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Original Article

Descriptive Study of Cognitive Development of Children Aged 5-6 Years in Preschool Education at Pambudi Bhakti Turirejo Kindergarten Demak

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ABSTRACT

Background: Cognitive development is a crucial component of early childhood education, as it significantly influences children's ability to think, reason, and solve problems in daily life. However, cognitive development among children aged 5–6 years in preschool settings has not yet reached optimal levels across several developmental indicators.

Method: This study employed a quantitative descriptive design and was conducted at Pambudi Bhakti Turirejo Kindergarten, Demak. The participants included 61 children aged 5–6 years, selected using a total sampling technique. Data were collected through direct observation using the Pre-Screening Development Questionnaire (KPSP) and analyzed descriptively using frequencies and percentages. Ethical approval was obtained under EC number 052/KEPK/UNPRI/II/2025.

Result: Most participants were aged 6 years (72.1%). The findings revealed that 60.7% of children were categorized as having doubtful cognitive development, 24.6% demonstrated appropriate cognitive development, and 14.8% were classified as deviant.

Conclusion: The results indicate that the majority of children require more optimal cognitive stimulation. Therefore, the implementation of creative and child-centered learning strategies, including play-based learning, effective teacher–child interaction, and a supportive learning environment, is essential to enhance children's cognitive development in preschool education.

INTRODUCTION

Early childhood represents a critical developmental period that lays the foundation for later cognitive, social, and academic outcomes. Among various developmental domains, cognitive development plays a central role in shaping children's ability to think, reason, and solve problems in everyday contexts. It encompasses mental processes such as perception, memory, reasoning, and the use of information to interpret experiences (Khadijah & Amelia, 2020) Providing appropriate stimulation during this "golden age" is therefore essential to ensure optimal developmental trajectories aligned with children's developmental stages.

Children aged 5–6 years are at a pivotal stage of cognitive development, characterized by the emergence of symbolic thinking, basic logical reasoning, and the ability to classify objects based on observable attributes such as shape, color, and size (Purnamasari, 2018). At this stage, children begin to demonstrate early problem-solving abilities in daily situations (Karnita & Sumarni, 2021) Consistent with Piaget's theory, preschool-aged children are in the preoperational stage, where thinking is dominated by symbolic representation and intuitive reasoning (Sulaiman & Ardianti, 2019) Despite these developmental potentials, children's cognitive outcomes remain highly dependent on the quality of stimulation and learning environments they experience.

At a global level, evidence from international organizations such as UNICEF highlights that a substantial proportion of children fail to reach their developmental potential due to inadequate stimulation and limited access to quality early childhood education. Similarly, national reports in Indonesia indicate that developmental delays, including in the cognitive domain, are still observed among preschool-aged children. These findings underscore persistent disparities in early childhood development and emphasize the need for contextually relevant educational strategies.

Existing literature has predominantly focused on intervention-based approaches, including play-based learning and STEAM-oriented instruction, which have demonstrated positive effects on children's cognitive outcomes (Hasanah, Ramahwati, & Hendriawan, 2024) While these studies provide valuable insights into effective learning strategies, they often overlook a fundamental issue: the lack of comprehensive baseline data describing the actual cognitive development status of children in specific preschool contexts. Without such descriptive evidence, the design of targeted and evidence-based interventions remains limited and potentially misaligned with children's real developmental needs.

Furthermore, recent studies rarely integrate updated global and national data with localized empirical findings, resulting in a gap between broader developmental trends and context-specific conditions. This gap is particularly critical in early childhood education, where variations in environmental, social, and educational factors significantly influence developmental outcomes. A clear and context-based understanding of children's cognitive development is therefore essential to inform policy, curriculum design, and instructional practices.

In response to these gaps, this study aims to provide a descriptive analysis of the cognitive development of children aged 5–6 years in a preschool setting. By offering empirical baseline data, this study contributes to the existing body of knowledge and supports the development of more targeted, evidence-based, and contextually appropriate learning strategies in early childhood education.

METHODS

This study employed a quantitative descriptive approach to describe the cognitive development of children aged 5–6 years in preschool education. This design was used to focus on the natural developmental phenomena of preschool children and to provide a structured overview of children's thinking patterns during the learning process (Anggraini & Putri, 2019) The descriptive approach is widely used in child development research as it provides information about cognitive development levels based on observable indicators during learning activities (Masrun & Okilanda, 2025)

The population of this study consisted of all preschool children aged 5–6 years who actively participated in education at Pambudi Bhakti Turirejo Kindergarten, Demak, totaling 61 children. The sample was determined using a total sampling technique, in which all members of the population were included as research participants. Children aged 5–6 years were selected because they are at a critical stage of cognitive development, where they begin to demonstrate more complex thinking abilities, such as understanding symbols, grouping objects, and solving simple problems in daily learning activities (Franco, Jose, & Silva, 2020)

The research instrument used was the KPSP (Pre-Screening Development Questionnaire), which is a standardized screening tool to assess child development. The KPSP covers multiple developmental domains, including gross motor, fine motor, language, and social independence aspects (Karnita & Sumarni, 2021; Sa'diyah et al, 2024). In this study, the instrument was used in its complete form to provide an overview of children's overall development, with particular emphasis on items related to cognitive abilities. These cognitive-related indicators include children's ability to understand instructions, recognize objects and colors, solve simple problems, and demonstrate early logical thinking. Data collection was carried out through direct observation during classroom learning activities using the KPSP instrument. Each child was observed while performing tasks according to the KPSP items. The observation process was conducted by the researcher to maintain consistency in assessment, with each observation lasting approximately 15–20 minutes per child during regular learning sessions.

