# *Early Childhood Science Development Through Experiments on Mixing Colors with Water Media at Al Irsyad Banyuwangi Kindergarten Age Group 5-6 Years*

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***Abstract*— Early childhood is crucial for fostering curiosity and interest in science. This research aims to examine the development of early childhood science through experiments mixing colors with water as a medium at the Al Irsyad Banyuwangi Kindergarten in the 5–6-year age group. This research uses a qualitative method with a case study approach. Data collection was carried out through observation, interviews, and documentation. Data analysis was carried out using qualitative descriptive analysis techniques. The research results show that the experiment of mixing colors with water as a medium is effective in developing early childhood science, including aspects of knowledge, scientific processes, and scientific attitudes. In the knowledge aspect, children can recognize primary, secondary, and tertiary colors well. In the scientific process aspect, they are skilled in carrying out observations, experiments, and communication. In the scientific attitude aspect, children show increased curiosity, creativity and critical thinking. An interesting finding is the child's ability to discover new colors from primary colors and apply them in everyday life, such as when painting and drawing. This shows that this experiment can foster creativity and problem solving in children. In conclusion, the experiment of mixing colors with water as a medium is an appropriate strategy for developing science in early childhood, especially in the aspects of knowledge, scientific processes and scientific attitudes.**

***Keywords: early childhood science, experiments, mixing colors, water media***

## I. INTRODUCTION

Early childhood is an individual who is experiencing a very rapid growth and development process, it is even said to be a developmental leap. Early childhood has a very valuable range compared to later ages because their intelligence development is extraordinary. This age is a unique phase of life and is during a process of change in the form of growth, development, maturation and perfection, both in physical and spiritual aspects, which lasts a lifetime, gradually and continuously (H. E. Mulyasa, 2012).

Early Childhood Education (ECE) in the 0–6-year age range is the golden age for various aspects of child development, as stated in the learning outcomes of the independent curriculum, namely religious values and character, identity, basics of literacy, mathematics, science, engineering and art. At this age, children's brains develop rapidly so they have a high curiosity. This can be seen from the fact that children at this age enjoy exploring the environment around them. As stated by Montessori (Yuliani, 2011: 54) that early childhood is a sensitive period, during this period children are especially receptive to stimuli from their environment. For this reason, educators must be astute in seeing these developmental abilities, because this is the right time to provide support for various aspects of children's development, including cultivating children's interest and enjoyment of science.

Science development in early childhood can develop critical thinking skills, problem solving and creativity. Science helps children to understand the environment around them in a systematic and logical way. The development of science in early childhood has many benefits, including: 1. Increasing critical thinking and problem-solving skills. 2. Increase creativity and imagination. 3. Increase curiosity and interest in learning. 4. Improve communication and collaboration skills. 5. Prepare children for the future. Therefore, it is important to provide appropriate stimulation, so that children's scientific abilities can develop optimally.

Science education emphasizes providing direct experience. Thus, children need to be helped to develop a number of science process skills, so they are able to explore and understand the natural surroundings. Science as a science about the natural environment is a process that contains theories or concepts obtained through observation and research. Science is a series of concepts that are related to each other based on the results of observations, experiments on natural phenomena and the contents of the universe. (FF Hikam & E Nursari, 2020)

Teachers have an important role in the development of early childhood science through choosing appropriate learning methods. One effective method is the experimental method. This method allows children to learn actively through direct experience.Experiments provide opportunities for children to observe, investigate, and test various natural phenomena. This not only improves children's understanding of science, but also develops other skills such as communication, cooperation and problem solving.

Color mixing experiments are an interesting and fun activity for young children. This activity can be done easily by children. Apart from that, the tools and materials needed are simple and easy to obtain, such as clear jars, plastic cups, plastic spoons, water and food coloring. Through color mixing experiments, children can learn about primary, secondary and tertiary colors. Activities can be developed by studying the properties of water. In addition, this experiment supports the development of children's critical thinking, communication, creativity and imagination.

Experimenting with mixing colors using water as a medium is a fun and easy activity for children to do. This activity can help children learn to recognize colors, understand the concept of color mixing, and develop various other skills such as fine motor skills, creativity, and problem solving. Through Kindergarten Al Irsyad Banyuwangi is committed to developing early childhood science through various activities, including experiments. One of the experimental activities routinely carried out at Al Irsyad Banyuwangi Kindergarten is the experiment of mixing colors with water as a medium.

Based on the background above, this research will answer the following research question, how do you develop scientific knowledge, scientific processes and scientific attitudes in early childhood through experiments mixing colors with water as a medium in the Al Irsyad Banyuwangi Kindergarten for the 5-6 year age group?

Based on the problem formulation above, the objectives of this research have general objectives and specific objectives. The general objective is to determine the development of early childhood science through experiments mixing colors with water as a medium at the Al Irsyad Banyuwangi Kindergarten for the 5-6 year age group.

