Systems Thinking Implementation in Early Childhood Education: A Case Study at TK IT Asyifaiyah, Kuningan Regency

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ABSTRACT

The role of early childhood education (PAUD) in the era of globalization is crucial in shaping children's character to be moral and virtuous, creative, innovative, and competitive. PAUD is not merely about improving knowledge and skills related to scientific fields but rather about preparing children to be able to master various challenges in the future. Innovation in PAUD learning is not only related to the use of digital technology, but also includes updating learning approaches, methods, and strategies that are appropriate to the characteristics of early childhood. Systems thinking in PAUD learning is highly relevant because child development is a holistic process. Cognitive, motor, socio-emotional, language, and religious/moral values do not develop separately, but rather influence each other. The program implementation method employs a descriptive qualitative approach, aiming to describe the process of implementing systems thinking in PAUD learning. The implementation of systems thinking at TK IT Asyifaiyah, Kuningan Regency, has a positive impact on the quality of PAUD learning. The implementation of systems thinking has been proven to be able to provide holistic and contextual learning in PAUD so that it has a positive impact on students, including children being more active and critical in asking questions and telling stories, children's social skills developing through interrelated group activities, teacher motivation increasing because they have a more systematic framework of thinking, and collaboration between teachers and parents increasing, especially in supporting thematic learning activities.

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INTRODUCTION

Education is a fundamental instrument in building human and national civilization. Through education, individuals acquire not only knowledge but also the skills, attitudes, and values necessary to contribute to social, economic, and cultural life. In the context of Indonesian national development, education plays a strategic role, as stipulated in Law Number 20 of 2003 concerning the National Education System, which states that the goal of education is to develop students' potential to become faithful individuals, pious, have noble character, are healthy, knowledgeable, capable, creative, independent, and become democratic and responsible citizens (Nasional, 2003).

The role of early childhood education (PAUD) in this era of globalization is crucial in shaping children's character to be morally and ethically sound, creative, innovative, and competitive (Lestari, 2021). Learning in PAUD goes beyond simply enhancing knowledge and skills related to academic fields, but rather prepares children to be able to master the various challenges of the future (Alvarez, 2020; Casnan, Purnawan, et al., 2022b). Early Childhood Education (PAUD) is not simply a process of filling the brain with as much information as possible, but rather a process of cultivating, nurturing, motivating, and providing an environment that allows children to develop their potential to the fullest (Heong et al., 2020; Widiastuti et al., 2022; Yusuf et al., 2020).

In practice, early childhood education (PAUD) plays a crucial role as the initial foundation for lifelong education. Early childhood, the age range of 0–6, is often referred to as the golden age because at this stage, a child's brain development reaches approximately 80% of its maximum capacity. The stimulation provided during this phase will determine the quality of the child's subsequent development. Therefore, PAUD institutions serve not only as childcare centers but also as a vehicle for the formation of personality foundations, the instillation of moral values, cognitive development, and social and emotional skills (Batubara et al., 2022; Parwati & Suharta, 2020; Wangchuk, 2021).

The Early Childhood Education (PAUD) learning process, through the concepts of inclusive education and differentiated learning, can provide appropriate stimulation during this phase, thus determining the quality of the child's subsequent development (Al-Farisi et al., 2022; Panergayo et al., 2022; Yusuf et al., 2020). The concept of inclusion is an approach that aims to create an open environment for individuals with diverse backgrounds and conditions. This encompasses various aspects such as character, physical condition, personality, social status, ethnicity, culture, and so on. Inclusive schools have the potential to provide a strong foundation for shaping children's character and developing their talents (Panergayo et al., 2022; Pujawan et al., 2022). Differentiated learning is designed to keep students challenged and engaged in the learning process. The concept of differentiated learning encompasses three main criteria: content differentiation, process differentiation, and product differentiation. Content differentiation focuses on different learning materials tailored to students' learning readiness levels, interests, or learning styles. Process differentiation involves learning methods tailored to individual student needs, such as providing guiding questions or using flexible grouping. Product differentiation refers to varying tasks or products provided to students according to their interests and abilities (Hasibuan & Hasanah, 2022; Revilla et al., 2022; Roza et al., 2022).

