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Improving Color and Shape-Based Classification Skills through Logical Block Play in Group B Kindergarten Children

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Abstract

Classification skills based on color and shape are fundamental cognitive abilities that are important to develop in early childhood, as they play a crucial role in training logical thinking, observation, and the ability to distinguish object characteristics. This study aims to improve color and shape-based classification skills in Group B kindergarten children through the implementation of logical block play. The study utilizes the Classroom Action Research (CAR) method conducted in two cycles, with 20 Group B kindergarten children as the research subjects. Data collection techniques included observation, documentation, and children's performance assessment. The results showed an increase in children's classification abilities in each cycle. In Cycle I, the completeness of color classification reached 55% and shape classification was 50%. After instructional improvements were made in Cycle II, completeness increased to 85% for color classification and 80% for shape classification. The research findings indicate that the structured, gradual, and engaging implementation of logical block play is effective in improving the color and shape classification skills of Group B kindergarten children.

Keywords: logical blocks; classification skills; early childhood cognitive development; Group B kindergarten

Abstrak

Keterampilan klasifikasi berdasarkan warna dan bentuk merupakan salah satu kemampuan kognitif dasar yang penting dikembangkan pada anak usia dini karena berperan dalam melatih kemampuan berpikir logis, mengamati, serta membedakan karakteristik benda. Penelitian ini bertujuan untuk meningkatkan keterampilan klasifikasi berdasarkan warna dan bentuk pada anak TK Kelompok B melalui penerapan permainan balok logika (logical blocks). Penelitian menggunakan metode Penelitian Tindakan Kelas (PTK) yang dilaksanakan dalam dua siklus, dengan subjek penelitian sebanyak 20 anak TK Kelompok B. Teknik pengumpulan data dilakukan melalui observasi, dokumentasi, dan asesmen unjuk kerja anak. Hasil penelitian menunjukkan adanya peningkatan kemampuan klasifikasi anak pada setiap siklus. Pada siklus I, ketuntasan klasifikasi warna mencapai 55% dan klasifikasi bentuk sebesar 50%. Setelah dilakukan perbaikan pembelajaran pada siklus II, ketuntasan meningkat menjadi 85% untuk klasifikasi warna dan 80% untuk klasifikasi bentuk. Temuan penelitian menunjukkan bahwa penerapan permainan balok logika secara terstruktur, bertahap, dan menyenangkan efektif dalam meningkatkan keterampilan klasifikasi warna dan bentuk pada anak TK Kelompok B.

Kata kunci: balok logika; keterampilan klasifikasi; kognitif anak usia dini; TK Kelompok B

Introduction

Early childhood cognitive development serves as the foundation that determines the quality of a child's learning in subsequent educational stages. The abilities to think, understand concepts, remember, and solve problems that develop during this period will shape the child's cognitive framework into adulthood. Early childhood, specifically between the ages of four to six, is known as the *golden age*—a highly strategic period for laying down the foundations of optimal cognitive development. Halawa, Suryaningsih, and Prima (2025) emphasize that the golden age largely determines the cognitive, emotional, and social development of early childhood, meaning that stimulation provided during this period has a long-term impact on the child's potential. Based on this rationale, providing rich and meaningful learning experiences from an early age is an urgent necessity.

One of the cognitive abilities that has become a primary focus in early childhood education is the ability to classify objects based on specific characteristics. This ability is the foundation of logical thinking, enabling children to recognize similarities and differences among objects in their surroundings. Hidayana, Izzah, and Kiromi (2024) explain that cognitive development is a process in which individuals enhance their ability to utilize acquired knowledge, including the ability to group objects by color and shape, which helps children grasp visual concepts and improves systematic thinking. Similarly, Safira and Sitepu (2025) state that logical-mathematical intelligence is closely related to the ability to think systematically, create classifications, and discover cause-and-effect relationships—abilities that should begin forming during the kindergarten years. This classification skill serves as a vital cornerstone for children in understanding mathematical and scientific concepts at higher educational levels.

However, the reality in the field presents a discrepancy from these expectations. Initial observations conducted in Group B Kindergarten in September 2024 showed that out of 20 children, only 6 children (30%) were able to independently and accurately classify objects by color, while only 5 children (25%) could correctly classify objects by shape. The children tended to experience difficulty when asked to group objects based on two criteria simultaneously—color and shape. This condition is exacerbated by a learning approach that remains predominantly verbal and lacks the use of concrete media that children can observe and manipulate directly. Monotonous learning fails to stimulate children to think and explore, resulting in suboptimal development of classification skills. Susanti (2022) asserts that the Early Childhood Education (ECE) period is the most appropriate time to develop all aspects of a child's potential, including cognitive abilities. If appropriate stimulation is not provided during this period, there is a risk that the child's potential will not develop maximally.

