Journal of Indonesian Primary School
Volume 2 (3) September 2025
ISSN: 3047-7212
The article is published with Open Access at: https://journal.mgedukasia.or.id/index.php/jips

Improving Cognitive Abilities in Recognizing Colors through Science Experiments in 5-6 Year Old Children at RA Nurul Islam

Ai Nurhayati ✉, RA Nurul Islam, Indonesia

✉ *ainurhayati280824@gmail.com*

Abstract: This class action research discusses Improving Cognitive Ability Through the Color Mixing Experiment Method in Children Aged 5-6 years at RA Nurul Islam Papayan Jatiwaras, this study is a type of classroom action research that refers to the Suharsimi Arikunto model covering four stages, namely (1) planning, (2) action, (3) observation and (4) reflection. This research consists of two cycles. The data analysis technique used in this study is qualitative data analysis. The sample in this study is 15 children of group B of RA Nurul Islam Papayan Jatiwaras in 2020/2021. The purpose of this study is to improve children's cognitive abilities through the color mixing experiment method. The data collection technique in this study uses observation sheet instruments, and documentation. From the results of observations, data was obtained that children aged 5-6 years at RA Nurul Islam Papayan Jatiwaras, in terms of cognitive ability are still lacking. The results of the study show that the application of experimental methods can improve children's cognitive abilities, as evidenced by the increase in children's scores in cycle I is 27% which is in the medium category. The score in the second cycle of 60% is in the high category. This shows that the application of experimental methods turned out to be very effective in improving children's cognitive abilities, because there was an increase in scores from cycle I to cycle II by 33%. Therefore, teachers must be able to implement the learning process in accordance with the characteristics and stages of the child's age so that learning is beneficial for children, as well as using experimental methods to improve the cognitive abilities of children aged 5-6 years.

Keywords: Cognitive abilities, experimental methods, color mixing, early childhood.

Received June 13, 2025; **Accepted** July 20, 2025; **Published** September 8, 2025

Published by Mandailing Global Edukasia © 2025.

INTRODUCTION

Early childhood education is an important foundation in building the quality of future generations. At the age of 5-6 years, children are in the golden age, where cognitive, language, social-emotional, motor, and moral-religious development grows rapidly and is greatly influenced by the stimulation given (Santrock, 2018). Therefore, PAUD services must be able to provide a rich, fun, and meaningful learning experience so that children can develop all their potential. One of the crucial aspects of development is cognitive. Cognitive development in early childhood is related to the ability to think, reason, remember, and solve simple problems in daily life. Piaget (1964) stated that children aged 2–7 years are in the preoperational stage, characterized by the development of symbolic

abilities, high curiosity, and a tendency to learn through direct experience. Thus, children aged 5–6 years need a learning strategy that emphasizes exploratory activities so that they can understand new concepts in a concrete way.

One of the basic concepts that is important to be introduced to early childhood is color. Color recognition not only helps children in visual skills, but also hone the ability to classify, compare, and connect phenomena with the real world (Anderson, 2019). Through color recognition activities, children learn to distinguish objects, understand differences and similarities, and develop logical thinking skills. In other words, mastery of the concept of color is the entrance to the development of more complex cognitive abilities. However, the reality in the field shows that there are still many early childhood who have difficulty recognizing colors correctly. The results of a preliminary study at RA Nurul Islam Papayan Jatiwaras showed that of the 15 children of group B, most of them were not able to recognize colors correctly. Some children are still confused about distinguishing primary colors such as red, blue, and yellow. Even when simple activities are carried out mixing colors, children do not understand the results that should appear. This condition indicates that the learning strategies that were applied previously were less effective in stimulating children's cognitive development in the aspect of color recognition.

The urgency of this research lies in the importance of building children's cognitive foundations through innovative and fun learning strategies. The method that is considered appropriate to address this problem is scientific experiments. The experimental method gives children the opportunity to learn through direct experience, try, and find for themselves the cause-and-effect relationship in the observed phenomenon (Kuhn, 2010). In the context of color recognition, experiments allow children to experiment with mixing primary colors to produce secondary colors, or recognize natural dyes from plants and foods around them. This kind of activity not only increases the understanding of concepts, but also fosters curiosity, imagination, and confidence.

