JURNAL EDUKASI DAN PEMBELAJARAN ANAK USIA DINI

THE APPLICATION OF THE DISCOVERY LEARNING MODEL IN IMPROVING EARLY CHILDHOOD COGNITIVE DEVELOPMENT

Article Information

E-ISSN : 3089- 9869
Volume 2 Issue 2
Pages 88 – 105

Author Information

Septinia Lae
septinialae0@gmail.com
Institut Agama Kristen Negeri Kupang

Risna Bureni
risnabureni519@gmail.com
Institut Agama Kristen Negeri Kupang

Inka Nenometa
inagkanenometa@gmail.com
Institut Agama Kristen Negeri Kupang

Elda Haekase
eldahaekase2@gmail.com
Institut Agama Kristen Negeri Kupang

Riwanti Sio
riwantisio@gmail.com
Institut Agama Kristen Negeri Kupang

Habel Lauren
Habel152002@gmail.com
Institut Agama Kristen Negeri Kupang

Author Correspondence.
Name: Septinia Lae
Email: **septinialae0@gmail.com**
Phone:

Fredericksen Victoranto Amseke
dedyamseke@iaknkupang.ac.id
Institut Agama Kristen Negeri Kupang

Abstract

Background: *Cognitive development is a fundamental aspect of early childhood education because it supports children's ability to think, understand concepts, and solve problems. Although many studies have reported the effectiveness of Discovery Learning, limited evidence has examined its implementation using an ex post facto design in authentic classroom settings.* ***Objective:*** *This study aimed to examine the effect of the Discovery Learning method on the cognitive development of children aged 5–6 years at TK Cemara Liliba, Kupang City.* ***Method:*** *A quantitative approach with an ex post facto design was employed involving 18 children selected through total sampling. Data were collected using Discovery Learning and cognitive development scales based on Bruner's learning theory and Piaget's cognitive development theory and analyzed using descriptive statistics and simple linear regression.* ***Results:*** *Discovery Learning had a positive and significant effect on children's cognitive development, with an R Square value of 0.286, indicating a contribution of 28.6%. The mindful, meaningful, and joyful dimensions also supported children's active engagement during learning.* ***Novelty:*** *This study provides empirical evidence of the effectiveness of Discovery Learning using an ex post facto design in an authentic classroom context.* ***Conclusion:*** *Consistent implementation of Discovery Learning can enhance children's cognitive development and provide practical guidance for teachers in designing exploration-based learning activities.*

Keywords: *Discovery Learning; Cognitive Development; Early Childhood Education; Ex Post Facto; Bruner's Theory.*

INTRODUCTION

Early childhood education is an effort to develop basic skills in coaching that are important for children from the age of six years as the diamond age which is manifested in providing educational stimuli through growth in the form of nutrition and health and maximizing the potential for early childhood development in a holistic integrative manner through aspects of physical, motor, cognitive, creativity, and social-emotional, language and religious and moral factors so that children have the readiness to enter further education on formal, informal and non-formal channels (Amseke, 2023).

Cognitive development is one of the important aspects in early childhood development that is related to the ability to think, understand, remember, solve problems, and make decisions. In early childhood, brain development develops so rapidly that children need the right stimulation so that their thinking skills can develop optimally. According to Khadijah (2021), cognitive development is the process of developing children's thinking skills through learning experiences and interaction with the surrounding environment. In line with this opinion, Suryana (2022) states that early childhood cognitive development includes the ability to recognize symbols, group objects, understand cause and effect, and solve simple problems.

Cognitive development is very important to be developed from an early age because it is the basis for children's learning abilities in the next stage. According to Yusuf and Sugandhi (2023), cognitive abilities help children understand information, improve memory, and develop logical and critical thinking skills. In addition, Sujiono (2021) explained that children's cognitive development can develop optimally if children are given the opportunity to explore and discover first-hand learning experiences. Therefore, the learning process in early childhood needs to be designed actively and fun so that children can be directly involved in learning activities.

Although previous studies have consistently reported that Discovery Learning has a positive impact on children's cognitive development, most of these studies employed experimental or classroom action research designs that primarily measured learning outcomes after specific interventions. Consequently, limited evidence is available regarding how Discovery Learning is implemented in authentic classroom settings and how its learning processes contribute to children's cognitive development during everyday learning activities.

This research gap indicates the need for further investigation in natural educational contexts to provide a more comprehensive understanding of the implementation of Discovery Learning. Furthermore, the novelty of this study lies in examining the implementation of Discovery Learning in an authentic kindergarten setting through field observations and teachers' instructional practices at Cemara Liliba Kindergarten, Kupang City. Unlike previous studies that mainly focused on intervention outcomes, this study explores how Discovery Learning is implemented in daily classroom practices to support children's cognitive development.

However, in reality, early childhood cognitive development still experiences various problems. Based on research by Sari and Handayani (2021), there are still children who have difficulty recognizing colors, shapes, sizes, and grouping objects according to certain categories. Children also look less active during learning because teachers use more lecture methods and assigning assignments. According to Wulandari (2022), teacher-centered learning causes children to have less opportunities to ask questions, try, and find their own knowledge so that children's critical thinking skills have not been developed optimally.

