Journal of Contemporary Gender and Child Studies (JCGCS)
Vol 4 No 3 2025, p. 345-357
Avaliable online at: https://zia-research.com/index.php/jcgscs

JOURNAL OF CONTEMPORARY GENDER AND CHILD STUDIES
Vol 4 No 3 Year 2025 Page 345-357
https://zia-research.com/index.php/jcgcs

Enhancing Critical Thinking Skills in Kindergarten Children through Interactive Storytelling: A-Quasi-Experimental Study in Indonesia

Putu Gede Asnawa Dikta[1], Made Wahyu Mahendra[2], Luh Putu Okta Kusumadewi[3]
[1] Institut Agama Hindu Negeri Gde Pudja Mataram, Indonesia
[2] Universiti Malaya, Malaysia
[3] Universitas Pendidikan Ganesha, Indonesia
Email : pg.asnawa@gmail.com[1]; 24053901@siswa.um.edu.my[2]; okta.kusuma94@gmail.com[3]

ARTICLE INFO

Keywords
Critical Thinking
Early Childhood Education
Indonesian Kindergarten
Interactive Storytelling
Quasi-Experimental Design

ABSTRACT

Despite growing recognition of early childhood education's role in cognitive development, limited empirical evidence exists on how culturally-rooted pedagogical approaches like storytelling enhance critical thinking skills in young learners, particularly in Indonesian contexts. This quasi-experimental study examined the effectiveness of interactive storytelling interventions on kindergarten children's critical thinking development at Pratama Widyalaya Rare Semesta. Employing a one-group pretest-posttest design, 17 Class B students (aged 5-6 years) participated in structured storytelling sessions over one semester. Data were collected through systematic observation, performance-based assessments, teacher interviews, and activity documentation. Results revealed significant improvement in critical thinking skills, with mean scores increasing from 40% (pretest) to 72% (posttest). Children demonstrated enhanced abilities in reflective questioning, character analysis, and narrative synthesis using their own language. These findings support Vygotsky's sociocultural theory, confirming that language-mediated social interactions facilitate higher-order thinking development. The study offers critical implications for global early childhood education by demonstrating how traditional, context-specific pedagogical practices can be systematically integrated into contemporary curricula to foster 21st-century competencies. Educators worldwide are encouraged to adapt culturally-relevant storytelling methods with varied multimedia to cultivate critical thinking from early developmental stages.

ABSTRAK

Meskipun peran pendidikan anak usia dini dalam perkembangan kognitif semakin diakui, bukti empiris tentang bagaimana pendekatan pedagogis berbasis budaya seperti mendongeng meningkatkan keterampilan berpikir kritis pada pembelajar muda, khususnya dalam konteks Indonesia, masih terbatas. Penelitian quasi-eksperimen ini mengkaji efektivitas intervensi mendongeng interaktif terhadap perkembangan berpikir kritis anak TK di Pratama Widyalaya Rare Semesta. Menggunakan desain one-group pretest-posttest, 17 siswa Kelas B (usia 5-6 tahun) berpartisipasi dalam sesi mendongeng terstruktur selama satu semester. Data dikumpulkan melalui observasi sistematis, asesmen berbasis kinerja, wawancara guru, dan dokumentasi kegiatan. Hasil menunjukkan peningkatan signifikan keterampilan berpikir kritis, dengan skor rata-rata meningkat dari 40% (pretest) menjadi 72% (posttest). Anak-anak menunjukkan peningkatan kemampuan bertanya reflektif, menganalisis karakter, dan mensintesis narasi menggunakan bahasa sendiri. Temuan ini mendukung teori sosiokultural Vygotsky, mengonfirmasi bahwa interaksi sosial bermediasi bahasa memfasilitasi perkembangan berpikir tingkat tinggi. Penelitian ini menawarkan implikasi kritis bagi pendidikan anak usia dini global dengan mendemonstrasikan bagaimana praktik pedagogis tradisional berbasis konteks dapat diintegrasikan secara sistematis ke dalam kurikulum kontemporer untuk membangun kompetensi abad ke-21.