As the challenges of the 21st century evolve, education is required to prepare a generation that is not only intellectually intelligent but also adaptive, creative, collaborative, and capable of critical thinking. Critical and creative thinking skills are essential in addressing the complexity of global issues, ranging from environmental and social issues to technological and cultural ones. In the context of Early Childhood Education (PAUD), although children are not yet required to master formal academic skills in

depth, they must be introduced to mindsets that build the foundation for 21st-century skills (Roza et al., 2022). One relevant approach to addressing this need is Systems Thinking (Casnan, Purnawan, et al., 2022b).

Educational innovation is a necessity to address the challenges of modern development. Innovation in PAUD learning is not only related to the use of digital technology but also includes updating learning approaches, methods, and strategies that are appropriate to the characteristics of early childhood. Innovation in PAUD must be able to create a learning environment that is fun, safe, and rich in experiences, so that children can develop optimally (Roza et al., 2022).

An integrative thematic approach has been widely used in PAUD learning to connect various areas of child development into a single theme. However, the implementation of this approach is often partial and does not demonstrate the deep connections between aspects. Therefore, a framework is needed that can integrate various learning components systematically, comprehensively, and sustainably. Systems thinking offers a solution to integrate these components (Dian et al., 2022).

In early childhood education, systems thinking is highly relevant because child development is holistic. Cognitive, motor, socio-emotional, language, and religious/moral aspects do not develop in isolation but rather influence each other. For example, a child's fine motor skills influence writing ability, which in turn influences communication skills and self-confidence (Yudha & Wardaya, 2023).

By using systems thinking, teachers can design lessons that emphasize the interconnectedness between these aspects. For example, in the theme "Plants," children are not only introduced to plant species but also encouraged to care for plants (motor skills), learn to be grateful for God's creation (affective skills), discuss the benefits of plants (cognitive and language skills), and collaborate in groups (social skills). This way, learning becomes more meaningful and integrative (Triwahyuni et al., 2025).

