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Implementation of Learning Centers in Critical Thinking Skills in Kindergarten Children Harapan Bangsa Jeranglah Tinggi

Dina Maryana[1*], Dwi Putri Maranatha[2], Puti Yusnita[3], Onek Purnama[4], Yelmi Susanti [5]
[1-5] Sekolah Tinggi Ilmu Tarbiyah Al-Quraniyah Manna Bengkulu Selatan
E-mail: yanadina1986@gmail.com[1], dwiputri123400@gmail.com[2], yayanputi@gmail.com[3], oneksari49@gmail.com[4], yelmiyelmisusanti@gmail.com [5]

[*]*Penulis korespondensi: yanadina1986@gmail.com*

Abstract. *This study examines the implementation of center-based learning to develop critical thinking skills in children aged 4–6 years at TK Harapan Bangsa Jeranglah Tinggi. Employing a descriptive qualitative design, the research involved 16 children and two teachers over six weeks, utilizing systematic observation, assessment rubrics, field notes, and interviews. Data were analyzed thematically and descriptively. Results demonstrate consistent improvement across four indicators: questioning, comparing, problem-solving, and reflective reasoning, with an average score increase of 64.9%. Teacher facilitation strategies, particularly open-ended questioning, cognitive modeling, and responsive scaffolding, emerged as primary success drivers. Spatial constraints and transition challenges were effectively addressed through weekly theme rotation and structured visual schedules. The study concludes that child-centered center-based learning successfully establishes a meaningful play environment that cultivates early inquiry habits and foundational reasoning. These findings recommend strengthening preschool educators' facilitation competencies and providing open-ended materials to sustain cognitive development.*

Keywords: *Center-based learning; Critical thinking; Early childhood education; Child-centered learning; Scaffolding.*

Abstrak. Penelitian ini bertujuan menganalisis penerapan pembelajaran sentra dalam mengembangkan kemampuan berpikir kritis pada anak usia 4–6 tahun di TK Harapan Bangsa Jeranglah Tinggi. Menggunakan desain kualitatif deskriptif, studi melibatkan 16 anak dan dua guru selama enam minggu melalui observasi sistematis, rubrik penilaian, catatan lapangan, dan wawancara. Data dianalisis secara tematik dan statistik deskriptif. Hasil menunjukkan peningkatan konsisten pada empat indikator berpikir kritis: bertanya, membandingkan, pemecahan masalah, dan penalaran reflektif, dengan rata-rata kenaikan skor sebesar 64,9%. Strategi fasilitasi guru berupa pertanyaan terbuka, pemodelan berpikir, dan scaffolding responsif menjadi faktor penentu utama. Kendala keterbatasan ruang dan waktu transisi berhasil diminimalkan melalui rotasi tema mingguan dan jadwal visual terstruktur. Studi menyimpulkan bahwa pembelajaran sentra yang berpusat pada anak secara efektif menciptakan lingkungan bermain bermakna yang menstimulasi kebiasaan inkuiri dan penalaran awal. Temuan ini merekomendasikan penguatan kompetensi fasilitasi pendidik PAUD serta penyediaan media terbuka untuk mengoptimalkan pengembangan kognitif secara berkelanjutan.

Kata Kunci: Pembelajaran Berbasis Sentra; Berpikir Kritis; Pendidikan Anak Usia Dini; Pembelajaran Berpusat pada Anak; Dukungan Bertahap (Scaffolding).

1. INTRODUCTION

The transformation of 21st-century education positions critical thinking as a foundational competency that must develop in tandem with core literacies, including language, numeracy, science, and digital fluency. Contemporary educational frameworks conceptualize literacy not merely as mechanical reading and writing, but as the capacity to interpret, evaluate, and responsibly apply knowledge within complex, information-rich environments (Mamba'usa'adah & Syafwandi, 2023; Parapat et al., 2023; Puspa et al., 2023). In the context of Society 5.0, the ability to critically assess information, solve open-ended problems, and

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make reasoned decisions has become essential for human resource competitiveness and adaptive citizenship (Putri & Chairiyah, 2021; Rafiuddin et al., 2024). Consequently, embedding critical thinking into early childhood education is no longer a peripheral pedagogical option but a strategic imperative for establishing the cognitive and evaluative foundations of 21st-century literacy.