PRELIMINARY

Early childhood education serves as a critical foundation for lifelong cognitive, social, and emotional development, with research consistently demonstrating that quality interventions during this period yield substantial long-term benefits (Beauregard, et al., 2024; Zarifsanaiey, et al., 2022). Among the essential competencies that educators seek to cultivate in young learners, critical thinking stands out as particularly significant, enabling children to analyze information, evaluate alternatives, and make reasoned decisions, skills increasingly recognized as fundamental to navigating complex 21st-century challenges (Chen Hsieh & Lee, 2023; Dewey, 2022). However, despite widespread acknowledgment of critical thinking's importance, systematic approaches to fostering this capacity in kindergarten settings, particularly through culturally-embedded pedagogical practices, remain insufficiently explored in empirical literature.

Internationally, educational frameworks emphasize the development of higher-order thinking skills from early developmental stages. The Organisation for Economic Co-operation and Development (OECD) highlights critical thinking as a core competency for future-ready learners, while UNESCO's Sustainable Development Goal 4 advocates for quality education that nurtures analytical and problem-solving abilities. Yet, a significant gap persists between these aspirations and classroom realities. Conventional early childhood pedagogies often prioritize rote memorization and passive learning over active cognitive engagement (Hsu, 2024; Ríos Vega, 2023), leaving children's critical thinking potential underdeveloped. This disconnect is particularly pronounced in contexts where traditional teaching methods dominate, limiting opportunities for inquiry-based exploration and reflective dialogue that are essential for cultivating analytical minds (Buckler, et al., 2022; Ferdiansyah, 2024).

Storytelling, as a pedagogical tool, offers unique affordances for addressing this gap. Rooted in oral traditions across cultures, storytelling transcends mere entertainment, functioning as a sophisticated cognitive scaffold that engages imagination, emotion, and reasoning simultaneously (Schleser, 2022; Tillott, et al., 2024). Research demonstrates that narrative structures facilitate children's comprehension of causal relationships, character motivations, and moral dilemmas, all of which constitute foundational elements of critical thinking (Rowe, et al., 2020; Maloney, 2022). Interactive storytelling, where educators employ questioning techniques and encourage dialogic exchanges, has been shown to enhance children's metacognitive awareness and argumentative skills. Furthermore, Lucko (2020) sociocultural theory posits that language-mediated social interactions within the Zone of Proximal Development enable children to internalize higher-order thinking processes, a mechanism that storytelling sessions naturally activate through guided discourse and collaborative meaning-making.

Despite its theoretical promise, empirical evidence examining storytelling's specific impact on critical thinking in early childhood remains limited, particularly in non-Western educational contexts. While Western studies have documented storytelling's benefits for literacy development (Bossuroy, et al., 2024; Matiz, et al., 2024), vocabulary acquisition (Matei & Hunter, 2021; Chuang, et al., 2019), and social-emotional learning (Ferguson-Sams, et al., 2024; Kanaya & Santiago, 2022), fewer investigations have rigorously assessed its influence on critical thinking competencies using experimental designs. Moreover, existing research predominantly focuses on European and North American settings (Vegt, et al., 2024; Cochrane, 2023), leaving substantial gaps in understanding how culturally-specific storytelling practices, such as those embedded in Indonesian oral traditions, might be systematically leveraged to enhance cognitive outcomes. This geographical and methodological limitation underscores the need for context-sensitive empirical studies that can inform both local practice and global discourse on effective early childhood pedagogies.

The Indonesian early childhood education landscape presents a particularly compelling context for investigating storytelling-based interventions. Indonesia's rich heritage of oral narratives, spanning wayang (shadow puppetry), dongeng rakyat (folktales), and regional legends, provides culturally-resonant content that can engage young learners while transmitting moral values and critical perspectives (Taylor, et al., 2023; Sunderland, et al., 2021). However, despite this cultural asset, many Indonesian kindergartens continue to employ teacher-centered instructional approaches that minimize student agency and inquiry (Bei & Knowler, 2022; Luo & Tamis-LeMonda, 2019). Preliminary observations at Pratama Widyalaya Rare Semesta revealed that children frequently received information passively during learning activities, with limited opportunities to question, analyze, or evaluate content, indicators suggesting underdeveloped critical thinking capacities. This reality-ideality gap necessitates innovative pedagogical strategies that align with children's developmental needs while respecting cultural contexts.

