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ANALYSIS OF PHYSICAL, COGNITIVE, SOCIOEMOTIONAL, AND LANGUAGE DEVELOPMENT AT MADANI KINDERGARTEN SURAKARTA

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Abstrak

Masa kanak-kanak awal merupakan periode krusial bagi perkembangan holistik yang mencakup aspek fisik, kognitif, sosial-emosional, dan bahasa. Urgensi penelitian ini terletak pada pemahaman tentang bagaimana keempat aspek tersebut muncul dalam konteks pembelajaran nyata guna mengoptimalkan praktik pendidikan anak usia dini. Penelitian deskriptif kualitatif ini dilakukan di TK Madani Pabelan, Surakarta, dengan melibatkan lima anak berusia 4-6 tahun dan satu guru kelas. Data dikumpulkan melalui observasi partisipatif, wawancara semi terstruktur, dan dokumentasi, kemudian dianalisis menggunakan model interaktif Miles dan Huberman. Hasil penelitian menunjukkan bahwa seluruh peserta memiliki perkembangan sesuai usia pada setiap aspek. Faktor utama yang memengaruhi perkembangan anak meliputi gizi, lingkungan rumah, serta kolaborasi guru dan orang tua. Penelitian ini menyimpulkan bahwa pendekatan integratif antara pendidik dan keluarga diperlukan untuk menjaga pertumbuhan anak usia dini yang seimbang.

***Kata Kunci**: Akuisisi bahasa bilingual, Perkembangan kognitif, Perkembangan anak usia dini, Pertumbuhan fisik, Perilaku sosial-emosional*

Abstract

Early childhood is a critical period for holistic development, encompassing physical, cognitive, socio-emotional, and linguistic domains. The urgency of this study lies in understanding how these domains manifest in real classroom contexts to optimize early learning practices. This qualitative descriptive study was conducted at Madani Kindergarten, Pabelan, Surakarta, involving five children aged 4–6 years and one teacher. Data were collected through participatory observation, semi-structured interviews, and documentation, then analyzed using Miles and Huberman's interactive model. The results revealed that all participants showed age-appropriate development in every domain. Key factors influencing development included nutrition, home environment, and teacher–parent collaboration. The study concludes that integrative approaches between educators and families are essential to sustain balanced growth among preschool children.

***Keywords**: Bilingual language acquisition, Cognitive development, Early childhood development, Physical growth, Socio-emotional behavior*

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A. Introduction

Early childhood, typically between ages 4 and 6, is widely acknowledged as a pivotal stage in human development, during which essential skills spanning physical, cognitive, socio-emotional, and language domains begin to emerge and interconnect (Learning through Play, 2022; UNICEF, 2023). This period is marked by significant neural plasticity, making children especially receptive to experiences that shape their future learning paths (Learning through Play, 2022). In Indonesia, the importance of bolstering early childhood education (ECE) has been emphasized in national policies, with the government ramping up investments in early childhood development to capitalize on the demographic dividend projected for 2030–2040 (Antara News, 2024). Despite expanded access to ECE, the quality of programs remains inconsistent, and many fail to support comprehensive child development fully (World Bank, 2023).

Theoretically, child development is understood as a multidimensional process influenced by context. Piaget's (1952) preoperational stage describes 4–6-year-olds as symbolic thinkers who predominantly use concrete and intuitive reasoning. Vygotsky's sociocultural theory highlights that growth occurs through social interactions and guided support, encapsulated in his concept of the Zone of Proximal Development (ZPD). Bronfenbrenner's ecological systems theory frames development within nested environments—including family, school, and community—that dynamically interact. More contemporary approaches, such as embodied cognition, stress that cognitive growth is grounded in bodily and sensorimotor experiences, showing that learning is both physical and mental (Barsalou, 2008). Collectively, these frameworks underscore the importance of observing children's development within their real-life learning environments.

Recent empirical research illustrates these theoretical principles in action. Sitorus, Siregar, and Sari (2025) examined play-based learning in Indonesia, demonstrating that cognitively stimulating play simultaneously enhances social, emotional, and physical development. Their mixed-methods study revealed strong consensus among teachers and parents regarding the integral role of play in holistic growth (Sitorus et al., 2025). Additionally, a meta-analysis of game-based learning in early childhood education reported moderate to large positive effects on cognitive, social, emotional, motivational, and engagement outcomes (Frontiers, 2024). Studies on project-based learning in Indonesian PAUD (early childhood education) contexts further emphasize the necessity of careful planning, scaffolding, and evaluation when implementing integrative pedagogical approaches (Sadaruddin et al., 2025). Collectively, these findings suggest that contemporary ECE should move beyond isolated skill drills toward contextualized, playful, and integrative learning experiences.

