2018) also emphasized the pedagogical role of teachers in connecting children's play experiences with conceptual learning. Taken together, these perspectives highlight the importance of teacher mediation, interaction, responsive support, and professional judgment during children's learning through play.

Research on STEAM and play-based learning in early childhood education has expanded considerably. Previous studies have examined STEAM implementation, children's creativity and problem-solving, guided play, scaffolding, and teacher-child interaction. These studies have provided important insights into specific aspects of teaching and learning. However, individual pedagogical practices are often examined separately. Such an approach provides limited understanding of how teachers coordinate different forms of pedagogical action as learning situations develop and change during authentic play. In particular, there remains a need for empirical research that examines how teachers build meaningful learning contexts, respond to children's ideas and needs, provide appropriate support, make pedagogical judgments, and use reflection as interconnected aspects of their professional practice during L-STEAM play. This limitation is important because pedagogical practice in early childhood education does not occur as a series of completely separate teaching techniques. Teachers' actions are shaped by the situations that emerge during learning. A teacher may begin by creating a meaningful context for play, respond to a child's question through dialogue, provide support when difficulties arise, modify an activity based on children's interests, and use reflection to inform subsequent learning experiences. Understanding these actions only as isolated strategies may therefore overlook the relationships among planning, interaction, support, judgment, and reflection. A more integrated perspective is needed to understand how teacher pedagogical practices unfold within the dynamic context of L-STEAM play.

The present study addresses this gap by exploring teacher pedagogical practices during L-STEAM play in an early childhood education setting. Specifically, the study examines how teachers provide learning support, develop pedagogical interactions, and make pedagogical decisions in response to children's ideas, questions, needs, and initiatives, as well as how these practices are related to the emergence of children's creative behavior. This focus is consistent with the central concerns of the study, which examine both teacher pedagogical practices and the creative behaviors that emerge within the context of L-STEAM play. The contribution of this study lies in providing an empirically grounded understanding of teacher pedagogical practices as interconnected processes rather than as isolated instructional techniques. The findings are synthesized into a conceptual model that shows how multiple pedagogical practices are related within the implementation of L-STEAM play. The study does not propose a new theory. Instead, it contributes an empirical synthesis that clarifies the relationships among different forms of teacher practice and their role in facilitating children's opportunities to think, explore, communicate, develop ideas, and engage in creative behavior. This contribution reflects the central finding of the thesis that the identified pedagogical practices are interconnected and form a more comprehensive pedagogical system.

METHOD

This study employed a qualitative approach using a case study design to obtain an in-depth understanding of teacher pedagogical practices during L-STEAM play within their natural educational context. A qualitative case study was considered appropriate because the study focused on understanding how teachers enacted pedagogical practices and responded to situations that emerged during everyday

learning activities. Following Yin (2018), the case study approach enabled an in-depth investigation of a contemporary phenomenon within its real-life context, particularly when the phenomenon could not be meaningfully separated from the context in which it occurred. The case examined in this study was teacher pedagogical practice during L-STEAM play and its relationship to the emergence of children's creative behavior.

The study was conducted at TK ADC+, an early childhood education center in Indonesia where L-STEAM play had been implemented as part of the learning program. The site was selected purposively because its learning activities integrated literacy, science, technology, engineering, arts, and mathematics through play. This context provided an appropriate setting for examining how teachers enacted pedagogical practices and how children responded during naturally occurring L-STEAM activities.

Participants were selected purposively based on their direct involvement in the implementation of L-STEAM play. The study involved five teachers who facilitated L-STEAM activities across five learning classes or centers. Groups of children aged 5–6 years were observed within their natural learning activities. The children were not interviewed as individual participants. Instead, observations of their participation, responses, interactions, and creative behaviors provided contextual evidence for understanding how teacher pedagogical practices unfolded during L-STEAM play.