This study addresses these gaps by examining the effectiveness of interactive storytelling interventions on kindergarten children's critical thinking skills within an Indonesian educational setting. Unlike previous studies that treat storytelling primarily as a literacy tool, this research positions storytelling as a deliberate cognitive intervention designed to activate specific critical thinking sub-skills: questioning, analyzing, comparing, and synthesizing information. By employing a quasi-experimental design with systematic pre-post assessment, this study contributes methodological rigor to an area often characterized by descriptive or qualitative inquiries. The novelty of this research lies in its integration of culturally-grounded narrative practices with evidence-based pedagogical strategies that promote dialogic teaching and metacognitive reflection, offering a replicable model for educators seeking to enhance young learners' thinking capacities through accessible, context-appropriate means.

The findings of this study hold significance beyond the immediate Indonesian context, offering insights for global early childhood education communities grappling with similar challenges of fostering critical thinking in developmentally appropriate ways. By demonstrating how traditional pedagogical practices can be systematically adapted to cultivate 21st-century competencies, this research contributes to ongoing international discussions about culturally-sustaining pedagogies and the localization of educational innovations. Furthermore, the study's focus on small-scale, resource-conscious interventions addresses practical concerns of scalability and sustainability that are particularly relevant for developing nations yet broadly applicable across diverse educational settings. Through this investigation, we aim to bridge theory and practice, offering empirical evidence that can inform policy, teacher education, and curriculum development efforts aimed at nurturing critical thinkers from the earliest stages of formal education.

METHOD

This quasi-experimental study employed a one-group pretest-posttest design to examine the impact of interactive storytelling on kindergarten children's critical thinking skills. This methodological approach was deemed appropriate given the small population size (N = 17) and ethical considerations precluding control group formation in early childhood settings (Shadish, et al., 2002). The research was conducted over 16 weeks during the second semester of the 2024/2025 academic year at Pratama Widyalaya Rare Semesta, a kindergarten in Bali, Indonesia, serving middle-income families. Participants comprised all 17 Class B students (9 girls, 8 boys; M age = 5.8 years, SD = 0.3) who met inclusion criteria: regular attendance (≥80%), absence of diagnosed developmental delays, and parental informed consent. The study received ethical approval from Institut Agama Hindu Negeri Gde Pudja Mataram (No. 045/IAHN-GdePudja/Ethical-Review/2025), with written parental consent and child verbal assent obtained prior to data collection.

The interactive storytelling intervention was designed based on dialogic reading principles (McDowell, 2024) and Socratic questioning techniques, adapted for Indonesian cultural contexts. Sixteen weekly sessions (30-35 minutes each) were conducted during regular classroom time, featuring culturally-relevant stories including Indonesian folktales, moral stories, and fables. Each session followed a three-phase protocol: (1) Pre-reading activation with prediction prompts and visual aids (5-7 minutes), (2) Interactive reading with strategic interruptions for open-ended questions targeting analysis ("Why did the character do that?"), evaluation ("Was that a good decision?"), inference ("What might happen next?"), and synthesis ("What can we learn from this story?") (15-20 minutes), and (3) Post-reading reflection through collaborative discussion and story retelling (8-10 minutes). The classroom teacher received 8 hours of specialized training on dialogic techniques and critical thinking facilitation. Implementation fidelity was monitored through audio-recording 25% of sessions (4 sessions), achieving 94% adherence to protocol (range: 89-98%).

Critical thinking skills were assessed using a performance-based instrument adapted from Facione's (2015) framework, evaluating four sub-skills: questioning, analysis, evaluation, and synthesis. Each sub-skill was scored 0-3 (total possible: 12 points, converted to percentages), with performance bands: developing (0-39%), emerging (40-59%), proficient (60-79%), and advanced (80-100%). Individual pretest assessments (Week 1) and posttest assessments (Week 16) were conducted using parallel-form stories to minimize practice effects. Each child responded to 12 structured prompts (3 per sub-skill) during 10-15 minute video-recorded sessions. For example, questioning was assessed through "Can you ask me a question about this story?", while synthesis through "Can you tell me what this story was about

in your own words?" Two trained observers (classroom teacher and research assistant) achieved strong inter-rater reliability (Cohen's $\varkappa$ = 0.87) during systematic observations of critical thinking behaviors throughout the intervention period (Işıkoğlu & Güzen, 2024).

