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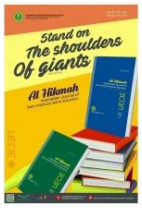

Stimulation of Cognitive Abilities of 5-6 Year Old Children through Ecoprint Activities

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ABSTRACT

This study aims to explore the stimulation of cognitive abilities of children aged 5-6 years through ecoprint activities at Himawari Ngaliyan Semarang Kindergarten. The background of the study shows that children's cognitive development at an early age is crucial for long-term learning success. Ecoprint activities, which involve multisensory experiences with natural materials, are given optimal facts to stimulate children's cognitive abilities, especially the introduction of models, problem solving and classification. This research uses a qualitative method through a case study approach, which links documentation, questions and answers and observations. This lesson displays ecoprint activities are able to stimulate early childhood cognition. This activity provides a fun and meaningful learning experience, and encourages children to be more familiar with the surrounding environment. Thus, the integration of ecoprint activities in the early childhood education curriculum is highly recommended.

INTRODUCTION

Education is defined as a conscious effort that has been formed in realizing various scopes and learning processes so that students can increase their potential and talents in having various strengths including spiritual, religious, personality, self-control, intelligence, noble character, and skills needed for themselves and society. "Education that includes a variety of teaching or learning about certain skills, as well as something that cannot be observed but can be practiced," he said. more deeply, namely by providing wisdom, comparison and insight" (Ainur et al, 2023). Early childhood education is considered as a fostering effort intended for children from birth to 6 years old which is carried out from providing stimulation in supporting spiritual and physical growth and development so that children are ready to continue the next level of education (Rohmat,

2017). In this regard (Bastian & Novitasati, 2022) outlines a form of education that focuses on the basis of child development including aspects of intelligence (creativity, thinking, spiritual and emotional), physical (gross and fine motor), communication and language, socio-emotional (religion, actions and attitudes), in line with the process and stages of child development.

Cognitive is considered a skill related to the insights that a person gets as well as a person's thinking technique on a phenomenon, action and what he sees. Whether or not someone is fast enough to solve a problem will be related to their cognitive development (Veronica, 2018). Cognitive skills can be interpreted to be a skill to observe a thing, this is interpreted as displaying skills in capturing the meaning, information and nature of a thing, as well as having a clear illustration of it. This cognitive development leads to children's skills in observing a thing. The author will initially carry out pre-research preparation by collecting student data from direct observation through the results and learning process. Cognitive skills are observed from 3 aspects in line with Permendikbud No. 137 of 2014, namely problem solving, learning, symbolic and logical thinking (Valentina et al., 2023). Based on this understanding, cognitive development can be understood as a series of changes in human thought processes, including the ability to understand the world, process information, and solve problems.

This research is important to do because *ecoprint* activities can foster children's interests and talents in realizing personal creativity. This statement is certainly supported by several sources, Wulandari (2023), early childhood cognitive development is strongly influenced by stimulus and direct experience with the environment. Ecoprint offers a rich sensory experience where children can see, feel, smell, and experiment with various natural materials: "activities that engage with nature such as ecoprinting provide a much richer multisensory stimulus than conventional indoor learning." (Pratiwi, 2022). Project-based learning such as ecoprint encourages children to develop higher-order thinking skills, including analysis, evaluation, and creativity where children learn to predict outcomes, observe processes, and evaluate success which are important components of cognitive development (Hidayat, 2021). According to (Rahmawati & Supriyanto, 2023) they explained that ecoprint activities can be a bridge to introduce science and math concepts concretely then children can learn about color, shape, pattern, texture, as well as the process of chemical changes when plant pigments are transferred to the medium.