METHOD

The community service program was conducted at TK IT Asyifaiyah, an integrated Islamic-based early childhood education (PAUD) institution in Kuningan Regency, West Java. This school's vision is to create a generation of intelligent, noble, and competitive Muslims. The program implementation method employs a descriptive qualitative approach, aiming to describe the process of implementing systems thinking in PAUD learning (Casnan, 2021; Rijali, 2019). The implementation of systems thinking in the learning process for early childhood was carried out by 4 teachers to 34 students at TK IT Asyifaiyah. The implementation of community service is carried out through several stages: the first stage, preparing an Early Childhood Education (PAUD) learning implementation plan using a systems thinking approach. The second stage involves implementing systems thinking in the early childhood learning process, as well as the process of collecting data and documenting activities. The final stage is compiling a scientific article report on the community service (Casnan, Purnawan, et al., 2022b).
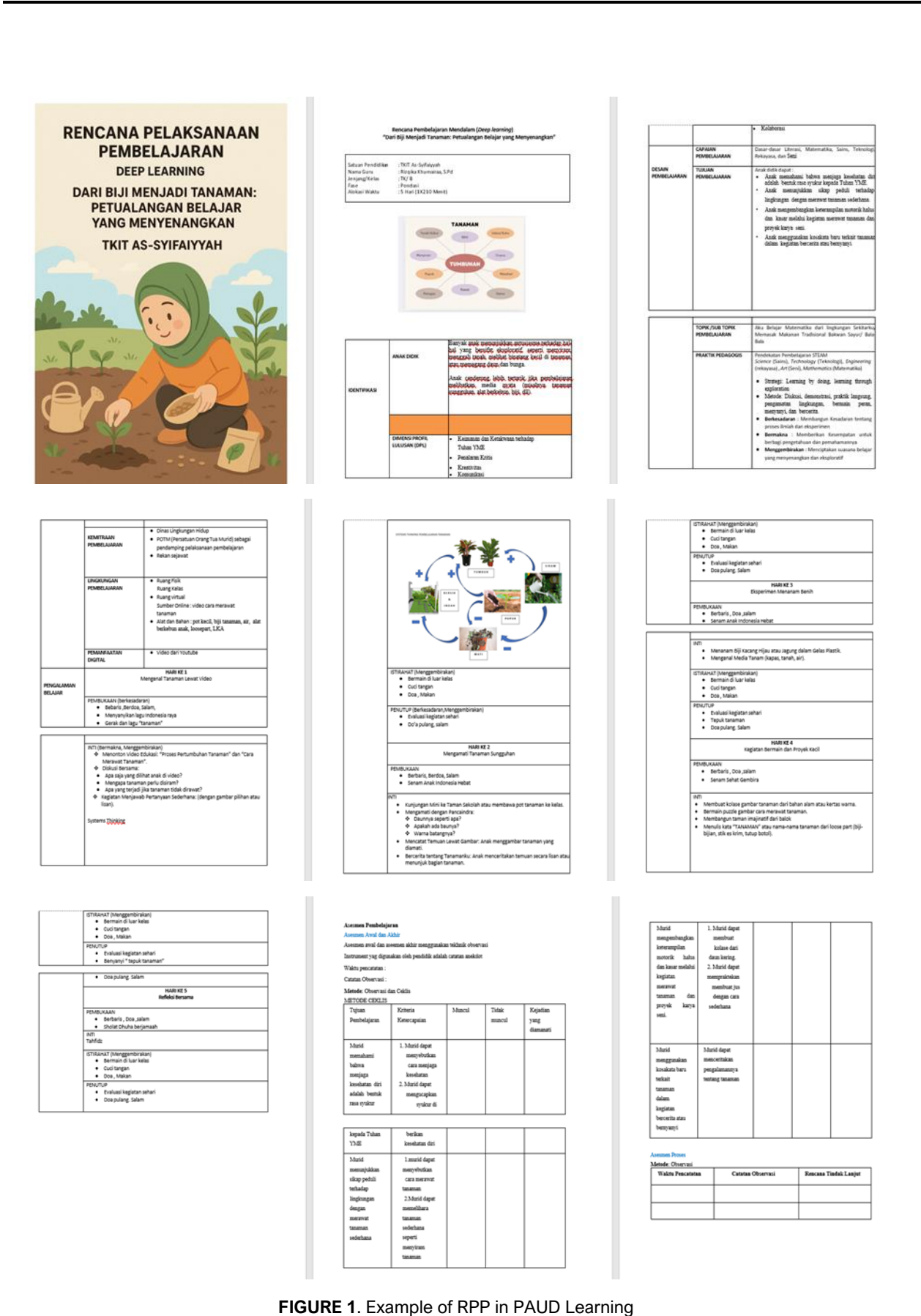
RESULTS AND DISCUSSION

Learning Innovation with a Systems Thinking Approach

Early Childhood Education (PAUD) is a crucial foundation for children's character, cognitive, social, and emotional development. During the early years (0–6 years), children are in a golden age of development, where appropriate stimulation will significantly impact their future quality of life. Therefore,

an innovative, adaptive, and contextual learning approach is needed to holistically develop children's full potential (Casnan, Hadiana, et al., 2023; A. Hidayat, 2022). One relevant innovative approach is systems thinking. Systems thinking is a framework that emphasizes the interconnectedness of elements within a comprehensive system. In the context of education, particularly PAUD, systems thinking helps educators design learning that focuses not only on one aspect but also considers the interconnectedness between cognitive, affective, motor, social, and environmental aspects of the child's learning (Casnan, Purnawan, et al., 2022a; Pasqualotto et al., 2021; Polo-Blanco et al., 2022).