The researcher served as the primary instrument in the qualitative inquiry. Data were collected through non-participant observations, semi-structured interviews with teachers, and documentation. Observations focused on naturally occurring pedagogical practices during L-STEAM play, including learning support, pedagogical interaction, teacher responses to children's ideas and questions, and pedagogical decision-making. Field notes were prepared during and after observations, while photographs and videos were used to support the documentation of learning activities. Interviews explored teachers' experiences, considerations, and reflections regarding their pedagogical practices. Documentary data included teaching modules, learning activity plans, learning documentation, photographs and videos of classroom activities, children's work, and other relevant school documents.

Data collection was conducted through repeated observations of the five teachers during L-STEAM learning activities. The observation period extended from 6 April to 8 May 2026. Observations were conducted across five classes or learning centers, with each session lasting approximately 90 minutes and repeated according to the school's L-STEAM activity schedule. During the observation process, the researcher used an observation guide, prepared field notes, and documented relevant learning activities through photographs and videos.

The research instruments included observation guidelines, semi-structured interview guides, and documentation review procedures developed in accordance with the research focus. The observation guidelines focused on teacher learning support, pedagogical interaction, and pedagogical decision-making, as well as children's observable creative behaviors during L-STEAM play. Interview questions explored teachers' experiences and considerations in facilitating children's learning, while documentary evidence was used to provide additional information regarding the planning and implementation of L-STEAM activities.

Data analysis followed the interactive model proposed by Miles, Huberman, and Saldaña (2014), which consists of data condensation, data display, and conclusion drawing and verification. Analysis was conducted iteratively alongside data collection. The researcher repeatedly reviewed observation records, field notes, interview transcripts, and documentary materials to identify meaningful units related to teacher pedagogical practices and children's creative behaviors. The analysis involved open coding and subsequent refinement of codes, followed by the grouping of related codes into categories. Through axial and selective coding, broader themes and relationships among the emerging categories were identified. The analysis continued through comparison and refinement across data sources until a coherent interpretation of the relationships among the identified pedagogical practices was developed.

Several strategies were used to strengthen the trustworthiness of the findings. Triangulation was conducted by comparing information obtained from teachers with evidence from classroom observations, field notes, learning documents, and other relevant documentation. Method triangulation involved comparing findings across observations, interviews, and documentation. Member checking was conducted

by communicating interview transcripts and summaries of important information back to the participating teachers. They were given opportunities to clarify, correct, or add information when necessary, thereby supporting the accuracy of the researcher's interpretation. Persistent observation was also conducted through repeated observations of the five teachers during the research period. This process enabled the researcher to identify recurring patterns in teacher pedagogical practices and children's creative behaviors. An audit trail was maintained through the systematic organization of data from lesson plans, observations, interviews, and documentation throughout the research and analysis process.

RESULTS AND DISCUSSION

The analysis identified five interconnected pedagogical practices enacted by teachers during L-STEAM play: creating a meaningful play context, adapting scaffolding to children's needs, building pedagogical interactions, responding through pedagogical decisions, and supporting children's learning reflection. These practices emerged from the analysis of classroom observations, interviews, and documentary evidence. Although presented as five themes, they did not operate as separate or fixed stages. Teachers moved between these practices in response to children's participation, ideas, difficulties, and emerging learning opportunities. The findings therefore indicate that teacher pedagogical practices in L-STEAM play functioned as interconnected and responsive processes rather than as isolated teaching techniques.

Creating a Meaningful Play Context

The first theme concerns teachers' efforts to create meaningful contexts in which children could engage in L-STEAM play. The analysis indicates that teachers did more than prepare materials and introduce activities. They connected learning experiences with particular themes, objects, places, and situations that provided children with meaningful starting points for exploration. One example involved an activity in which children constructed Gedung Merdeka using blocks. The activity provided a concrete context through which children engaged with materials, developed construction ideas, and explored different ways of arranging the blocks. When problems emerged during the construction process, children were encouraged to identify the causes of those problems and consider possible solutions.