The specific aim of this research is first, to describe early childhood science knowledge through experiments mixing colors with water as a medium at the Al Irsyad Banyuwangi Kindergarten for the 5-6 year age group. Second, to describe the development of the science process for early childhood through experiments mixing colors with water as a medium at Al Irsyad Banyuwangi Kindergarten for the 5-6 year age group. Third, to describe the development of scientific attitudes in early childhood

through experiments mixing colors with water media at the Al Irsyad Banyuwangi Kindergarten for the 5-6 year age group.

It is hoped that this research can contribute to the development of early childhood science, especially in terms of knowledge, scientific processes and scientific attitudes.

Early childhood (ECCE) is a golden period for brain development and various other fundamental aspects. Therefore, it is important to provide children with the right stimulation, including in the realm of science, such as encouraging curiosity, scientific attitudes and critical thinking skills. The development of science in early childhood has many benefits, both for their cognitive, language and social-emotional development.

Early childhood has a great curiosity about the world around them. This is the perfect opportunity to introduce them to science concepts in a fun and interesting way. One effective method for doing this is through experimentation. The experiment of mixing colors using water as a medium is a simple but effective science activity for young children. This activity can help children learn about colors, color mixing, and the properties of water.

Research has shown that experiments mixing colors with water can help young children develop their scientific knowledge. Dio Claudia Safitri, (2022) in her research found that using natural media that is interesting and fun for children can develop cognitive abilities and have a positive influence on children. This research shows that the game of mixing colors with watercolors can improve the science abilities of young children, especially in terms of recognizing colors. (Riastuti, R. 2018)

Experiments with mixing colors using water can also help young children develop their scientific processes. The science process includes skills such as observing, predicting, investigating, and communicating results. Fajriah (2020) found that science experiments involving mixing colors can influence the cognitive development of early childhood. Shanty, A. D. (2021). The research results show that the process of learning to mix colors using experimental methods and using watercolor media has increased the development of science in a good direction. Dio Claudia Saputri, (2022) concluded from the results of her literature review that children's cognitive abilities in recognizing colors develop very rapidly by using simple experimental methods of mixing colors.

Experiments with mixing colors using water can also help young children develop a scientific attitude. A scientific attitude includes curiosity, curiosity, and openness to new ideas. Yeni Astuti, et al. (2023) found that developing scientific abilities through experimental methods is very effective as an effort to provide stimulus to children's scientific abilities.

Based on various credible sources, it can be concluded that the experiment of mixing colors with water as a medium is an effective method for developing science in early childhood. This activity can help children develop their knowledge about colors, scientific processes, and scientific attitudes.

## II. METHODS

This research uses qualitative research with a case study approach. The case study was chosen to describe in depth and comprehensively the development of science in early childhood through experiments mixing colors with water as a medium at the Al Irsyad Banyuwangi Kindergarten. The population of this study was all children aged 5-6 years at Al Irsyad Banyuwangi Kindergarten, totaling 60 children. With a sample of 15 children aged 5-6 years who were selected using purposive sampling techniques. The sample selection criteria were children who were active and enthusiastic in participating in teaching and learning activities. Children come from various family backgrounds and

cognitive abilities, as well as children whose parents are willing to give consent to become participants in research.

Researchers used data collection techniques by making observations during the experimental activity of mixing colors with water media. Observations focused on how children interacted with media and experimental materials, how they collaborated with their peers, and how they demonstrated curiosity and interest in science. Researchers will conduct semi-structured interviews with children, teachers and parents. Interviews were conducted to dig up deeper information about children's experiences in participating in color mixing experiments, teachers' and parents' perceptions of the effectiveness of experiments in developing children's science, and the obstacles faced in implementing activities. Researchers will document experimental activities of mixing colors using photos and videos. This documentation will be used to enrich research data and to assist in data analysis. The data analysis technique used in this research is a qualitative descriptive analysis technique.

## III. RESULTS AND DISCUSSION

The experiment of mixing colors with water as a medium has proven to be effective in developing early childhood science, especially in the aspects of knowledge, scientific processes and scientific attitudes. In the knowledge aspect, children showed a good understanding of primary, secondary and tertiary colors before and after the experiment. There was a significant improvement in the children's ability to name and identify colors after the experiment. Children were also able to explain the color mixing process better after the experiment. In aspects of the science process, children showed better observation skills after experiments, such as noticing changes in the color of the water they were mixed with. Children can carry out experiments more independently, including pouring water, mixing colors, and observing the results. Children demonstrated better communication skills in describing experimental results and discussing their findings with peers. They discussed mixing blue and yellow together, but the results were not the same, some were dark green and light green. From this we can see the development of aspects of children's scientific attitudes, they show a higher level of curiosity, by asking more questions about colors and the mixing process. After the experiment, the children showed higher creativity in using colors to create works of art, such as when painting and with only 3 primary colors they could find the colors they wanted themselves. Children show better critical thinking skills by analyzing experimental results and drawing conclusions, this can be seen when children combine colors that have been mixed in plastic cups to form a rainbow.