Every child has different needs and characteristics. Lesson Plans (RPPs) assist teachers in designing learning activities that align with the principles of developmentally appropriate practice (DAP), namely activities tailored to the child's age, interests, abilities, and experiences (Diputera et al., 2022; Marlina et al., 2020; Triwahyuni et al., 2023). This is crucial to ensure that learning in PAUD is neither too overwhelming nor too simple. A Lesson Implementation Plan (RPP) is a crucial instrument in the implementation of education, including at the Early Childhood Education (PAUD) level. In PAUD, the RPP typically takes the form of a Daily Lesson Implementation Plan (RPPH) or a Weekly Lesson Implementation Plan (RPPM). This document contains a systematically designed set of learning activities aligned with the curriculum and the child's developmental stage (Naim, 2020; Rahmi & Hijriati, 2021; Triwahyuni et al., 2025).

The lesson plan (RPP) serves as a guide for teachers' work. Without careful planning, learning activities can be spontaneous, unfocused, or even deviate from the learning objectives. With a lesson plan (RPP), teachers have a reference point for objectives, materials, methods, media, and daily steps (Casnan, Triwahyuni, et al., 2022; Naim, 2020). A draft lesson plan for early childhood education (PAUD) that implements systems thinking is shown in Figure 1.

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FIGURE 1. Example of RPP in PAUD Learning

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Creating lesson plans trains teachers to think systematically, creatively, and in a structured manner. Teachers are required to adapt activities to the child's actual conditions, choose appropriate methods, and use a variety of learning media (Asrul et al., 2014; Sari, 2017). This will improve the competence and professionalism of early childhood education teachers. In education, systems thinking can be understood as an approach that views the teaching and learning process as a system consisting of many elements. The application of systems thinking enables teachers to understand the patterns of relationships between elements, identify the root causes of learning problems, and design more effective and sustainable strategies (Casnan, Purnawan, et al., 2022c, 2022b; Firmansyah, 2020; Triwahyuni et al., 2025). An example of systems thinking designed in an early childhood education lesson plan is shown in Figure 2.
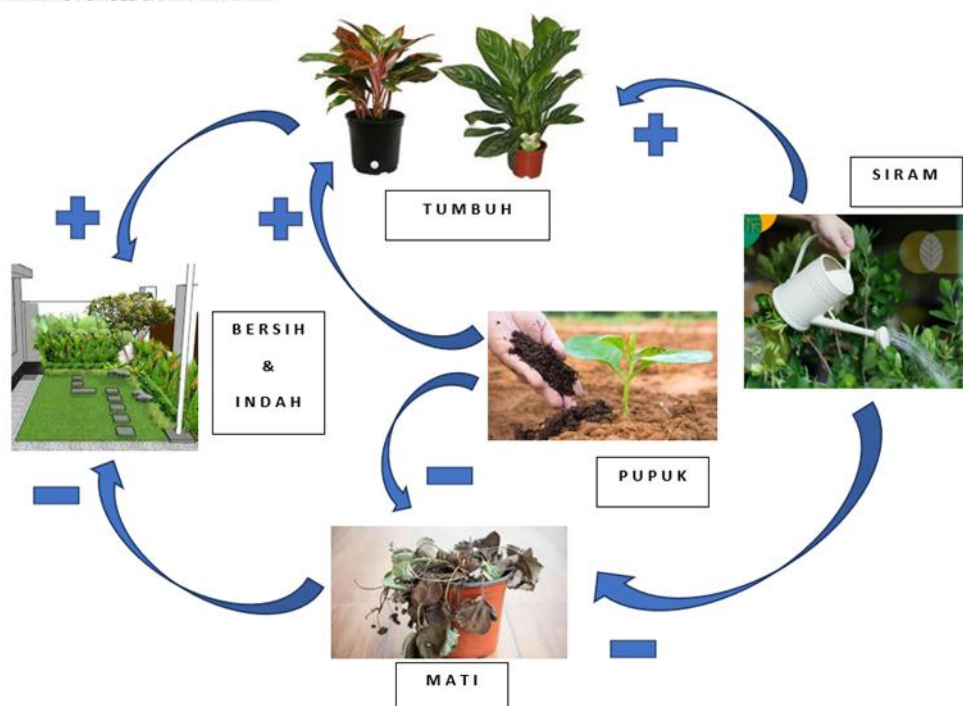