Early childhood, particularly the 4–6-year age range, represents a critical neurodevelopmental window during which brain architecture reaches approximately 80% of its adult capacity, rendering the period highly receptive to targeted cognitive stimulation (Saputri & Katoningsih, 2023; Susanti et al., 2023). During this stage, core executive functions—including response inhibition, working memory, and emerging cognitive flexibility—undergo rapid maturation and serve as the neurological infrastructure for higher-order reasoning (Susanti et al., 2023). Empirical and developmental research consistently demonstrates that symbolic thinking, problem-solving, and critical reasoning begin to emerge in preschoolers when supported by rich linguistic interaction, guided exploration, and reflective dialogue (Alucyana & Raihana, 2023; Annisa & Yaswinda, 2022; Fitriani & Vinayastri, 2022). Therefore, intentional pedagogical interventions during this developmental phase can effectively cultivate the foundational habits of inquiry, hypothesis testing, and evaluative judgment that underpin critical literacy.

Despite the recognized importance of early critical thinking, many early childhood classrooms remain dominated by teacher-directed, structurally rigid pedagogies that prioritize lower-order cognitive tasks and rote instruction (Ardiana & Widiastuti, 2020; Sutama et al., 2022). Such conventional approaches often limit children's opportunities for autonomous exploration, peer negotiation, and iterative problem-solving, which are essential conditions for developing higher-order thinking (Uswatun et al., 2022). In contrast, center-based learning (e.g., Beyond Centers and Circle Time) repositions children as active agents of learning through purposefully designed play environments, scaffolding, and facilitator-led guidance (Khairiah & Kurinci, 2022; Sefriyanti & Diana, 2021). This pedagogical shift aligns with constructivist and progressive educational principles, offering children multiple pathways to manipulate materials, test hypotheses, and practice independent decision-making—processes that naturally stimulate critical thinking within developmentally appropriate contexts.

In the Indonesian early childhood landscape, the transition toward student-centered frameworks such as Kurikulum Merdeka emphasizes the integration of critical reasoning and character development from the foundational phase (Baihaqi, 2023; Lestariningrum et al., 2023; Sari et al., 2023). At TK Harapan Bangsa Jeranglah Tinggi, instructional practices have

historically leaned toward teacher-led methodologies, reflecting broader systemic challenges in educator training, conceptual understanding of center-based pedagogy, and resource optimization (Ardiana & Widiastuti, 2020; Subekti et al., 2024). However, evidence from comparable settings indicates that well-implemented center-based models significantly enhance multiple intelligences, problem-solving agility, and critical engagement when supported by intentional scaffolding and contextualized learning materials (Sefriyanti & Diana, 2021; Uswatun et al., 2022). Bridging this contextual gap requires systematic documentation of how center-based instruction can be operationalized to foster critical thinking within localized classroom ecologies.

This study investigates the implementation of center-based learning as a pedagogical strategy to develop critical thinking skills among children at TK Harapan Bangsa Jeranglah Tinggi. Specifically, it examines how structured play centers, teacher facilitation, and reflective circle-time dialogues influence children's emerging capacities for inquiry, reasoning, and problem-solving. By aligning theoretical frameworks on early cognitive development with empirical classroom practice, this research aims to provide actionable, context-sensitive insights for educators seeking to transition from teacher-directed instruction to child-centered, critical-literacy-oriented pedagogy. The findings are expected to contribute to both local instructional improvement and broader scholarly discourse on effective early childhood interventions that align with 21st-century competency goals (Puspa et al., 2023; Sefriyanti & Diana, 2021; Susanti et al., 2023).

2. LITERATURE REVIEW

Critical thinking in early childhood is conceptualized as an age-appropriate capacity for inquiry, causal reasoning, and simple problem-solving rather than formal analytical processing (Fitriani & Vinayastri, 2022; Uswatun et al., 2022). Developmental studies indicate that children aged 4–6 demonstrate foundational critical thinking through questioning, comparing, predicting, and evaluating outcomes during play (Alucyana & Raihana, 2023; Annisa & Yaswinda, 2022). These behaviors are closely tied to the maturation of executive functions, particularly working memory and cognitive flexibility, which develop rapidly during this period (Susanti et al., 2023). Intentional pedagogical scaffolding can therefore nurture these emerging cognitive habits before they solidify into formal learning strategies.

