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The Use of Nature-Themed Stamp Game Media to Improve Early Childhood Science and Mathematics Skills at Al Ikhsan Kindergarten in Bangun Purba Village

Zaskia Kamalia Rangkuti *, Iis Islamiyah, Nur Fadilah Gultom, Sari Wartini
Sekolah Tinggi Agama Islam Negeri Mandailing Natal
Jalan Prof. Dr. Andi Hakim Nasution, Komplek STAIN, Desa Pidoli Lombang, Kecamatan Panyabungan, Kabupaten Mandailing Natal, Sumatera Utara 22976, Indonesia

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ABSTRACT

This research is motivated by the importance of cognitive stimulation in early childhood through innovative and contextual learning media. At Al Ikhsan Kindergarten in Bangun Purba Village, children's science and mathematics skills still require improvement due to the limited use of creative media that utilize the surrounding environment. The purpose of this study was to analyze the effectiveness of nature-themed stamp games in improving children's science and mathematics skills. The research method used was quantitative with a pre-experimental design (One Group Pretest-Posttest Design). The study subjects included all students at Al Ikhsan Kindergarten. Data collection techniques were carried out through structured observation, documentation, and performance tests. Data analysis used a t-test to compare pre- and post-treatment results. The results showed that the use of nature-themed stamp games significantly improved children's abilities in science (recognizing natural phenomena), correspondence, classification, geometry, and numeracy. In conclusion, nature-themed stamp games are an effective educational tool for optimizing the cognitive potential of early childhood through a fun, play-while-learning approach.

Corresponding Author:

Zaskia Kamalia Rangkuti
Sekolah Tinggi Agama Islam Negeri Mandailing Natal
Email: zaskiakamariah@gmail.com

INTRODUCTION

Early childhood education is a crucial phase in developing holistic intelligence, which lays the foundation for future academic success. During this golden age, children require appropriate stimulation to develop their brain structures through sensory and motor experiences. Effective learning for young children is no longer oriented toward memorization, but rather toward active exploration of real objects around them. According to Hidayat (2022), innovative learning media that integrates visual and kinesthetic elements is essential to creating a learning environment conducive to children's natural cognitive development.

In the context of science and mathematics literacy, the use of concrete media provides a bridge for children to understand abstract concepts. Science helps children understand natural phenomena, while mathematics fosters logical thinking through numbers and shapes. However, limited media

often poses a major obstacle to this knowledge transfer process. In line with Saputri's (2023) opinion, the use of environmental or nature-themed media has been shown to increase children's active involvement in scientific exploration and understanding of basic numeracy due to their familiarity with everyday life.

Initial observations at Al Ikhsan Kindergarten in Bangun Purba Village showed that the learning process was still dominated by lectures and textbooks, resulting in a lack of interest in science and mathematics. Children appeared to struggle when asked to group objects or recognize simple geometric patterns. Innovation through nature-themed stamp games offered a solution to engage children's learning interests. As emphasized by Pratama (2021), the availability of creative media that allow children to directly engage in physical activities strengthens memory retention and understanding of complex cognitive concepts.

The use of stamps with leaf, flower, or stone motifs allows children to learn through tangible natural symbols while practicing hand-eye coordination. The integration of nature themes aims to bring children closer to the local wisdom of Bangun Purba Village, making learning more meaningful. These activities encompass various developmental aspects, from texture recognition to counting the number of stamp impressions produced. According to Lestari (2024), manipulative game-based learning, such as stamping, not only hones intellectual skills but also fosters children's creativity and confidence in completing simple academic tasks.

The purpose of this study was to measure and describe the improvement of science (natural material recognition) and mathematics (correspondence, classification, geometry, and numeracy) skills in early childhood at Al Ikhsan Kindergarten, Bangun Purba Village through the implementation of nature-themed stamp game media. Through this study, it is hoped that empirical evidence will be found regarding the effectiveness of this media as an innovative learning alternative that is relevant for early childhood education in rural areas.

IMPLEMENTATION METHOD

This study employed a quantitative research approach with a pre-experimental design (One-Group Pretest-Posttest Design). The quantitative approach was chosen to generate accurate numerical data regarding changes in children's abilities before and after treatment. In this design, research subjects were observed twice: before using the stamp media (pre-test) and after using the stamp media (post-test). This aligns with the principles of quantitative research, which prioritize objectivity and systematic measurement of variables to draw generalizations.