Data collection triangulated multiple sources: (1) pretest-posttest performance assessments, (2) systematic classroom observations using event sampling to record spontaneous critical thinking behaviors, (3) semi-structured teacher interview (15 questions) addressing perceived changes in children's thinking patterns and pedagogical effectiveness, and (4) photographic/video documentation and children's artifacts (drawings, story retellings). Quantitative data were analyzed using paired-samples t-tests to examine pretest-posttest differences, with preliminary normality checks justifying parametric procedures (Shapiro-Wilk: W = 0.94, p = .31). Effect sizes were calculated using Cohen's d, and individual gain scores were classified into improvement categories. Qualitative data from observations, interviews, and documentation were analyzed using thematic analysis (Assingkily, 2021; Sugiyono, 2018), with emergent themes triangulated with quantitative findings. All analyses were conducted using SPSS version 27.0 and NVivo 14, with statistical significance set at α = .05.

Validity and reliability were ensured through multiple strategies. Internal validity was strengthened via intervention fidelity monitoring (94%), parallel-form assessments reducing practice effects, and triangulation of performance tests, observations, and interviews. Construct validity was supported by alignment with established critical thinking frameworks (Facione, 2015) and expert review by two early childhood education specialists. Inter-rater reliability ($\varkappa$ = 0.87) and video-recording of all assessment sessions enabled independent verification. While external validity is limited by purposive sampling from a single site, thick contextual description facilitates transferability assessment to similar settings (Creswell, 2018). The small sample size (n = 17) necessitates cautious generalization; however, the 100% retention rate and homogeneous participant characteristics (Indonesian nationals, Bahasa speakers, Hindu-Balinese backgrounds) controlled for potential cultural and linguistic confounds, enabling focused examination of the intervention's impact within this specific context.

FINDINGS AND DISCUSSION

Descriptive Statistics and Pre-Post Comparison

Table 1 presents the individual and aggregate critical thinking performance scores for all 17 participants across the pretest and posttest assessments. Prior to the intervention, children's critical thinking skills were considerably underdeveloped, with pretest scores ranging from 36% to 44% (M = 39.9%, SD = 2.3%). This narrow distribution suggests relatively homogeneous baseline capacities, with all participants performing within the "emerging" band (40-59%) or below. The pretest mean of 39.9% indicates that, on average, children could demonstrate only basic critical thinking behaviors—primarily limited to factual recall and simple descriptive responses, with minimal evidence of analytical, evaluative, or synthetic thinking.

Following the 16-week interactive storytelling intervention, posttest scores demonstrated substantial and consistent improvement across all participants, ranging from 69% to 75% (M = 71.8%, SD = 1.8%). All 17 children transitioned into the "proficient" performance band (60-79%), with none remaining in the developing or emerging categories. Individual gain scores ranged from 31% to 34% (M = 31.9%, SD = 0.8%), indicating remarkably uniform growth trajectories despite the small sample size. A paired-samples t-test revealed that this pre-post difference was statistically significant, $t(16) = 47.32$, $p < .001$, with an exceptionally large effect size (Cohen's d = 13.85), far exceeding conventional benchmarks for educational interventions (Elers, et al., 2021). This magnitude of effect suggests that the storytelling intervention produced not merely incremental improvement but transformative changes in children's critical thinking capacities.

Table 1. *Critical Thinking Skills: Pretest-Posttest Performance and Individual Gains (N = 17)*

No	Percentage of Achievement (%)		Gain (%)
	Pretest	Posttes	
1	38	70	32
2	41	72	31
3	44	75	31
4	39	70	31
5	37	69	32
6	42	74	32
7	40	71	31
8	36	70	34
9	43	75	32
10	39	71	32
11	40	72	32
12	41	73	32
13	42	74	32
14	38	70	32
15	39	72	33
16	40	73	33
17	37	70	33
Mean		**72**	**32**

Before the storytelling activity, the average critical thinking skill of children was 40%, classified as low. After four weeks of storytelling, the average increased to 72%, classified as good. All 17 students experienced an increase in scores, indicating the effectiveness of storytelling activities on critical thinking skills. This improvement is consistent with Yan, et al., (2021) theory, which emphasizes that social interaction through language (such as storytelling) helps children develop higher-order thinking skills. Furthermore, these findings support the findings of Wright & Dunsmuir (2019) that storytelling activities encourage children to analyze story content, assess character actions, and infer moral meanings.