FIGURE 2. Systems Thinking in Early Childhood Education Learning

Early Childhood Education (PAUD) emphasizes the development of six main aspects: religious and moral values, physical-motor skills, cognitive skills, language skills, socio-emotional skills, and the arts (A. Hidayat, 2022; Triwahyuni et al., 2025). Lesson plans (RPPs) help teachers integrate all these aspects into interrelated thematic activities, ensuring a holistic and meaningful learning experience for children. They also serve as evaluation tools. Through RPPs, teachers can compare learning plans and implementation (Naim, 2020). They can assess whether learning objectives are achieved, activities are proceeding according to plan, and identify any obstacles. This evaluation is crucial for future improvements. RPPs help maintain continuity between daily, weekly, and semester learning activities. This ensures that children's development can be monitored consistently and in line with developmental milestones (Casnan, Hadiana, et al., 2023; Triwahyuni et al., 2025).

Implementation of Systems Thinking in Early Childhood Learning

Early Childhood Education (PAUD) is the primary foundation for a child's overall development. During

this early age, children experience a golden age, where brain capacity develops rapidly, reaching 80% before the age of 6. This period cannot be repeated, making appropriate stimulation crucial. In practice, the learning process at PAUD still faces many challenges, including: Learning is still academically centered; based on previous research data, several PAUD institutions still emphasize reading, writing, and arithmetic (calistung) without considering the child's overall developmental needs (Hastuti, 2017; Yudha & Wardaya, 2023). Lack of variety in approaches; learning is often monotonous, lacking innovation, and lacking exploration that encourages children's creativity. Limited integration between developmental aspects; learning activities only focus on one aspect (e.g., cognitive), while socio-emotional, motoric, and moral aspects have not been well integrated. Minimal parental involvement in the learning process results in suboptimal child development, even though child development is not only determined by the school, but also by the family. Learning innovation is urgently needed so that PAUD can produce a generation that is not only cognitively intelligent but also possesses critical thinking skills, collaborative skills, and has social and emotional sensitivity (Dewi et al., 2023; Sokhibah & Komalasari, 2015; Yudha & Wardaya, 2023).

Systems thinking is a way of thinking that views the world as a network of interconnected relationships, rather than as separate parts. In his book, The Fifth Discipline, systems thinking is the fifth discipline in a learning organization, emphasizing the importance of seeing the whole rather than just the parts (A. Hidayat, 2022).

TK IT Asyifaiyah is an integrated Islamic-based early childhood education (PAUD) institution in Kuningan Regency, West Java. This school's vision is to develop a generation of intelligent, noble, and competitive Muslims. In recent years, Asyifaiyah IT Kindergarten has implemented various learning innovations, including integrating Islamic values with a thematic approach. However, the school recognizes that today's educational challenges are increasingly complex, necessitating a more comprehensive approach. Therefore, implementing systems thinking is considered a strategic step to strengthen learning innovation at Asyifaiyah IT Kindergarten. Systems thinking is expected to increase synergy between teachers, children, and parents, as well as create more holistic, integrative, and contextual learning.

In education, systems thinking can be understood as an approach that views the teaching and learning process as a system consisting of many elements: children, teachers, curriculum, learning environment, parents, and school culture. All of these elements are interconnected and influence each other. The application of systems thinking enables teachers to understand the patterns of relationships between these elements, identify the root causes of learning problems, and design more effective and sustainable strategies (Bui & Baruch, 2010; Casnan, Purnawan, et al., 2022b; Triwahyuni et al., 2025). The implementation of system thinking in PAUD learning at TK IT Asyifaiyah, Kuningan Regency, is shown in Figure 3.

