

Improving Early Childhood's Ability to Recognize Object Sizes and Concentration Through the Pink Tower for Children Aged 4–5 Years

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ABSTRACT

This study aimed to examine the effect of the Pink Tower learning media on the ability to recognize object sizes and the concentration of children aged 4–5 years. The research employed a quasi-experimental method using a pretest–posttest control group design involving 20 children who were divided equally into an experimental group and a control group. The findings revealed that the experimental group demonstrated significantly greater improvement than the control group. These results indicate that the Pink Tower learning media has a positive and significant effect on enhancing children's ability to recognize object sizes and improving their concentration during learning activities. Therefore, the Pink Tower can serve as an effective Montessori-based educational medium to support cognitive development and learning readiness among early childhood learners.

Introduction

Children's ability to distinguish object sizes through activities such as matching sizes and shapes, as well as their ability to maintain concentration through sustained focus and attention, constitutes an essential aspect of early childhood cognitive development (Rohmah, 2025). Concentration skills include the ability to differentiate between large and small objects (Martini & Masganti Sitorus, 2023), identify differences in size such as large, medium, and small, and classify objects according to similar sizes. Furthermore, children are expected to be able to arrange objects from the smallest to the largest or vice versa and accurately match objects based on their respective sizes. These skills are fundamental for helping children understand measurement concepts and apply logical reasoning in their everyday lives (Afrianti et al., 2020; Nurdiansyah et al., 2024).

Children's limited understanding of object size and shape recognition highlights the importance of providing early stimulation (Nurjanah et al., 2021). Around the ages of four to five years, children enter a developmental stage in which they are highly receptive to understanding concepts of size and shape. They begin to comprehend basic measurement concepts such as tall and short, big and small, as well as high and low. As part of their cognitive development, children become capable of sorting objects according to size and shape, enabling them to develop greater focus, accuracy, and the ability to distinguish among different objects (Hapsari, 2020; Bjorklund, 2022). This

perspective aligns with Montessori's theory of cognitive development, which emphasizes that children learn to concentrate independently on one task at a time while comparing, distinguishing, and identifying differences in size, shape, and color through hands-on sensory experiences (Liliard, 2017; Dutcher et al., 2017).

According to Puling (2023), one of the most crucial aspects of children's cognitive development is their ability to recognize object sizes and shapes. Through activities involving the identification of shapes, sizes, and colors, children develop visual observation skills and logical thinking. Similarly, Fitri and Dike Amelia (2014) argue that children's ability to classify objects based on characteristics such as size, color, type, and shape reflects the development of their cognitive abilities. Nurjanah et al. (2021) further emphasize that recognizing shapes, sizes, and colors promotes children's thinking skills by strengthening visual perception while helping them understand relationships among objects through comparing similarities and differences. These experiences establish the foundation for logical thinking, analytical reasoning, and problem-solving skills.

Children also require consistent concentration training from an early age (Nuraida et al., 2025). Those who develop concentration skills are better able to ignore irrelevant stimuli and complete assigned tasks effectively. Supporting this view, Rufaidah et al. (2025) explain that concentration plays a critical role in learning because it enhances children's readiness to participate in classroom activities and facilitates

their understanding of learning materials. Children who are able to concentrate effectively tend to learn more successfully, complete assignments appropriately, and achieve expected learning outcomes (Narti, 2025). Educational Play Tools (*Alat Permainan Edukatif*) contribute significantly to children's cognitive development and thinking abilities, particularly in recognizing numbers (Sari et al., 2023). In addition, APE supports motor development and socio-emotional growth. Within the Montessori approach, sensorial learning materials function as concrete tools that enable children to understand abstract concepts through sensory exploration (Suciati et al., 2025; Allee-Herdon & Roberts, 2018). One such material is the Pink Tower, a set of ten pink cubes arranged progressively from the largest to the smallest. Constructing the tower enables children to understand size concepts concretely while simultaneously developing their ability to classify and sequence objects according to size.