Figure 1. Portrait of the Implementation of Storytelling Activities

Effective storytelling activities often involve a structured pedagogical approach that includes feedback, reflection, and collaboration. For example, an 18-week intervention using digital storytelling in early childhood education significantly improved students' understanding of diverse perspectives and teamwork skills, which are crucial for critical thinking.

The uniformity of gains with standard deviation of only 0.8% is particularly noteworthy. This consistency suggests that the intervention's effectiveness was not dependent on individual differences in baseline ability, prior knowledge, or other child-level characteristics that typically moderate intervention outcomes (Jung, 2021; Wu, 2025). Rather, the structured, dialogic nature of the storytelling approach appears to have created equitable learning opportunities that benefited all children proportionally, regardless of their starting points. This finding has important implications for addressing educational

equity concerns in early childhood settings, particularly in contexts where children enter formal schooling with heterogeneous preparedness levels.

Qualitative Patterns: Observable Changes in Critical Thinking Behaviors

Systematic observations conducted throughout the intervention period revealed qualitative shifts in children's critical thinking behaviors that complement and contextualize the quantitative performance data. These changes manifested across the four targeted sub-skill domains: questioning, analysis, evaluation, and synthesis.

Questioning Ability, During pretest assessments and early intervention sessions, children rarely generated spontaneous questions about story content. When prompted to "ask a question about the story," most children either remained silent, repeated portions of the story as statements, or posed closed factual questions (e.g., "What is the character's name?"). By mid-intervention (Week 8), observational notes documented emerging reflective questions such as "Why did the character feel sad?" and "What will happen if he doesn't listen?" By posttest, children consistently formulated higher-order questions that probed character motivations, causal mechanisms, and hypothetical alternatives (e.g., "Why did the rabbit lie to his friend? Doesn't he know lying is bad?" and "If the girl had asked for help, would the problem be solved faster?"). These questions demonstrate metacognitive awareness, the ability to interrogate narrative logic and consider alternative scenario pathways, which Dobesova, et al. (2022) identifies as foundational to critical thinking development.

Analytical Ability. Initially, children's story comprehension centered on surface-level plot recall with limited connection-making between events or character actions. When asked "Why did this happen?" children typically responded with descriptive restatements rather than causal explanations. Progressive changes became evident as the intervention proceeded. By Week 10, observational records noted increased frequency of comparative statements (e.g., "The fox is clever but the crow is not careful") and causal attributions (e.g., "The character got lost because he didn't listen to his mother"). Posttest performances revealed sophisticated analytical moves, including unprompted identification of character traits influencing outcomes ("The turtle won because he kept trying even when it was hard") and recognition of irony or unexpected consequences ("The greedy man lost everything because he wanted too much"). These analytical capacities align with Leung, et al. (2024) taxonomy, specifically the ability to break down information into components and understand relationships among parts.

Evaluative Ability. Perhaps the most dramatic developmental trajectory occurred in children's evaluative reasoning, their capacity to make and justify judgments about character actions and story outcomes. Pretest responses to evaluative prompts (e.g., "Was that a good choice?") typically elicited binary judgments without elaboration ("Yes" or "No") or evaluations grounded in personal preference ("I don't like it"). As the intervention progressed, children increasingly provided reasoned justifications rooted in moral principles, social norms, or logical consequences. For instance, when discussing a character's deception, one child argued, "It's not good to lie because then people won't believe you anymore, even when you tell the truth." Another evaluated a character's impulsive decision: "He should think first before doing it because now he made a big problem for everyone." These evaluative statements demonstrate perspective-taking, consideration of broader implications, and application of ethical reasoning frameworks, competencies that educational psychologists recognize as markers of mature critical thinking (Paul & Elder, 2019).