Other activities documented in the study also involved meaningful contexts, including the construction of Bandara Soekarno-Hatta and activities related to Batik Banten. These activities connected L-STEAM learning with cultural and real-world contexts while providing opportunities for children to explore materials and develop ideas. The findings indicate that creating a meaningful play context involved more than arranging the physical learning environment. Teachers framed activities in ways that encouraged children to participate, explore, and develop their own ideas. The play context therefore provided an important starting point for the pedagogical processes that developed throughout the activity.

Adapting Scaffolding to Children's Needs

The second theme concerns how teachers adapted their support to children's needs during L-STEAM play. The analysis indicates that teachers did not provide the same form or level of assistance in every situation. Instead, they observed children's responses and adjusted their support according to the difficulties, abilities, and needs that emerged during the activity. The construction of Gedung Merdeka provides an example of this process. When part of the structure collapsed, the teacher did not immediately rebuild it for the children. Instead, the teacher encouraged the children to identify the problem and reconsider the arrangement of the blocks. The children were then given opportunities to make adjustments and continue the activity.

Teachers used different forms of support, including questions, prompts, guidance, demonstrations, feedback, and encouragement. However, support was not automatically provided. Teachers first observed children's actions and considered whether intervention was necessary. When children were able to continue independently, teachers reduced or withheld assistance. When difficulties prevented further participation, teachers provided support that enabled children to continue exploring. These findings indicate that scaffolding was adaptive and responsive to children's participation. Teachers continuously adjusted their actions according to children's emerging needs and learning processes.

Building Pedagogical Interactions

The third theme concerns how teachers built pedagogical interactions with children throughout L-STEAM play. The analysis identified interactions that extended beyond giving instructions or evaluating children's answers. Teachers used questions, dialogue, responses, and feedback to encourage children to explain ideas, consider

possibilities, and communicate their thinking. Teachers asked questions that encouraged children to explain their reasoning, connect experiences, predict possible outcomes, and consider alternative approaches. They also responded to children's questions and ideas and created opportunities for children to communicate their thinking.

These interactions enabled teachers and children to develop meaning together. Questions did not function solely as a way to determine whether children had produced a correct answer. Instead, they encouraged children to elaborate their ideas and consider different possibilities. The findings also indicate that pedagogical interactions provided opportunities for creative behavior to emerge. Children were encouraged to express ideas, ask questions, explore possibilities, try alternatives, and develop their initial thinking during L-STEAM activities. This, building pedagogical interactions involved more than maintaining communication during classroom activities. It created opportunities for children to articulate ideas, extend their thinking, and participate actively in the learning process.

Responding Through Pedagogical Decisions

The fourth theme concerns how teachers responded to situations that emerged during L-STEAM play through pedagogical decisions. The findings indicate that teachers did not implement planned activities in a fixed manner. Instead, they observed children's responses, interpreted emerging needs and interests, and determined how to respond as activities developed. Teachers made decisions based on children's responses and learning needs, adjusted their strategies according to the dynamics of play, determined the appropriate level of intervention, and used spontaneous events as opportunities for further learning.

An example occurred during a Batik Banten activity. A child accidentally mixed yellow and blue paint and discovered that the colours produced green. Other children became interested in this change. Rather than immediately returning to the original procedure, the teacher allowed the children to continue exploring colour mixing. The spontaneous event therefore became part of the learning process. These findings highlight that pedagogical decisions were embedded in the unfolding process of play. Teachers determined whether to intervene, provide support, modify an activity, follow an emerging interest, or maintain children's independence. Such decisions depended on their interpretation of specific classroom situations rather than on the mechanical implementation of predetermined plans.

Supporting Children's Learning Reflection

The fifth theme concerns teachers' role in supporting children to reflect on their learning experiences. The findings indicate that teachers created opportunities for children to recall activities, explain their ideas, describe what they had done, and communicate their experiences. Through reflective dialogue, children were encouraged to explain their thinking, describe the processes they had followed, and communicate reasons for particular choices. Teachers responded to these explanations through clarification, reinforcement, and further questions. Reflection therefore became part of the learning process through which children communicated and made sense of their experiences.