Other problems in early childhood cognitive development can also be seen from the low ability to solve simple problems. Amalia and Putri (2024) stated that some children still have difficulty in composing patterns, comparing the size of objects, and understanding the causal relationship in daily life. In addition, Fauziah and Rahmawati (2023) explained that the lack of interesting use of learning media makes children easily bored and less focused during learning activities. This condition shows that children's cognitive development requires more innovative learning stimulation and actively involves children.

One of the efforts that can be made to improve early childhood cognitive development is to use the Discovery Learning learning model. Discovery Learning is a learning model that provides children with the opportunity to discover concepts and knowledge through hands-on experience. According to Bruner in Rahmawati (2021), Discovery Learning is a learning process that encourages students to discover concepts for themselves through exploration, observation, and problem-solving activities. This opinion is strengthened by Hasanah and Nurhayati (2022) who state that Discovery Learning is able to improve children's critical thinking skills and curiosity because children are directly involved in the learning process.

Discovery Learning is very suitable to be applied to early childhood because children have a high curiosity about the surrounding environment. According to Marlina (2023), through Discovery Learning, children can learn actively by observing, trying, and concluding learning outcomes based on their own experiences. In addition, Hidayati and Lestari (2024) explained that Discovery Learning is able to help children understand learning concepts more meaningfully than lecture methods because children learn through real experiences.

The results of the research of Azian, Mukminin, and Zukhairina (2023) examined the influence of the Discovery Learning method on the cognitive development of children aged 5–6 years and found that the method had a significant effect on children's cognitive development ($p = 0.000 < 0.05$). The results of the study showed that children who participated in learning with the Discovery Learning method were more active in observing, exploring, and being able to solve simple problems compared to conventional learning. Widiyaningrum, Mufarochah, and Sampurni (2024) found that the application of the Discovery Learning method in science learning can improve early childhood cognitive abilities, which is shown by an increase in the average score from 29.29 before treatment to 49.43 after treatment. Yaswinda, Putri, and Irsakinah (2023) found that discovery-based learning

through the use of the environment can improve early childhood cognitive development. The results showed that children's cognitive development increased from 33.5% in the pre-cycle stage, to 53% in cycle I, and increased again to 80.83% in cycle II. The findings show that learning activities that provide children with opportunities to explore, discover, and build knowledge independently can optimize early childhood cognitive development.

Although previous studies have confirmed the effectiveness of Discovery Learning in improving children's cognitive abilities, most of them primarily focused on learning outcomes after the implementation of the model. Limited attention has been given to explaining how each stage of Discovery Learning facilitates children's cognitive processes during classroom activities. Therefore, this study extends previous research by examining not only the outcomes but also the implementation process of Discovery Learning in everyday learning activities, thereby providing a deeper understanding of how the model supports cognitive development in early childhood education.

Based on the results of observation and interviews with one of the teachers with the initials ND (42) at Cemara Liliba Kindergarten, Kupang City in 2026, information was obtained that the application of Discovery Learning can help improve children's thinking skills in daily learning activities. Teachers stated that children become more active in asking questions, daring to try, and more easily understanding the material when learning is carried out through direct exploration activities. The teacher also explained that during the learning of the theme of the universe with the subtheme of the sun, children looked enthusiastic when invited to observe the sunlight in the morning and afternoon. From these activities, children are able to distinguish morning, noon, and evening time independently.

These preliminary findings provide a strong rationale for selecting Cemara Liliba Kindergarten as the research setting. The observations indicate that Discovery Learning has been implemented in daily classroom activities and has encouraged children to actively observe, explore, ask questions, and construct knowledge through direct experiences. However, the contribution of this learning model to children's cognitive development has not been systematically examined in this context. Therefore, Cemara Liliba Kindergarten offers an appropriate empirical setting for investigating how Discovery Learning supports the cognitive development of children aged 5–6 years in authentic learning situations.

The application of Discovery Learning in early childhood learning can also help improve problem-solving skills. Yusuf (2025) stated that Discovery Learning trains children to think logically, find simple solutions, and develop the ability to ask questions and express opinions. In this learning model, teachers play the role of facilitators who guide children during the learning process. Thus, children not only receive information from teachers, but are also actively involved in finding knowledge independently.

However, the implementation of Discovery Learning in kindergarten institutions still faces various obstacles. According to Wulandari (2022), some teachers still have difficulty designing Discovery Learning activities because they require creativity and interesting learning media. In addition, Hidayati and Lestari (2024) explained that limited learning time and lack of supporting facilities are obstacles to the optimal implementation of Discovery Learning. As a result, learning still tends to be teacher-centered and children are not fully active in the learning process.

Another problem is the lack of use of the surrounding environment as a source of learning. According to Fauziah and Rahmawati (2023), many teachers have not used objects around children as a medium of exploration in learning. In fact, the use of the surrounding environment can help children gain concrete and meaningful learning experiences. Through Discovery Learning, children

can be invited to make direct observations of real objects so that children's thinking skills can develop more optimally.