A play technique designed to encourage early childhood cognitive development is ecoprint activities practiced during play activities in kindergarten. Ecoprint comes from the words print and eco (nature). This method intends to produce a work by utilizing materials that exist in nature to be used as motifs or coloring materials. Generally, the materials used include leaves, bark, fruit, roots, as well as flowers from various plants (Aini et al., 2022). According to Herlina, et al. Ecoprint is a way of coloring to beautify fabrics using natural materials available in the surrounding environment, which then produces beautiful motifs. Some plants that can be used such as trees that are easy to grow in various places can produce leaves, flowers, twigs, and bark which often become

waste and accumulate, thus polluting the environment. With the ecoprint technique, natural materials such as flowers, leaves, bark and twigs around the house can be used as a substitute for chemical dyes to obtain natural colors (Susilawati et al., 2022).

Early childhood cognitive development is a fundamental aspect that influences successful lifelong learning. At the age of 0-6 years, a child's brain will develop rapidly reaching 80% of the adult brain, so this period is often referred to as the golden age in cognitive development (Santrock, 2018). Cognitive aspects include the ability to process information, solve problems, develop reasoning, and build an understanding of basic concepts that become important provisions for children in facing future learning challenges (Piaget & Inhelder, 2019). Innovative and contextualized learning methods such as ecoprinting offer an interesting approach to stimulate children's cognitive development. Learning that involves direct experience and active exploration can significantly improve children's cognitive abilities compared to conventional learning methods. Ecoprint as a form of experiential learning supports children to contribute to a process of discovery, observation and experimentation that stimulates higher-order cognitive functions (Susanto, 2017).

According to Devi, et al Cognitive is considered a thinking technique or a person's skill to associate, compare or assess a phenomenon. Then cognitive skills are considered as skills that use the brain or reasoning. If the child gets the appropriate guidance and stimulation, so that the child can achieve maximum cognitive development (Fitasari et al., 2023). So that learning activities that focus on children and share broad opportunities in imagination within the scope of learning that is scientific and fun as stated in learning activities based on science process skills support children to carry out cognitive development (Fitasari et al., 2023).

Directed cognitive process (Putri & Anmbia., 2023). The introduction of ecoprint techniques for adolescents and children brings up some experiences when humans in real life can coexist with nature (Merdekasari, 2022). Then this activity can share learning experiences and learning meanings for students, so from the implementation of this activity students will find their own understanding and awareness (Sari et al., 2023). Furthermore, from the assumption of Hilmawati, et al. collaborating with village children in environmentally friendly art for example to help them improve their ability to collaborate, think critically, while looking at the protection and ecological value of an environment.

Research related to the stimulation of cognitive abilities of children aged 5-6 years from ecoprint activities has been carried out a lot, such as according to (Widyaningrum & Hasibuan, 2020) the hammer pounding technique in ecoprint with the subject of 28 kindergarten children. The results showed a significant increase in classification and pattern recognition skills. Children who participated in ecoprint activities showed a 27% increase in the ability to identify the shape and texture of plant materials. According to (Hasnawati & Anggraini, 2021) experimental research with the pretest-posttest method

involved 42 children who acted as elementary school students. Children perform the steaming process in ecoprint and their cognitive abilities are measured. The results showed an increase in problem solving skills, especially in the aspect of identifying variables that affect the results (steaming time, temperature, and type of material). According to (Purnomo & Winarni, 2022) a descriptive qualitative research with 35 children who are high school students analyzed how the bundling technique (binding the material on the fabric) in ecoprint affects systematic thinking skills. The results showed that the planning, drafting, and evaluation stages in bundling improved sequential and organizational thinking skills.

This research is different from previous studies because it specifically targets children aged 5-6 years and uses an ecoprint activity approach as a comprehensive stimulation of cognitive abilities at an early developmental stage. In contrast to (Widyaningrum & Hasibuan, 2020) who emphasized the hammer pounding technique for classification and patterning, (Hasnawati & Anggraini, 2021) who focused on problem solving through steaming at the elementary level, and (Purnomo & Winarni, 2022) who examined systematic thinking skills in secondary school students through bundling techniques, this study integrates aspects of ecoprint holistically and in accordance with the characteristics of early childhood development to observe its impact on cognitive skills in general. So the author wants to carry out a study entitled stimulation of cognitive abilities of children aged 5-6 years through ecoprint activities. Himawari Ngaliyan Semarang Kindergarten was chosen as the research location because this institution has a commitment to the cognitive skills of 5-6 year old children through ecoprint activities. Nature-based education and has integrated various environmental exploration activities in its curriculum. In addition, the availability of a garden with a variety of plants in the Himawari Kindergarten environment facilitates the implementation of ecoprinting activities as part of the learning process.