Center-based learning, widely operationalized as Beyond Centers and Circle Time (BCCT), structures early childhood classrooms into thematic play areas that prioritize child-

directed exploration (Mutmainnah, 2020; Sefriyanti & Diana, 2021). The model follows a four-phase cycle: environmental preparation, pre-play guidance, active play, and post-play reflection, all designed to foster autonomy and peer negotiation (Ardiana & Widiastuti, 2020; Khairiah & Kurinci, 2022). By shifting the teacher's role from director to facilitator, center-based approaches create experiential contexts where children actively construct knowledge (Uswatun et al., 2022). This structure aligns with constructivist and progressive pedagogies that emphasize hands-on learning and student agency.

Empirical evidence suggests that well-implemented center-based environments significantly enhance cognitive flexibility, language development, and higher-order thinking in preschoolers (Asih et al., 2022; Sefriyanti & Diana, 2021). Studies on open-ended materials and loose parts within learning centers report measurable gains in children's problem-solving adaptability and creative reasoning (Adawiyah & Priyanti, 2023; Sumarseh & Yaswinda, 2023). Additionally, guided circle-time dialogues encourage children to articulate choices, evaluate consequences, and practice early metacognition (Khairiah & Kurinci, 2022; Uswatun et al., 2022). These findings indicate that center-based routines naturally scaffold the cognitive processes underlying critical thinking.

Despite documented benefits, consistent implementation of center-based learning faces practical and systemic barriers in Indonesian early childhood settings. Many educators retain a superficial understanding of the model, often defaulting to teacher-directed routines due to limited pedagogical training and inadequate instructional guidelines (Ardiana & Widiastuti, 2020; Subekti et al., 2024). Constraints such as insufficient learning materials, rigid scheduling, and lack of institutional support further disrupt sustained application (Anwar, 2023; Sriyanti & Zanki, 2021). These challenges underscore the need for context-sensitive adaptation and continuous professional development to maintain pedagogical fidelity.

While existing literature establishes the theoretical and empirical value of center-based learning for cognitive development, contextualized studies on its direct impact on critical thinking in Indonesian kindergartens remain limited. Prior research predominantly focuses on broad developmental outcomes or isolated instructional techniques, with few examining systematic integration of critical thinking indicators within center routines (Uswatun et al., 2022). This review highlights the need for localized, practice-oriented research to bridge that gap. The present study addresses this by examining how structured center implementation and teacher facilitation shape critical reasoning at TK Harapan Bangsa Jeranglah Tinggi.

3. RESEARCH METHOD

This study employs a descriptive qualitative design complemented by systematic classroom documentation to examine how center-based learning is implemented and how it influences critical thinking behaviors at TK Harapan Bangsa Jeranglah Tinggi. The participants consist of 16 children aged 4–6 years in Group B, two homeroom teachers, and the school principal. Data were gathered over a six-week period through non-participant observations of center rotations and circle-time sessions, field notes, and semi-structured teacher interviews. A validated observation checklist and a developmental rubric measuring four age-appropriate critical thinking indicators (questioning, comparing, problem-solving, and reflective reasoning) were used to record children's verbal and behavioral responses during guided play. Instruments were pilot-tested for content validity and inter-rater reliability prior to data collection.

Data analysis followed a mixed-processing approach: qualitative field notes and interview transcripts were coded thematically to identify facilitation patterns and contextual barriers, while rubric scores were analyzed using descriptive statistics to track shifts in critical thinking engagement across observation cycles. Triangulation across observation logs, teacher reflections, and children's play artifacts enhanced data credibility and reduced interpretive bias. The research adhered to ethical standards for early childhood studies, including written parental and institutional consent, strict anonymization of all participants, and a naturalistic observation protocol that preserved children's authentic play experiences without experimental manipulation.