Children's reflections also provided teachers with information about their learning. Through children's explanations and responses, teachers could identify aspects of the activity that children understood and considered meaningful. This information could subsequently inform pedagogical planning and future learning activities. The findings further indicate that opportunities for reflection allowed children to revisit their experiences and communicate the ideas developed during L-STEAM play. Reflection therefore connected children's experiences during an activity with subsequent learning processes.

Taken together, the five themes indicate that teacher pedagogical practices in L-STEAM play formed interconnected processes. Creating a meaningful play context provided conditions for children's participation and exploration. Adapting scaffolding to children's needs enabled teachers to provide appropriate support while maintaining opportunities for independence. Building pedagogical interactions supported children in expressing and developing their ideas. Responding through pedagogical decisions allowed teachers to adapt their actions to children's needs, interests, and emerging learning opportunities. Finally, supporting children's learning reflection enabled children to revisit and communicate their learning experiences while providing teachers with information for subsequent pedagogical action. These practices did not occur in a fixed sequence. A teacher could provide scaffolding during an interaction, make a pedagogical decision based on a child's response, and use children's reflections to inform subsequent learning activities. The five themes were therefore analytically distinct but closely interconnected in practice.

DISCUSSION

The findings provide an empirically grounded understanding of how teacher pedagogical practices were enacted during L-STEAM play. The five practices identified in this study, namely creating a meaningful play context, adapting scaffolding to children's needs, building pedagogical interactions, responding through pedagogical

decisions, and supporting children's learning reflection, were interconnected throughout the learning process. Rather than functioning as separate teaching techniques, these practices developed in relation to children's participation, ideas, difficulties, and emerging learning opportunities. This interpretation supports a broader understanding of pedagogy in play-based learning. Teachers did not simply implement predetermined activities or apply individual instructional strategies. Their pedagogical work involved creating conditions for participation, interpreting children's responses, adjusting support, sustaining interactions, making decisions, and facilitating opportunities for children to revisit their learning experiences.

Creating a Meaningful Play Context as a Foundation for Exploration

The first finding highlights the importance of creating a meaningful context for children's exploration. From a sociocultural perspective, learning develops through participation in socially and culturally mediated activities. The contexts created by teachers therefore provided more than a physical setting for L-STEAM activities. They established meaningful situations in which children could engage with materials, ideas, and other participants. This interpretation is consistent with Vygotsky's sociocultural perspective, which positions social and cultural contexts as important conditions for cognitive development. It also aligns with Fler's play pedagogy, particularly the view that teachers can connect children's play experiences with conceptual learning. The present study further indicates that the pedagogical role of context continued beyond the initial planning of an activity. The meaning of the activity developed through children's participation and teachers' responses. Creating a meaningful play context can therefore be understood as a foundation that supports subsequent interaction, scaffolding, pedagogical decisions, and reflection.

Adapting Scaffolding to Children's Needs

The second finding highlights the adaptive nature of scaffolding during L-STEAM play. This interpretation is consistent with the work of Wood, Bruner, and Ross, who conceptualized scaffolding as temporary support that enables learners to engage with tasks beyond their current independent capacity. It also corresponds with Vygotsky's concept of the Zone of Proximal Development. The findings indicate that the effectiveness of support depended not only on the type of assistance provided but also on teachers' ability to interpret children's changing needs. Questions, prompts, guidance, and other forms of support became meaningful when they were adjusted to children's participation in specific situations.

This finding suggests that scaffolding should not be understood as a fixed instructional procedure. Teachers needed to determine whether children required assistance, what form of support was appropriate, and when support could be reduced. In this sense, scaffolding was closely connected with teachers' observations, interactions, and pedagogical decisions. The findings also highlight an important issue in play-based learning. Teachers need to balance support with children's opportunities for independence. Excessive intervention may limit children's opportunities to explore and develop their own ideas, whereas insufficient support may make it difficult for children to continue participating in the activity. Adapting scaffolding to children's needs therefore requires continuous pedagogical judgment.