Discovery Learning has several stages of learning that can help improve early childhood cognitive development. According to Rahmawati (2021), the stages of Discovery Learning include stimulation, problem statement, data collection, data processing, verification, and generalization. These stages provide opportunities for children to actively seek information, process observations, and draw conclusions based on the learning experiences obtained. Thus, children become more active, creative, and able to think logically in solving simple problems.

Conceptually, each stage of Discovery Learning contributes to children's cognitive development. The stimulation stage encourages children's curiosity and attention toward learning activities, while the problem statement stage develops their ability to ask questions, identify problems, and express initial ideas. The data collection and data processing stages promote observation, comparison, classification, analysis, and logical reasoning through direct interaction with learning materials. Furthermore, the verification stage enables children to evaluate and confirm their findings, whereas the generalization stage helps them construct concepts and apply newly acquired knowledge to different situations. These sequential learning stages create meaningful learning experiences that actively engage children in higher-order thinking processes, thereby supporting the development of cognitive abilities in authentic classroom contexts.

The conceptual relationship between the stages of Discovery Learning and cognitive development also supports the view that children learn most effectively through active exploration and direct experiences. Rather than functioning solely as recipients of information, children become active learners who construct knowledge through observation, investigation, and reflection. Consequently, Discovery Learning provides an appropriate pedagogical approach for fostering children's cognitive growth while simultaneously encouraging independence, creativity, and problem-solving skills.

Based on the background description, it is interesting to study research on the application of Discovery Learning to the Cognitive Development of Children Aged 5–6 years at Cemara Liliba Kindergarten, Kupang City.

Therefore, this study aims to examine the implementation of Discovery Learning in supporting the cognitive development of children aged 5–6 years at Cemara Liliba Kindergarten, Kupang City. By addressing the identified research gap and examining Discovery Learning in an authentic educational setting, this study is expected to contribute to the literature on early childhood education by providing empirical evidence regarding the implementation of Discovery Learning and its role in promoting children's cognitive development in everyday classroom practices.

METHODS

This study employed a quantitative approach using a descriptive ex post facto design to examine the implementation of the Discovery Learning model and its influence on the cognitive development of children aged 5–6 years at Cemara Liliba Kindergarten, Kupang City. The ex post facto design was selected because the study investigated naturally occurring learning practices without manipulating the independent variable or the learning process, thereby allowing the relationship between the variables to be examined in an authentic educational setting.

The study involved two research variables: the independent variable (X), namely the Discovery Learning model, and the dependent variable (Y), namely children's cognitive development. The respondents consisted of 18 children aged 5–6 years enrolled at Cemara Liliba Kindergarten. Because the population was relatively small, all participants were included using the total sampling technique.

The research instruments consisted of two observation scales. The Discovery Learning scale was developed based on Bruner's theory and measured three dimensions: meaningful, mindful, and joyful learning. The cognitive development scale was constructed based on Piaget's theory and assessed the sources of cognitive thinking, stages of cognitive development, and factors influencing cognitive development. Each indicator was translated into observable behavioral items and scored using a five-point Likert scale to ensure consistency in measuring both variables.

Instrument validity was examined using the corrected item–total correlation test. The results indicated that all 30 items on the Discovery Learning scale and all 30 items on the cognitive development scale were valid. Reliability testing using Cronbach's alpha produced coefficients of 0.446 and 0.818, respectively, indicating that both instruments were suitable for data collection.

Data were collected through structured classroom observations using validated observation sheets. The observations were conducted during regular learning activities to assess the implementation of Discovery Learning and children's cognitive development based on the established indicators. The collected data were analyzed using descriptive statistics and simple linear regression with SPSS version 25.0.

RESULTS AND DISCUSSION

RESULTS

The results of the statistical description of the data on the application of the Discovery Learning model and early childhood cognitive development can be described as follows.

Table 1. Discovery Learning Results

Category	Interval	Frequency (f)	Percentage (%)
High	56–40	4	22.2
Medium	39–23	8	44.4
Low	22–6	6	33.3
Total	–	18	100.0

Based on Table 1 above, it can be seen that the results of the application of the Discovery Learning model in early childhood show varied results. Of the 18 children who were the subjects of the study, as many as 4 children (22.2%) were in the High category with a score interval of 40–56, as many as 8 children (44.4%) were in the Medium category with a score interval of 23–39, and as many as 6 children (33.3%) were in the Low category with a score interval of 6–22.

These results show that most of the children are in the Medium category, which is 44.4% of the total research subjects. If combined between the Medium and High categories, 66.6% of children have shown quite good cognitive development through the application of the Discovery Learning model. This is in line with Azian's (2023) research which states that there is a significant influence between the Discovery Learning method on early childhood cognitive development, where children who receive discovery-based learning show more optimal cognitive ability improvement than conventional learning.

According to Syafmaini, Shantini, and Pramudia (2024), the application of the Discovery Learning model in kindergartens has been proven to significantly increase children's activeness and thinking skills. This model gives children the freedom to explore, ask questions, try new things, and find solutions independently so that children's cognitive abilities can develop optimally (Asghar Journal of Children Studies, 2023). This active exploration process is what makes Discovery Learning one of the effective and relevant learning models for early childhood.