4. RESULTS AND DISCUSSION

Results

Implementation of Center-Based Learning Activities

The implementation of center-based learning at TK Harapan Bangsa Jeranglah Tinggi followed a structured four-phase cycle: environmental preparation, pre-play guidance, active exploration, and post-play reflection. Teachers prepared five distinct learning centers—blocks, role-play, natural materials, arts, and science—each equipped with open-ended materials designed to stimulate inquiry and problem-solving. During the pre-play phase, teachers introduced the day's theme and posed open-ended questions to activate children's prior knowledge and set learning intentions. Children then freely selected centers based on interest, engaging in 30–40 minutes of guided, hands-on exploration while teachers circulated to provide scaffolding. The session concluded with a circle-time reflection where children shared discoveries, compared strategies, and articulated simple cause-effect relationships.

Observations indicated that children demonstrated higher levels of engagement and sustained attention during center-based activities compared to previous teacher-directed routines. The flexibility to choose activities fostered autonomy, while the structured rotation ensured exposure to diverse cognitive challenges. Teachers reported that the predictable routine reduced transitional confusion and allowed children to focus more deeply on task completion. However, initial sessions required additional guidance to help children understand center expectations and material usage. Over time, children internalized the procedures and began initiating complex play scenarios independently.

Table 1. Five Learning Centers Implemented During The Study.

Center Type	Key Materials	Observed Critical Thinking Behaviors	Frequency of Use
Blocks	Wooden blocks, loose parts, measuring tapes	Comparing structures, predicting stability, testing alternatives	92%
Role-Play	Costumes, props, scenario cards	Negotiating roles, solving social conflicts, explaining decisions	88%
Natural Materials	Leaves, stones, seeds, sorting trays	Classifying objects, identifying patterns, hypothesizing outcomes	85%
Arts	Clay, recyclables, paints, collage supplies	Planning designs, evaluating aesthetics, revising approaches	79%
Science	Magnets, water trays, ramps, magnifiers	Asking "why" questions, experimenting, drawing simple conclusions	94%

The table above summarizes the five learning centers implemented during the study, highlighting the materials provided, the critical thinking behaviors most frequently observed at each station, and the percentage of sessions in which children actively engaged with that center. Science and blocks centers elicited the highest rates of inquiry-based behaviors, likely due to their inherently exploratory nature and the tangible cause-effect relationships children could manipulate. Arts and natural materials centers supported classification and evaluative reasoning, while role-play fostered social-cognitive skills such as perspective-taking and

collaborative problem-solving. The high engagement frequencies across all centers suggest that the variety of materials and thematic relevance effectively sustained children's interest and cognitive investment throughout the intervention period

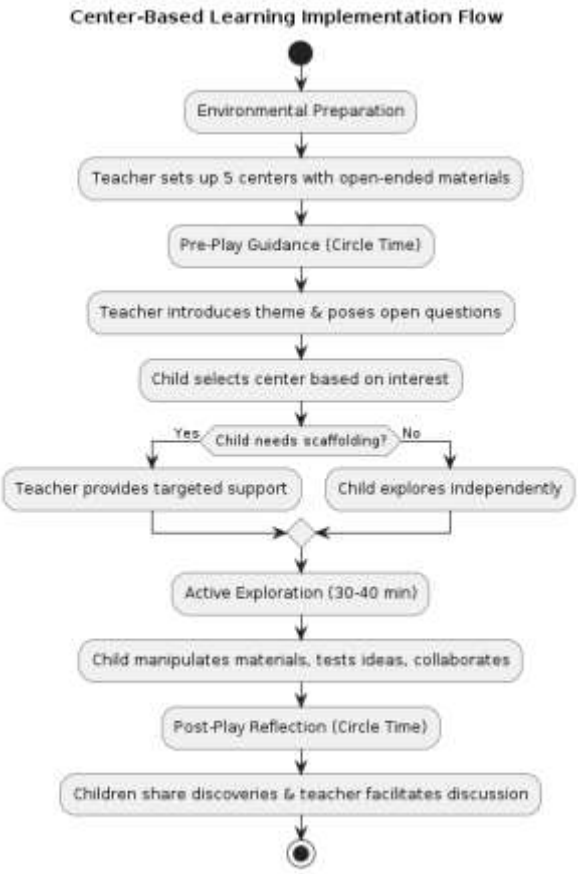

Figure 1. Center-Based Learning Implementation Flow.