Previous studies have shown that appropriate learning stimulation through exploratory and hands-on activities can improve children's thinking skills (Isnariyati et al., 2025; Hasanah et al., 2024). Therefore, observation during active learning was considered relevant to capture children's actual cognitive performance.

After data collection, the results were analyzed using descriptive statistical methods, including frequencies and percentages, to describe the level of cognitive development of preschool children. The outcomes were then classified into three categories—appropriate, doubtful, and deviant—based on the KPSP scoring criteria.

RESULTS

The results of the study are presented in Tables 1 and 2.

Table 1. Distribution of Respondents by Age (n=61)

Child Age (Years)	n	%
5	17	27.9
6	44	72.1

As shown in Table 1, the majority of respondents were 6 years old (72.1%), while 27.9% were 5 years old. This indicates that most participants were in the final stage of preschool education, a critical period for cognitive development

Table 2. Cognitive Development Categories of Children Aged 5 – 6 Years (n=61)

Cognitive Development	n	%
Approriate	15	24.6
Doubtful	37	60.7
Deviant	9	14.8

As shown in Table 2, the majority of children (60.7%) were categorized as having doubtful cognitive development, indicating that many children may require further stimulation. Meanwhile, 24.6% of children were in the appropriate category, and 14.8% were classified as deviant. These findings suggest that a considerable proportion of children have not yet achieved optimal cognitive development and may benefit from more targeted learning support.

DISCUSSION

Overview of Cognitive Development Findings

The findings of this study indicate that the majority of children aged 5–6 years were categorized as having doubtful cognitive development (60.7%), followed by appropriate (24.6%) and deviant (14.8%). This distribution highlights that more than half of the children have not yet achieved optimal cognitive development, which raises important concerns regarding the adequacy of stimulation and learning experiences provided in the preschool environment.

At the age of 5–6 years, children are in a crucial phase of cognitive development, where they are expected to demonstrate symbolic thinking, early logical reasoning, and the ability to solve simple problems in everyday situations. According to Piaget's theory, children at this stage are in the preoperational phase, characterized by the use of symbols, language, and imagination in thinking processes (Noviana, 2025). Ideally, children at this stage should begin to understand relationships between concepts, classify objects, and show basic reasoning skills.

However, the high proportion of children in the doubtful category suggests that these expected developmental milestones are not being fully achieved. This condition may reflect a gap between developmental expectations and actual learning experiences. It is possible that children are not receiving sufficient opportunities to engage in activities that stimulate higher-order thinking skills, such as problem-solving, reasoning, and concept understanding. Therefore, this finding emphasizes the need for more structured and consistent cognitive stimulation in preschool education settings.

Role of Play-Based Learning

Play-based learning is considered a fundamental approach in early childhood education, as it provides children with meaningful and engaging learning experiences. Through play, children actively explore their environment, experiment with ideas, and develop problem-solving skills in a natural and enjoyable way. Previous research has shown that play-based learning significantly improves children's cognitive abilities, including logical thinking, creativity, and problem-solving (Kohli, 2025). In addition, structured educational games, such as alphabet recognition or problem-solving games, have been proven to enhance children's memory, language understanding, and cognitive flexibility (Alotaibi MS, 2024). These activities allow children to learn abstract concepts through concrete experiences, which is highly appropriate for their developmental stage.

In relation to the findings of this study, the high percentage of children in the doubtful category may indicate that play-based learning has not been implemented optimally. Learning activities may still rely on more passive or teacher-centered approaches, limiting children's opportunities to actively engage, explore, and think critically. If children are not sufficiently exposed to exploratory and interactive learning experiences, their cognitive development may be slower or less optimal.

This suggests that preschool curricula need to place greater emphasis on structured play-based activities that encourage exploration, creativity, and problem-solving. Providing varied and meaningful play experiences can help bridge the gap between children's developmental potential and their actual cognitive performance.

Importance of Teacher–Child Interaction

Teacher–child interaction is another critical factor influencing cognitive development in early childhood. Teachers play a central role in facilitating learning by designing activities, guiding children's thinking, and providing appropriate stimulation. Research indicates that teacher creativity and the ability to design engaging learning experiences significantly impact children's cognitive abilities (Sefriyanti & ibrahim, 2022). Furthermore, positive and responsive interactions between teachers and children have been shown to enhance language development, mathematical understanding, and overall cognitive skills (Bartholo et al, 2022). Through meaningful interaction, teachers can scaffold children's learning, support their reasoning processes, and encourage them to explore new ideas.