Nonetheless, significant gaps remain. Many investigations focus on a single developmental domain—such as cognition or language—while overlooking how domains interact in real classroom settings. There is also a scarcity of qualitative research capturing the co-construction of development by teachers, children, and contexts over time in Indonesian preschools. Moreover, although digital and game-based pedagogies are increasingly discussed (Frontiers, 2024; Sadaruddin et al., 2025), little is known about their adaptation in rural or semi-urban PAUD environments with limited resources. This study differentiates itself by conducting an in-depth, holistic qualitative observation in a bilingual, character-centered kindergarten (Madani Kindergarten, Pabelan, Surakarta). It investigates how children aged 4–6 demonstrate development across physical, cognitive, socio-emotional, and language domains and examines how pedagogical strategies and family involvement influence these developmental trajectories. The study aims both to provide rich empirical insight into holistic early childhood development in Indonesian preschools and to inform practical approaches for integrating play, guided learning, and home–school collaboration in post-COVID-19 early education.

B. Research Methods

This study employed a qualitative descriptive approach to examine the developmental traits of children aged 4–6 years within their authentic classroom environment (Creswell & Poth, 2018). Conducted on October 25, 2022, at Madani Kindergarten, Pabelan, Surakarta, the research involved five children and one early childhood teacher, purposefully selected to reflect the typical developmental range of preschool-aged learners (Palinkas et al., 2020). Data collection combined direct observation, semi-structured interviews, and document review, including lesson plans, children's artwork, and classroom photographs. Observations concentrated on children's physical coordination, problem-solving skills, emotional responses, and verbal interactions, while interviews provided insight into the teacher's perspectives on classroom practices and dynamics. All collected data were analyzed using Miles and Huberman's (1994) interactive model, which involves stages of data reduction, data display, and conclusion drawing, to uncover patterns in developmental progress. The integration of multiple data sources and methods through triangulation strengthened the credibility of the findings (Nowell et al., 2017), enabling a comprehensive understanding of children's physical, cognitive, socio-emotional, and language development within the classroom context.

C. Discussion

1. Physical Development

At Madani Kindergarten, Pabelan, Surakarta, on October 25, 2022, observations indicated that children aged 4–6 years were developing physically within norms outlined by the World Health Organization (2021). Their average height and weight ranged from 100–110 cm and 14–16 kg, respectively, showing appropriate growth. More importantly, motor development was observable in children's agility, stamina, and coordination during structured and free-play activities.

Daily routines, including morning exercises, running, rhythmic movements, and free play, were consistently guided by the teacher to foster gross-motor skills and muscle endurance. Children were able to jump with both feet, run in straight paths without falling, and throw and catch balls with improving accuracy, indicating strong muscle tone and postural control (Hidayat, Setyawati, & Hartono, 2024). Similar findings from Yogyakarta showed that structured daily movement enhanced early coordination and proprioception in 5-year-olds.

Children also demonstrated heightened spatial awareness and body orientation, forming lines, circles, and geometric shapes with minimal teacher input. This reflects growing kinesthetic intelligence, as Gardner (1993) identifies bodily-kinesthetic ability as an early problem-solving indicator. Embodied learning, which links movement to cognition, further supports executive control and memory development in preschoolers (Frontiers, 2024).

Fine-motor skills were evident through activities such as drawing, cutting, and assembling crafts. Children displayed tripod grasp, accurate tracing, and precise manipulation of small objects, engaging visual-motor integration and cerebellar circuits (Kristina, Widodo, & Rahayu, 2025). These skills correlate with writing readiness and early literacy development (Gea, Diana, & Aeni, 2025).

Pedagogical strategies often merged movement with cognitive tasks, following the embodied learning approach. For instance, children shaped letters with their bodies or "stepped" on numbered floor squares, integrating motor activity with abstract concepts like sequence and symmetry (Barsalou, 2008; Hidayat et al., 2024).