METHODS

This research uses a qualitative method through a case study approach, which intends to observe in depth the stimulation of cognitive skills of children aged 5-6 years from ecoprint activities. This activity was carried out at Himawari Ngaliyan Semarang Kindergarten in October 2024 by children who are members of Group B students with a total of 19 students with 7 girls and 12 boys. "In qualitative studies, the researcher becomes the key instrument, to collect the data will be carried out by triangulation (combined), the data analysis with qualitative / inductive nature and the results of the study emphasize a meaning rather than generalization" (Sugiyono, 2019). In the context of a case study approach, Moleong defines it as a study that is carried out in depth, detail and intensively on a symptom, agency or organization. This study focuses on a particular "case" that has interesting, unique characteristics and requires in-depth study (Moleong, 2018).

The data collected in this study are related to, observation of ecoprint activities carried out direct observation by children at Himawari Ngaliyan Semarang Kindergarten, semi-structured interviews with teachers who carry out ecoprint activities. Video and photo documentation of ecoprint activities to analyze the activities and movements carried out. Field notes such as monitoring carried out during the study. Instrument indicators carried out are, the introduction of ecoprint to children carried out by teachers, the process of making ecoprints and the obstacles that occur when the activity takes place. There is an interview guideline used to explore the teacher's assumptions about his experience during the implementation of ecoprint activities. Data analysis techniques are carried out in stages, namely, reviewing all existing information from various sources, observation results, interviews, official / personal files, photos and others. Data reduction is done by way of abstraction; an effort to summarize the core, process, and statements that need to be maintained so that they remain in it. Checking the validity of the data, using techniques of extension of participation, persistence of observation, triangulation, peer checking, referential adequacy, and member checking. Data interpretation is useful for answering the problem formula carried out with analytical descriptions.

RESULT

There are several methods used to produce ecoprint motifs, such as boiling, steaming and pounding techniques. This study will apply the pounding technique which is safe and easy to work with for young children. The mechanism works like the leaves that have been collected and then beaten on a white cloth sheet, then the leaves will release natural colors (Sholikhah et al., 2021).

In the first stage, the teacher provides direction and explanation of what ecoprint is and how to make it through the video shows that have been provided. Children are given an overview of what tools and materials are used to make ecoprints such as leaves, flowers, fabrics, paper, wooden hammers, plastic, totebags, and other tools. This explanation is very important to provide a basic understanding of the activities they will do and why natural materials were chosen. The children were asked to mention what activities were carried out, what materials and tools should be used, then they were asked to bring plants or flowers at home.

Figure 1. Watching a Video About Ecoprinting

In the second stage, the teacher provides ecoprinting tools and materials such as totebags, drawstring bags, and square-shaped plain white cloth, wooden hammers,

blocks, scissors, plastic then explains how the texture of the three materials that have been provided.

Figure 2. Tools and Materials

In the third stage, the activity begins with an invitation to explore the environment around the school to find additional materials to make ecoprints, after collecting materials from the surrounding environment, children are directed to return to school.

Figure 3. Looking For Flowers and Leaves in The School Environment

In the fourth stage, children are allowed to make ecoprints according to the instructions that have been given with the teacher supervising each process, then children can make it according to their wishes and imagination.

Figure 4. Manufacturing Process

In the fifth stage, the children dipped the ecoprint media into alum water for 1 minute and then dried under the sun until dry.

