

# Implementation of Children's Cognitive Abilities Through Color Recognition Activities in Early Childhood

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## Abstract

This study aims to explore and analyze the effectiveness of color recognition activities in enhancing the cognitive abilities of early childhood children at RA Syifaul Qalbi Jumantono. Children are expected to be able to recognize various colors, conduct color mixing experiments, and produce other colors. They should be able to name primary and mixed colors, state the results of color mixing, and recount the color mixing process. The research was conducted using a descriptive qualitative method with classroom action research. Data was collected through observation of children's activities during the sessions, interviews, and documentation. The results indicate that the application of experimental methods in color recognition at RA Syifaul Qalbi Jumantono was successful. The achievements according to the lesson plans and syllabi were acceptable to teachers and students in conducting activities involving color mixing experiments using materials such as bond paper, colored water, and straws. Activities were carried out using planning and implementation systems. This finding emphasizes the significant role of color recognition activities in the cognitive development of early childhood. The practical implication of this research underscores the importance of incorporating color recognition stimulating activities into the early childhood education curriculum to strengthen their cognitive development.

**KeyWord:** *Cognitive, Early Childhood Education, Color Mixing Experiments.*

## Introduction

A coaching effort aimed at children from birth to 6 years of age, which is very important to develop children's potential from an early age (Yenti, 2021). One of them is children's cognitive development, as a foundation for optimizing children's thinking skills so that children are ready to face life in the future and continue their education at the next level (Santi, 2023). hildhood is the right time to start providing various stimulations so that children can develop optimally. What a person learns early in life will have an impact on life in the future. Raudhatul Athfal (RA) is an institution that provides educational services to children aged 4 to 6 years. Within the framework of early childhood education, Raudhatul Athfal plays an important role not only in optimizing children's abilities, including the ability to think, understand, identify problems, analyze problems and solve problems faced by children. Therefore, the presence of an educator who is an expert in the field of early childhood education is very necessary. Educators at this institution provide students with special services related to laying the foundation for critical thinking, how to understand the information received by children, and in solving problems according to their age and ability. So that they are able to adapt to the environment and prepare themselves to enter primary education.

Therefore, the key in determining the success of implementing the curriculum is part of a teacher's new idea.

Educators are the most important factor with great influence and can make a big difference in the success or failure of a child's learning. It allows children to engage in active learning, find solutions to various problems, classify, and prepares children to develop math logic skills and their knowledge of space and time. Teaching thinking skills to produce more comprehensive thinking skills. Cognitive ability can be defined as the ability to know something. In other words, understanding shows the child's ability to capture and describe clearly the nature, meaning, or information about something. Cognitive development itself is related to a child's ability to understand something. After learning, a person will have skills, attitudes, knowledge, and also values. Thus, learning is a set of cognitive processes that change the nature of environmental stimuli, pass through information processing, and become new capabilities (Purnamasari, 2023).

Many teachers in Raudhatul Athfal rarely use play techniques during learning. This is due to various reasons, including the lack of educational aids, expensive costs, long-term preparation needs, and requires high teacher creativity, and there are still many parents who are still unfamiliar with learning through play. Learning with the play method requires creativity from RA teachers. It is hoped that creative educational games will make learning fun for children. In creative educational games, various rules are included so that children can understand and follow without compulsion and train the spirit of sportsmanship in children. Teachers can use it to teach their children learning that can be used for cognitive development through demonstration learning models and color experiments (Purnamasari., 2023). Color mixing experiments are one of the alternatives carried out in this simple research activity. This simple science concept should be taught to children because it can train children to think logically. One of them is about the daily events they encounter, namely about how primary colors can change into secondary colors through various experiments. In addition, developing children's cognitive abilities by teaching color mixing in a fun way is of course very desirable to be developed widely. Color mixing games are also in accordance with the principles of learning in early childhood where they learn many things through play.

That is what causes a method applied in a learning process to be timely and portion according to the pattern of child development. With observations during this survey that encouraged researchers to conduct field studies or in this case classroom action research by observing the improvement of children's cognitive abilities through color mixing experiments where children can recognize basic colors and secondary colors from mixing primary colors, so they are no longer confused in mentioning the color of an object, but they can also find out the origin of existing colors in a more fun way. It is hoped that with this color mixing experiment, children can find other secondary colors. Based on the introduction above, the formulation of the problem raised in this study is "how to improve children's cognitive abilities through color mixing experiments at RA Syifaul Qolbi, Jumantono?"