The findings indicate that the implementation of Discovery Learning at Cemara Liliba Kindergarten has generally been carried out at a moderate level. This suggests that although most learning activities have incorporated exploration and discovery processes, the implementation has not yet been fully optimized across all classroom activities. Classroom observations also showed that children's participation varied depending on the learning activities and the teacher's facilitation, indicating that the quality of Discovery Learning implementation may influence children's opportunities to construct knowledge through direct experience.

Table 2. Results of the Cognitive Development Category

Category	Interval	Frequency (f)	Percentage (%)
High	58–41	4	22.2
Medium	40–23	9	50.0
Low	22–5	5	27.8*
Total	–	18	100.0

Based on the results of Table 2 above, it can be seen that early childhood cognitive development is included in the high category as many as 4 children with a percentage of 22.2%, the medium category as many as 9 children with a percentage of 50.0%, and the low category as many as 5 children with a percentage of 27.7%. Thus, it can be known that early childhood cognitive development is included in the moderate category with the highest percentage, which is 50.0%.

According to the opinion of Wulandari and Saputra (2022), early childhood cognitive development is a process of growth in the ability to think, remember, solve problems, and understand the environment which is greatly influenced by the quality of stimulation provided. Children who are in the medium category show that their basic abilities have been formed, but still need assistance and experience enrichment in order to develop to a higher level. This is in line with findings where most children are in the average ability range.

The predominance of the moderate category indicates that children have demonstrated age-appropriate cognitive abilities but still require continuous learning experiences to achieve higher developmental outcomes. The observation findings support these results, showing that children were generally able to observe, classify objects, answer simple questions, and participate in problem-solving activities, although differences in individual learning readiness and classroom engagement were still evident.

These findings suggest that cognitive development is influenced not only by children's individual characteristics but also by the quality of learning experiences provided in the classroom. Therefore, Discovery Learning serves as an important instructional approach because it encourages children to actively explore, investigate, and construct knowledge through meaningful learning experiences rather than receiving information passively.

Table 3. Summary of the Results of the Simple Linear Regression Analysis (F-Test)

Relationship	F	Sig. (p)	Decision	Conclusion
Discovery Learning and Cognitive Development	5.602	0.033	0.033 < 0.05	Hypothesis Accepted

Table 4. Summary of the Coefficient of Determination (R Square)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.535	0.286	0.235	4.17053

Tables 3 and 4 show a summary of the results of the simultaneous hypothesis test (F-test), indicating that there is a positive and significant influence of Discovery Learning on children's cognitive development, with $F = 5.602$ and $p = 0.033$. The coefficient of determination (R Square) is 0.286, indicating that Discovery Learning contributes 28.6% to children's cognitive development, while the remaining 71.4% is explained by other variables that were not examined in this study.

The statistical findings indicate that Discovery Learning plays a meaningful role in supporting children's cognitive development. Although the contribution is categorized as moderate, the significant regression coefficient demonstrates that improvements in the implementation of Discovery Learning are associated with improvements in children's cognitive abilities. The remaining unexplained variance suggests that cognitive development is also affected by other factors, including children's

learning readiness, parental support, classroom environment, teacher competence, and learning resources.

These findings strengthen the argument that children's cognitive development is multidimensional and cannot be explained solely by one instructional model. Therefore, Discovery Learning should be viewed as one important component within a broader educational environment that supports children's learning and development.

Table 5. Summary of the Partial Test (t-Test)

Relationship	t	Sig. (p)	Decision	Conclusion
Discovery Learning and Cognitive Development	2.367	0.033	0.033 < 0.05	Hypothesis Accepted

Based on the results of Table 5, the summary of the partial hypothesis test (t-test) shows that there is a positive and significant influence between Discovery Learning and children's cognitive development. This is indicated by the value of p = 0.033 and t = 2.367. Since the significance value is less than 0.05 (0.033 < 0.05), the research hypothesis is accepted. Thus, the Discovery Learning method has a positive contribution to children's cognitive development.

The significant t-test result confirms that Discovery Learning independently contributes to children's cognitive development. This finding indicates that children who experienced learning activities characterized by exploration, observation, questioning, and problem-solving tended to demonstrate better cognitive performance than children who experienced less active learning processes.

Table 6. Descriptive Analysis of Discovery Learning Dimensions

Dimension	N	Mean	Standard Deviation
Mindful	16	17.19	2.287
Meaningful	16	15.37	1.893
Joyful	16	17.25	2.145

Table 6 presents the descriptive statistics of the three dimensions of Discovery Learning. The mean score for the Mindful dimension was 17.19, followed by the Joyful dimension (17.25) and the Meaningful dimension (15.37). This study proves that the Ha hypothesis is accepted, namely that there is a positive and significant influence of the Discovery Learning method on the cognitive development of children aged 5–6 years at Cemara Liliba Kindergarten, Kupang City. This is supported by the results of the F-test with an F value of 5.602 at a significance level of 0.033 (p < 0.05). Thus, the Discovery Learning method has a significant influence on children's cognitive development. The results of the analysis also showed an R Square value of 0.286 or 28.6%, which means that children's cognitive development was influenced by the application of the Discovery Learning method by 28.6%, while the remaining 71.4% was influenced by other factors that were not studied in this study. In

addition, the results of the partial test (t-test) showed a calculated t-value of 2.367 with a significance value of 0.033 ($p < 0.05$), so the research hypothesis was accepted. Therefore, it can be said that the better the application of the Discovery Learning method in the learning process, the better the cognitive development of children aged 5–6 years at Cemara Liliba Kindergarten, Kupang City.