Preliminary observations conducted at RA Albanatu Shalihah indicated that children aged 4–5 years continued to experience difficulties in recognizing object sizes from the smallest to the largest. Although some children already understood the concepts of large and small, they often hesitated to answer because they feared making mistakes or had not yet fully mastered the concepts. They were also not accustomed to working independently. Consequently, they frequently required teachers' assistance when classifying objects and often sought confirmation from the teacher before determining which objects were

larger or smaller. Children's concentration skills were likewise underdeveloped, as reflected in their tendency to become easily distracted and their inability to maintain attention during learning activities for extended periods. One contributing factor was the classroom environment, where two inclusive students with special educational needs were generally more active, creating a noisier atmosphere. Although such conditions are natural, they inadvertently distracted other children. Given that young children are highly sensitive to surrounding sounds and activities, this less conducive classroom environment further reduced their ability to concentrate during learning activities.

A classroom action research study conducted by Erimedia et al. (2025) demonstrated that children aged 4–5 years improved their ability to classify objects according to size through activities involving the Pink Tower building blocks. Learning outcomes increased from 64.10% during the pre-cycle to 78.85% in Cycle II, while children became more enthusiastic, actively engaged, and better able to understand the concepts of large and small through play-based learning. Other studies have also shown that the Pink Tower and other Montessori instructional materials, including geometric puzzles, improve children's ability to recognize geometric shapes (Pajririya, 2024) among children aged five to six years. Likewise, Maulidiyah et al. (2022) reported that RA Syihabuddin successfully implemented the Montessori approach to foster fine motor development by effectively utilizing the Sensorial Area

in classroom learning.

This study was conducted to provide valuable insights for educators, parents, and early childhood education institutions regarding the use of the Pink Tower Educational Play Tool (APE) in improving children's ability to recognize object sizes and enhance concentration (Rohmah, 2025, p. 134). Unlike previous studies, which primarily employed classroom action research designs or focused on object sequencing abilities (Erimedia et al., 2025), geometric shape recognition (Pajririya, 2024), or fine motor development (Maulidiyah et al., 2022), the present study investigates whether the use of the Pink Tower significantly influences both children's ability to recognize object sizes and their concentration during learning activities. The findings are expected to provide practical benefits for teachers, early childhood education institutions, parents, and future researchers.

Methods

This study employed a quasi-experimental research design using a pretest–posttest control group design (Herawati et al., 2019). The research was conducted at RA Albanatu Shalihah, Medan Labuhan. The study sample consisted of 20 children aged 4–5 years, who were equally divided into an experimental group and a control group, with 10 children in each group.

The research design is presented as follows:

Table 1. Research design of quasi experimental

Experimental Group	O ₁	X	O ₂
Control Group	O ₃	–	O ₄

Description:

- O₁ = Pretest of the experimental group
- O₂ = Posttest of the experimental group
- O₃ = Pretest of the control group
- O₄ = Posttest of the control group
- X = Treatment using the Pink Tower learning media.

In this study, the experimental group received instruction using the Pink Tower learning media, whereas the control group participated in learning activities without using the media. The research was conducted over a period of two weeks, comprising ten learning sessions. Data were collected using observation sheets designed to assess children's ability to recognize object sizes and their concentration based on the indicators developed by Nuraida et al. (2025) and Nurdiansyah et al. (2024).

The collected data were analyzed using IBM SPSS Statistics. Before hypothesis testing, the data were subjected to normality and homogeneity tests to ensure that the assumptions for parametric analysis were satisfied. Subsequently, an Independent Samples t-test was performed to determine whether significant differences existed between the experimental and control groups. The indicators and sub-indicators employed in this study are presented below.