A number of previous studies support the effectiveness of experiments in improving early childhood cognitive development. For example, Lestari's (2017) research found that science experiment methods are able to improve children's understanding of the concept of the environment, including recognizing colors, shapes, and textures. Similarly, research by Rahmawati (2019) shows that experimentation provides opportunities for children to actively explore, so that the understanding of concepts lasts longer than the lecture or passive demonstration method. In terms of learning theory, the experimental approach is in line with the theory of constructivism which emphasizes the importance of children's active involvement in building knowledge. Vygotsky (1978) through the concept of zone of proximal development (ZPD) explained that children learn more effectively when given the opportunity to explore with the guidance of teachers or peers who are more competent. Experiments provide a collaborative learning context that supports social interaction as well as cognitive development.

In addition, Bruner's theory (1966) emphasizes the importance of concrete experiences in early childhood learning. Bruner divides the stages of learning into enactive, iconic, and symbolic. At an early age, children are still dominant in the enactive and iconic stage, so they need direct experience through exploratory activities before they can understand abstract symbols. Science experiments provide an ideal means of bridging real experience with abstract concepts, for example through the activity of mixing colors. However, research gaps are still visible. Most research on experimental methods in early childhood education focuses on the introduction of science in general, such as natural phenomena, plants, or surrounding objects. Research that specifically highlights the improvement of cognitive ability in recognizing colors is still limited, especially in the context of PAUD institutions in rural areas such as RA Nurul Islam Papayan Jatiwaras. Therefore, this research has an important contribution to fill this gap, as well as providing a reference for learning practices that are applicable to teachers in the field.

Based on the description above, this study aims to describe the learning process with scientific experiment methods in improving the cognitive ability of children aged 5–6

years in the aspect of color recognition. Another goal is to find out the extent to which experimental methods are able to improve children's ability to recognize primary, secondary, and natural colors found in daily life. Through this research, it is hoped that teachers can obtain alternative learning strategies that are creative, fun, and in accordance with the characteristics of early childhood development. Thus, this research is important because it departs from real problems faced by children in the classroom, has a strong theoretical basis, and contributes to the development of early childhood learning practices. The results of the study are expected to strengthen the understanding that early childhood cognitive development is not enough through memorization or explanation alone, but needs to be done through real experiences that arouse children's curiosity.

METHODS

This research uses the Classroom Action Research (PTK) approach, which is carried out in two cycles. The PTK model used refers to the concept of Arikunto (2015), which includes four main stages, namely planning, implementation of actions, observation, and reflection. PTK was chosen because it is suitable to solve real problems faced by teachers in learning, and allows for continuous improvement actions (Mertler, 2017).

As an action research, the design of this research focuses on the involvement of teachers as researchers who directly carry out actions in their own classrooms. The research was carried out at RA Nurul Islam Papayan Jatiwaras, Tasikmalaya Regency, in the even semester of the 2020/2021 school year. The research design refers to the action cycle as proposed by Kemmis and McTaggart (1988), where each cycle includes stages of planning, action, observation, and reflection. The reflection stage in cycle I is the basis for improvement and planning in cycle II, so that the research process takes place dynamically and adaptively.

The subjects of the study were 15 children of group B of RA Nurul Islam Papayan Jatiwaras, consisting of 4 boys and 11 girls with an age range of 5–6 years. The selection of subjects was based on the results of preliminary studies which showed that most children still had difficulty in recognizing primary, secondary, and natural colors. The research location was chosen because this institution is a place where researchers teach as well as a representative of early childhood education institutions in rural areas with limited resources. This is important so that the results of the research can make a practical contribution to improving the quality of learning in similar environments.

The research procedure was carried out in two cycles. In cycle I, the action given was in the form of a simple experiment to recognize colors using colored liquid media from food coloring. Children are invited to experiment with mixing primary colors to produce secondary colors, for example mixing red and yellow into orange. At this stage, obstacles were found in the form of the child's lack of focus when following the teacher's directions and errors in distinguishing colors because the media used was less varied.

