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COLOR MIXING PLAY TO DEVELOP SCIENCE SKILL FOR YOUNG LEARNERS AT PRATAMA WIDYALAYA KUMARA GIRI KUSUMA

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Abstract

Play is fundamental to early childhood development, offering children valuable opportunities to acquire knowledge and refine various skills. This study examines the effectiveness of color mixing play as a means to enhance science-related skills in young learners. Conducted as Classroom Action Research, it spans two cycles with 21 kindergarten students at Pratama Widyalaya Kumara Giri Kusuma in Jembrana Regency as participants. Data were collected through observation, field notes, and documents and were analyzed using descriptive statistical methods. Results indicate a substantial improvement in active learning engagement, rising from 60.93% in Cycle I (categorized as moderately active/developing) to 90.18% in Cycle II (very active/developing exceptionally well). Correspondingly, the average learning outcomes increased from 74.50 in Cycle I to 85 in Cycle II, with learning mastery rates progressing from 75.5% to 90.4%. These findings highlight that color mixing play effectively supports the development of science skills and serves as a practical, engaging educational strategy in early childhood science education. Beyond science, color mixing play supports growth in other areas, including language, cognitive, physical motor, social-emotional, moral, and artistic development. However, a primary challenge identified was limited playtime, which restricts the extent of skill development. Despite this, the findings suggest that color mixing activities can be a valuable addition to early childhood curricula, providing a fun and interactive way to promote scientific thinking and multi-faceted development in young children.

Keywords: Colour Mix, Science Skill, Young Learners

INTRODUCTION

Early childhood education is a crucial foundation for developing a high-quality generation, essential for facing 21st-century challenges. This period, often referred to as a “golden age,” is an optimal time for physical, cognitive, and character growth, as the stimuli received during this stage significantly impact future development(Aulinda, 2020; Masruroh, 2018; Safitri, 2020). Early education aims to foster holistic development across

social, motor, emotional, spiritual, intellectual, artistic, and language skills. Among these, cognitive development is especially vital as it enhances thinking processes, which are essential for acquiring knowledge (Jopowicz et al., 2022).

In line with the National Education System Act No. 20 of 2003, early education focuses on providing educational stimulation that supports children's physical and spiritual development. This stage readies children for formal schooling (Farhurohman, 2017). The National Association for the Education of Young Children (NAEYC) also classifies children from birth to age eight as early childhood (Brown et al., 2017), further underscoring the need for comprehensive, age-appropriate educational approaches.

A core component of early education is play, which, for children, combines joy with meaningful learning (Fyffe et al., 2024). Properly structured play supports various developmental aspects, with educational play fostering creativity, critical thinking, and problem-solving. Specifically, science-oriented play can develop scientific thinking in young children by encouraging observation, classification, conclusion-making, and application of knowledge (Andrée & Lager-Nyqvist, 2013). For example, Gardner's theory of multiple intelligences highlights that children's intelligence is best understood not only through written assessments but also through their capacity to solve real-world problems (Morris, 2023).

The Pratama Widyalaya Kumara Giri Kusuma in Jembrana Regency is an early childhood institution where Hindu teachings are integrated into daily learning to instill character from a young age. Here, color mixing activities offer children a way to explore creativity in an enjoyable manner while developing scientific skills. Preliminary observations at this institution reveal that many children lack optimal creative thinking, especially in forming new color combinations, due in part to traditional teaching methods that emphasize passive learning rather than active exploration.

Despite its potential benefits, constructive play and color mixing activities are underutilized at Pratama Widyalaya Kumara Giri Kusuma. Traditional teaching methods limit children's ability to engage in creative and experimental learning. This study addresses this gap by focusing on how color mixing play can enhance early scientific skills, foster creativity, and support holistic development in young children. Through this focus, the study aims to develop strategies for implementing science-based play effectively in early childhood education.

METHOD

This study is a classroom action research aimed at reflecting learning outcomes as a measurement of improvement before and after treatment. A total of 21 students participated as subjects in this study, which took place from January to March 2024 and was designed in cycles, each consisting of two sessions. If the gathered data are not successfully meeting the minimum fulfilment criteria, then the cycle will continue to the next one. Data collected to assess children's understanding of color identification and mixing were obtained through direct observation, field notes, and document analysis. Observations were conducted to monitor student activity during the learning process. Field notes were used to record observed, heard, and felt events during the actions, including methods of color mixing and planning for subsequent steps. Document analysis

provided data on the list of student subjects and supported the study with relevant school data and profiles, including books and previous studies related to this research.

The research instruments prepared by the researchers included: (1) identifying different colors, (2) recognizing various color materials, (3) understanding proportions in color mixing, and (4) naming the new colors created by mixing primary colors. All components align with the learning objectives in the basic competencies, specifically for children to identify the results of color mixing. The scoring categories used in this study are: 1- 50 (Poor), 51-75 (moderate), 76-85 (good), 86- 100 (very good). The cycles in this research can be illustrated as follows:

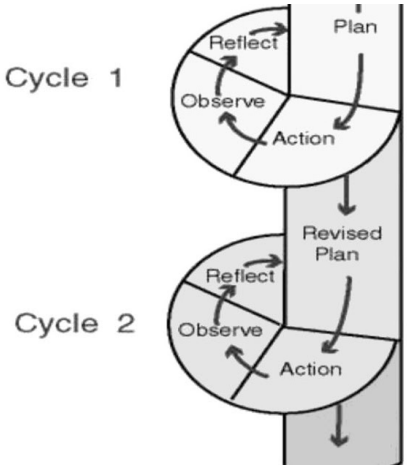

Figure 1. Classroom Action Research Cycle

This study focused on improving early science skill development in children through active, discovery-based learning, specifically by replacing lecture-based instruction with interactive color-mixing play activities. Data on children's engagement levels and the challenges encountered during these activities were analyzed using qualitative interpretive methods. This analysis allowed researchers to observe participation patterns and identify obstacles in implementing hands-on learning strategies. Quantitative descriptive analysis was used to assess learning achievements across cycles, comparing average scores and engagement percentages from the pre-cycle stage, Cycle I, and Cycle II.