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FIGURE 3. Practice Using Tools

The implementation of systems thinking in early childhood education makes the learning process more engaging and interactive. Observations show that when teachers at Asyifaiyah Kindergarten begin implementing systems thinking, they integrate various learning aspects within a specific theme. For example, under the theme "Plants," teachers encourage children to: Observe the environment and schoolyard for plants (motor and social skills); Discuss the importance of environmental protection (cognitive and affective skills); Connect the interrelationships between elements through systems thinking in learning about plants (creativity); and share their experiences in front of the class (language skills).

The implementation of systems thinking demonstrates the interconnectedness of learning components, which are mutually supportive, not fragmented. Teachers are also trained to understand cause-and-effect patterns and feedback loops in children's learning processes (Farooq et al., 2007; Mentesogullari, 2023; Raharjo & Yuliana, 2016).

Systems Thinking is an approach that emphasizes the interconnectedness of components, relationship patterns, and the dynamics that influence each other within a system. In the context of Early Childhood Education (PAUD) (A. Hidayat, 2022), this approach is highly relevant because:

▪ Integrative learning

Systems thinking enables various aspects of child development (cognitive, language, motor skills, social-emotional, religious values, and the arts) to be designed within a single, interrelated activity.

▪ Critical and holistic thinking

The implementation of systems thinking trains children from an early age to see simple cause-and-effect relationships, interconnected patterns, and understand the environment holistically. For example, through the theme "Plants," children learn about the functions of plants, how to care for them by watering and fertilizing them, how to maintain cleanliness, and the religious value of gratitude for God's creation.

▪ Encourages sustainable learning

Systems thinking helps teachers design continuous learning from one theme to another, so that children receive a consistent learning experience.

- Supports character building

The implementation of systems thinking in the learning process through systems interconnections helps children understand the importance of cooperation, empathy, and responsibility.

Kuningan Regency in West Java has unique characteristics with strong cultural potential, religiosity, and local wisdom. This can be an important asset for contextualizing a systems thinking approach in early childhood education. Local arts and cultural traditions such as wayang golek, regional dances, and traditional games can be integrated into systems-based learning, allowing children to learn historical values as well as motor and social skills. Kuningan is known as a religious area. Religious values can be integrated into thematic learning so that children learn from an early age about morals, honesty, gratitude, and caring for others. The Kuningan community has a tradition of cooperation and a strong environmental awareness, for example, in protecting Mount Ciremai. This can be used as teaching material to train children in systems thinking about the relationship between humans and nature. The implementation of systems thinking in early childhood education through contextualization of local potential makes learning in early childhood not only meaningful but also contextual. Children will more easily grasp concepts because they are related to their daily lives (Masruroh & Nurhayati, 2016; Nugraha, 2021).

The role of parents in early childhood education is crucial. The family environment is a child's first school, while the school is the family's partner in optimizing child growth and development. However, there is often a gap in communication and understanding between teachers and parents. A systems thinking approach can be a strategic tool for strengthening collaboration. Through systems thinking, teachers and parents can understand that child development is influenced by many interrelated factors (family, school, environment, culture, and religion) (Yudha & Wardaya, 2023). Systems thinking teaches the importance of feedback. Teachers and parents can regularly share information about their children's development, creating consistent learning strategies at school and at home. Parents not only provide administrative support but also engage in their children's learning activities, for example, by presenting local wisdom in class, assisting with simple projects at home, or sharing experiences. The role of parents and schools will build a learning ecosystem that promotes quality education (Triwahyuni et al., 2025).

Systematic implementation of systems thinking in early childhood education (PAUD) is still rarely carried out. Generally, PAUD teachers are unfamiliar with this approach due to limited training and resources. Therefore, strengthening teacher capacity is key to success.

Impact of Implementation

Children are more active and critical in asking questions and telling stories.