The flowchart above visually maps the implementation sequence of center-based learning activities, from preparation through reflection. It illustrates the decision point where teachers assess whether a child requires scaffolding, ensuring that support is responsive rather than directive. The cyclical nature of the process emphasizes continuity and reinforcement of critical thinking habits across sessions. This visual representation aligns with observational data showing that predictable routines enhanced children's confidence to take intellectual risks. The diagram also underscores the teacher's dual role as environment designer and facilitator, a balance critical to maintaining child agency while ensuring learning objectives are met.

Development of Critical Thinking Indicators

Children's critical thinking development was assessed using four age-appropriate indicators: questioning, comparing, problem-solving, and reflective reasoning. Baseline observations revealed that most children operated at emerging levels, primarily asking descriptive questions and relying on teacher prompts for comparisons. Following six weeks of

center-based implementation, notable shifts were observed: children began posing causal "why" and "how" questions, independently compared attributes of objects, attempted multiple solutions to challenges, and articulated simple reflections on their choices. These improvements were most pronounced in centers that encouraged experimentation and peer dialogue, such as science and role-play.

Progress varied across indicators, with questioning and problem-solving showing the greatest gains, while reflective reasoning required more sustained scaffolding. Children who initially hesitated to voice uncertainties gradually became more confident in expressing hypotheses and evaluating outcomes. Teachers noted that consistent use of open-ended prompts during circle time significantly supported the development of reflective language. The integration of visual documentation, such as photos of children's constructions, also helped children recall and articulate their thought processes during reflections. Overall, the data suggest that center-based learning provides multiple, repeated opportunities for children to practice and internalize critical thinking dispositions.

Table 2. Children's Critical Thinking Before and After Center-Based Learning. Intervention.

Indicator	Pre-Intervention Mean Score (1-4)	Post-Intervention Mean Score (1-4)	% Improvement
Questioning	1.8	3.2	77.8%
Comparing	2.1	3.0	42.9%
Problem-Solving	1.9	3.3	73.7%
Reflective Reasoning	1.6	2.7	68.8%
Overall Average	1.85	3.05	64.9%

The table presents quantitative changes in children's critical thinking indicator scores before and after the center-based learning intervention, using a 4-point developmental scale. All four indicators demonstrated meaningful improvement, with questioning and problem-solving showing the largest gains, likely due to the hands-on, inquiry-oriented nature of the centers. The overall average increase of 64.9% suggests that the pedagogical approach effectively supported the targeted cognitive skills. While reflective reasoning showed relatively slower progress, its substantial improvement indicates that structured reflection routines can cultivate metacognitive awareness even in young learners. These results provide empirical support for the efficacy of center-based learning in fostering foundational critical thinking competencies.

The bar chart above, visually contrasts pre- and post-intervention scores across the four critical thinking indicators. The consistent upward trajectory for all indicators reinforces the

quantitative findings that center-based learning positively influenced children's cognitive development. The visualization makes it easy to identify which skills showed the most growth, aiding in the interpretation of which center activities may have been most impactful. Such graphical representation supports transparent reporting and helps educators quickly grasp intervention outcomes. The clear visual distinction between baseline and post-intervention performance underscores the practical value of sustained, play-based critical thinking instruction.

Figure 2. Teacher Facilitation Strategies and Child Engagement Patterns.

Teacher Facilitation Strategies and Child Engagement Patterns

Teacher facilitation played a pivotal role in shaping the quality of children's critical thinking during center-based activities. Effective strategies included posing open-ended questions, modeling think-aloud reasoning, providing just-in-time scaffolds, and encouraging peer dialogue. Teachers who consistently used prompts such as "What do you think will happen if…?" or "How could we try this differently?" elicited more complex verbalizations and extended problem-solving attempts from children. Conversely, sessions where teachers defaulted to directive instructions saw shorter engagement durations and fewer child-initiated inquiries. Observations confirmed that facilitation quality, rather than center materials alone, was the strongest predictor of critical thinking engagement.