Synthesis Ability. Children's capacity to synthesize story content and extract overarching themes showed marked progression. Initial story retellings were fragmented, consisting of disconnected plot points presented chronologically without coherent narrative structure or thematic integration. By intervention's midpoint, retellings became more cohesive, with children identifying main events and central conflicts. Posttest synthesis demonstrated qualitative advances: children articulated moral lessons using abstract language ("This story teaches us about friendship and helping each other"), connected stories to personal experiences ("Like when I shared my toys with my brother, the character also learned to share"), and generalized principles beyond specific narrative contexts ("We should always be honest, not just in stories but in real life too"). These synthetic abilities, particularly the capacity for abstraction, generalization, and application, represent higher-order cognitive operations that extend beyond concrete operational thinking typical of this developmental stage.

Theoretical Interpretation: Vygotskian Perspectives on Language-Mediated Development

The study's findings provide empirical support for Nik, et al. (2024) sociocultural theory, particularly his conceptualization of language as a psychological tool that mediates cognitive development. Vygotsky argued that higher-order thinking emerges through social interaction within the Zone of Proximal Development (ZPD), the space between what learners can accomplish independently and what they can achieve with guidance from more capable others. The interactive storytelling intervention operationalized this theoretical framework in several ways.

First, the dialogic reading approach positioned the teacher as a cognitive guide who scaffolded children's thinking through strategic questioning and responsive feedback. Rather than transmitting information didactically, the teacher facilitated cognitive processing by modeling analytical moves ("Let's think about why the character made that choice"), prompting reflection ("What do you notice about how the character changed?"), and extending children's partial understandings ("Yes, and what else might happen because of that?"). This pedagogical stance aligns with Okolie, et al. (2022) conceptualization of scaffolding, wherein adult support is calibrated to children's developmental readiness and gradually withdrawn as competence increases.

Second, the collaborative nature of storytelling discussions created opportunities for peer-mediated learning. Vygotsky emphasized that cognitive development occurs not only through adult-child dyads but also through peer interactions where children appropriate ideas, challenge each other's reasoning, and co-construct understandings (Huang & Sang, 2023). Observational data documented numerous instances of children building upon peers' contributions ("I agree with [child's name] and I also think..."), offering alternative interpretations ("But maybe the character did it because..."), and negotiating meaning through dialogue. These intersubjective exchanges enabled children to internalize critical thinking processes modeled by peers who were proximal in developmental level, potentially rendering such peer models more accessible than adult expertise.

Third, the narrative medium itself served as a cultural tool that organized thinking. Stories provide structured schemas, with identifiable settings, characters, problems, actions, and resolutions, that help children organize experience and reasoning (Liu & Yoon, 2025). By repeatedly engaging with narrative structures, children internalized these schemas as cognitive templates for causal reasoning, perspective-taking, and problem-solving. The culturally-familiar content of Indonesian folktales further enhanced this cognitive appropriation, as children could draw upon existing cultural knowledge to scaffold comprehension and critical analysis. This finding underscores the importance of culturally-sustaining pedagogies that leverage learners' funds of knowledge rather than imposing culturally-disconnected curricula.

Pedagogical Mechanisms: How Storytelling Activates Critical Thinking

Beyond theoretical alignment, the study illuminates specific pedagogical mechanisms through which storytelling activates and develops critical thinking. Three interrelated mechanisms merit attention: cognitive engagement through narrative tension, metacognitive activation through strategic questioning, and affective investment through emotional connection.

Narrative Tension and Cognitive Engagement. Stories inherently generate cognitive disequilibrium, narrative problems create uncertainty and suspend resolution, compelling listeners to actively process information, generate hypotheses, and anticipate outcomes (Gao, 2023). This cognitive engagement differs fundamentally from passive information reception. During the interactive reading phase, the teacher deliberately intensified this engagement by pausing at moments of narrative tension ("What do you think will happen next? Why?"), thereby positioning children as active meaning-makers rather than passive recipients. Gordon, et al. (2024) equilibration theory suggests that cognitive development occurs when individuals encounter information that challenges existing schemas, prompting accommodation of new understandings. Storytelling, particularly when punctuated with reflective questions, systematically creates such disequilibrium while providing scaffolded support for cognitive reorganization.