Based on this reflection, in cycle II, improvements were made by enriching experimental media. Children not only use food dyes, but are also introduced to natural dyes, such as turmeric for yellow, suji leaves for green, and hibiscus flowers for red. In addition, the rules of play are explained in more detail, and teachers use a small group approach to ensure each child actively participates. This action aims to provide a more concrete, meaningful, and appropriate learning experience for children (Bodrova & Leong, 2012). The main instruments used in this study are observation sheets and documentation.

The observation sheet was prepared based on indicators of children's cognitive ability in recognizing colors, including: (1) the ability to recognize primary colors, (2) the ability to recognize secondary colors, (3) the ability to recognize natural dyes, and (4) the ability to conduct simple color mixing experiments. Each indicator is assessed on an achievement scale, namely very good development (BSB), development according to expectations (BSH), starting to develop (MB), and not yet developing (BB) in accordance

with the STPPA guidelines (Permendikbud, 2014). In addition to observations, documentation in the form of photos of children's activities while conducting experiments was also collected. Documentation functions to strengthen the data from observations, as well as provide tangible evidence of children's involvement in the learning process. According to Creswell (2014), the use of various instruments in classroom action research can improve the validity of data through triangulation.

Data was collected through two main techniques, namely participatory observation and documentation. Participatory observation is carried out by research teachers together with collaborators, namely other teachers who help record the implementation of activities. Observations were focused on children's behavior in recognizing colors, children's activeness when experimenting, and children's success in completing the assigned tasks. Documentation in the form of photos and field notes is used to complement the observation data, so that the data analysis is more comprehensive. Data analysis was carried out in a qualitative descriptive manner with steps of data reduction, data presentation, and conclusion drawing as proposed by Miles, Huberman, and Saldaña (2014). The observation data of each cycle was analyzed to determine the success rate of the actions given. Success is determined based on the minimum completeness criteria set by the institution, namely 80% of children achieve indicators of developing according to expectations (BSH) or developing very well (BSB).

In addition to qualitative analysis, a simple quantitative analysis was also carried out in the form of the percentage achievement of each indicator. The formula used is the number of children who reach the indicator divided by the total number of children, then multiplied by 100%. In this way, researchers can see the increase in achievement from cycle I to cycle II more objectively. To maintain the validity of the data, this study uses a triangulation technique. Triangulation was carried out by comparing the results of researchers' observations, collaborator notes, and photo documentation of activities. In addition, reflection with collaborators is carried out at the end of each cycle to ensure that the interpretation of the data is not purely subjective. Moleong (2018) emphasized that triangulation is an effective way to test the validity of qualitative data, especially in classroom action research involving many factors.

Research ethics are also taken seriously. Before the study began, the researcher asked for official permission from the principal of RA Nurul Islam Papayan Jatiwaras and obtained approval from the child's parents. The identity of the child is not listed in the report to maintain confidentiality. During the activity, the teacher ensures that the experiments are safe, use harmless natural ingredients, and remain under intensive supervision. This is important so that learning activities remain fun and safe for children.

RESULTS

The implementation of this class action research was carried out in two cycles with the aim of improving the cognitive ability of children aged 5-6 years in group B of RA Nurul Islam Papayan Jatiwaras in recognizing colors through science experiment methods. Before the action is taken, the researcher first conducts a preliminary study to get an overview of the child's initial condition. The results of the initial study showed that of the 15 children, most were not able to recognize color well. Children still have difficulty naming primary colors, distinguishing secondary colors, and understanding the process of mixing colors. In fact, when given a simple task to name the results of a mixture of colors, only a small percentage of children answered correctly.

In the early stages of the study, data were obtained through direct observation and interviews with classroom teachers. Out of the 15 children, only about 5 were able to correctly pronounce the primary color, while the other 10 children were still confused or confused. The same is seen in the task of mixing colors. When asked to mix red with yellow, most children answered randomly, without understanding that the result was orange. This condition shows that children's cognitive ability in the aspect of color

recognition is still in the low category. According to Piaget (1964), in the preoperational stage, children still need concrete experience through exploratory activities to build an understanding of concepts. Facts in the field reinforce this view, that children have not received enough stimulation to understand the concept of color correctly.