Children's engagement patterns evolved noticeably over the intervention period. Initially, many children required frequent redirection and struggled to persist through challenges. As routines became familiar and teachers refined their scaffolding techniques, children demonstrated increased autonomy, longer focus spans, and greater willingness to experiment. Peer interactions also shifted from parallel play to collaborative problem-solving, with children negotiating roles, sharing materials, and co-constructing solutions. Teachers reported that documenting children's work through photos and simple notes helped them tailor subsequent facilitation to individual developmental needs. These patterns highlight the reciprocal relationship between responsive teaching and children's growing cognitive confidence.

Table 3. Lead Teacher Facilitation Strategy.

Facilitation Strategy	Example Prompt	Observed Child Response	Frequency of Use
Open-Ended Questioning	"Why do you think the tower fell?"	Child tests alternative bases, explains reasoning	95%
Think-Aloud Modeling	"I wonder if this piece fits here because…"	Child imitates reasoning language, applies to own task	82%
Just-in-Time Scaffolding	"What if we try a wider bottom?"	Child adjusts approach, persists through challenge	89%
Peer Dialogue Encouragement	"Can you ask your friend for an idea?"	Children collaborate, negotiate solutions	76%

The table categorizes key teacher facilitation strategies observed during the study, providing concrete examples of prompts, the corresponding child responses they elicited, and how frequently each strategy was employed. Open-ended questioning was the most commonly used and most effective technique for stimulating critical thinking behaviors, as it invited children to articulate hypotheses and evaluate outcomes. Think-aloud modeling and just-in-time scaffolding also proved highly impactful, particularly for children who needed additional support to extend their thinking. Encouraging peer dialogue, while used slightly less frequently, fostered valuable social-cognitive skills such as perspective-taking and collaborative reasoning. These findings underscore that intentional, responsive facilitation is essential for maximizing the critical thinking potential of center-based learning environments.

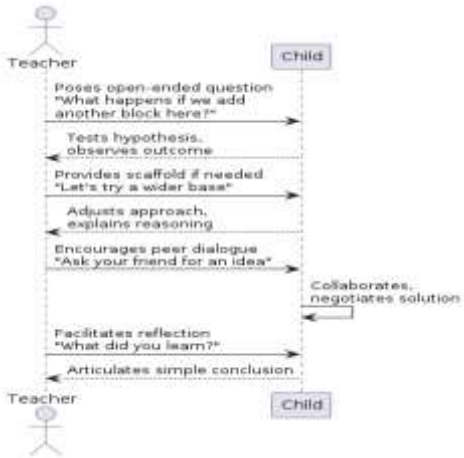

Figure 3. Teacher-Child Interaction Sequence During Center Play.

The sequence diagram above illustrates a typical high-quality teacher-child interaction during center-based play, mapping the iterative cycle of questioning, exploration, scaffolding, collaboration, and reflection. This visual representation captures the dynamic, responsive nature of effective facilitation, where teacher prompts are contingent on child actions rather than predetermined scripts. The diagram emphasizes that critical thinking development occurs

through repeated, scaffolded opportunities for hypothesis testing and verbal reasoning. It also highlights the importance of peer interaction as a catalyst for deeper cognitive engagement. Such interaction patterns, consistently observed in successful sessions, provide a practical model for teachers seeking to enhance critical thinking through center-based pedagogy.

Supporting and Inhibiting Factors in Implementation

Several contextual factors influenced the fidelity and impact of center-based learning implementation at TK Harapan Bangsa Jeranglah Tinggi. Supporting factors included strong administrative backing, adequate basic materials, and teachers' growing confidence in facilitation techniques. The school's commitment to professional development enabled teachers to refine their understanding of child-centered pedagogy and adapt center activities to local resources. Additionally, children's natural curiosity and enthusiasm for hands-on play created a positive feedback loop that sustained engagement and encouraged iterative improvement of center designs. These enablers collectively fostered an environment where critical thinking could flourish through structured yet flexible exploration.