The purpose of this study was to determine the improvement of children's cognitive abilities through color mixing experiments at RA Syifaul Qolbi, Jumantono, Karanganyar. The benefit of this research is that we can find out the improvement of children's cognitive abilities through color mixing experiments at RA Syifaul Qolbi, Jumantono. The color experiment learning method was developed by Friedrich Froebel who is famous for the Frobelian approach or Frobelian education (Fadillah, 2020). In this learning model, "learners are asked to observe, apply the colors observed to the objects around them, try mixing two colors and observe the results of mixing the two colors in a comfortable atmosphere". The learning process becomes more interesting, and most learners follow the learning process with great enthusiasm, and they are amazed when they find other colors as a result of mixing two colors, children's cognitive abilities can be developed. There are many findings related to the application of learning to mention the color of the ball that can improve children's cognitive abilities by

observing activities. This can be seen when children mention the colors of the ball and objects around the children.

However, based on the results of interviews and observations, Raudhotul Athfal Syifaul Qolbi, Jumantono children's cognitive abilities have been revealed but are still low. The cause of this problem is the teaching method of the teacher using educational methods that do not involve children to be active. Learning activities for children have not been carefully planned due to limited learning media around the child.

From the results of initial cognitive observations, researchers still see deficiencies, especially related to the problem of color experiments at Raudhatul Athfal Syifaul Qolbi, Jumantono, due to the lack of teacher knowledge about educational methods that are suitable for early childhood. The material to be delivered by the teacher looks makeshift and lacks planning. In addition, children in the understanding stage tend not to be able to repeat what the teacher tells them. Based on observations of these conditions, one of them is influenced by the lack of teacher knowledge in using learning models that can stimulate children's interest in learning. Therefore, from the results of the above problems, researchers are inspired to conduct further research through classroom action research entitled "Implementation of Cognitive Skills in Early Childhood to Recognize and experiment with colors at RA Syifaul Qolbi, Jumantono".

This research is said to be useful because of the following things: For students, the game model of finding objects with colors that match the color of the ball shown can improve children's cognitive abilities in recognizing the colors of objects around the child. For schools, this can be an alternative to improving the quality of cognitive learning in children. For development, especially color recognition, creative educational game methods and color experiments can be used as an alternative to teacher learning (Susanti, 2022). This can improve children's cognitive abilities. Researchers themselves increase their scientific insight and knowledge through learning activities to produce innovative ideas and works, especially to improve children's cognitive abilities.

## Methodology

This research method uses a descriptive qualitative approach, which is a research approach that produces descriptive data from interviews and observations, with data sources consisting of primary data and secondary data. Primary data was obtained from interviews with group B class teachers and principals, as well as observations of learning inside and outside the group B classroom at RA Syifaul Qolbi Jumantono, Karanganyar. While secondary methods are obtained from documentation in the form of texts and other documents related to research at RA Syifaul Qolbi Jumantono, Karanganyar. As previously stated, this class action research consists of two cycles where each cycle consists of four stages, namely planning, implementation, observation and reflection which are described as below:

### a. Planning Stage

The planning stage is certainly passed by the preparation of learning devices consisting of weekly learning preparation plans (RPPM) which are described in daily learning plans (RPPH), preparation of tools and materials that will be used in conducting this class action research, checking the location and all the tools used and communicating with parents of students whose children are involved in this activity.

### b. Implementation Stage

The implementation stage is carried out after all the tools and materials (plastic balls with several colors, hvs paper, water that has been mixed with red, blue and yellow dyes, straws) are prepared, the location, the readiness of all students and the team that helps for documentation and also oversees the entire incident is already at the school location. Activities began according to the time listed on the daily learning preparation plan (RPPH). Color mixing activities also run properly, it's just that for the first cycle it has not shown the results of the

assessment for cognitive aspects with satisfactory results so that it must be repeated again in the next cycle or the second cycle.

#### c. Observation Stage

The author or researcher has certainly prepared a team that will help him during the activities or throughout the research process. The research series becomes a record even all under the supervision of the researcher, but the team that helps at the location can of course also provide input or views on what is happening in order to maximize the expected results. At the observation stage, it is carried out after the implementation of activities and seeing and even documenting the activities properly so that there are no stages left behind. It is expected from this observation that all children can be observed properly and also record the results of the activity process according to the indicators observed, especially in the number of cognitive abilities improvement through color mixing experiments.

