Journal of Educational Sciences
Journal homepage: https://jes.ejournal.unri.ac.id/index.php/JES

P-ISSN 2581-1657
E-ISSN 2581-2203

The Effect of Lasy Extracurricular Activities on the Problem Solving Ability of Children Aged 4-5 Years

Kharisma Putri*, Naili Rohmah
Early Childhood Teacher Education Study Program, Faculty of Educational Sciences and Psychology, Universitas Negeri Semarang, Semarang, 50229, Indonesia

ARTICLE INFO

Article history:

Received: 11 May 2026
Accepted: 29 June 2026
Available Online: 05 July 2026

Keywords:

Lasy Extracurricular,
Problem Solving Skills,
Constructive Play,
Cognitive Stimulation,
Early Childhood

* *Corresponding author:*

E-mail:
kharismaputri12@students.unnes.ac.id

Article Doi:

https://doi.org/10.31258/jes.10.7.p.594-606

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A B S T R A C T

Problem solving skills constitute an important aspect of early childhood cognitive development because they support children's ability to identify problems, formulate solutions, make decisions, and evaluate outcomes. Appropriate stimulation requires exploratory learning experiences through concrete learning activities. This study aims to analyze the effect of Lasy extracurricular activities on the problem solving skills of children aged 4-5 years. The study employed a quantitative approach using a quasi experimental method with a non equivalent control group design. Research subjects consisted of 40 children, including 20 children in the experimental group and 20 children in the control group. Data analysis involved the Wilcoxon Signed Rank Test and the Mann-Whitney test. Findings indicated that the experimental group's average score increased from 25.90 to 41.45, while the control group's score increased from 25.00 to 36.45. Statistical analysis showed a significance value of 0.000 in the Wilcoxon test and a p-value of 0.007 in the Mann-Whitney test ($p < 0.05$). The findings demonstrate that Lasy extracurricular activities significantly improve the problem solving skills of children aged 4-5 years and can be utilized as an alternative for cognitive stimulation through constructive play in early childhood education.

1. Introduction

Early childhood represents a critical stage in human development that forms the foundation for character formation, thinking abilities, social competence, and emotional sensitivity. The National Association for the Education of Young Children (NAEYC) defines early childhood as the period from birth to eight years of age, while Permendikbud Number 18 of 2018 defines early childhood in Indonesia as children aged 0–6 years. Optimal development during this period requires stimulation across all developmental domains, including the cognitive

domain (Oktaviany et al., 2021). Permendikbud Number 137 of 2014 identifies learning and problem solving as important components of cognitive development. According to Heppner and Petersen in Asridoni et al. (2025), problem solving refers to a combination of cognitive processes and emotional responses used to identify, assess, and determine appropriate solutions to everyday challenges. Problem solving abilities reflect children's capacity to analyze situations, generate alternative solutions, make decisions, and evaluate outcomes. These abilities have become increasingly important in the 21st century, which demands adaptability, creativity, critical thinking, and independent decision-making from an early age.

The development of children's problem solving abilities can be stimulated through meaningful learning experiences, including extracurricular activities implemented in early childhood education settings. Based on Karunia et al. (2022) research, well-managed extracurricular activities play a strategic role in improving the quality of PAUD services by stimulating various aspects of child development, including social emotional, language, art, moral values, and cognitive development. These activities can take the form of extracurricular sports, musical arts, drawing, dance, or educational games tailored to children's interests and potential. Educational quality in learning activities is influenced by effective learning management, adaptive educational support, and meaningful learning experiences that encourage active participation during the learning process. Mulawarman et al. (2026), explains that structured educational management and continuous academic guidance contribute to improving the quality of learning processes and support the achievement of educational objectives effectively. Innovative learning approaches supported by exploratory learning activities also create more meaningful and effective learning experiences for children. Wahyuni et al. (2025), states that project-based learning activities encourage active participation, exploration, and direct learning experiences that support cognitive development during the learning process. One effective way to stimulate cognitive abilities and problem solving skills is through constructive games such as Lasy, which encourages children to think creatively, try various preparation strategies, and find solutions to build the desired shape.