Conversely, certain constraints posed challenges to optimal implementation. Limited storage space restricted the variety of materials that could be simultaneously available across centers, occasionally reducing novelty and choice. Time management during transitions between centers required careful planning to avoid rushing children's deep play episodes. Furthermore, varying levels of parental understanding about play-based learning sometimes led to expectations for more academic, worksheet-oriented tasks. Teachers addressed these barriers through creative resource sourcing, visual schedules to support transitions, and regular communication with families about the cognitive benefits of center-based exploration. These adaptive strategies helped mitigate external pressures while maintaining pedagogical integrity.

Table 4. Supporting and Inhibiting Factors.

Factor Category	Key Factor	Influence on Implementation	Strategy for Improvement
Supporting Factor	Administrative support	Facilitated allocation of resources and flexible scheduling	Conducting regular coordination with school leadership
Supporting Factor	Teacher collaboration	Encouraged exchange of ideas for adapting learning centers	Organizing weekly collaborative planning sessions
Supporting Factor	Child engagement	Increased motivation and active exploration during activities	Allowing children to choose learning centers independently

Inhibiting Factor	Limited classroom space	Reduced diversity of materials and learning activities	Applying rotating themes for learning centers each week
Inhibiting Factor	Transition time constraints	Caused learning activities to become rushed	Using visual timers and structured transition signals
Inhibiting Factor	Parental academic expectations	Created pressure to prioritize academic-oriented tasks	Providing workshops about the value of play-based learning

The table above categorizes key supporting and inhibiting factors identified during the study, detailing their specific impacts on implementation and the strategies employed to address them. Supporting factors such as administrative backing and teacher collaboration created a foundation for sustained pedagogical innovation, while child engagement served as both an outcome and a driver of success. Inhibiting factors like space constraints and transitional challenges required pragmatic, context-sensitive solutions that preserved the core principles of center-based learning. The mitigation strategies listed reflect a proactive, reflective approach to implementation science, emphasizing adaptation without compromise. Recognizing and addressing these factors is essential for scaling center-based models in diverse early childhood settings.

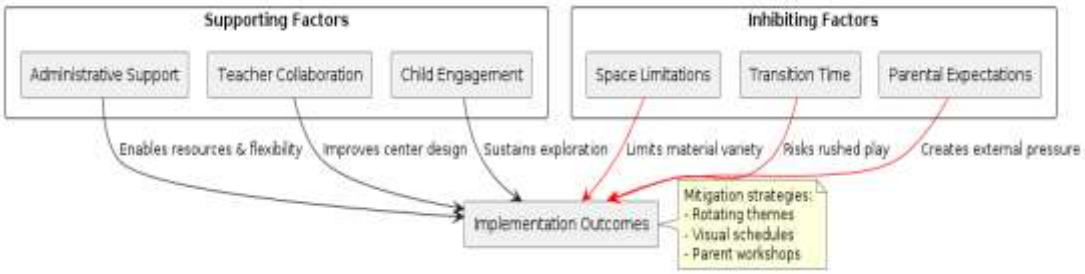

Figure 4. Factors Influencing Center-Based Learning Implementation.

The mind map diagram above, created with PlantUML, visually organizes the supporting and inhibiting factors that shaped center-based learning implementation, along with their directional influence on outcomes. The clear color-coding and directional arrows help distinguish enablers from barriers, while the embedded note summarizes the adaptive strategies employed to address constraints. This visualization supports holistic interpretation of implementation dynamics, emphasizing that successful pedagogy depends not only on instructional design but also on contextual navigation. The diagram's structure encourages systematic reflection on how to leverage strengths and mitigate challenges in future iterations. Such visual synthesis aids educators and administrators in planning sustainable, context-responsive center-based programs.

Discussion

The findings of this study demonstrate that center-based learning effectively enhances critical thinking skills in children aged 4–6 years, particularly in questioning, problem-solving, and reflective reasoning. These results align with prior research indicating that play-based, child-centered environments provide optimal conditions for cognitive exploration and hypothesis testing in early childhood (Sefriyanti & Diana, 2021; Uswatun et al., 2022). The observed gains in children's inquiry behaviors support the theoretical premise that structured autonomy—where children choose activities within a scaffolded framework—stimulates executive functions and higher-order thinking (Alucyana & Raihana, 2023; Susanti et al., 2023). Thus, the pedagogical shift from teacher-directed instruction to facilitative guidance appears to unlock children's innate capacities for critical engagement.