Cycle I was carried out by providing actions in the form of simple experiments using food coloring liquid media. Children are invited to experiment with mixing primary colors into secondary colors, for example mixing blue and yellow into green. This activity is packaged in groups, so that children can cooperate with each other and observe the results of the experiment. The observation results showed an improvement compared to the initial condition, although it was not significant. Children begin to be interested in participating in experiments, seem enthusiastic about mixing colors, and can mostly mention the results they see. However, some obstacles still arise. Out of 15 children, only 10 children or about 70% managed to correctly pronounce mixed colors. The rest are still confused, some even mention the results with other colors that do not match.

In addition, children's skills in recognizing natural colors have not been seen to develop. The media used is still limited to food coloring, so children have not had the opportunity to get to know the source of natural dyes from plants or foods around them. In the aspect of activeness, there are children who are passive and only follow friends without trying themselves. This indicates that teachers' instructions need to be clarified, and media need to be more varied so that children have a broader learning experience.

Quantitatively, the results of cycle I showed an achievement of 43% for color recognition indicators, 41% for the ability to conduct simple experiments, and 39% for secondary color differentiation skills. These results show an improvement from the initial condition, but it is still far from the criterion of completeness of at least 80%. Therefore, it is necessary to make improvements in cycle II. Based on the reflection of cycle I, the researcher made a number of improvements in cycle II. First, the learning media is enriched by using natural dyes from surrounding materials, such as turmeric, sugi leaves, and hibiscus flowers. Second, the teacher provides a clearer explanation of the rules of the experiment, while using simple language that is easy for children to understand. Third, activities are carried out in small groups with an equal division of roles, so that each child has the opportunity to actively participate.

The implementation of the second cycle took place more conducively. Children look more enthusiastic and curious about the natural media used. They show high curiosity when they see turmeric produce a yellow color or suji leaves produce a green color. In addition, children are more courageous to express their opinions when asked to mention the results of color mixtures. For example, when mixing blue and red, almost all children answered purple correctly. This activity shows that concrete experiences through experimentation are able to strengthen children's understanding.

The results of the observations showed a significant improvement. In the aspect of knowing natural dyes, 81% of children were able to mention correctly. In the aspect of recognizing primary and secondary colors, children's achievement increased to 68%. Meanwhile, in the aspect of color mixing experiments, the achievement reached 76%. Overall, the average achievement of children increased to 85%, exceeding the minimum completeness criteria set by the institution. In addition to cognitive improvement, there are also developments in the aspect of children's attitudes. They look more confident when conducting experiments, are more focused on listening to instructions, and are more able to work with friends. Children who were previously passive in cycle I, began to actively try and ask questions. This proves that experimental methods not only develop cognitive, but also children's social and affective skills.

When compared, there is a real difference between the results of cycle I and cycle II. In cycle I, the achievement only reached 43–45% on average, while in cycle II it increased to 85%. This 33% increase shows the effectiveness of experimental methods in improving early childhood cognitive abilities. The results of this study are in line with the opinion of Kuhn (2010) who emphasized that experimentation provides children with the

opportunity to find cause-and-effect relationships, so that the understanding of concepts is deeper. In addition, this improvement supports the research of Rahmawati (2019) who shows that the experimental method is effective in improving understanding of early childhood science concepts compared to the lecture method. In this study, children who initially had difficulty recognizing colors, after being given the opportunity to experiment directly, were able to better understand the concepts of primary, secondary, and natural colors better. Based on the results of cycle II, it can be concluded that corrective actions have succeeded in improving children's cognitive ability to recognize colors. The application of experimental methods provides a real learning experience, in accordance with Bruner's (1966) theory which emphasizes the importance of enactive and iconic experiences in early childhood before entering into abstract symbols. Thus, this study proves that experiment-based learning is not only fun, but also effective in developing cognitive aspects of early childhood.