Building Pedagogical Interactions to Extend Children's Thinking

The third finding highlights pedagogical interaction as an important process through which teachers supported children's participation and thinking. This interpretation is consistent with Siraj-Blatchford's concept of Sustained Shared Thinking, which emphasizes collaborative intellectual engagement between adults and children. Within the present study, interaction created opportunities for children to explain ideas, consider possibilities, and communicate their thinking. Teachers' questions and responses also provided a basis for understanding children's perspectives and determining appropriate subsequent actions.

The findings suggest that pedagogical interaction served two interconnected functions. First, it supported children's thinking by encouraging them to articulate and develop ideas. Second, it provided teachers with information about children's understanding, interests, and emerging needs. This information subsequently informed scaffolding and pedagogical decisions. Pedagogical interaction can therefore be understood as more than effective classroom communication. It functioned as part of the pedagogical process through which teachers and children jointly developed learning experiences.

Responding Through Pedagogical Decisions

The fourth finding emphasizes the situated and responsive nature of teachers' pedagogical decisions. Teaching during L-STEAM play required teachers to respond not only to planned learning intentions but also to

events that emerged during the activity. This interpretation supports perspectives that understand teaching as a process requiring professional judgment within specific educational situations. Teachers needed to interpret children's responses, determine whether emerging events created meaningful learning opportunities, and decide how their actions could support continued participation.

The findings therefore indicate that pedagogical decision-making was closely connected with other practices identified in this study. Decisions were informed by teachers' observations and interactions with children. These decisions subsequently influenced the form of scaffolding, the direction of the activity, and the opportunities available for further exploration. Rather than viewing deviations from a lesson plan as disruptions, the findings suggest that emerging situations can become pedagogically meaningful when teachers interpret and respond to them in relation to children's learning processes.

Supporting Children's Learning Reflection

The fifth finding highlights the role of teachers in supporting children to revisit and make sense of their learning experiences. Reflection created opportunities for children to recall activities, explain their ideas, and communicate aspects of the processes they had experienced. This finding positions reflection as part of children's learning rather than solely as a process undertaken by teachers after instruction. Through dialogue, children could revisit their experiences and articulate aspects of their thinking. At the same time, children's reflections provided teachers with information about how children understood and interpreted the activity. Supporting children's learning reflection was also connected with the other pedagogical practices. Teachers' interactions created opportunities for children to express their experiences, while children's responses could inform subsequent pedagogical decisions. Reflection therefore linked experiences from ongoing or completed activities with subsequent learning processes.

An Interconnected Understanding of Teacher Pedagogical Practices

Taken together, the findings indicate that the five pedagogical practices formed an interconnected pattern of practice. Creating a meaningful play context established conditions for exploration. Adapting scaffolding to children's needs supported children while maintaining opportunities for independence. Building pedagogical interactions enabled children to express and develop ideas. Responding through pedagogical decisions allowed teachers to adjust their actions as situations developed. Supporting children's learning reflection enabled children to revisit their experiences and provided teachers with information that could inform subsequent learning.

These practices did not form a fixed sequence. Teachers could move between them according to the situation. An interaction could lead to a pedagogical decision, which could influence the form of scaffolding provided. Children's reflections could subsequently inform future activities. The five practices were therefore analytically distinct but interconnected in classroom practice. This integrated interpretation provides the central conceptual contribution of the study. Rather than treating scaffolding, interaction, decision-making, and reflection as independent components, the findings illustrate how these practices were related within the implementation of L-STEAM play.

Implications for Theory and Practice

The findings contribute to the understanding of sociocultural and play-based pedagogy by illustrating how several pedagogical principles operated together within L-STEAM play. Vygotsky's emphasis on social mediation helps explain the importance of interaction and meaningful contexts. The concept of scaffolding provides a basis for understanding responsive support. Sustained Shared Thinking helps explain collaborative meaning-making, while play pedagogy provides a perspective on connecting children's play experiences with conceptual learning. The present study does not propose a new theory or replace these existing perspectives. Instead, it provides an empirically grounded understanding of how related pedagogical principles appeared as interconnected practices within the educational context examined.