These issues prompted researchers to seek learning solutions better suited to the characteristics and needs of early childhood. Learning media that are concrete, interactive, and enjoyable are deemed more effective in helping children grasp abstract concepts through direct experience. One highly appropriate option is logical block play, which utilizes media consisting of a collection of blocks in various colors (red, yellow, blue) and shapes (circle, square, triangle, rectangle) specifically designed to train children's logical thinking skills. Itryah and Pertiwi (2024) proved that the use of block play media can improve aspects of children's cognitive development as it allows children to directly manipulate, observe, and group objects based on specific traits. Furthermore, Safira and Sitepu (2025) also demonstrated that the implementation of block board media is effective in improving early childhood logical-mathematical abilities, including the ability to classify.

The application of logical block play in learning positions children as active subjects who explore and discover concepts through real experiences. Masnipal (2017) explains that play is a voluntary activity that provides pleasure as well as meaningful learning experiences for children. Through play, children do not merely receive information, but actively construct an understanding of the world around them. Mursid (2018) adds that learning strategies for early childhood must be adapted to the characteristics and developmental stages of children, making play the most suitable vehicle for this purpose. Research by Kurnietin, Tugiyono, and Prayogo (2025) also confirmed that structured and guided play activities can

significantly improve early childhood cognitive development. Thus, logical block play is considered an appropriate alternative solution to address the low classification skills in Group B kindergarten children.

Based on the elaboration above, this study formulates three main research questions: (1) How is the process of implementing logical block play to improve color and shape classification skills in Group B kindergarten children? (2) How significant is the improvement in color classification skills achieved by children after the implementation of logical block play? (3) How significant is the improvement in shape classification skills achieved by children after the implementation of logical block play? This study aims to describe the implementation process of logical block play while simultaneously measuring the improvement of color and shape classification skills in Group B kindergarten children through a planned, systematic, and reflective Classroom Action Research approach.

Method

This study employed a Classroom Action Research (CAR) approach. CAR was selected because it aligns with the research objective, which is to continuously improve and enhance the quality of learning through cycles consisting of planning, acting, observing, and reflecting. The CAR model utilized refers to the Kemmis and Taggart model, which views these four stages as a continuous cycle that repeats until the success indicators are achieved. This approach was chosen as it allows researchers to directly identify classroom problems, design corrective actions, implement them, and evaluate the results in a cohesive and reflective unit.

The research subjects were 20 Group B kindergarten children at TK Pertiwi Harapan, consisting of 11 girls and 9 boys aged between 5 to 6 years. The subject selection was based on preliminary observations indicating low color and shape classification skills in this group. The research was conducted over two months during the odd semester of the 2025/2026 academic year, from October to November 2025. Each cycle consisted of two meetings lasting 60 minutes each, totaling four meetings across the two research cycles.

Research data were collected using three main techniques. First, participatory observation was conducted during the learning process using a structured observation sheet containing indicators of classification skill achievement. Second, performance assessments were carried out at the end of each cycle to measure children's ability to independently classify blocks based on color and shape. Third, documentation in the form of field notes and photographs of learning activities was used to corroborate observation data and track each child's progress.

The research instrument utilized was a classification skills observation sheet developed based on cognitive development indicators for children aged 5–6 years, in accordance with the Minister of Education and Culture Regulation Number 146 of 2014 concerning the 2013 Early Childhood Education Curriculum. These indicators included: (1) the child's ability to group blocks based on a single color criterion; (2) the ability to group based on a single shape criterion; and (3) the ability to group based on two criteria simultaneously (color and shape). Each indicator was assessed on a scale of 1–4: 1 (Not Yet Developed / *Belum Berkembang* - BB), 2 (Beginning to Develop / *Mulai Berkembang* - MB), 3 (Developing as Expected / *Berkembang Sesuai Harapan* - BSH), and 4 (Developing Very Well / *Berkembang Sangat Baik* - BSB). A child was declared competent if they achieved a minimum score of BSH (3).