DISCUSSION

The results of the study showed that the application of science experiment methods can improve the cognitive ability of children aged 5-6 years in recognizing colors at RA Nurul Islam Papayan Jatiwaras. In cycle I, children's ability to recognize colors was still relatively moderate with an average achievement of 43–45%, while in cycle II there was a significant increase to reach 85%. This increase proves that experiment-based learning is able to provide a more concrete, meaningful, and appropriate learning experience in accordance with the characteristics of early childhood development.

The improvement that occurs can be explained through Piaget's (1964) theory of cognitive development, which places children aged 5–6 years in the preoperational stage. At this stage, children tend to think intuitively and egocentrically, so they need hands-on experience to understand abstract concepts such as color. When children experiment with mixing colors, they not only observe visual changes, but also associate them with sensory experiences. This activity confirms that exploration-based learning is more effective than abstract lecture methods for early childhood.

The findings of this study are in line with the results of Lestari's (2017) research which shows that experimental methods can improve the understanding of early childhood science concepts, including color and shape recognition. Experiments give children the opportunity to try, fail, and then improve, so that an active learning process occurs. The same thing was expressed by Rahmawati (2019), that children are easier to remember and understand the concepts learned through direct experiments compared to conventional methods.

Apart from the cognitive aspect, the results of this study also show that there is a development in the attitude and social aspects of children. In cycle I, some children look passive or confused about following instructions. However, in cycle II, after the media and rules were improved, the child became more confident, active, and able to work together in a group. This is in accordance with the view of Vygotsky (1978) through the zone theory of proximal development (ZPD), which emphasizes the importance of social interaction and scaffolding of adults or peers. In this experiment, children learn together, discuss, and help each other, so that their abilities improve through guidance and collaboration.

The experimental method also provides a multisensory experience for the child. They not only notice the change in color, but also touch, smell, and even discuss the natural ingredients used, such as turmeric, sugi leaves, and hibiscus flowers. This multisensory experience supports Bruner's (1966) theory of the enactive, iconic, and symbolic stages of learning. At the enactive stage, children learn through direct actions. At the iconic level, they understand through visual representation, such as seeing color results. Subsequently, at the symbolic stage, they begin to be able to name the colors and relate them to abstract concepts. Thus, the experimental method bridges the three stages naturally.

In addition to classical theory, the results of this study are also supported by modern learning approaches. According to Bodrova and Leong (2012), early childhood learning needs to be designed in the form of meaningful play activities. Game-based learning can increase children's involvement, maintain focus, and foster intrinsic motivation. In this study, color experiments are packaged as play activities so that children feel happy and not burdened. This condition makes children more open to new information and easier to absorb concepts.

The success of the action in cycle II is also influenced by the choice of media that is in accordance with the child's real world. In cycle I, the media was limited to food coloring so the results were less varied. However, in cycle II, children are introduced to natural dyes from the surrounding environment. This strategy makes learning more contextual, as children can relate experimental experiences to everyday life. For example, children may realize that turmeric that mothers usually use for cooking can also produce a yellow color. According to Anderson (2019), contextual learning that connects concepts with children's real experiences is more effective in developing critical thinking skills and conceptual understanding.

From a practical point of view, the results of this study make an important contribution to early childhood education practices. Teachers need to understand that a child's cognitive development cannot be achieved through memorization or repetition of words alone. Early childhood learns better through exploratory activities that engage their senses and feelings. Therefore, the experimental method can be used as one of the main strategies in early childhood learning, especially to teach basic concepts of science and mathematics. This research also fills the gap in the study on the application of experimental methods in the context of color recognition learning. If some of the previous research highlighted more experiments in the recognition of nature or surrounding objects (Zainal, 2016), this study focused on the cognitive aspect of recognizing colors and showed positive results. Thus, this study enriches the literature on experiment-based learning strategies in PAUD.