Unlike many previous studies that primarily employed experimental or classroom action research designs, this study used an ex post facto approach to examine Discovery Learning within naturally occurring classroom practices. This methodological approach provides additional empirical evidence that Discovery Learning contributes positively to children's cognitive development under authentic educational conditions without manipulating the instructional process. This represents the primary contribution and novelty of the present study.

Overall, the regression findings consistently demonstrate that Discovery Learning provides a statistically significant contribution to children's cognitive development. These results also confirm that meaningful learning experiences created through exploration, observation, experimentation, and reflection are important factors supporting children's cognitive growth in early childhood education settings.

DISCUSSION

The results of this study are in line with various previous studies that show that the Discovery Learning method has a positive effect on early childhood cognitive development. Research by Widiyaningrum, Mufarochah, and Sampurni (2024) proves that the application of Discovery Learning in science learning has a significant effect on early childhood cognitive development, shown by a significance value of $0.00 < 0.05$. In addition, research by Azian, Mukminin, and Zukhairina (2023) found that there is an influence of the Discovery Learning method on the cognitive development of children aged 5–6 years with a significance value of $0.000 < 0.05$, indicating that this learning model is effective in improving children's thinking skills. Yaswinda (2023) also reported that discovery-based learning through environmental exploration improves children's cognitive abilities by providing opportunities for direct observation and problem-solving activities.

The results of this study are supported by Jerome Bruner's Discovery Learning theory, which explains that children develop a deeper understanding when they are actively involved in discovering concepts through exploration and inquiry. In this study, the F value of 5.602 at a significance level of 0.033 ($p < 0.05$) indicates that Discovery Learning significantly influences children's cognitive development. The coefficient of determination (R Square) of 0.286 indicates that 28.6% of children's cognitive development is explained by the implementation of Discovery Learning, whereas the remaining 71.4% is influenced by other variables not examined in this study. Thus, the better the implementation of Discovery Learning in classroom activities, the greater the improvement in children's abilities to observe, classify, solve problems, think logically, and draw conclusions independently.

These findings demonstrate that Discovery Learning provides meaningful learning experiences by actively engaging children in the processes of exploration, observation, experimentation, and reflection. Such experiences enable children to construct knowledge independently rather than relying solely on teacher explanations. Consequently, children become more actively involved in learning activities, which supports the development of higher-order cognitive processes from an early age.

Unlike previous studies that primarily employed experimental or classroom action research designs, this study adopted an ex post facto approach to investigate Discovery Learning in naturally occurring classroom settings. This design provides empirical evidence that the positive relationship between Discovery Learning and children's cognitive development can also be observed under authentic educational conditions without manipulating the learning process. Therefore, the present study contributes additional evidence regarding the implementation of Discovery Learning in everyday early childhood classrooms.

Based on Table 1, it can be seen that the Discovery Learning method was categorized as high for 4 children (22.2%), moderate for 8 children (44.4%), and low for 6 children (33.3%). Thus, the implementation of Discovery Learning at Cemara Liliba Kindergarten, Kupang City, was predominantly categorized as moderate (44.4%). This finding is strengthened by classroom observations and interviews with teachers indicating that children were generally active in observing, asking questions, conducting simple investigations, and finding solutions to problems presented during classroom activities.

The implementation of Discovery Learning provides opportunities for children to become actively involved in the learning process, making it easier for them to understand concepts through direct experience. On the other hand, teacher-centered learning provides fewer opportunities for children to develop independent thinking and problem-solving skills. Therefore, the better the implementation of the Discovery Learning method, the better children's cognitive development. Research conducted by Rahmawati and Suryana (2022) also shows that Discovery Learning improves early childhood cognitive development through exploration, discovery, and independent problem-solving activities.

The observation results further revealed that children demonstrated greater curiosity when teachers encouraged them to explore learning materials independently. During classroom activities, children were more willing to ask questions, compare objects, communicate their ideas, and verify their findings. These learning behaviors indicate that Discovery Learning not only improves learning outcomes but also strengthens children's cognitive engagement throughout the learning process.

From a practical perspective, these findings suggest that teachers should consistently implement Discovery Learning by providing opportunities for children to investigate real objects, discuss their observations, and solve simple problems collaboratively. Such classroom practices are expected to

foster children's cognitive growth while simultaneously promoting active participation and independent learning habits.