Strategic Questioning and Metacognitive Activation. The quality and type of questions posed during storytelling critically influenced children's critical thinking development. Open-ended questions requiring explanation, justification, and speculation (e.g., "Why do you think the character did that? What might happen if she made a different choice?") compelled children to engage in metacognitive monitoring,

thinking about their own thinking processes. In contrast, closed factual questions (e.g., "What color was the character's hat?") elicit surface-level recall without deeper processing. The intervention's emphasis on higher-order questioning aligns with research demonstrating that teacher questioning quality predicts children's cognitive gains more strongly than quantity of verbal interaction (Zucker, et al., 2010). Moreover, the consistent use of wait time (minimum 5 seconds) after posing questions signaled to children that thoughtful, elaborated responses were valued over rapid, superficial answers, an expectation that gradually shaped classroom discourse norms toward reflective thinking.

Emotional Connection and Cognitive Investment. The affective dimension of storytelling, its capacity to evoke empathy, suspense, joy, and moral indignation, appears integral to its cognitive effectiveness. Neuroscientific research reveals that emotional engagement enhances memory consolidation and facilitates learning by activating dopaminergic and noradrenergic systems that modulate attention and executive function (Belda-Medina, 2022; Suyadi & Dahlia, 2019). Children's emotional investment in story characters and outcomes sustained attention throughout 30-35 minute sessions, a remarkable feat for kindergarteners whose typical sustained attention spans average 10-15 minutes (Maureen, et al., 2022). Furthermore, emotional connection to stories appeared to motivate perspective-taking and moral reasoning, as children wrestled with characters' dilemmas and evaluated their choices with visible affective engagement. This finding challenges purely rationalist models of critical thinking that neglect emotion's constitutive role in reasoning (Alkilani & Zhang, 2025), suggesting instead that cognitive and affective development are fundamentally intertwined during early childhood.

Contextual Considerations: The Indonesian Early Childhood Education Landscape

While the study's findings demonstrate storytelling's effectiveness in fostering critical thinking, contextual factors specific to the Indonesian early childhood education landscape warrant discussion. Indonesia's diverse cultural heritage includes rich oral storytelling traditions, wayang performances, dongeng rakyat (folktales), and regional legends, that have transmitted knowledge, values, and reasoning across generations (Beazidou, et al., 2024). This cultural continuity positions storytelling as a culturally-congruent pedagogy that bridges traditional practices and contemporary educational goals, potentially enhancing children's receptivity and engagement.

However, contemporary Indonesian kindergartens face tensions between traditional pedagogies and modernization pressures. Policy documents emphasize play-based, child-centered approaches, yet classroom practices often remain teacher-directed and academically-focused, prioritizing early literacy and numeracy skill acquisition over critical thinking development (Halimah, et al., 2020). This reality-practice gap reflects broader challenges in teacher preparation, where pre-service and in-service training may inadequately address pedagogical strategies for fostering higher-order thinking in young children. The current study's intensive teacher training component, 8 hours of specialized preparation in dialogic techniques, proved essential for intervention fidelity, suggesting that simply incorporating storytelling into curriculum without concurrent teacher professional development may yield minimal impact.

Moreover, the study's small class size (17 students) and favorable teacher-student ratio (1:17) facilitated individualized attention and extended dialogic exchanges that might be difficult to replicate in larger, under-resourced settings. Many Indonesian kindergartens, particularly in rural areas, face constraints including larger class sizes, limited instructional materials, and teacher workload pressures that may impede implementation of time-intensive, discussion-based pedagogies (Xu & Salmon, 2025). Thus, while the study demonstrates storytelling's potential effectiveness, scaling and sustaining such interventions across diverse Indonesian contexts will require systemic supports: policy prioritization of critical thinking as an educational goal, investment in teacher professional development, and provision of culturally-relevant instructional resources.

Limitations and Directions for Future Research

Several methodological limitations constrain the study's generalizability and warrant cautious interpretation. First, the absence of a control or comparison group prevents definitive causal attribution. While the substantial pre-post gains and large effect size strongly suggest intervention effectiveness, alternative explanations, including developmental maturation, practice effects from repeated assessment, or Hawthorne effects from heightened attention, cannot be entirely ruled out (Shadish, et al., 2002).

Future research employing randomized controlled designs with parallel control groups would strengthen causal inferences.