The application of systems thinking encourages children to see the relationship between objects, events, and daily experiences. In thematic learning, children not only receive passive information but are also invited to explore simple causal patterns. For example, during the theme of plants, children are invited to observe why plants need water and fertilizer. Implementation of Systems Thinking on the theme of plants makes children more active in asking questions like, "Why can plants wither if not watered?". Storytelling activities also increase because children feel they have a real experience they can connect. This shows critical thinking skills and child communication skills develop naturally.

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Collaboration between teachers and parents increases, especially in supporting thematic learning activities

The implementation of Systems Thinking also strengthens the relationship between the teacher and parents. In thematic learning activities, the teacher involves parents to prepare materials, support children's activities at home, or share local wisdom. For example, on the theme of plants, parents are asked to accompany children to water plants and care for plants to create the beauty of the environment.

This collaboration makes parents not only administrative supporters but also active partners in the learning process. In the end, a strong synergy will be created, children feel fully supported, the teacher is helped in expanding learning experiences, and parents feel more involved in children's development.

Teacher motivation increases because it has a more systematic frame of thinking.

PAUD teachers often face challenges in designing activities that are varied, meaningful, and appropriate to the stage of child development. With systems thinking, teachers have a more systematic frame of thinking to develop learning plans. Implementation of Systems Thinking in PAUD Learning helps teachers in integrating various aspects of development (cognitive, socio-social, language, motor, religious values, and arts) into one activity, by looking at the interrelationship between themes, so that learning is more sustainable. Arranging activities with a clear plot, not a separate activity, so that teacher motivation increases because it feels that it has a clearer direction, is more creative in designing activities, and is more confident in involving children and parents. The teacher is not only a facilitator, but also an innovator in PAUD learning.

Children's social skills develop through interrelated group activities.

Systems thinking emphasizes the importance of relationships and interactions. This is reflected in PAUD learning based on group activity, where children are trained to work together, share roles, and understand the relationship between activities. For example, when making a "mini garden" project, children share tasks: Some are planting, watering, or tidying the land. They learn that every role is interconnected for the success of a joint project. Activities like this train children to respect the opinions of friends, practice two-way communication, learn to work together for common purposes, and develop empathy when they see their friends' difficulties. The impact is that children's social skills develop faster. They not only learn individually, but are also able to place themselves in groups and understand their respective roles. In addition, the teacher reports an increase in children's learning outcomes that are more evenly distributed in various aspects of development compared to conventional methods.

The implementation of Systems Thinking in PAUD has a comprehensive positive impact. Children become more active and critical in asking questions and telling stories, collaboration between teachers and parents increases, and teacher motivation increases thanks to a systematic framework of thinking, as well as children's social skills developing through interrelated group activities (Casnan et al., 2021; Casnan, Triwahyuni, et al., 2023).

This approach is proven not only to improve the quality of learning in the classroom but also to strengthen the PAUD educational ecosystem holistically, where children, teachers, and parents move together in a system that supports each other (A. Hidayat, 2022; Yudha & Wardaya, 2023).

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FIGURE 4. Impact of Systems Thinking Implementation in Learning

The implementation of Systems Thinking has proven to be able to bring holistic and contextual learning in PAUD. Systems thinking in basic education can increase student understanding of conceptual relations. However, the success of the application is very dependent on the support of school systems, teacher competencies, and parental involvement. For this reason, a continuous strategy is needed in the form of teacher training, strengthening the communication between the school and parents, and the development of creative learning facilities (Arsiwi & Adi, 2020; Hamdi, 2020; A. S. Hidayat, 2012).

CONCLUSION

Implementation of Systems Thinking at TK IT Asyifaiyah, Kuningan Regency, has a positive impact on the quality of PAUD learning. The implementation of the thinking system is proven to be able to bring holistic and contextual learning in PAUD so that it has a positive impact on students, including children more active and critical in asking questions and telling stories, children's social skills develop through interrelated group activities, teacher motivation increases because it has a more systematic frame of thought, teacher and parents' collaboration increases especially in supporting thematic learning activities.

ACKNOWLEDGMENTS

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