Figure 5. Dipping Into Alum Water

The sixth stage as the end, children can see the results of the ecoprint that they have made then the teacher documents it and students are asked to tell what shapes and patterns they made then students can take it home.

Figure 6. Drying the Media

Ecoprint activities stimulate various cognitive aspects of students, including pattern recognition and classification, prediction and hypothesis generation, simple science processes, problem-solving skills, introduction to basic math concepts, and development of planning skills. Through identifying leaf shapes and textures, children learn to classify based on certain characteristics, while experimenting with prints teaches them about cause-and-effect relationships, simple chemical changes, and coping strategies when results are not as expected. The activity also introduces the concepts of symmetry, patterns and spatial skills while training children to plan layouts and predict outcomes.

In the early stages of the ecoprint activity, children are invited to observe and select various types of leaves based on their shape, size and texture. This activity stimulates the cognitive aspects of pattern recognition and classification, as children are asked to classify leaves based on certain characteristics such as round, pointed, jagged, or rough and smooth surfaces. This process encourages children to compare, recognize similarities and differences, and develop simple categories, which are the basis of logical and analytical thinking skills.

At the stage of planning and arranging the leaves on the cloth before the printing process, children are invited to predict the final result of the pattern they have arranged. This is where predictive and hypothesizing skills are stimulated, as children make conjectures about the color, shape, or clarity of the print that will emerge after the beating or steaming process. For example, they may hypothesize that thicker leaves will

result in stronger colors, or that placing the leaves symmetrically will result in a neater pattern. This process helps children understand cause-and-effect relationships and develop simple scientific thinking skills.

Figure 7. The result of Ecoprinting

The implementation of ecoprints for cognitive stimulation can be done through a series of structured practical steps. Starting with the exploration of various types of leaves to observe the differences in their characteristics, followed by a predictive discussion where students are asked to estimate the printout of each leaf. Then, children are helped to carry out the ecoprint process with safe materials, such as the pounding technique, followed by reflection and analysis of the results comparing the prints with the initial predictions and conducting questions and answers such as what things are needed when making so that children can determine which materials and tools they want to use, what shapes and patterns they will apply in making ecoprints so that children can find out that there are many shapes and patterns such as leaf shapes, flower shapes, circle patterns, triangle patterns, square patterns, etc. As well as an evaluation of the activity process from the beginning. And there is an evaluation of the activity process from beginning to end to find out how far ecoprint activities stimulate early childhood cognition.

DISCUSSION

Ecoprinting activities at Himawari Ngaliyan Semarang Kindergarten are implemented to support children's development through educational play experiences. This activity is carried out in the classroom, where students are invited to create patterns and colors. Through ecoprint activities, children can explore, imagine, and develop creativity. In addition, this activity provides an opportunity for students to express their ideas in a unique way. Ecoprint also keeps children enthusiastic, as they are busy adjusting patterns and colors as desired, while continuing to use imagination to produce new and interesting works (Putri & Mustakimah., 2025). The introduction of ecoprint techniques to children presents a new experience that humans in real life can coexist with nature without hurting each other. This is in line with the concept of sustainable education which is important to instill from an early age (Merdekasari, 2022). In research (Anggraeni & Setiawan, 2022) revealed that "ecoprinting activities not only improve children's cognitive aspects, but also fine motor aspects, creativity, and environmental awareness. The integration of these various aspects of development makes ecoprinting a holistic and meaningful learning activity for early childhood". In line with the interview delivered by Mrs. Irta conducted at Himawari Kindergarten as follows. "Himawari Kindergarten itself has never done this ecoprint practice, but then when it will be

implemented I strongly agree because this activity is very interesting to do so that we can find out other things that children might be interested in such as art, explore the surrounding environment and get to know colors and shapes in a real way through research that is focused on developing early childhood cognition". (Excerpt from Mrs. Irta's interview).