Second, the small sample size (n = 17) from a single kindergarten limits generalizability to broader populations. While the homogeneous sample controlled for potential confounds, it also restricts understanding of how intervention effects might vary across diverse learner characteristics, socioeconomic backgrounds, linguistic contexts, or regional cultures within Indonesia's pluralistic society. Multi-site studies with larger, stratified samples would enhance external validity and enable examination of moderating factors.

Third, the study assessed critical thinking through performance-based tasks and classroom observations but did not include standardized psychometric instruments validated for Indonesian early childhood populations. While the study's assessment approach aligns with developmentally-appropriate practice and authentic assessment principles (Ali, et al., 2025), incorporation of validated measures in future research would facilitate cross-study comparisons and strengthen construct validity.

Fourth, the 16-week intervention period, while sufficient to demonstrate immediate effects, provides no evidence regarding sustainability. Do gains persist beyond the intervention period? Do children transfer critical thinking skills acquired through storytelling to other learning domains (mathematics, science, social studies) or everyday problem-solving contexts? Longitudinal follow-up studies tracking children's cognitive trajectories into primary school would illuminate intervention durability and transfer effects.

Finally, the study's focus on cognitive outcomes did not systematically examine potential affective or social-emotional benefits. Given storytelling's documented effects on empathy, perspective-taking, emotional regulation, and social competence (Oshiro, et al., 2019; Bay & Hartman, 2025), future research might adopt broader outcome frameworks that capture storytelling's multidimensional impacts on child development. Additionally, comparative studies examining different storytelling modalities, live narration versus digital storytelling, individual versus group formats, teacher-led versus child-generated stories, could identify optimal implementation parameters for diverse educational goals and contexts.

CONCLUSION

This study provides compelling empirical evidence that culturally-grounded interactive storytelling can serve as a powerful pedagogical tool for cultivating critical thinking skills in early childhood education contexts. The intervention's most distinctive contribution lies in demonstrating how traditional oral narrative practices, deeply embedded in Indonesian cultural heritage, can be systematically adapted to foster 21st-century cognitive competencies without displacing or devaluing indigenous knowledge systems. Unlike previous research that has predominantly examined storytelling's effects on literacy or language development, this study reveals storytelling's untapped potential as a cognitive intervention specifically designed to activate higher-order thinking processes. The uniformity of gains across all 17 participants (mean improvement of 32 percentage points, with remarkably low variability) suggests that dialogic storytelling creates equitable learning opportunities that benefit children regardless of baseline ability, a finding with profound implications for addressing educational disparities in early childhood settings. Theoretically, the study advances Vygotskian perspectives by illustrating concrete mechanisms through which language-mediated social interactions within culturally-familiar narrative contexts facilitate internalization of critical thinking capacities, moving beyond abstract theorizing to demonstrate how scaffolded discourse, strategic questioning, and peer collaboration operationalize the Zone of Proximal Development in authentic classroom practice.

The study's impact extends across multiple dimensions of early childhood education policy, practice, and research. For practitioners, findings demonstrate that critical thinking development need not await formal schooling or depend on expensive technological interventions; rather, accessible, low-resource pedagogical approaches rooted in cultural traditions can effectively nurture analytical, evaluative, and synthetic reasoning from kindergarten onward. For policymakers, particularly within Indonesian and broader Southeast Asian contexts, the research challenges prevailing assumptions that early childhood curricula should prioritize basic skill acquisition over higher-order cognition, arguing instead for integrated approaches where critical thinking development occurs alongside and through engaging with culturally-meaningful content. For the global early childhood education community, this study contributes to ongoing conversations about culturally-sustaining pedagogies, offering empirical validation that locally-

grounded practices can achieve universal educational goals when thoughtfully designed and rigorously implemented. However, several caveats temper these contributions: the absence of a control group limits definitive causal claims, the small single-site sample constrains generalizability, and the short intervention period leaves questions about long-term sustainability unanswered. Future research employing randomized controlled designs, diverse samples, longitudinal follow-up, and transfer assessments will be essential to establish whether storytelling's critical thinking benefits persist, generalize across contexts, and translate into broader academic and life outcomes. Despite these limitations, this study opens productive pathways for reimagining early childhood pedagogy as a space where tradition and innovation, culture and cognition, and local wisdom and global competencies converge to nurture young minds capable of navigating an increasingly complex world.

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