Data analysis was conducted qualitatively and quantitatively. Quantitative analysis was used to calculate the percentage of student completeness in each cycle using the formula: Percentage = (Number of competent children ÷ Total number of children) × 100%. Qualitative analysis was utilized to interpret observation data and field notes, describe the learning process, and identify supporting and inhibiting factors. The criteria for research success were established if a minimum of 75% of the children achieved the Developing as Expected (BSH) or Developing Very Well (BSB) category on both classification indicators (color and shape) by the end of Cycle II.

Results and Discussion

Results

Prior to implementing the action research, the researcher conducted a preliminary observation to gain an overview of the children's baseline ability to classify objects. The observation was carried out over two days in the first week of October 2025 using the same observation sheet intended for Cycle I and Cycle II. The baseline data for the classification skills of Group B kindergarten children are presented in Table 1 below.

Table 1. Children's Classification Skills Baseline Data (Pre-Cycle)

No	Child's Name	Color Classification	Shape Classification	2-Criteria Classification	Total Score	Category
1	Aisyah N.	2	2	1	5	MB
2	Bintang R.	3	2	2	7	MB
3	Cahaya D.	2	1	1	4	BB
4	Dani P.	3	3	2	8	BSH
5	Eka S.	2	2	1	5	MB
6	Fajar K.	1	1	1	3	BB
7	Gilang M.	3	2	2	7	MB
8	Hani L.	2	2	1	5	MB
9	Indra W.	3	3	2	8	BSH
10	Juwita A.	2	1	1	4	BB
11	Kevin R.	3	2	2	7	MB
12	Lina S.	2	2	1	5	MB
13	Mutiara P.	1	1	1	3	BB
14	Nanda F.	3	3	2	8	BSH
15	Omar D.	2	2	1	5	MB
16	Putri H.	3	2	2	7	MB
17	Qiana B.	2	1	1	4	BB
18	Rizal T.	3	3	2	8	BSH
19	Sari M.	2	2	1	5	MB
20	Taufik N.	3	2	2	7	MB
Total Competent (BSH/BSB)		**6 children (30%)**	**5 children (25%)**			

Source: Researcher's observation data, October 2025

The data in Table 1 shows that at the baseline condition, only 6 children (30%) achieved completeness in classification skills based on color, and only 5 children (25%) were competent in classification based on shape. The majority of the children, 10 in total, were in the Beginning to Develop (MB) category, while 5 children were still in the Not Yet Developed (BB) category. No children achieved the Developing Very Well (BSB) category during this pre-cycle stage. This data underscores the need for more targeted, concrete media-based instructional interventions to improve the children's classification skills.

1. Cycle I Results Data

Cycle I was conducted in two meetings during the second and third weeks of October 2025. The first meeting focused on introducing logical blocks and classification based on a single criterion (color), while the second meeting increased the challenge by introducing classification based on a single shape criterion. In each meeting, activities were divided into three stages: opening activities (±10 minutes), main logical block play activities (±35 minutes), and closing activities in the form of joint reflection (±15 minutes). The results of the final Cycle I assessment are presented in Table 2.

Table 2. Children's Classification Skills Data in Cycle I

No	Child's Name	Color Classification	Shape Classification	2-Criteria Classification	Total Score	Category
1	Aisyah N.	3	3	2	8	BSH
2	Bintang R.	3	3	2	8	BSH
3	Cahaya D.	3	2	2	7	MB
4	Dani P.	4	3	3	10	BSB
5	Eka S.	3	3	2	8	BSH
6	Fajar K.	2	2	1	5	MB
7	Gilang M.	4	3	3	10	BSB
8	Hani L.	3	3	2	8	BSH
9	Indra W.	4	4	3	11	BSB
10	Juwita A.	3	2	2	7	MB
11	Kevin R.	3	3	2	8	BSH
12	Lina S.	3	3	2	8	BSH
13	Mutiara P.	2	2	1	5	MB
14	Nanda F.	4	4	3	11	BSB
15	Omar D.	3	3	2	8	BSH
16	Putri H.	3	3	2	8	BSH
17	Qiana B.	3	2	2	7	MB
18	Rizal T.	4	3	3	10	BSB
19	Sari M.	3	3	2	8	BSH
20	Taufik N.	3	3	2	8	BSH
Total Competent (BSH/BSB)		**11 children (55%)**	**10 children (50%)**			