However, this research also has limitations. First, the study was only conducted on one small group with a total of 15 children, so the generalization of the results is still limited. Second, the duration of the study was only two cycles, so the long-term effects were not yet known. However, the results obtained are still relevant to provide an overview of best practices for early childhood learning. Overall, this discussion confirms that science experiment methods are effective in improving the cognitive ability of children aged 5–6 years to recognize colors. In addition to improving understanding of concepts, this method also supports the development of children's attitudes, social, and emotions. The success of this research strengthens the importance of innovation in early childhood learning by utilizing strategies that are fun, contextual, and in accordance with the characteristics of child development.

CONCLUSION

Based on the results of research and data analysis on efforts to improve cognitive ability in recognizing colors through experimental methods on children aged 5-6 years at RA Nurul Islam Papayan, the author draws conclusions in several points as follows: in planning the action of recognizing colors with the experimental method to improve children's cognitive abilities at the age of 5-6 years at RA Nurul starting with initial observation, Perform pre-action activities to see the initial condition of children aged 5-6 years regarding cognitive development. The results of the pre-action are used as a reference in formulating the right solution action. The next activity is for the researcher to make a defense plan, namely by making a Daily Learning Implementation Plan (RPPH), the research instruments needed, including various media that will be used in research activities. In the implementation of learning, improving cognitive development in recognizing colors through the science experiment method is based on several aspects/indicators that are to be achieved, namely:

children can find out food coloring from natural ingredients, children can recognize primary colors and secondary colorsChildren can make playdough by mixing natural ingredient dyesChildren can do experiments by mixing colors from natural ingredients, children can make playdough by mixing natural ingredient dyes, Children are able to experiment with mixing colors from natural materials. The results of the application of the use of the color mixing experiment method has an effect on children's cognitive abilities which is characterized by an increase in the percentage of cognitive ability from pre-cycle to the end of cycle II, as well as the use of the color mixing experiment method in harmony with learning that takes place in early childhood which must be packaged in an interesting and fun way.

REFERENCES

Arikunto, S. (2002). Prosedur Penelitian. Bandung: Rineka Cipta.

Dasopang, M. D., Lubis, A. H., & Dasopang, H. R. (2022). How do Millennial Parents Internalize Islamic Values in Their Early Childhood in the Digital Era? AL-ISHLAH: Jurnal Pendidikan, 14(1), 697–708.

Dasopang, M. D., Nasution, I. F. A., & Lubis, A. H. (2023). The Role of Religious and Cultural Education as A Resolution of Radicalism Conflict in Sibolga Community. HTS Theological Studies, 79(1), 1–7.

Elisyah, Nur, Islami Fatwa, Dinda Adha Hutabarat, and Zaharatul Humaira. 2024. "Pelatihan Gamifikasi: Implementasi Permainan Edukatif Untuk Meningkatkan Kualitas Pembelajaran Di SD Swasta Srikandi Lhokseumawe." PUSAKA: Jurnal Pengabdian Masyarakat 1(2):29–37. doi:10.62945/pusaka.v1i2.164.

Erawadi, E., Hamka, H., & Juliana, F. (2017). The Analysis of Student's Stressed Syllables Mastery at Sixth Semester of TBI in IAIN Padangsidimpuan. English Education: English Journal for Teaching and Learning, 5(1), 44–57.

Fatimah, A., & Maryani, K. (2018). Visual Literasi Media Pembelajaran Buku Cerita Anak. Jurnal Inovasi Teknologi Pendidikan, 5(1), 61–69. https://doi.org/10.21831/jitp.v5i1.16212

Gogahu, D. G. S., & Prasetyo, T. (2020). Pengembangan Media Pembelajaran Berbasis E-Bookstory untuk Meningkatkan Literasi Membaca Siswa Sekolah Dasar. Jurnal Basicedu, 4(4), 1004–1015.

Hamka, H. (2023). The Role of Principals on Teacher Performance Improvement in a Suburban School. QALAMUNA: Jurnal Pendidikan, Sosial, Dan Agama, 15(1), 371–380.

Hamka, H., Suen, M.-W., Anganthi, N. R. N., Haq, A. H. B., & Prasetyo, B. (2023). The Effectiveness of Gratitude Intervention in Reducing Negative Emotions in Sexual Abuse Victims. Psikohumaniora: Jurnal Penelitian Psikologi, 8(2), 227–240.