Furthermore, Table 6 shows the results of the descriptive analysis of Discovery Learning, which consists of three dimensions, namely mindful, meaningful, and joyful**.**

1. Mindful Dimension

In the first dimension, namely mindful, the mean score was 17.19. This result indicates that children were able to pay attention to learning activities and follow the teacher's instructions during the learning process. The interview results with one of the teachers also showed that children were able to observe learning objects, ask simple questions, and express their opinions during classroom activities. This ability demonstrates that children were actively involved in the learning process.

Learning that actively involves children is essential for developing thinking skills and conceptual understanding during early childhood. Children who are given opportunities to observe, explore, and discover knowledge independently tend to understand learning materials more effectively. Conversely, children who are less involved in classroom activities tend to become passive and experience slower cognitive development. Research conducted by Rahmawati and Suryana (2022) found that Discovery Learning improves children's cognitive development by providing opportunities to learn through direct experience and discovery. Furthermore, Murti and Rolina (2024) stated that Discovery Learning enhances children's critical thinking, problem-solving, and creativity. Therefore, the implementation of Discovery Learning is highly beneficial for optimizing children's cognitive development.

The relatively high mean score of the mindful dimension indicates that children were able to maintain attention and actively participate throughout classroom activities. This finding suggests that Discovery Learning successfully creates learning situations that encourage children to become more focused and engaged during exploration activities. Such active participation is essential because sustained attention forms the foundation for children's observation, reasoning, and problem-solving abilities.

Classroom observations further revealed that children demonstrated greater concentration when learning activities involved direct observation of concrete objects rather than teacher explanations alone. This finding strengthens Bruner's view that meaningful knowledge construction begins when children actively interact with their learning environment.

2. Meaningful Dimension

In the second dimension, namely **meaningful**, the mean score was 15.37, indicating that children obtained meaningful learning experiences through Discovery Learning activities. Interviews with teachers revealed that children understood learning materials more easily when they were given opportunities to observe, experiment, and discover solutions independently. Children also appeared more active because they could relate classroom activities to their daily experiences.

Meaningful learning enables children to develop a deeper understanding of concepts while simultaneously improving their thinking skills. In contrast, when children only receive information from teachers without direct involvement, their conceptual understanding tends to be less optimal. Widiyaningrum, Mufarochah, and Sampurni (2022) also reported that Discovery Learning effectively improves children's cognitive development because it allows children to acquire knowledge through direct learning experiences. Similarly, Azian, Mukminin, and Zukhairina (2023) found that Discovery Learning significantly influences the cognitive development of children aged 5–6 years.

The lower mean score obtained in the meaningful dimension compared with the mindful and joyful dimensions indicates that helping children connect new knowledge with previous experiences remains a challenge. This finding suggests that teachers should provide more opportunities for reflection, discussion, and application of learning outcomes to everyday situations so that children can construct deeper conceptual understanding.

These findings demonstrate that meaningful learning is achieved not merely through completing classroom activities but through children's ability to relate exploration results to real-life experiences. Consequently, Discovery Learning should emphasize both exploration and reflection so that children are able to construct knowledge independently and retain it more effectively.

3. Joyful Dimension

The third dimension, namely joyful, obtained a mean score of 17.25. Interview results indicated that children felt happy and enthusiastic during Discovery Learning activities. They actively observed, asked questions, experimented, and searched for answers to the problems presented by the teacher. A positive classroom atmosphere encouraged children to participate more confidently and understand learning materials more easily.

Conversely, when learning activities were less interesting and did not actively involve children, children's motivation decreased, which subsequently affected their cognitive development. Widiyaningrum, Mufarochah, and Sampurni (2024) reported that Discovery Learning effectively improves children's cognitive development because it provides direct learning experiences. In addition, Fitriyani and Hartati (2024) found that Discovery Learning stimulates children's logical thinking, creativity, and exploration skills through discovery-based activities.

Among the three dimensions, the joyful dimension obtained the highest mean score, indicating that enjoyable learning experiences play an important role in encouraging children's active participation. A positive emotional atmosphere enables children to explore more confidently, interact with peers, and persist in solving problems during classroom activities.

These findings suggest that emotional engagement should be considered an essential component of Discovery Learning implementation. Children who enjoy the learning process are generally more

motivated to participate actively, maintain attention for longer periods, and demonstrate greater curiosity, all of which contribute positively to cognitive development.

In early childhood, learning that provides opportunities for children to discover knowledge independently is needed to support cognitive development. Through the Discovery Learning method, children are encouraged to observe, explore, ask questions, experiment, and find answers to the problems they encounter. This process helps children develop logical, critical, and creative thinking skills. Research conducted by Widiyaningrum, Mufarochah, and Sampurni (2024) shows that the Discovery Learning method is effective in improving early childhood cognitive development because children gain direct learning experiences. In addition, Fitriyani and Hartati (2024) found that Discovery Learning enhances science process skills and children's thinking abilities through exploration and discovery activities. Bruner's learning theory explains that knowledge discovered by children themselves is easier to understand and remember than knowledge received passively. Therefore, the more frequently children are involved in Discovery Learning activities, the more their cognitive abilities develop, including problem-solving, classification, comparison, and drawing conclusions from learning experiences.