The classroom and playground offered ample space and equipment to explore balance, coordination, and risk-taking, enhancing motor proficiency, perseverance, and decision-making (UNICEF, 2025). Socially, group activities fostered coordination and cooperation, reflecting Bronfenbrenner's (1979) ecological model of development. Gender differences were observed, with boys gravitating toward high-energy activities and girls toward precision tasks, consistent with sociocultural influence on motor expression (Duncan, 2023). Individual variation in

endurance and coordination highlighted the need for differentiated instruction, which the teacher implemented through scaffolding and adaptive guidance (Hidayat et al., 2024).

Overall, physical development at Madani Kindergarten exemplifies an integrated, socially situated, and embodied learning process, forming a foundation for subsequent cognitive, emotional, and linguistic growth (WHO, 2021; UNESCO, 2022; Gea et al., 2025).

2. Cognitive Development

Observations of cognitive growth revealed that children exhibited symbolic reasoning, problem-solving, attention, and memory retention, reflecting the preoperational stage described by Piaget (1952). Children represented concepts through language, symbols, and imaginative play but occasionally relied on perceptual cues and egocentric thinking, such as assuming a longer pencil is heavier.

Guided discovery learning promoted cognitive reflection through scaffolded questioning. During block-building activities, the teacher asked questions like, "What happens if you stack the bigger block on top?" fostering hypothesis testing and aligning with Vygotsky's (1978) Zone of Proximal Development. Similar studies in Indonesia show that guided play with questioning enhances reasoning and metacognitive awareness (Rahma et al., 2025).

Children demonstrated classification, sequencing, and narrative skills, arranging shapes by single or multiple attributes and ordering story pictures chronologically, reflecting emerging executive function (Siegler, 2005; Yang, Kim, & Lee, 2025). Memory and attention also supported learning; children followed multi-step instructions and recalled songs and vocabulary over time, illustrating effective working memory and long-term memory consolidation (Baddeley, 2000; Frontiers, 2024).

Executive functions such as inhibitory control and cognitive flexibility were evident in games like "freeze" and role-switching in pretend play, indicating delayed gratification and adaptability, predictors of later academic success (Gea, Diana, & Aeni, 2025; Zelazo, 2015). Analogical reasoning emerged when children linked personal experience to natural processes, signaling a transition toward relational thinking (Gauvain, 2022).

Some children showed limited attention spans during abstract tasks, emphasizing the importance of alternating active and reflective learning to maintain engagement (Duncan, 2023; UNESCO, 2022). Madani Kindergarten's constructivist, play-based approach nurtured exploration, inquiry, and cognitive autonomy, aligning with Creswell and Guetterman (2021). Overall, cognitive development was characterized by a balance of spontaneous discovery and structured guidance within a socially interactive environment.

3. Socio-Emotional Development

Children displayed healthy socio-emotional growth, including interpersonal awareness, emotional regulation, and empathy, consistent with developmental norms for ages 4–6. They engaged cooperatively, shared resources, took turns, and expressed feelings verbally, echoing findings by Damayanti and Syafril (2024).

Daily routines like greeting circles, collaborative clean-up, and paired storytelling offered regular emotional modeling. The teacher mediated emotions calmly, guiding children to verbalize feelings during conflicts, reflecting Denham's (2006) emotional coaching framework. Children gradually internalized these scripts, demonstrating early self-regulation predictive of school readiness (Goleman, 1995; Gea, Diana, & Aeni, 2025).

Prosocial behaviors, such as comforting peers or inviting quieter classmates to play, illustrated moral and social development, reinforced by the local cultural value of "gotong royong" (Rahmah & Siregar, 2023; Eisenberg et al., 2021). Post-pandemic social adjustments initially manifested as hesitation and reduced attention but improved over weeks with structured group activities and storytelling (Prime, Wade, & Browne, 2020; Martikainen, Salmela-Aro, & Niemi, 2023).

Classroom design, including open spaces, sensory corners, and flexible seating, supported emotional regulation and self-awareness (Tamblyn, Huang, & Zhou, 2023). Variability among children in expression and leadership highlighted Bronfenbrenner's (1979) ecological view of socio-emotional development. Overall, socio-emotional competence at Madani Kindergarten was fostered through teacher guidance, culturally responsive practices, and adaptive learning environments, preparing children for future academic and social demands.