#### d. Reflection Stage

The reflection stage is carried out after observation activities, where we assess and evaluate all activities that take place and from the results of the assessment according to the indicators of the assessment aspects carried out, we improve and compile the next steps to produce cognitive aspect assessments so that the results are maximized. For the reflection stage in the first cycle, of course, it is a separate note so that the results of the assessment of indicators for cognitive aspects in the second cycle can be maximized. The data sources in this study are the results of observations of the implementation of activities, the results of interviews with the teacher in charge or the team that helped the course of this activity, documentation of the implementation of research and of course group B children (aged 5-6 years) at RA Syifaul Qolbi, Jumantono, Karanganyar as many as 17 children. The research instruments used in this activity refer to the Learning Outcome Elements of cognitive, science and art learning objectives:

1. The child recognizes basic colors and colors resulting from mixing
2. Children can mix basic colors to produce secondary colors.
3. The child states the mixing of basic colors used to produce secondary colors

(as stated in the Decree of the Minister of Religious Affairs number 347 of 2022 concerning guidelines for implementing the Merdeka curriculum in madrasas and Decree of the Head of the Standards, Curriculum and Assessment Agency and Education of the Ministry of Education and Culture, Research and Technology Number 033 / H / KR / 2022 concerning amendments to the decision of the head of the standards, curriculum and education assessment agency of the ministry of education and culture, research and technology Number 008 / H / KR / 2022 concerning learning outcomes in early childhood, basic education levels, and secondary education levels in the Merdeka Curriculum). with activities to conduct color mixing experiments using primary colors: red, blue and yellow with predetermined assessment rubrics for each category.

Each assessment category is first made an assessment standard based on the activities carried out so that it makes it easier for teachers or researchers and even anyone who helps in this class action research activity to be able to measure children's cognitive abilities and the relationship between color mixing experiments with primary colors to produce other secondary colors. From the assessment made, it will be easier to determine the category obtained for each student's learning outcomes at each stage of the activity that is passed and that way it will be easier to know that an activity can be said to be successful or not significantly. Assessment of the indicators that have been set becomes a reference that makes it easy to measure the success of a research action.

## Results and Discussion

Data analysis showed significant improvements in color understanding, creativity, and fine motor skills in the experimental group compared to the control group. Children in the experimental group showed greater improvements in their ability to identify colors, explore

with colors, and use fine motor skills when mixing colors. An in-depth analysis of the data highlights the significant positive impact the implementation of the color mixing experiment had on early childhood development. Below, we will elaborate more on how this color mixing experiment research at RA Syifa'ul Qolbi, Jumantono showed significant improvements in color understanding, creativity, and fine motor skills in the experimental group compared to the control group:

1. **Color Comprehension:** Children in the experimental group showed a marked improvement in their understanding of colors. This was reflected in their ability to identify colors more accurately and confidently after participating in the color mixing sessions. In addition, the children also demonstrated a deeper understanding of the relationship between colors and the way they interact with each other when mixed.
2. **Creativity:** The implementation of color mixing experiments encourages children to explore creatively with colors. They begin to develop the courage to create unique color mixtures and produce interesting results. This activity not only broadens their creative horizons but also enriches their sensory experience.
3. **Fine Motor Skills:** The process of mixing colors involves the careful use of fine motor skills, such as controlling straws and manipulating dyes. Children in the experimental group showed greater improvement in their ability to use these fine motor skills with more precision and coordination after engaging in the color mixing sessions. They became more skillful in manipulating tools and materials, such as holding straws and mixing dyes with water, which are important abilities in fine motor development (Wathon, 2020).

Thus, the overall results confirm that color mixing experiments not only enhance children's understanding of colors but also stimulate their creativity and strengthen fine motor skills. This shows the great potential of this activity in enriching early childhood education experiences and providing a strong foundation for holistic development in childhood.

The initial stage of this research begins with carrying out all the SOPs that have been listed in the lesson plan starting from welcoming children to entering into initial activities such as rows outside the classroom and doing gross motor exercises. Then proceed with the opening activity which begins with greeting, praying before starting the activity, checking the presence of children, making apperception of themes, subthemes, sub-subthemes and continued with activities to discuss with children about the material of activities to be carried out that day.

Before carrying out learning activities, the teacher or researcher explains the play activities that children will do, starting from the first, second, third and fourth activities which will be followed by watching videos that match the material that day. After the opening activity is complete, it is continued with the core activity. This core activity begins with introducing various colors with red, blue, green, yellow and purple plastic balls. Then the children are invited alternately to choose the ball according to their favorite color, then the child is asked to mention the color of the ball he chooses. In this activity, researchers found that some children had difficulty distinguishing colors, especially for green and blue. Finally, the researcher provided special understanding to some children who could not distinguish colors by inviting them to recognize colors from various objects around the child.