Table 2. Cognitive Indicators and Measurement

No.	Indicator	Sub-indicator
1	Ability to distinguish object sizes	The child is able to distinguish between large and small objects.
2	Ability to compare object sizes	The child is able to identify differences in size, such as large, medium, and small.
3	Ability to classify object sizes	The child is able to classify objects according to the same size.
4	Ability to sequence object sizes	The child is able to arrange objects from the smallest to the largest or vice versa.
5	Ability to match object sizes	The child is able to accurately match objects according to their respective sizes.

Table 3. Learning Concentration Indicators and Measurement

No.	Indicator	Sub-indicator
1	Ability to focus attention	The child is able to remain focused on object-size recognition activities without being easily distracted.
2	Persistence in completing activities	The child is able to complete the Pink Tower construction activity until it is finished.
3	Accuracy in performing	The child is able to follow the teacher's instructions during learning activities.

	activities	
4	Persistence during activities	The child demonstrates perseverance while participating in object-size recognition activities.
5	Attention during learning	The child is able to pay close attention to the teacher's explanations throughout the learning process.

The assessment criteria used in this study were as follows:

- BB (Belum Berkembang) = Not Yet Developed
- MB (Mulai Berkembang) = Beginning to Develop
- BSH (Berkembang Sesuai Harapan) = Developing as Expected
- BSB (Berkembang Sangat Baik) = Very Well Developed

Data analysis was conducted in two stages (Yunitri et al., 2024). First, descriptive statistical analysis was used to process the observational data in order to determine the average scores and changes in children's abilities before and after the implementation of the Pink Tower learning media, both in terms of object-size recognition and concentration. Second, an Independent Samples t-test was conducted to compare the pretest and posttest results, thereby determining whether the observed improvements were statistically significant or merely occurred by chance. Through this analytical procedure, the study sought to verify whether the use of the Pink Tower learning media had a significant effect on improving children's ability to recognize object sizes and enhance their concentration.

Result and Discussions

Preliminary observations were conducted to determine the baseline ability of children aged 4–5 years to recognize object sizes and their level of concentration before the implementation of the **Pink Tower** learning media at **RA Al-Banatu Shalihah**. This activity aimed to obtain an initial profile of children's abilities prior to the learning intervention, enabling teachers to design learning experiences that were appropriate to the characteristics of early childhood learners so that they remained interested, actively engaged, and less likely to become bored. The results of these initial observations were subsequently used as baseline data for comparison with the outcomes following the implementation of the learning media.

The preliminary findings indicated that children aged 4–5 years demonstrated relatively low abilities in recognizing object sizes and maintaining concentration. Several children experienced difficulties in distinguishing, sequencing, and matching objects according to their sizes. In addition, their concentration had not yet developed optimally, as reflected by their tendency to become easily distracted, lack sustained focus during learning activities, and inability to complete tasks independently. Therefore, engaging and concrete learning stimulation through the Pink Tower learning media was considered necessary to improve both abilities. The initial observation results were then compared with the post-treatment findings to determine the extent of improvement achieved.

The findings revealed significant differences in the improvement of children's ability to recognize object sizes and concentration between the experimental group, which received instruction using the Pink Tower, and the control group, which participated in conventional learning activities. These differences were reflected in the pretest and posttest scores of both groups, as presented in Table 1.

Table 4. Summary of Changes in Children's Abilities

Variable	Group	Pretest	Posttest	Improvement
Object Size Recognition	Control	9.1	11.3	2.2
	Experimental	10.8	15.2	4.4
Concentration	Control	9.1	11.3	2.2
	Experimental	11.7	16.0	4.3

Based on Table 4, the object size recognition ability of the control group improved from a mean score of 9.1 to 11.3, representing an increase of 2.2 points. In contrast, the experimental group demonstrated a greater improvement, increasing from a mean score of 10.8 to 15.2, representing an improvement of 4.4 points. These findings indicate that children who learned using the Pink Tower achieved nearly twice the improvement in object size recognition compared with those in the control group.