The improvement in children's questioning and problem-solving behaviors corroborates earlier studies on open-ended materials and loose parts, which report that manipulable, exploratory resources encourage iterative testing and causal reasoning (Adawiyah & Priyanti, 2023; Sumarseh & Yaswinda, 2023). Furthermore, the role of circle-time reflection in advancing children's verbal reasoning echoes findings by Khairiah & Kurinci (2022), who emphasized that guided dialogue helps children articulate choices and evaluate outcomes. These convergent insights reinforce the view that critical thinking in early childhood is not an isolated skill but a disposition cultivated through repeated, socially mediated experiences of inquiry and evaluation (Fitriani & Vinayastri, 2022; Parapat et al., 2023).

Within the Indonesian PAUD context, this study's outcomes resonate with prior implementations of Beyond Centers and Circle Time (BCCT) that reported enhanced multiple intelligences and cognitive flexibility (Asih et al., 2022; Sefriyanti & Diana, 2021). However, the present findings extend this literature by explicitly linking center-based routines to measurable gains in critical thinking indicators, a connection less emphasized in earlier descriptive reports. The consistency of results across diverse center types—science, blocks, role-play—also supports (Rafiuddin et al., 2024) assertion that integrated, cross-domain approaches better prepare children for the complex problem-solving demands of Society 5.0.

Practically, these findings underscore the importance of intentional teacher facilitation in maximizing the cognitive benefits of center-based learning. Strategies such as open-ended questioning, think-aloud modeling, and just-in-time scaffolding—identified as high-impact in this study—align with recommendations from Sutama et al (2022) and Ardiana & Widiastuti (2020) for shifting educator roles from directors to responsive facilitators. Schools seeking to adopt similar models should prioritize professional development focused on these techniques,

alongside investments in diverse, open-ended materials and flexible scheduling that honors children's deep play episodes (Sriyanti & Zanki, 2021; Subekti et al., 2024).

This study has several limitations that warrant consideration. The sample was confined to one classroom in a single school, limiting generalizability to broader PAUD contexts with different resource levels or cultural norms. Additionally, the six-week intervention period, while sufficient to detect initial shifts, may not capture the long-term consolidation of critical thinking dispositions. Future research could employ longitudinal or quasi-experimental designs across multiple sites to examine sustained impacts and contextual moderators. Despite these constraints, the convergence of observational, quantitative, and qualitative data strengthens confidence in the conclusion that center-based learning, when implemented with fidelity, offers a viable pathway for nurturing critical thinking in early childhood education.

5. CONCLUSION AND SUGGESTIONS

The implementation of center-based learning at TK Harapan Bangsa Jeranglah Tinggi effectively fostered critical thinking skills in children aged 4–6 years, as evidenced by measurable improvements in questioning, comparing, problem-solving, and reflective reasoning. The structured yet flexible nature of learning centers—combined with responsive teacher facilitation—created an environment where children could actively explore, test hypotheses, and articulate their thinking through play. Children demonstrated increased autonomy, sustained engagement, and greater confidence in expressing ideas, particularly in centers that encouraged experimentation and peer dialogue. These findings affirm that center-based pedagogy, when implemented with intentionality and developmental sensitivity, serves as a powerful vehicle for cultivating foundational critical thinking competencies in early childhood.

Based on these results, it is recommended that educators prioritize ongoing professional development focused on facilitation techniques, such as open-ended questioning and just-in-time scaffolding, to maximize the cognitive potential of center-based activities. Schools should allocate resources for diverse, open-ended materials and ensure adequate space and time for deep, uninterrupted play. Future research could explore longitudinal impacts of center-based learning on critical thinking trajectories, as well as adaptive strategies for implementing this model in resource-constrained settings. Ultimately, sustained commitment to child-centered, play-based pedagogy—supported by reflective practice and contextual adaptation—will strengthen early learning ecosystems and better prepare young learners for the complex demands of the 21st century.

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