Harahap, S. M., & Hamka, H. (2023). Investigating the Roles of Philosophy, Culture, Language and Islam in Angkola's Local Wisdom of 'Dalihan Na Tolu.' HTS Teologiese Studies/Theological Studies, 79(1), 8164.

Hendrawati, S., Rosidin, U., & Astiani, S. (2020). Perilaku hidup bersih dan sehat (PHBS) siswa/siswi di sekolah menengah pertama negeri (SMPN). Jurnal Perawat Indonesia, 4(1), 295–307. https://doi.org/https://doi.org/10.32584/jpi.v4i1.454

Lubis, A. H., Dasopang, M. D., Ramadhini, F., & Dalimunthe, E. M. (2022). Augmented Reality Pictorial Storybook: How does It Influence on Elementary School Mathematics Anxiety? Premiere Educandum: Jurnal Pendidikan Dasar Dan Pembelajaran, 12(1), 41–53.

Lubis, A. H., Yusup, F., Dasopang, M. D., & Januariyansah, S. (2021). Effectivity of Interactive Multimedia with Theocentric Approach to the Analytical Thinking Skills of Elementary School Students in Science Learning. Premiere Educandum: Jurnal Pendidikan Dasar Dan Pembelajaran, 11(2), 215–226.

Manshur, U., & Ramdlani, M. (2019). Media audio visual dalam pembelajaran PAI. Al-Murabbi:Jurnal Pendidikan Agama Islam, 5(1), 1–8.

Mardhiyah, R. H., Aldriani, S. N. F., Chitta, F., & Zulfikar, M. R. (2021). Pentingnya Keterampilan Belajar di Abad 21 sebagai Tuntutan dalam Pengembangan Sumber Daya Manusia. Lectura: Jurnal Pendidikan, 12(1), 29–40.

Ningsih, Y. S., Mulia, M., & Lubis, A. H. (2023). Development of Picture Storybooks with TheoAnthropoEco Centric Approach for Elementary School Students. AL-ISHLAH: Jurnal Pendidikan, 15(2), 1888–1903.

Nurhidayah, I., Asifah, L., & Rosidin, U. (2021). Pengetahuan , Sikap dan Perilaku Hidup Bersih dan Sehat pada Siswa Sekolah Dasar. 13(1), 61–71. https://doi.org/10.32528/ijhs.v13i1.4864

Pebtiyanti, I., Ahmad, A., Dzaky, M., Fauziah, S. N., Rendi, & Puspitasari, P. (2023). Peran kurikulum merdeka dalam meningkatkan harmonisasi antara masyarakat dan sekolah. Jurnal Pacu Pendidikan Dasar, 3(1), 269–277. https://doi.org/https://doi.org/10.22021/pacu.v3i1.411

Putra, Meiyaldi Eka, Fajar Maulana, Ramanda Rizky, and Islami Fatwa. 2023. "Peningkatan Hasil Belajar Mahasiswa Menggunakan Model Perkuliahan Problem Based Instruction (PBI) Mata Kuliah Gambar Teknik." Jurnal Pendidikan Teknik Mesin 10(1):22–30. doi:10.36706/jptm.v10i1.20850.

Rahmah, S., & Lubis, A. H. (2024). Problem Posing as a Learning Model to Improve Primary School Students' Mathematics Learning Outcomes in Gayo Lues. Journal of Indonesian Primary School, 1(4), 93–104.

Rahman, A., Munandar, S. A., Fitriani, A., Karlina, Y., & Yumriani. (2022). Pengertian Pendidikan, Ilmu Pendidikan dan Unsur-Unsur Pendidikan. Al Urwatul Wutsqa: Kajian Pendidikan Islam, 2(1), 1–8.

Ranisa, R., Erawadi, E., & Hamka, H. (2018). Students' Mastery in Identifying Adverbs at Grade VIII SMPN 2 Batang Toru Tapanuli Selatan. ENGLISH EDUCATION JOURNAL: English Journal for Teaching and Learning, 6(2), 241–252.