Lasy educational game tools (APE) are constructive games designed according to the principles of interlocking components to form a real object (Oktavia & Sari, 2024). This principle allows children to assemble gradually, thereby stimulating psychomotor skills, creativity, concentration, and conceptual thinking. Naufalia (2025), stated that Lasy consists of plastic pieces that children can assemble into various shapes according to their imagination. As a constructive APE from Germany, Lasy has effective flexibility in practicing eye hand coordination and developing cognitive skills, especially problem solving. Interactive and manipulative learning media also contribute to strengthening children’s cognitive engagement through direct exploration activities during learning. Munasti et al. (2026), explains that learning media involving observation, interaction, and repeated practice effectively stimulate children’s cognitive development and encourage active participation during learning activities. Previous studies further reinforce these findings, demonstrating that constructive games such as LEGO (Lestari & Mariyani, 2024), puzzles (Permata, 2020), and loose parts

(Lestariningrum & Wijaya, 2020) are effective for children's development. Contribute significantly to children's cognitive development, creativity, and independence. Research by Shufiyah & Hariyati (2023), and Rokhimah & Darmawanti (2013), supports the advantages of Lasy in improving children's accuracy and perseverance. This also shows the children's endurance in facing construction challenges. Lasy play not only plays a role in supporting fine motor development, but also strengthens critical thinking skills and integrates early childhood problem solving.

Based on observations conducted in August 2025 by researchers of the last extracurricular activities at Siti Sulaechah 04 Kindergarten, the findings indicate a discrepancy between the availability of complete teaching aids and the suboptimal level of children's problem solving abilities. Children tend to be passive and gradually become highly dependent on the teacher's instructions. Children have not shown the desire to explore independently. When faced with technical challenges, such as difficulty with component relationships, children are more likely to stop playing or ask the teacher for help without trying other alternatives. This condition shows low endurance in children when faced with construction failures. This study emphasizes the need to investigate this phenomenon further, as previous research has demonstrated a positive correlation between constructive play and child development. Previous research has shown that constructive media such as puzzles and loose parts are effective in improving problem solving skills. The use of Lasy extracurricular activities also contributes to the development of fine motor and concentration in children. Studies that specifically examine the influence of lasy games on the problem solving abilities of children aged 4-5 years are still limited. Field practices reflect this gap, as many extracurricular activities routinely conducted do not yet optimally stimulate children's problem solving abilities. This study aims to analyze the influence of Lasy extracurricular activities on the improvement of children's problem solving skills aged 4-5 years.

2. Methodology

This study employed a quantitative approach emphasizing objective measurement, numerical data analysis, and statistical procedures to examine the effect of Lasy extracurricular activities on children's problem solving abilities (Sugiyono, 2024). The research used a quasi experimental method with a non equivalent control group design involving an experimental group and a control group without random assignment of participants (Muhamad et al., 2026). The research procedure consisted of three stages, including pre-test administration, treatment implementation, and post-test administration. The independent variable was Lasy extracurricular activities, while children's problem solving ability served as the dependent variable. The experimental group consisted of 20 children aged 4-5 years from KB-TK Siti Sulaechah 04 Semarang who participated in Lasy extracurricular activities. The control group consisted of 20 children aged 4-5 years from TK Siti Sulaechah 01 Semarang who participated in regular learning activities without exposure to Lasy extracurricular activities. Group selection employed the intact group technique based on existing institutional conditions without altering the

natural classroom setting (Abraham & Supriyati, 2022). This design was selected to analyze differences in children's problem solving abilities before and after treatment while maintaining the natural learning conditions within each institution.