Source: Cycle I performance assessment data, October 2025

Table 2 indicates a meaningful improvement compared to baseline conditions. Color classification completeness increased from 30% to 55% (11 children), and shape classification completeness increased from 25% to 50% (10 children). Five children even achieved the Developing Very Well (BSB) category. However, there were still 5 children in the Beginning to Develop (MB) category who had not yet achieved competence. This indicates that while Cycle I successfully yielded improvements, it had not yet reached the minimum success indicator of 75%, thus necessitating continuation to Cycle II. *(Note: Diagram 1 mentioned in the original text would visually display this trend).*

2. Cycle II Results Data

Based on the reflections from Cycle I, the researcher implemented instructional improvements in Cycle II by adding more challenging game variations, namely classifying based on two criteria simultaneously (color and shape), as well as providing more intensive individualized guidance to the 5 children who remained in the MB category. Cycle II was conducted in the first and second weeks of November 2025. The results of the final Cycle II assessment are presented in Table 3.

Table 3. Children's Classification Skills Data in Cycle II

No	Child's Name	Color Classification	Shape Classification	2-Criteria Classification	Total Score	Category
1	Aisyah N.	4	3	3	10	BSB
2	Bintang R.	4	3	3	10	BSB
3	Cahaya D.	3	3	2	8	BSH
4	Dani P.	4	4	4	12	BSB
5	Eka S.	3	3	3	9	BSH

6	Fajar K.	3	3	2	8	BSH
7	Gilang M.	4	4	4	12	BSB
8	Hani L.	4	3	3	10	BSB
9	Indra W.	4	4	4	12	BSB
10	Juwita A.	3	3	2	8	BSH
11	Kevin R.	4	3	3	10	BSB
12	Lina S.	4	4	3	11	BSB
13	Mutiara P.	3	3	2	8	BSH
14	Nanda F.	4	4	4	12	BSB
15	Omar D.	3	3	3	9	BSH
16	Putri H.	4	4	3	11	BSB
17	Qiana B.	3	3	2	8	BSH
18	Rizal T.	4	4	4	12	BSB
19	Sari M.	4	3	3	10	BSB
20	Taufik N.	2	2	1	5	MB
Total Competent (BSH/BSB)		**17 children (85%)**	**16 children (80%)**			

Source: Cycle II performance assessment data, November 2025

The data in Table 3 demonstrates highly significant improvements in Cycle II. Color classification completeness increased to 85% (17 children), and shape classification completeness reached 80% (16 children). Both successfully surpassed the established minimum success indicator of 75%. Only one child (Taufik N.) remained in the Beginning to Develop category. Twelve children reached the Developing Very Well (BSB) category, signifying that logical block play not only increased the quantity of completeness but also encouraged children to attain higher levels of mastery.

Table 4. Recapitulation of Classification Skills Completeness Percentages Across Three Stages

Classification Indicator	Pre-Cycle	Cycle I	Cycle II
Color Classification	30% (6 children)	55% (11 children)	85% (17 children)
Shape Classification	25% (5 children)	50% (10 children)	80% (16 children)
2-Criteria Classification	15% (3 children)	35% (7 children)	75% (15 children)

Source: Research data recapitulation, 2025

Discussion

The Process of Implementing Logical Block Play in Classification Learning

The implementation of logical block play in this study was carried out gradually and systematically following the principle of scaffolding—progressing from simple tasks to more complex ones. In Cycle I, the children were first introduced to logical blocks through free exploration for 10 minutes, then gradually directed to classify the blocks based on a single criterion—color in the first meeting, and shape in the second. This arrangement aligns with the principle proposed by Mursid (2018), which states that early childhood learning strategies must be adapted to children's characteristics and developmental stages, ensuring that task complexity increases gradually alongside the reinforcement of conceptual understanding.

In Cycle II, the challenge was elevated by asking children to classify blocks based on two criteria simultaneously—color and shape. Observation results showed that children who previously experienced difficulties began to group the blocks independently after receiving more intensive individualized guidance. Masnipal (2017) explains that play is an activity that provides meaningful learning experiences, and in the context of this research, children were not merely playing but actively constructing an understanding of

color and shape concepts through direct manipulation of the blocks. This process reflects Piaget's constructivist theory, which emphasizes that children learn best when actively interacting with concrete objects in their environment. Thus, the process of implementing logical block play in this study successfully created an active, enjoyable learning experience appropriate for the developmental stage of Group B kindergarten children.

Improvement of Color-Based Classification Skills

The children's color classification skills exhibited consistent and significant improvement throughout the study. The percentage of completeness increased from 30% in the pre-cycle to 55% at the end of Cycle I, and reached 85% at the end of Cycle II—a total increase of 55 percentage points. This improvement demonstrates that logical block play effectively aids children in understanding and applying color concepts in classification activities.