A similar pattern was observed for children's concentration. The control group improved from a mean score of 9.1 to 11.3, corresponding to an increase of 2.2 points. Meanwhile, the experimental group

improved from 11.7 to 16.0, representing an increase of 4.3 points. These results demonstrate that the Pink Tower learning media not only enhanced children's ability to recognize object sizes but also positively influenced their ability to maintain attention, follow instructions, and complete learning activities with greater focus compared with conventional instruction that did not utilize the media.

Throughout the intervention, children's abilities in the experimental group improved progressively during each learning session. They demonstrated increasing competence in distinguishing object sizes, arranging objects from the largest to the smallest and vice versa, and matching objects according to their sizes. Furthermore, children's concentration also improved, as evidenced by longer periods of sustained attention during learning activities, greater persistence in completing assigned tasks, and an enhanced ability to follow teachers' instructions. These findings suggest that the use of concrete learning materials such as the Pink Tower creates more engaging learning experiences, thereby encouraging children to become more active participants throughout the learning process.

To verify that these improvements were statistically significant rather than occurring by chance, the data were analyzed using normality, homogeneity, and Independent Samples t-test analyses. A summary of the statistical analysis is presented in Table 2.

Table 5. Summary of Statistical Test Results

Variable	Normality	Homogeneity	t-value	Sig.	Decision
Object Size Recognition	Normal	Homogeneous	-8.794	0.000	Significant
Concentration	Normal	Homogeneous	-10.480	0.000	Significant

Based on Table 5, all research data satisfied the assumptions required for parametric statistical analysis, as evidenced by the normal distribution of the data and the homogeneity of variances. Since both prerequisites were fulfilled, an Independent Samples t-test was conducted to examine differences between the experimental and control groups. The analysis revealed a significance value of 0.000 ($p < 0.05$) for both research variables, namely object size recognition ability and concentration.

For the object size recognition variable, the statistical analysis produced a t-value of -8.794, whereas the concentration variable yielded a t-value of -10.480. Because the significance values for both variables were below 0.05, the results indicate statistically significant differences between the experimental and control groups following the intervention. Therefore, the use of the Pink Tower learning media was proven to have a significant positive effect on improving children's ability to recognize object sizes while simultaneously enhancing the concentration of children aged 4–5 years compared with conventional

learning activities that did not utilize the media.

The findings of this study demonstrate that the Pink Tower learning media is effective in improving both children's ability to recognize object sizes and their concentration. These results are consistent with Montessori theory, which views sensorial materials as concrete learning tools that enable children to construct abstract concepts through direct experience. By arranging cubes according to graduated sizes, children are provided with opportunities to compare, sequence, and classify objects independently, making the learning process more meaningful. Furthermore, the activity requires sustained attention, careful observation, and the gradual completion of tasks, thereby fostering the development of concentration alongside cognitive growth.

The present findings are also consistent with previous studies. Erimedia et al. (2025) reported that the Pink Tower effectively enhanced children's ability to classify objects according to size. Likewise, Pajriryah (2024) found that Montessori learning materials effectively supported young children's understanding of geometric concepts. In addition, Maulidiyah et al. (2022) demonstrated that the implementation of Montessori sensorial activities contributed positively to children's overall development through manipulative learning experiences. However, the present study extends previous findings by demonstrating that the Pink Tower not only improves children's ability to recognize object sizes but also simultaneously enhances their learning concentration. Consequently, this study provides broader empirical

evidence regarding the contribution of Montessori-based learning media to both cognitive development and learning readiness in early childhood education.

Conclusion

The findings of this study indicate that the Pink Tower Educational Play Tool (APE) is effective in improving both the ability to recognize object sizes and the concentration of children aged 4–5 years at RA Albanatu Shalihah. Prior to the intervention, children's abilities in both aspects were relatively low; however, following the implementation of the Pink Tower, significant improvements were observed. These findings demonstrate that the Pink Tower is an engaging instructional medium that is developmentally appropriate for early childhood learners. Therefore, it can serve as an alternative Montessori-based learning medium to effectively support children's cognitive development and enhance their concentration during learning activities.

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