Instruments

The research instrument consisted of structured observation sheets using rating scale categories including BB (1), MB (2), BSH (3), and BSB (4) (Rahmawati et al., 2024). The observation instrument measured several indicators of children's problem solving abilities during learning activities, including the ability to identify problems, determine alternative solutions, make decisions, evaluate outcomes, and demonstrate persistence when facing difficulties during constructive play activities. Early childhood education experts conducted content validity testing through expert judgment procedures (Utari & Indriati, 2022). Empirical validity testing was conducted through instrument trials involving 41 children aged 4-5 years using Product-Moment correlation analysis. Instrument items with r count values exceeding the r table value were considered valid. Reliability testing employed Cronbach's Alpha to determine the internal consistency of the instrument, ensuring the stability and dependability of measurements throughout the study.

Data Collection

Data collection was conducted through structured observations during the pre-test and post-test phases. The pre-test was administered before the implementation of the intervention to determine the initial level of children's problem solving abilities in both groups. The experimental group subsequently received treatment through Lasy extracurricular activities implemented over six meetings, while the control group continued participating in learning activities according to the institutional curriculum. Throughout the intervention process, observations focused on children's behaviours related to problem solving indicators, including identifying challenges, selecting appropriate strategies, testing alternative solutions, evaluating results, and demonstrating persistence when facing difficulties. The post-test was administered after completion of the intervention to determine changes in children's problem solving abilities following participation in the learning activities. All observations were conducted systematically using the validated observation instrument to ensure consistency in data collection procedures.

Data Analysis

Data analysis employed descriptive and inferential statistical techniques. Descriptive statistics were used to describe research data through frequencies, minimum scores, maximum scores, ranges, and mean values. Statistical prerequisite testing included normality testing and homogeneity testing before hypothesis testing procedures were performed. The normality test results indicated that the experimental group post-test data were not normally distributed. Consequently, hypothesis testing for the experimental group employed the Wilcoxon Signed Rank Test. The control group data met the assumptions of normal distribution and were analyzed using the Paired Samples t-test to examine differences between pre-test

and post-test scores. Homogeneity testing was subsequently conducted to determine variance equality between groups. The Mann-Whitney Test was then applied to identify differences in the improvement of problem solving abilities between the experimental and control groups. The level of significance for all statistical analyses was established at 0.05.

3. Results and Discussion

The treatment was implemented through Lasy extracurricular activities conducted over 6 meetings, with each session lasting approximately 45 minutes. During the activities, children were encouraged to construct various objects and structures using Lasy components based on themes and instructions provided by the teacher. The learning process involved identifying construction problems, selecting appropriate components, testing different assembly strategies, evaluating the results, and revising constructions when difficulties occurred. Throughout the implementation, children actively engaged in exploration, decision-making, persistence, and independent problem solving during constructive play activities. Observations were conducted in each session using indicators of problem solving abilities that had been established in the research instrument. The results of children's problem solving abilities in the experimental and control groups before and after treatment are presented in Table 1.

Table 1. Descriptive Statistics

Descriptive Statistics					
	N	**Range**	**Minimum**	**Maximum**	**Mean**
Pre-test Experiment	20	19	15	34	25,90
Post-test Experiment	20	23	25	48	41,45
Pre-test Control	20	17	17	34	25,00
Post-test Control	20	17	27	44	36,45

The descriptive statistics in Table 1 indicate an increase in children's problem solving abilities in both groups after the learning intervention. The experimental group demonstrated an increase in the average score from 25.90 in the pre-test to 41.45 in the post-test, while the control group increased from 25.00 to 36.45. The increase in the experimental group was higher than that in the control group, indicating that Lasy extracurricular activities provided more optimal stimulation for children's problem solving development.