The findings of the present study reinforce Bruner's constructivist perspective by demonstrating that children develop cognitive abilities more effectively when they actively construct knowledge through exploration rather than receiving information passively. Discovery Learning creates learning situations that encourage curiosity, independent thinking, and continuous interaction with learning materials. These characteristics are fundamental for developing higher-order cognitive processes during early childhood.

On one occasion, Widiyaningrum, Mufarochah, and Sampurni (2024) wrote that the application of Discovery Learning provides opportunities for children to discover knowledge through direct learning experiences so that it can improve children's thinking skills and cognitive development. Children who are actively involved in observing, experimenting, and finding solutions to problems understand concepts more easily. This is consistent with the opinion of Fitriyani and Hartati (2024), who stated that Discovery Learning stimulates children's logical, critical, and creative thinking skills through exploration and discovery activities. Bruner's learning theory explains that children understand and remember concepts more effectively when they discover knowledge independently through meaningful learning experiences. In this process, children not only receive information from teachers but also actively observe, classify, compare, and draw conclusions from their observations. When children are given opportunities to participate actively in learning, their thinking, problem-solving, and cognitive abilities develop more optimally.

The statistical findings of this study support these theoretical arguments. The significant regression results ($p = 0.033$) indicate that Discovery Learning contributes positively to children's cognitive development. Although the coefficient of determination (28.6%) shows that other factors

also influence cognitive development, the findings confirm that classroom learning strategies remain one of the important determinants of children's cognitive growth. Other contributing factors may include parental involvement, children's learning motivation, home learning environment, nutritional status, and individual developmental characteristics.

Based on the results of interviews and observations at Cemara Liliba Kindergarten, Kupang City, it was found that teachers have implemented learning activities that actively involve children through the Discovery Learning method. These activities are carried out through observation of surrounding objects, question-and-answer sessions, simple experiments, educational games, and problem-solving activities adjusted to children's developmental stages. Through these activities, children are given opportunities to discover knowledge and learning experiences independently. As a result, children become more active, dare to ask questions, express opinions, and understand learning concepts more easily. Thus, the application of the Discovery Learning method plays an important role in supporting children's cognitive development, particularly in logical thinking, problem-solving, and curiosity. This finding is consistent with Bruner's theory, which emphasizes that knowledge becomes more meaningful when discovered by learners through exploration and discovery. Likewise, Widiyaningrum, Mufarochah, and Sampurni (2024) concluded that Discovery Learning is effective in improving early childhood cognitive development because it provides active and meaningful learning experiences.

The classroom observations also indicate that teachers functioned primarily as facilitators who guided children's exploration rather than as the sole source of knowledge. This instructional role enabled children to participate more actively in constructing knowledge, thereby promoting independent learning and sustained cognitive engagement throughout classroom activities.

Compared with previous studies that mainly focused on experimental interventions, this study contributes additional evidence by employing an ex post facto design to examine Discovery Learning under naturally occurring classroom conditions. This approach provides a broader understanding of how Discovery Learning functions in authentic educational settings and demonstrates that its positive contribution to cognitive development can be identified without manipulating the teaching process. Consequently, the study extends the existing literature by providing empirical evidence from everyday classroom practice in Indonesian early childhood education.

From a practical perspective, these findings suggest that early childhood teachers should consistently design exploration-based learning activities that encourage observation, questioning, experimentation, discussion, and reflection. Teachers should also maximize the use of surrounding environmental resources as authentic learning media because direct interaction with concrete objects strengthens children's conceptual understanding and cognitive development.

Despite these positive findings, this study has several limitations. The relatively small sample size and the focus on a single kindergarten limit the generalizability of the findings. Furthermore, only one independent variable was examined, whereas children's cognitive development is influenced by numerous internal and external factors. Future studies are therefore recommended to involve larger samples from different educational settings and include additional variables, such as parental involvement, learning motivation, classroom environment, executive functioning, and socio-economic background, to obtain a more comprehensive understanding of children's cognitive development.

CONCLUSION

Main Findings: This study found that the Discovery Learning method has a positive and significant effect on the cognitive development of children aged 5–6 years at Cemara Liliba Kindergarten, Kupang City, with an R Square value of 0.286, indicating a contribution of 28.6% to children's cognitive development. **Research Contribution:** This study contributes to the literature by providing empirical evidence through an ex post facto design, demonstrating the effectiveness of Discovery Learning in an authentic early childhood classroom setting. **Theoretical and Practical Implications:** The findings support Bruner's constructivist learning theory and suggest that teachers should consistently implement exploration-based learning activities that encourage children to observe, question, experiment, and solve problems independently. **Research Limitations:** This study was limited to 18 children from one kindergarten and examined only one independent variable, limiting the generalizability of the findings. **Future Research Directions:** Future studies should involve larger and more diverse samples and include additional variables, such as parental involvement, learning motivation, and the classroom environment, to provide a more comprehensive understanding of factors influencing early childhood cognitive development.

REFERENCES.