In the initial pre-cycle phase, instruction primarily followed a teacher-centered, lecture-based approach. This method, while informative, limited the opportunities for children to actively participate, explore, and independently experiment with materials. Observations indicated that many children struggled with maintaining attention and did not fully engage with the scientific concepts intended. Recognizing these limitations, Cycle I introduced a discovery-learning framework, allowing children to interact with colors and explore combinations autonomously. This shift provided children with the freedom to experiment, engage, and observe results firsthand, which helped boost their interest and participation.

Cycle II further refined this discovery-based approach by incorporating structured guidance to enhance children's independent exploration. Teachers acted as facilitators,

encouraging children to hypothesize, observe, and draw conclusions from their color-mixing experiments. This phase showed a marked improvement in active learning, with children demonstrating increased engagement, curiosity, and problem-solving skills. Learning achievements also rose, with a higher average score and percentage of participation success compared to Cycle I.

The intervals used to categorize learning outcomes and participation levels are detailed in the table below, helping to track the progress of each cycle effectively. Overall, the shift to discovery learning significantly enhanced children's engagement and development, making it a promising approach for early science education. The criteria of success of the research is presented in the following table:

Table 1. Criteria of Success

Percentage	Achievement
85 % - 100%	Very good
75% - 84%	Good
59% -74%	Moderate
0% - 50%	Poor

A child is considered successful if observed behaviours align with the following criteria: (1) active participation and discipline during learning activities, and (2) collaboration with peers and the ability to share peers' experiences during learning sessions. Learning outcomes are deemed successful if 85% of children demonstrate an improvement in science development aspects through color-mixing play, achieving a "Very Good" rating in these areas.

RESULTS AND DISCUSSION

Pre-Cycle Description

The pre-cycle phase serves as the initial condition evaluated before further treatments to identify changes that should be applied throughout the study. During the pre-cycle, observational activities were conducted, revealing that children's learning activities at Pratama Widyalaya Kumara Giri Kusuma tended to be passive. This was evident from the summary of engagement levels across 21 children, with an average score of 7.76, reflecting an engagement percentage of 47.61%. These data indicate that the children's development did not yet meet the criteria for active learning, as defined in the categories discussed previously. Based on this pre-cycle data, which suggests that the children's learning activities were still lacking, adjustments to the learning process were necessary, specifically through color-mixing play activities. This approach aimed to enhance engagement, encouraging children to become either "active" (developing as expected) or "very active" (developing exceptionally well). Observations from this pre-cycle phase served as a reference for implementing treatments in Cycle I, with a set number of sessions.

Cycle I &II Description

In Cycle I & II, children's engagement in color-mixing play activities showed a gradual improvement. Observational results from the two sessions conducted in this cycle can be further detailed in the table below.

Table 2. Cycle I & II Students Activeness

Components	Meeting I	Meeting II
Percentage	60,38%	61,48%
Average	60,93%	
Category	Moderate	

Components	Meeting I	Meeting II
Percentage	88,88%	91,48%
Average	90,18%	
Category	Very Good	

Meanwhile, the results on students' achievement in cycle I and II are provided as follow:

Table 3. Students Learning Achievement from Cycle I and II

Students Number	21
Average Score	74,5
Fulfillment Criteria	75,5%
Category	Good

Students Number	21
Average Score	85
Fulfillment Percentage	90,47%
Category	Very Good

Reflecting on the observation data from Cycle I and field notes, it was clear that several children still struggled with identifying specific color names, categorizing them, and mixing colors to create new shades. Some challenges included children's difficulty in performing color mixing and explaining their results in simple terms. Based on these findings, discussions with teachers were conducted to refine the approach in order to enhance both engagement and learning outcomes. Several improvements were planned for Cycle II, including preparing more visually appealing materials to spark interest in color-mixing activities, providing motivational support, offering clearer, more concrete explanations using child-friendly language, and conducting careful observations of each child to ensure a smooth learning process and comprehension of the material.

Observation data from Cycle II showed a marked improvement compared to the previous cycle. Both student engagement and learning outcomes significantly increased, meeting the criteria for success with a learning outcome completion rate of 90.47% and an average score of 85, categorized as "Developing Very Well." This success was attributed to effective reflection and adjustments, particularly in preparing engaging materials and motivating children through color-mixing play. This strategy helped capture and retain children's attention, thereby enhancing their learning experience.

CONCLUSION

In conclusion, this study demonstrates that color-mixing play significantly enhances early childhood scientific development by fostering cognitive, social, motor, and emotional skills. The progression observed between Cycle I and Cycle II indicates that children's learning engagement and understanding of color mixing improved substantially with the incorporation of engaging materials and motivational techniques. This aligns with educational theories that advocate for hands-on, exploratory learning experiences to promote critical and creative thinking in young children.

The findings underscore that color-mixing activities are not only effective in enhancing scientific skills but also in nurturing fine motor abilities, cooperation, and social interaction among peers. By facilitating an active, discovery-oriented learning environment, educators can provide young children with the foundation for lifelong learning skills. However, the study also highlights the need for well-organized, supportive learning spaces and consistent guidance from teachers to optimize these outcomes. Ultimately, this research reinforces the idea that play-based activities, especially those rooted in experimentation, are crucial for developing young children's comprehensive abilities, helping them to explore, experiment, and build confidence in a way that supports their readiness for future educational stages.

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