After completing the initial activity, the teacher or researcher gives an explanation to the children about the various types of dyes, namely natural dyes from natural ingredients and synthetic dyes which are factory-produced dyes, after which the children are invited to observe one by one the tools and materials that will be used to play color mixing experiments such as HVS paper, water, synthetic dyes (red, blue, yellow), small cups for coloring and straws. The next play activity is that the researcher demonstrates how to play that the children will do. The next activity is for the children to conduct experiments in groups, where each group consists of 3 children. In this play activity, the researcher only acts as a supervisor, children are given the opportunity to explore as much as possible. After this play activity is complete, the teacher asks the children how much they understand about the play activity.

The closing activity begins by asking the children about their feelings during and after playing the play activities and then continues with a discussion related to the play activities that the children have done that day and asking the children about which play activities they like the most and why. After that, the teacher informs the children about the theme that will be learned at the next meeting and gives moral messages to the children, then invites the children to pray before going home and ends the meeting on that day with greetings, then directs the children out of the classroom in an orderly manner to wear their shoes.

All of the above stages are a series of activities carried out by children starting from their arrival at school until completion. For this activity is carried out repeatedly and regularly at each meeting at school, the only difference is in the form of activities carried out and included in the implementation, observation and reflection stages where observers or teams that assist in this research activity are very hard at work in documenting the moments that occur, observing each step and also recording indicators based on the assessment rubric which will be the focus of assessment in this activity. This stage will certainly be a record for making improvements or evaluating actions that are necessary or unnecessary in supporting the success of this class action research.

The learning outcomes of children in relation to the cognitive abilities of children in group B of RA Syifaul Qolbi, Jumantono are children showing basic abilities of critical, creative, and collaborative thinking. Children show curiosity through observation, exploration, and experimentation by using the surrounding environment and media as learning resources, to get ideas about natural and social phenomena. Children show early ability to use and engineer technology and to seek information, ideas, and skills safely and responsibly. While the learning objectives are that children can understand messages, instructions, instructions or information received, children can ask and answer questions, provide ideas, responses, comments or opinions about information or topics being discussed simply. The child can actively participate in a conversation or discussion. The child can recognize basic colors and mixed colors. The child can mix basic colors to produce secondary colors. The child can state the basic color mixing used to produce secondary colors, measure the child's cognitive understanding related to the concept of color through direct experience in experimental activities.

In this color recognition and mixing experiment, researchers determined the assessment indicators based on the assessment in the independent curriculum as follows:

1. The child's ability to identify different colors.
2. The child's ability to match objects around the child with the correct color of the ball.
3. The child's ability to answer questions about colors appropriately.
4. The child's level of engagement in experimental activities and response to teacher instructions.

Meanwhile, the researcher also set the assessment signs as follows:

1. Children who are able to identify colors correctly and match correctly show good cognitive understanding related to the concept of color.
2. Children's reactions to questions can provide additional insight into their understanding of color concepts.
3. Children's engagement and interest during the activity reflects their level of understanding and cognitive engagement.

Based on the results of the above research, we can conclude that conducting color mixing experimental activities using primary colors or basic colors can help early childhood, especially group B aged 5-6 years at RA Syifaul Qolbi, Jumantono to improve their cognitive abilities more easily and fun. The difference in color produced is also one of the topics of conversation among them. There are children who mix the same colors as their friends but produce different colors because the dose of color mixed is different so that the color obtained from mixing the colors is not exactly the same as what their friends have done. Providing stimulation of secondary color recognition with color mixing experiments is an activity that

was first given at RA Syifaul Qolbi so that this activity feels special. The ability of early childhood in this activity can also develop children's cognitive aspects, namely having behavior that reflects a great curiosity with the emergence of a high sense of enthusiasm for the colors produced by mixing the colors they do and children will be accustomed to showing exploratory activities.

The teacher or researcher's strategy of forming small groups also allows them to communicate and collaborate and cooperate with their group of friends, enabling them to think more creatively because ideas from their peers can encourage other friends to think the same thing and ultimately execute it together.

Through this color mixing experimental activity we can see: that activities that have been considered trivial up to now can become more interesting and fun when we can package them with simple but fun activities. The children were enthusiastic about doing these activities with the freedom to carry out activities and collaborative activities even though they were only in small groups.