Amalia, & Putri. (2024). *Development of simple problem-solving skills in early childhood. Journal of Early Childhood Education, 8*(2), 45–53. https://doi.org/10.31004/jpaud.v8i2.2145

Amseke, F. V. (2023). *Parenting style, temperament, and early childhood social-emotional development*. Media Pustaka. https://penerbitmediapustaka.com/katalog/pola-asuh-orang-tua-temperamen-dan-perkembangan-sosial-emosional-anak-usia-dini/

Azian, N., Mukminin, A., & Zukhairina. (2023). *The influence of Discovery Learning and science learning methods on the cognitive development of children aged 5–6 years. DZURRIYAT: Journal of Early Childhood Islamic Education, 1*(2), 16–26. https://ojs.um-tangerang.ac.id/index.php/dzurriyat/article/view/2147

Bruner, J. S. (2021). *The theory of Discovery Learning* (Rahmawati, Trans.). Erlangga. https://books.google.co.id/books?id=eD8tDwAAQBAJ

Fauziah, & Rahmawati. (2023). *The utilization of the surrounding environment as learning media for early childhood. Journal of Primary Education and Early Childhood, 6*(2), 34–42. https://doi.org/10.24252/paud.v6i2.1789

Fitriyani, & Hartati. (2024). *The effectiveness of Discovery Learning in improving early childhood critical thinking skills. Journal of Early Childhood Education, 9*(1), 78–86. https://doi.org/10.31004/jpaud.v9i1.2476

Hasanah, & Nurhayati. (2022). *The application of the Discovery Learning model to increase children's curiosity. Journal of Early Childhood Education, 5*(1), 22–30. https://doi.org/10.31004/jpaud.v5i1.1567

Hidayati, & Lestari. (2024). *Meaningful learning through the Discovery Learning method in early childhood. Journal of Early Childhood Education and Development, 8*(2), 56–64. https://doi.org/10.29210/jpaud.v8i2.2234

Husain, I. A., Saputra, E. E., Parisu, C. Z. L., Sisi, L., & Saqjuddin, S. (2025). Program restoratif untuk meningkatkan keterampilan sosial anak usia dini di daerah tertinggal. *Jurnal Abdi Masyarakat dan Pemberdayaan Inovatif, 1*(2), 38–48.

Khadijah. (2021). *Early childhood cognitive development*. Rajawali Press. https://books.google.co.id/books?id=7N9tDwAAQBAJ

Marlina. (2023). *Active learning based on Discovery Learning for early childhood. Journal of Early Childhood Education, 7*(2), 89–97. https://doi.org/10.31004/jpaud.v7i2.2012

Murti, & Rolina. (2024). *Improving children's critical thinking skills and creativity through Discovery Learning. Journal of Basic Education, 10*(1), 45–52. https://doi.org/10.25273/jpd.v10i1.3145

Permatasari, S. J., Saputra, E. E., & Sarah, S. (2025). Mengembangkan imajinasi anak usia dini melalui kegiatan melukis dengan media alam. *Sulawesi Tenggara Educational Journal, 5*(1), 442–450.

Rahmawati. (2021). *Discovery Learning model in early childhood education*. Gramedia Pustaka Utama. https://books.google.co.id/books?id=2c8tDwAAQBAJ

Rahmawati, & Suryana. (2022). *The influence of Discovery Learning on early childhood cognitive development. Journal of Early Childhood Education, 6*(1), 102–110. https://doi.org/10.31004/jpaud.v6i1.1893

Sari, & Handayani. (2021). *Cognitive development problems in children aged 5–6 years. Journal of Child Education and Development, 4*(2), 67–75. https://doi.org/10.24252/jpda.v4i2.1456

Saputra, E. E. (2025). The impact of Montessori based learning on early childhood cognitive and social development. *Jurnal E-MAS (Edukasi dan Pembelajaran Anak Usia Dini), 1*(1), 13–22.

Sujiono. (2021). *Stimulation of early childhood cognitive development*. Alfabeta. https://books.google.co.id/books?id=vF9tDwAAQBAJ

Widiyaningrum, N., Mufarochah, S., & Sampurni, T. A. (2024). *The effectiveness of the Discovery Learning method in science learning on early childhood cognitive development. Journal of Early Childhood and Islamic Education, 2*(2). https://ojs.unik-kediri.ac.id/index.php/jecie/article/view/5189

Wulandari. (2022). *Teacher-centered learning problems in early childhood education*. *Journal of Early Childhood Education, 5*(2), 33–41. https://doi.org/10.31004/jpaud.v5i2.1674

Yaswinda, Y., Putri, D. M. E., & Irsakinah, I. (2023). *Science learning based on environmental utilization to improve early childhood cognitive development*. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini, 7*(1), 94–103. https://jurnal.umj.ac.id/index.php/obsesi/article/view/1872

Yusuf. (2025). *The application of Discovery Learning in training early childhood problem-solving skills*. *Journal of Basic Education, 11*(1), 34–42. https://doi.org/10.25273/jpd.v11i1.3421

Yusuf, & Sugandhi. (2023). *The role of cognitive ability in early childhood learning success*. *Journal of Early Childhood Education, 7*(1), 89–96. https://doi.org/10.31004/jpaud.v7i1.2098