### Supporting Data

*Table 1: Comparison of Children's Abilities Before and After the Experiment*

| Science Aspects | Before Experiment (%) | After Experiment (%) |
|---|---|---|
| Primary color knowledge | 52 | 95 |
| Secondary color knowledge | 38 | 82 |
| Tertiary color knowledge | 10 | 67 |
| Observations | Good | Very Good |
| Eksperiment | Good Enough | Good |
| Comunication | Enough | Good |
| Curiosity | High | Very High |
| Creativity | medium | High |
| Critical thinking | Good Enough | Good |

*Figure 1: Children's Observation Skills*

*Table 2: Children's Communication Skills*

| Question | Before Eksperiment | After Eksperiment |
|---|---|---|
| What color is this water? | Blue | Blue mixed with yellow makes green. |
| How do you make purple? | Mixing red and blue | That's right, mixing red and blue produces purple. |

The results of the research show that the experiment of mixing colors with water as a medium is effective in developing early childhood science knowledge, especially in the aspect of knowledge about colors. This is in line with a literature review which shows that experiments can help children learn about science concepts in a fun and interesting way (Dio. 2022, Riastuti, R. 2018). The findings of this study showed that children demonstrated a good understanding of primary, secondary, and tertiary colors before and after the experiment. However, there was a significant improvement in the children's ability to name and identify colors after the experiment. This shows that color mixing experiments help children to strengthen their understanding of colors and the relationships between colors.

This research also shows that color mixing experiments are effective in developing early childhood science processes, especially in the aspects of observation, experimentation and communication. This is in line with a literature review which shows that experiments can help children develop their science process skills (Yeni Astuti, et al. 2023). Science experiments involving mixing colors can influence the cognitive development of early childhood (Fajriah. 2020). The results of Dio Claudia Saputri's (2022) literature study concluded that children's cognitive abilities in recognizing colors developed very rapidly using a simple experimental method of mixing colors. The results of other research show that the process of learning to mix colors using experimental methods and using watercolor media has increased the development of science in a good direction (Shanty, A. D. 2021). The findings of this study showed that children showed better observation skills after the experiment, such as noticing changes in the color of water when mixed with other colors. Children are also able to carry out experiments more independently, including pouring water, mixing colors, and observing the results. Additionally, children demonstrated better communication skills in describing experimental results and discussing their findings with peers. The use of natural materials that are interesting and fun can encourage critical thinking skills in children

Yeni Astuti et al, (2023) in their research showed that color mixing experiments were effective in developing scientific attitudes in early childhood, especially in the aspects of children's curiosity, critical thinking and creativity. This is in line with the literature review which shows that experiments can help children develop their scientific attitudes. The findings of this research show that the science

activities carried out in the form of stimuli given to children to foster curiosity and interest in the experiment of making sprouts, can solve simple problems that arise during the process of making sprouts, which will then lead to actions and thoughts to link one event that occurred. with ideas or initiatives that arise in making toge, it is easy to find a way to solve them, observing and thinking about the events and concepts that arise.

The findings of this research are in line with the research objectives, namely, to determine the development of early childhood science through experiments mixing colors with water as a medium at AL IRSYAD BANYUWANGI Kindergarten for the 5–6-year age group. This research shows that color mixing experiments are effective in developing early childhood science in all aspects studied, namely knowledge, scientific processes and scientific attitudes.

## IV. CONCLUSION AND RECOMMENDATION

This research shows that the experiment of mixing colors with water as a medium is a useful activity for developing science in early childhood, including aspects of knowledge, scientific processes and scientific attitudes. This activity can be done easily, is fun, and can be adapted to various ages and abilities of children. Educators and parents can use these activities to help children learn about colors, the science process, and develop scientific attitudes that are important for their cognitive and social development.

In conclusion, this research shows that the experiment of mixing colors with water as a medium is a useful activity for developing science in early childhood. This activity is easy to do, fun, and can be adapted to various ages and abilities of children. Educators and parents can use these activities to help children learn about colors, the science process, and develop scientific attitudes that are important for their cognitive and social development.

Based on the findings of this research, here are some suggestions for improving the science development of early childhood through experiments with mixing colors with water as a medium:

Increasing the variety of experimental activities, educators can increase the variety of experimental activities of mixing colors with water as a medium using various materials and tools, such as food coloring, dishwashing soap, and glitter. This can help children to learn about the different properties of these ingredients and how they mix with each other.

Integrating experiments with the curriculum, educators can integrate experiments mixing colors with water as a medium with the early childhood curriculum by connecting it with other themes that children are studying. For example, if children are learning about animals, educators can ask them to mix colors to create their favorite animal.

Involving parents in activities, educators can involve parents in experimental activities of mixing colors with water as a medium by providing them with information about the benefits of this activity and how they can do it at home with their children. This can help build strong relationships between home and school and support children's learning.

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