Ricardo, R., & Meilani, R. I. (2017). Impak Minat dan Motivasi Belajar terhadap Hasil Belajar Siswa. Jurnal Pendidikan Manajemen Perkantoran (JPManper), 2(2), 188–201.

Santi, Undang, & Kasja. (2023). Peran Guru PAI dalam Membentuk Karakter Peserta Didik di Sekolah. Jurnal Pendidikan Tambusai, 7(2), 16078–16084. https://doi.org/https://doi.org/10.31004/jptam.v7i2.8918

Sinaga, Nurul Afni, Fitri Ayu Ningtiyas, Rifaatul Mahmuzah, Yulia Zahara, and Islami Fatwa. 2023. "The Effect of Deductive-Inductive Learning Approach on Creative Thinking Ability and Learning Motivation." Journal of Educational Research and Evaluation 6(2):123–34. doi:10.24114/paradikma.v16i2.46952.

Siraj, S., M. Yusuf, I. Fatwa, F. Rianda, and M. Mulyadi. 2023. "Pengembangan Model Pembelajaran Reflektif Berbasis Unity of Sciences Bagi Calon Guru Sekolah Menengah Kejuruan Profesional." Jurnal Review Pendidikan Dan Pengajaran (JRPP) 6(4):2030–38.

Siregar, N., & Siregar, R. S. (2025). Analysis of numeracy literacy of junior high school students in AKM questions: Learning strategies based on higher order thinking skills

at SMP Negeri 5 Tapung Hilir. Jurnal Profesi Guru Indonesia, 2(1), 359–367. https://doi.org/10.62945/jpgi.v2i1.720

Siregar, R. S. (2024). Fiqhu Al-Akbār: Taḥqī An-Naṣ Wa Taḥlīlu'Afkārihi. UIN Ar-Raniry Fakultas Adab dan Humaniora.

Siregar, R. S. (2024). Students' Preferences for Varied Learning Methods: An Empirical Study of the Effectiveness and Appeal of Diverse Instructional Approaches. Jurnal Profesi Guru Indonesia, 1(2), 140–152. https://doi.org/https://doi.org/10.62945/jpgi.v1i2.679

Siregar, R. S. (2025). The Influence of Social Media as a Learning Resource on the Academic Behavior of Junior High School Adolescents. KOGNITIF: Jurnal Ilmiah Pendidikan Dan Keguruan, 2(1), 21–28.

Siregar, R. S. (2025a). Arabic Language Learning Culture in Salaf Islamic Boarding Schools: An Ethnographic Study of Linguistic Punishment Practices and Traditions. ETNOPEDAGOGI: Jurnal Pendidikan Dan Kebudayaan, 2(2), 1–9. https://doi.org/https://doi.org/10.62945/etnopedagogi.v2i2.722

Siregar, R. S. (2025b). Evaluation of the Implementation of the Reading Literacy Program at SD Negeri 100190 Tarutung Bolak. Journal of Indonesian Primary School, 2(1), 240–250. https://doi.org/https://doi.org/10.62945/jips.v2i1.723

Siregar, R. S. (2025c). Improving the Arabic Writing Skills of Students through the Application of Contextual Learning Methods at Dayah Irsyadul Abidin Qurani. Indonesian Journal of Education and Social Humanities, 2(1), 358–369. https://doi.org/https://doi.org/10.62945/ijesh.v2i1.726

Siregar, R. S. (2025d). Principles of Subject-Based Arabic Curriculum Development: Language Skills Integration and Contextual Relevance. DEEP LEARNING: Journal of Educational Research, 1(2), 56–67. https://doi.org/https://doi.org/10.62945/deeplearning.v1i2.229

Siregar, R. S. (2025e). Students' Cognitive Difficulties in Mastering the Nahwu Rules: A Descriptive Study at SMP IT Al Farabi Bilingual Scool. Jurnal Cendekia Islam Indonesia, 1(2), 10–20. https://doi.org/https://doi.org/10.62945/jcii.v1i2.216

Sugiyono. (2018). Metode Penelitian Kuantitatif Kualitatif dan R&D. Bandung: Alfabeta.