This simple activity can attract children's interest in exploring the existing colors and even the colors produced. They instead think of looking for other colors from mixing the secondary colors they produced previously. even though from the start the teacher or researcher only thought that this activity was carried out only to look for secondary colors from a mixture of primary colors. The breadth of children's thinking actually arises in activities that we think are simple, so with this activity we know that children's thinking space can emerge with any activity as long as the activity is fun and challenges their curiosity about something. This was also conveyed by the school principal and group B teacher at RA Syifaul Qalbi Jumantono in an interview session conducted by the researcher.

According to the results of an interview with the school principal from RA Syifa'ul Qalbi Jumantono, he said that color mixing experiments have apparently had a very important role in the cognitive development of early childhood. And through these activities, children can learn about basic color concepts, visual observation, and other cognitive processes such as problem solving and reasoning. This activity is very useful for improving fine motor skills and helping children to understand abstract concepts such as colors and differences as well as developing their creativity and imagination. Interesting activities like this can attract children's interest or response to explore or explore colors and can broaden their understanding of color concepts.

In line with the opinion of the school principal, one of the teachers at RA Syifa'ul Qalbi Jumantono who is the homeroom teacher of class B, also stated that color mixing experiments are very important in the cognitive development of early childhood because this is not only rich in sensory experience, but also stimulates thinking. creative and problem solving. Practical experiences such as mixing colors help children understand abstract concepts such as the difference between primary and secondary colors. They learn through hands-on experience how different colors can be combined to create new colors. This can stimulate their imagination. Children tend to be enthusiastic and excited when doing this activity, they look amazed when they discover other colors created by mixing these colors.

From the presentation of the results of this research discussion, we can see that the cognitive abilities of young children, especially in group B at RA Syifaul Qalbi, Jumantono, Karanganyar, are developing well and optimally through color mixing experimental activities packaged through creative and fun play activities and freedom to explore.

## **Citations and References**

Early Childhood Education (PAUD) is a coaching effort aimed at children from birth to 6 years of age, which is carried out through providing educational stimuli to help physical and spiritual growth and development so that children are ready to enter further education (Law - Law No. 20 of 2003, Article 1 Paragraph 14). In childhood, the process of growth and development in various aspects such as physical, language, social emotional, moral and

cognitive is experiencing the fastest period in the development span of human life (Rusmaladewi, 2020). And by the first four years of age, half of human intelligence capacity has been formed (Suryana, 2021).

Gagne in Dimiyati said that learning is a complex activity (Suryanto, 2022). After learning, a person will have skills, attitudes, knowledge and values. In this way, learning is a set of cognitive processes that change the nature of environmental stimuli, pass through information processing, and become new capabilities. Farida Rokhmi Na'imah said that during experiments, children actually experiment to discover something new, one of which is about the concept of science, namely mixing colors (Hamzah, 2022). This simple science concept needs to be taught to children because it can train children to think logically.

The introduction of color concepts in early childhood has an impact on their intellectual development because the introduction of color concepts in early childhood not only sharpens their memory or cognitive abilities, but also imaginative and artistic, understanding of space, and creative thinking patterns (Sulyandari, 2021). The color mixing game is also in accordance with the principles of learning in early childhood where they learn many things through playing. "We must be precise in laying down values that children can adopt" Child Development by Hurlock (dalam Buletin PADU, 2008:16).

The research instruments used in this activity refer to the elements of cognitive, science and arts learning outcomes (as stated in the Decree of the Minister of Religion number 347 of 2022 concerning guidelines for implementing the Merdeka curriculum in madrasas and the Decree of the Head of the Standards, Curriculum and Assessment and Ministry of Education and Culture Agency, Research and Technology Number 033/H/KR/2022 concerning changes to the decision of the head of the educational standards, curriculum and assessment body, Ministry of Education, Culture, Research and Technology Number 008/H/KR/2022 concerning learning outcomes in early childhood, basic education level, and Secondary Education levels in the Independent Curriculum).

## Conclusion

Children's cognitive abilities can be improved by doing various creative and fun activities. Like the experimental activity of mixing colors from primary colors to produce secondary colors. Children are able to recognize, mix and produce other colors through color mixing experimental activities. This can make children think creatively and can improve children's cognitive development. This was proven at RA Syifaul Qolbi, Jumantono. The positive response from the children proves that fun activities can attract interest in learning and spark their curiosity to find out more about color concepts resulting from the color mixing they do. And from this research it is proven that color mixing experimental activities can improve the cognitive abilities of young children, especially group B children at RA Syifaul Qolbi, Jumantono, Karanganyar.

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