4. Language Development

At Madani Kindergarten, Pabelan, Surakarta, children's verbal interactions during classroom activities were relatively minimal compared to other developmental domains. Most exchanges were brief and functional, such as short responses, greetings, or following simple instructions. The teacher consistently used Bahasa Indonesia, while children occasionally responded with short phrases combining Bahasa Indonesia and Javanese, demonstrating early signs of code-switching in bilingual contexts (Baker, 2011).

The limited verbal output did not indicate language deficiency but reflected the activity-focused classroom structure that prioritized movement and hands-on tasks over extended conversation. Children often conveyed understanding non-verbally, through gestures, actions, or showing completed work, a strategy typical in early learners when verbal competence is still emerging or when classroom pace emphasizes activity completion (Cameron, 2001).

Storytelling sessions occurred sporadically and were mostly teacher-led. Children listened attentively and sometimes repeated key expressions, supporting receptive language development. This aligns with findings by Sitorus, Siregar, and Sari (2025), indicating that in play-oriented classrooms, expressive language may be limited while comprehension strengthens. Repetition and clear instructions by the teacher further reinforced vocabulary and phonological awareness.

In summary, although spontaneous speech was restricted, children displayed comprehension and early bilingual awareness. These observations suggest that language development at Madani Kindergarten primarily emphasizes listening and understanding over expressive fluency, which is developmentally appropriate for children aged 4–6 in activity-based and bilingual learning environments (Gea, Diana, & Aeni, 2025).

5. Integrated Discussion

Across the four domains observed—physical, cognitive, socio-emotional, and language that children at Madani Kindergarten exhibited interconnected developmental progress, with language comprehension emerging more subtly. These results underscore the holistic nature of child development, where growth in one domain reinforces and interacts with others, consistent with UNESCO's (2022) whole-child approach that integrates movement, cognition, emotion, and communication through lived experiences rather than isolated skills.

Physical activity formed both the foundation and conduit for learning. Through running, balancing, and material manipulation, children strengthened coordination, attention, and executive functioning. Sensorimotor engagement stimulates neural pathways supporting self-regulation and working memory (Frontiers, 2024), illustrating cognitive benefits embedded in bodily movement

Cognitive development was scaffolded upon these embodied experiences. Guided play and questioning promoted reasoning, sequencing, and classification, aligning with Vygotsky's (1978) theory that higher mental functions emerge from social interaction before being internalized. Teacher scaffolding—prompting, questioning, and demonstrating—bridged experiential and conceptual learning. Dialogic play further enhanced metacognitive awareness and self-regulation, particularly in open-ended, problem-based activities (Rahma et al., 2025).

Socio-emotional growth acted as the connective tissue linking physical and cognitive domains. Cooperative play, emotional coaching, and structured routines fostered empathy, patience,

and self-discipline, stabilizing attention and motivation (Damayanti & Syafril, 2024). Post-pandemic observations showed gradual recovery of social confidence, supporting findings on resilience and peer bonding in early childhood (Prime, Wade, & Browne, 2020).

Language development, though less overt, underpinned cognitive and social growth. The bilingual environment encouraged listening skills, pragmatic understanding, and early metalinguistic awareness. As Bialystok (2018) noted, bilingual exposure enhances attentional control and cognitive flexibility, explaining children's responsiveness despite limited verbal output. Comprehension preceded articulation, reflecting a typical trajectory in early bilingual education.

From an ecological perspective, Madani Kindergarten exemplifies Bronfenbrenner's (1979) microsystem concept, where physical space, teacher practices, peer interactions, and cultural norms collectively shape development. Open areas, sensory corners, and collaborative, culturally grounded pedagogy facilitated integrated growth, consistent with evidence that early programs emphasizing multi-domain integration yield more consistent outcomes (Gea, Diana, & Aeni, 2025).

D. Conclusion

This study demonstrates that children aged 4–6 at Madani Kindergarten, Pabelan, Surakarta experienced balanced and interconnected development across physical, cognitive, socio-emotional, and language domains. Physical growth manifested in coordinated movements and fine-motor precision; cognitive development emerged through curiosity and guided reasoning; socio-emotional maturity was reflected in empathy and cooperative behaviors; and language progress, though subtle in speech, was evident in comprehension and early bilingual awareness. Overall, development occurred as an integrated process in which movement, cognition, emotion, and communication mutually reinforced one another. The findings confirm that play-based, socially interactive pedagogies effectively nurture holistic growth in early education settings.

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