The findings of this study suggest that the high proportion of doubtful cognitive development may be partly influenced by the quality of teacher–child interaction. If interactions are limited, less engaging, or not responsive to chil

dren's needs, opportunities for cognitive stimulation may be reduced. For example, if teachers do not actively encourage questioning, discussion, or exploration, children may not develop critical thinking skills effectively. Therefore, improving teacher competence, especially in creating interactive and child-centered learning environments, is essential. Teachers should be trained to use strategies such as questioning techniques, guided play, and problem-based activities to stimulate children's cognitive development more effectively.

Influence of Learning Environment and Family Factors

Children's cognitive development is shaped not only by school-based factors but also by broader environmental and family influences. A supportive learning environment that encourages exploration, interaction, and creativity plays a significant role in enhancing cognitive abilities (Hadayani, Oktarina & Kaffa, 2025). In such environments, children are more likely to engage actively in learning and develop higher-order thinking skills. Innovative learning approaches, such as STEAM-based learning, have also been shown to improve children's logical reasoning, creativity, and problem-solving abilities (Isnariyati et al., 2025). These approaches integrate science, technology, engineering, arts, and mathematics, allowing children to explore concepts in a holistic and interdisciplinary manner.

In addition, free play activities contribute significantly to cognitive development by fostering imagination, independence, and social skills (Ruiz-garcia et al, 2024). Through play, children learn to make decisions, solve problems, and interact with others, all of which are essential for cognitive growth. However, cognitive development is also influenced by physical and psychological factors. Motor development, for example, is closely linked to cognitive functioning, as physical activity supports brain development and concentration (Yang et al, 2025). Similarly, social-emotional development and adequate sleep are important for learning readiness and memory consolidation (Reynaud, Eve & Heude, 2018).

Family involvement also plays a crucial role. Activities such as role-playing and interactive communication at home can enhance children's symbolic thinking and social understanding (Hidayat, 2025). Conversely, a lack of stimulation at home may contribute to suboptimal cognitive development. Thus, the high proportion of children with doubtful development observed in this study may result from a combination of factors, including limited stimulation at school, less optimal learning environments, and varying levels of support from families.

Implications for Early Childhood Education

The findings of this study have important implications for early childhood education practice. The high percentage of children in the doubtful category indicates a need for more effective and targeted cognitive stimulation strategies. Educators should prioritize the use of active, engaging, and child-centered learning approaches, such as play-based learning, educational games, and exploratory activities. These strategies can help children develop critical thinking, problem-solving, and reasoning skills more effectively.

In addition, strengthening teacher–child interaction is essential to create a supportive learning environment. Teachers should be encouraged to use interactive teaching methods, provide feedback, and facilitate meaningful learning experiences.

Collaboration between schools and families is also crucial. Parents should be involved in supporting children's development at home through activities that stimulate thinking and creativity. Consistent stimulation across school and home environments can significantly enhance children's cognitive outcomes (Sulastri, 2021).

Strengths and Limitations of the Study

This study has several strengths, including the use of direct observational data and the assessment of children's development in a real educational setting. These aspects provide a realistic picture of children's cognitive development in preschool environments. However, several limitations should be considered. First, the study was conducted in a single institution with a relatively small sample size, which may limit the generalizability of the findings. Second, the descriptive design does not allow for causal analysis, so the factors influencing cognitive development cannot be determined with certainty.

Third, the use of the KPSP instrument, which is primarily a screening tool, represents another limitation. The KPSP is designed to identify children at risk of developmental delays rather than to provide a comprehensive or diagnostic assessment of cognitive abilities. Therefore, the results should be interpreted cautiously as an initial screening rather than definitive conclusions about children's cognitive development.

Future Research Directions

Future studies are recommended to use more robust research designs, such as experimental or longitudinal approaches, to better understand the causal factors influencing cognitive development. Research could also explore the effectiveness of specific interventions, such as play-based learning, STEAM education, and technology-assisted learning.

In addition, further studies involving larger and more diverse samples are needed to provide a more comprehensive understanding of children's cognitive development across different contexts. This will help in developing more targeted and evidence-based educational strategies for early childhood education.

CONCLUSION

This study demonstrates that the cognitive development of children aged 5–6 years in preschool education varies, with the majority of children categorized as having doubtful development, indicating that many have not yet achieved optimal cognitive outcomes. These findings highlight the need for more effective and consistent cognitive stimulation tailored to early childhood characteristics.

The study underscores the importance of play-based learning, meaningful teacher–child interaction, and a supportive learning environment in enhancing children's thinking skills and readiness for the next level of education. Therefore, early childhood education institutions should strengthen the implementation of creative, interactive, and game-based learning approaches, while encouraging collaboration between teachers and parents to support children's development. Future research should involve larger and more diverse samples and apply more comprehensive research designs to provide deeper insights into the factors influencing early childhood cognitive development.

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