According to fransiska, et al in (Octariza, 2021) the pounding technique is a method of printing leaf or flower motifs on fabric by hitting them with a hammer. Leaves that have been placed on the fabric and covered with plastic are hit to extract the color pigments. The pounding process starts from the edge of the leaf, following the flow of the stem and leaves.

This technique is considered safe for students to do with teacher guidance. Through the pounding technique, students can be creative in choosing leaves or flowers to decorate the fabric. The first process in the pounding technique is to hit the leaves on the fabric using a wooden hammer. The second process is drying, which is done by drying the fabric directly in the sun (Faridatun, 2022).

Ecoprinting activities require teacher supervision of early childhood, which is done with an "active and responsive observation" approach. Teachers not only supervise from afar, but are involved in the activity while still paying attention to the safety and development of children (Suyadi, 2017). The concept of structured but flexible supervision in activities with early childhood teachers needs to prepare an organized supervision system but can adjust to classroom dynamics by using 3 supervision strategies, namely, Creating a clear supervision zone in the classroom or play area, Implementing a supervision rotation system if there are several teachers, Using non-verbal communication techniques to direct children without direct interruption (Mulyasa, 2019) which was also conveyed by Mrs. Irta during the interview as follows. "Every time there is an activity that must involve children outside the school environment, we as teachers must ensure safety, comfort, and the need for supervision of children such as having to look right and left before crossing, holding hands with friends, praying before leaving school. Previously, the teacher must also tell in advance how the procedure is so that when the activity takes place everything is safe". (Excerpt from Mrs. Irta's interview)

When activities take place, there must be a few obstacles such as limited tools and materials which are often a challenge of various activities, especially in the education and research environment. Therefore, teachers must have alternative solutions such as utilizing recycled materials or digital technology, in this way teachers can still provide meaningful experiences even with limited resources. According to (Munawaroh & Kristanto, 2022) "The lack of availability of diverse tools and materials can reduce children's opportunities for maximum exploration with various textures, colors, and shapes that are important for their sensory and cognitive development". "The limited operational budget of PAUD institutions, especially in rural and suburban areas, causes the priority of procurement of learning tools and materials to be low" (Damayanti &

Nurjanah, 2023). According to (Wulandari & Hasanah, 2021) "The limitations of learning tools and materials are a reality faced by many PAUD institutions in Indonesia, but this can be an opportunity to develop teacher creativity in utilizing the resources available in the surrounding environment". As stated during an interview with the following class teacher, "When play activities take place, there must be obstacles, one of which is limited tools and materials, but that is not a reason to cancel play activities, we as teachers must have ideas or other ways, for example using natural materials that can be taken in the surrounding environment". (Excerpt from Mrs. Irta's interview)

Based on the results of the interviews above, it can be seen that making ecoprints is an interesting way for teachers and students to develop early childhood cognition by exploring the natural environment, knowing the shapes, colors, and patterns continuously which are then applied to making ecoprints. They can also work together with friends, make patterns and shapes according to their imagination, and do new things that are not yet known. The ecoprint activity itself has many benefits for children because it can provide opportunities for children to be able to choose and design their own by utilizing various original shapes and colors of various types of flowers and leaves, this has the potential to stimulate children's imagination and creativity. Ecoprint batik activities can make children feel confident to give birth to ideas and other creative ideas (Arika & Siti., 2023).

CONCLUSION

Ecoprint activities at Himawari Ngaliyan Semarang Kindergarten were found to be effective in stimulating the cognitive skills of children aged 5-6 years. From this experiential learning method, children can develop critical thinking, creativity, and problem-solving skills. This activity provides a rich multisensory stimulus, allowing children to interact with nature and understand basic science and math concepts concretely. The results show that children can be directly involved in pattern recognition, classification, and logical thinking skills. The ecoprint activity became a fun and educational tool, encouraging children to explore and imagine. In addition, the challenge of limited tools and materials can be overcome with teacher creativity in utilizing existing resources. Thus, the integration of ecoprinting in the early childhood education curriculum is highly recommended to support holistic and sustainable cognitive development.

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