Empirical observations during treatment showed that children in the experimental group gradually demonstrated greater initiative in assembling components independently, selecting construction strategies, and attempting alternative solutions when facing difficulties during play activities. Children became more active in exploring component arrangements, showed persistence after experiencing construction failure, and demonstrated the ability to evaluate and improve assembly results independently. These behavioral changes reflect the development of problem solving indicators, including identifying problems, testing solutions, decision-making, and evaluating outcomes. Children in the control group also

showed improvement during regular learning activities, although exploratory behavior and independent problem solving appeared less intensive compared with the experimental group.The normality test results for the research data are presented in Table 2.

Table 2. Normality Test

Tests of Normality					
	Groups	Kolmogorov-Smirnov[a]		Shapiro-Wilk	
		df	Sig.	df	Sig.
Problem solving Results for Children Aged 4-5 Years	Pre-test Experiment (Lasy extracurricular activities)	20	,140	20	,267
	Post-test Experiment (Lasy extracurricular activities)	20	,008	20	,001
	Pre-test Control (Learning according to the Curriculum)	20	,184	20	,555
	Post-test Control (Learning according to the Curriculum)	20	,200*	20	,586

The normality test results in Table 2 indicate that the pre-test experimental data, pre-test control data, and post-test control data obtained significance values greater than 0.05 in both the Kolmogorov-Smirnov and Shapiro-Wilk tests, indicating normally distributed data. The post-test experimental data obtained a significance value lower than 0.05, indicating a non normal distribution. These findings determined the use of nonparametric analysis through the Wilcoxon Signed Rank Test for the experimental group and parametric analysis through the Paired Samples t-test for the control group. The NonParametric Test results for the experimental group are presented in Table 3.

Table 3. NonParametric Test

Wilcoxon Signed Ranks Test	
Indicator	Value
Negative Ranks	0
Positive Ranks	20
Ties	0
Z	-3,926b
Asymp. Sig. (2-tailed)	,000

Table 3 shows that all children in the experimental group experienced improvement in problem solving abilities after participating in Lasy extracurricular activities. The absence of negative ranks indicates that no participant demonstrated a decline in performance during the post-test assessment. The presence of 20 positive ranks indicates improvement in all participants following the intervention. The Wilcoxon Signed Rank Test produced a Z value of -3.926 with an Asymp. Sig. (2-tailed) value of .000 ($p < 0.05$), indicating a statistically significant difference between pre-test and post-test scores. The findings demonstrate that Lasy extracurricular activities significantly improved the problem solving abilities of children aged 4-5 years. Observations conducted during the intervention revealed increased confidence in addressing construction challenges, greater persistence when encountering

difficulties, improved ability to identify inappropriate component placement, stronger initiative in correcting assembly errors, enhanced skill in selecting suitable components, increased independence during constructive play activities.

The present results are consistent with research conducted by Divanti & Nashiruddin (2025), which demonstrated that constructive Lego activities combined with interactive media stimulate children to independently develop solutions through repeated exploration. Research by Amatullah et al. (2022), also showed that constructive puzzle play improves children's problem solving abilities. Similar findings were reported by Yuriansa (2022), who explained that children develop problem solving abilities through observing, experimenting, comparing, and communicating ideas during play activities. These characteristics correspond with Lasy extracurricular activities, which provide exploratory, manipulative, and reflective learning experiences that encourage children to independently solve problems. The paired samples analysis results for the control group are presented in Table 4.

Table 4. Paired Samples Analysis of the Control Group

Paired Samples Statistics					
	Mean	**N**	**Correlation**	**Sig.**	**Sig. (2-tailed)**
Pre-Test Control	25,00	20	,831	,000	,000
Post-test Control	36,45	20	,831	,000	,000