These findings align with the research by Hidayana, Izzah, and Kiromi (2024), which proved that the use of block media significantly improves children's ability to recognize and group objects by color. According to them, concrete media such as blocks help children build much stronger mental representations of color compared to mere verbal instructions. Suyadi (2019) adds that optimal early childhood cognitive development occurs through the provision of meaningful learning experiences, and direct manipulation of colored blocks is a form of such meaningful experience. Furthermore, research by Halawa, Suryaningsih, and Prima (2025) affirms that block-based play is consistently proven effective in improving children's cognitive abilities, including the ability to recognize and group based on visual attributes such as color. The fact that 85% of the children achieved completeness in Cycle II, surpassing the minimum target of 75%, reinforces the conclusion that logical block play is an appropriate and effective strategy for developing the color classification skills of Group B kindergarten children.

Improvement of Shape-Based Classification Skills

Children's shape classification skills showed a similar pattern of improvement to color classification, albeit at a slightly slower pace. Completeness increased from 25% in the pre-cycle to 50% in Cycle I, reaching 80% in Cycle II—a total increase of 55 percentage points. The slightly slower improvement in shape classification compared to color can be understood from a cognitive development perspective, as the concept of geometric shapes requires a more abstract understanding than color concepts, which can be observed more directly and perceptually.

Safira and Sitepu (2025) explain that logical-mathematical intelligence, which includes the ability to classify by shape, develops through children's interaction with media that encourages systematic and analytical thinking. Logical block media, with its concrete, tangible shape variations, provides direct experiences that make it easier for children to distinguish and group geometric shapes. These findings are reinforced by Susanti's (2022) study, which showed that object-grouping activities using concrete media tangibly improve children's cognitive abilities, including shape recognition and classification. Kurnietin, Tugiyono, and Prayogo (2025) also found that structured play activities using concrete media effectively improve overall early childhood cognitive development. Regarding the 4 children who had not yet achieved completeness by the end of Cycle II, it is likely they require a more intensive individualized approach and extended exploration time, considering that every child has a different developmental pace. This simultaneously highlights the need for further research focusing on differentiated learning strategies to ensure all children can develop optimally.

Overall, the findings of this study have significant implications for learning practices in kindergartens. First, teachers must provide diverse and structured concrete media as the primary means of children's cognitive learning. Second, logical block play can be integrated into play centers systematically designed to develop classification skills. Third, the principle of gradually increasing complexity (from one criterion to two criteria) is proven effective and can serve as a reference for designing other cognitive learning activities. Fourth, individualized guidance for children experiencing difficulties must be provided consistently to ensure no child is left behind. Future research could explore the application of logical blocks for the

development of other cognitive aspects, such as the ability to compare sizes, sequence, and understand patterns, in order to comprehensively broaden the benefits of this media for early childhood development.

Conclusion

Based on the research findings described, three main conclusions can be drawn. First, the process of implementing logical block play in Group B Kindergarten was conducted gradually and systematically—starting from introduction and free exploration, progressing to single-criterion classification (color or shape), and advancing to dual-criteria classification simultaneously. This proved capable of creating an active, enjoyable learning environment conducive to children's cognitive development. Second, color-based classification skills demonstrated significant improvement, from 30% at the baseline to 55% in Cycle I, reaching 85% in Cycle II, thereby surpassing the minimum success indicator of 75%. Third, shape-based classification skills also increased consistently, from 25% at the baseline to 50% in Cycle I and 80% in Cycle II, also exceeding the established minimum target. Overall, the implementation of logical block play proved effective in improving the color and shape-based classification skills of Group B kindergarten children.

Based on these research findings, several recommendations are formulated for various parties. For kindergarten teachers, it is recommended to integrate logical block play into the routine activities of cognitive play centers, utilizing the principle of gradually increasing complexity as applied in this study. For school principals and ECE administrators, the provision of logic-based educational play media such as logical blocks should be prioritized in the procurement of learning and play equipment, given their tangible benefits for children's cognitive development. For future researchers, it is recommended to explore the effectiveness of logical blocks in developing other cognitive abilities, such as comparing object sizes, sequencing objects, and understanding simple patterns. Furthermore, exploring the possible integration of logical blocks with digital technology could yield more varied learning media that is responsive to the needs of 21st-century children.

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