From a practical perspective, the findings suggest that professional development should move beyond a narrow focus on individual teaching techniques. Teachers may benefit from developing their capacity to create meaningful play contexts, interpret children's responses, adjust support, sustain pedagogical interactions, make contextual decisions, and facilitate children's reflection on learning experiences. This implication is particularly relevant to L-STEAM implementation. The integration of literacy, science, technology, engineering, arts, and mathematics does not by itself ensure meaningful learning. The pedagogical value of L-STEAM activities also depends on how teachers respond to children's participation and connect planned learning experiences with the situations that emerge during play.

Conceptual Contribution of the Study

The study offers an empirically grounded conceptual understanding of teacher pedagogical practices in L-STEAM play. This understanding consists of five interconnected practices: creating a meaningful play context, adapting scaffolding to children's needs, building pedagogical interactions, responding through pedagogical decisions, and supporting children's learning reflection. This conceptual understanding is derived from the particular qualitative case examined in the study. It should not be interpreted as a universal model or a fixed sequence of pedagogical stages. Its contribution lies in clarifying how different pedagogical practices were interconnected within the implementation of L-STEAM play. Future research may examine whether similar relationships emerge in different early childhood education settings and other forms of play-based or STEAM-oriented learning. Further studies may also explore how contextual factors influence the ways teachers enact these interconnected pedagogical practices.

CONCLUSION

This study explored teacher pedagogical practices in L-STEAM play within an early childhood education setting through a qualitative case study. The findings indicate that teachers' pedagogical practices extended beyond the use of individual teaching strategies. Instead, pedagogical practice involved interconnected and responsive processes through which teachers created learning conditions, interpreted children's participation, adjusted their support, developed interactions, responded to emerging situations, and supported children in reflecting on their learning experiences.

Five interconnected pedagogical practices were identified: creating a meaningful play context, adapting scaffolding to children's needs, building pedagogical interactions, responding through pedagogical decisions, and supporting children's learning reflection. These practices did not operate as separate stages or fixed procedures. Teachers moved between them in response to children's ideas, needs, difficulties, and emerging learning opportunities during L-STEAM play. This interconnected relationship provides an empirically grounded understanding of how teachers supported children's participation and learning within the case examined.

The findings also indicate that these pedagogical practices collectively supported the emergence of children's creative behavior. Within L-STEAM play, children were provided with opportunities to explore materials, generate and express ideas, consider different possibilities, respond to problems, experiment with alternative approaches, and communicate their thinking. Creative behavior therefore emerged within the learning process through children's active participation rather than as a predetermined outcome of a single teaching strategy. Teachers supported this process by creating meaningful contexts, providing adaptive support, sustaining pedagogical interactions, responding to emerging situations, and encouraging children to revisit and communicate their learning experiences.

The study contributes an integrated understanding of teacher pedagogical practices in L-STEAM play. Rather than treating scaffolding, interaction, pedagogical decision-making, and reflection as separate aspects of teaching, the findings illustrate how these practices were interconnected within authentic classroom activities. This understanding is grounded in the particular qualitative case investigated and should not be interpreted as a universal model or a fixed sequence of pedagogical stages.

From a practical perspective, the findings suggest that teacher professional development should extend beyond training in individual instructional techniques. Professional learning may strengthen teachers' capacity to create meaningful play contexts, interpret children's responses, adapt scaffolding to emerging needs, build pedagogical interactions, make responsive pedagogical decisions, and support children's learning reflection. Such capacities may strengthen the implementation of child-centered L-STEAM play and create broader opportunities for children's exploration, participation, problem-solving, and creative behavior.

This study was conducted within a single early childhood education setting, and the findings should therefore be interpreted within the context of the case examined. Future research may investigate whether similar interconnected pedagogical practices emerge in other early childhood settings, cultural contexts, and forms of play-based or STEAM-oriented learning. Comparative case studies may provide further insight into how contextual conditions influence the enactment of these pedagogical practices and their relationship with children's learning and creative behavior.

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