Table 4 shows an increase in the mean score of children's problem solving abilities from 25.00 in the pre-test to 36.45 in the post-test. The paired samples correlation analysis produced a correlation coefficient of 0.831 with a significance value of 0.000, indicating a strong relationship between pre-test and post-test scores. The paired samples test yielded a significance value of 0.000 ($p < 0.05$), indicating a statistically significant difference between pre-test and post-test results in the control group. The findings indicate that regular learning activities contributed to the improvement of children's problem solving abilities. Observations during learning activities revealed gradual improvement in task completion, familiarity with classroom routines, independent participation in learning tasks. Dependence on teacher guidance remained evident when children encountered difficulties. Exploratory behaviour appeared less intensive than in the experimental group. The lower magnitude of improvement suggests limited opportunities for exploration, experimentation, and constructive challenges during conventional learning activities. This finding aligns with Jean Piaget's preoperational theory, which emphasizes children's understanding through concrete experiences, hands on activities, trial and error processes. Constructivist learning theory also explains that knowledge construction emerges through direct experiences involving manipulation, exploration, and active engagement with learning materials. The homogeneity test results are presented in Table 5.

Table 5. Homogeneity Test

Test of Homogeneity of Variance		
		Sig.
Children's Problem solving Results	Based on Mean	,002

The homogeneity test result presented in Table 5 showed a significance value of 0.002, which was lower than the significance level of 0.05. This finding indicates that the variances of the experimental and control groups were not homogeneous. The difference in variance suggests that the distribution of children's problem solving scores varied between groups after the learning intervention. The result reflects the presence of different response patterns and levels of improvement among participants in each group. The experimental group demonstrated a greater increase in problem solving abilities following participation in Lasy extracurricular activities, whereas the control group showed a lower magnitude of improvement through regular learning activities. Violation of the homogeneity assumption required the use of a statistical procedure that did not depend on equal variances between groups. Therefore, the analysis proceeded using the Mann-Whitney Test to examine differences in problem solving improvement between the experimental and control groups. The Mann-Whitney Test results are presented in Table 6.

Table 6. The Mann-Whitney Test

Test Statistics	
	Children's Problem solving Results
Asymp. Sig. (2-tailed)	,007

The Mann-Whitney Test results in Table 6 obtained an Asymp. Sig. (2-tailed) value of 0.007, which was lower than 0.05. These findings indicate a significant difference in the improvement of problem solving abilities between children who participated in Lasy extracurricular activities and those who participated in regular learning activities. Empirical observations further showed that children in the experimental group demonstrated more active exploration, stronger persistence during construction challenges, greater initiative in trying alternative strategies, and better independence in solving problems compared with children in the control group. These findings indicate that constructive play activities through Lasy provide richer cognitive stimulation for early childhood problem solving development. The present study revealed that Lasy extracurricular activities significantly improve the problem solving abilities of children aged 4-5 years. Constructive play activities using Lasy encouraged children to identify problems, determine strategies, test alternative solutions, evaluate outcomes, and independently correct construction errors during play activities. Observational results showed that children gradually became more confident when facing construction challenges, demonstrated persistence after failure, and actively explored various component arrangements to achieve desired construction outcomes. These behaviors indicate the development of logical thinking, cognitive flexibility, decision-making skills, and learning independence in early childhood.

The present results are consistent with research conducted by Divanti & Nashiruddin (2025), which demonstrated that constructive Lego activities combined with interactive media stimulate children to independently develop solutions through repeated exploration. Research by Amatullah et al. (2022), also showed that constructive puzzle play improves children’s problem solving abilities. Similar findings were reported by Yuriansa (2022), who explained that children develop problem solving abilities through observing, experimenting, comparing,

and communicating ideas during play activities. These characteristics correspond with Lasy extracurricular activities, which provide exploratory, manipulative, and reflective learning experiences that encourage children to independently solve problems.

Evidence from Asmiaty et al. (2026), reinforces the present results by explaining that constructive block media improve children's problem solving skills by encouraging children to identify obstacles, explore alternative solutions, and evaluate the outcomes of their actions during play activities. Social interaction during constructive play also contributes to the development of children's thinking skills through idea exchange, observation of peer strategies, and responses to teacher stimulation. Research by Yuliah et al. (2025), similarly explained that constructive play implemented through facilitative mentoring and reflective evaluation stimulates initiative, responsibility, and decision-making abilities in early childhood. Constructive learning activities involving direct object manipulation also strengthen concentration, coordination, persistence, and independent thinking during learning activities. Palit et al. (2026), explained that collage activities using natural materials effectively improve children's developmental abilities through activities requiring arranging, manipulating, and coordinating materials directly during the learning process. These characteristics align with Lasy extracurricular activities because children actively arrange components, correct construction errors, test alternative solutions, and maintain concentration during problem solving activities.

Additional empirical evidence further confirms the effectiveness of constructive play in stimulating children's problem solving abilities. Hasna (2025), identified a significant positive relationship between the intensity and complexity of constructive play and the problem solving abilities of children aged 4-6 years. Children who consistently engaged in constructing complex structures and persisted after experiencing construction failure demonstrated stronger abilities to identify problems, formulate solutions, and evaluate outcomes independently. Research by Rahmawati et al. (2024), also demonstrated that circle maze media effectively improve children's abilities to determine appropriate sequences in problem solving activities. Learning media requiring concentration, coordination, and strategy exploration provide direct stimulation for logical thinking, cognitive flexibility, perseverance, and independent decision-making during problem solving activities. Creative learning activities also contribute to strengthening children's originality, initiative, and flexibility during learning processes. Akmal et al. (2026), explained that papercraft activities effectively improve children's creativity through activities encouraging children to develop ideas, elaborate forms, and produce original creations independently. These findings support the observational results of the present study, in which children participating in Lasy extracurricular activities demonstrated increased persistence, exploratory behavior, strategy selection, and independence when solving construction challenges.

The effectiveness of Lasy extracurricular activities is closely related to the characteristics of constructive play that provide opportunities for children to design shapes, select components, determine strategies, test alternative solutions, correct

errors, and evaluate outcomes independently. These activities stimulate logical thinking, cognitive flexibility, perseverance, decision-making abilities, and learning independence. The findings are in line with the research by Azzahro et al. (2023), which demonstrated that STEAM-based constructive play effectively optimizes children's problem solving abilities through activities involving observation, questioning, information gathering, analysis, evaluation, and communication of experiences.

The development of children's thinking abilities is also influenced by environmental support, particularly the family as the first educational environment. Research by Fauziah et al. (2021), demonstrated that parental involvement through guidance, supervision, emotional support, habit formation, and emotional regulation contributes significantly to children's independent thinking abilities. These forms of support strengthen perseverance, frustration tolerance, initiative, and confidence when children solve problems independently during constructive play activities. The findings of this study have practical implications for early childhood education. Educators can utilize Lasy extracurricular activities as an alternative play-based learning approach to stimulate cognitive development, particularly problem solving abilities, creativity, and learning independence in early childhood. Optimal stimulation requires teachers to function as facilitators, learning environments rich in concrete experiences, and consistent family support to strengthen children's independent thinking habits from an early age.

4. Conclusion

This study demonstrates that Lasy extracurricular activities significantly improve the problem solving skills of children aged 4-5 years. Constructive play activities through Lasy encourage children to explore, select strategies, test alternative solutions, correct errors, evaluate outcomes, and solve problems independently. These learning experiences contribute to the development of logical thinking, cognitive flexibility, perseverance, decision-making skills, and learning independence in early childhood. The findings indicate that Lasy extracurricular activities can serve as an alternative play-based learning approach to support cognitive development, particularly problem solving skills, in early childhood education settings. The study also strengthens previous findings regarding the effectiveness of constructive play in stimulating children's active and independent learning experiences.

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How to cite this article:

Putri, K., & Rohmah, N. (2026). The Effect of Lasy Extracurricular Activities on the Problem Solving Ability of Children Aged 4-5 Years. *Journal of Educational Sciences*, *10(7)*, 594-606.