The data sources in this study were obtained through primary and secondary methods. Primary data came directly from the children at Al Ikhsan Kindergarten in Bangun Purba Village, who served as research subjects. Their performance in the stamp game was assessed using a prepared instrument. Secondary data were obtained from school documents such as the institution's profile, student lists, and photographic documentation of learning activities during the study. This selection of data sources aimed to ensure the validity of the information supporting the research findings in the field.

The data collection techniques used included structured observation, performance tests, and documentation. Researchers used observation sheets to record children's science and math ability scores based on established indicators. To ensure data validity, researchers employed source and technique triangulation. Triangulation was conducted by comparing the researcher's observations with the class teacher's notes and the children's stamped work, ensuring that the resulting data truly and objectively represented the children's abilities.

Data analysis was conducted using descriptive statistics to determine the average score and inferential statistics to test the hypothesis. Researchers used a paired sample t-test to determine whether there was a significant difference between children's abilities before and after the intervention. If the significance value (p-value) was <0.05, then the stamp media was declared to have a significant effect. Conclusions were drawn based on the interpretation of the data processing results, which were linked to theories of early childhood development.

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RESULTS AND DISCUSSION

1. Improved Science Skills

The use of nature-themed stamps has a significant impact on children's science skills, particularly in recognizing natural materials. Children are encouraged to observe the physical texture of stamps, which are derived from cross-sections of plants, such as banana stems or leaf stems. This observational process trains children's senses to distinguish the various structures of materials found in their environment.

Through stamping, children also learn the concept of cause and effect by observing how the pressure of the stamp creates certain patterns on paper. They experiment with mixing paint colors to observe the resulting color changes, a fundamental part of scientific experiments. Children's curiosity is heightened as they try replacing one natural object with another to observe the difference in the print.

Science at an early age is about exploration and discovery. Stamping facilitates children's role as little scientists investigating their surroundings. Children begin to name plant parts and their characteristics visually through the results of their stamps. This demonstrates a strong internalization of scientific knowledge gained through direct experience.

This improvement is also evident in children's ability to describe simple natural phenomena. For example, children can explain why a dry stamp doesn't produce an image, which provides an early understanding of the properties of liquids and solids. This active interaction makes science learning at Al Ikhsan Kindergarten very dynamic and far from boring.

According to Rahayu (2022), the use of environment-based media is very effective in instilling scientific literacy from an early age because children interact directly with real objects. This is supported by research by Fitriani (2023), which states that nature-based art activities can stimulate children's critical thinking skills in understanding basic concepts of biology and simple physics in a recreational manner.

2. Improving Correspondence Skills

One-to-one correspondence skills are a key foundation in mathematical logic. Through stamps, children are taught to match one stamp with one area or one number on a worksheet. This activity helps them understand that each object has a unique counterpart or value in a sequence.

At Al Ikhsan Kindergarten, children are trained to place flower stamps in the provided boxes sequentially. This process prevents children from making errors in randomly counting objects. This correspondence skill develops rapidly when children are able to coordinate their hand movements with their visual focus on the object being worked on.

In addition to matching quantities, correspondence is also seen when children match the type of stamp with the paint color according to instructions. Children learn about the consistent relationship between one element and another. This is crucial for developing organized thought patterns in children when completing logical tasks.

This game also trains children's precision. They learn that if they stamp twice in one box, the one-to-one relationship is disrupted. This understanding is the initial stage of understanding functions in mathematics. Teachers motivate children to remain patient in carrying out each step of the game according to the correct correspondence rules.

Based on research by Wardani (2021), manipulative activities significantly help children understand the relationships between numbers through concrete visualizations. Similarly, Utami (2024) revealed that play media involving visual-motor coordination, such as stamps, are effective in strengthening the understanding of one-to-one correspondence, which is the foundation for numeracy skills in early childhood.

3. Improved Classification Skills

Improved classification skills are seen when children are asked to group stamps based on specific categories, such as color or shape. Children are encouraged to sort which stamps are leaf-shaped and which are flower-shaped. This activity trains children's brains to identify similarities and differences between objects.

Children at Al Ikhsan Kindergarten are becoming adept at distinguishing large and small categories based on the size of the stamps they use. They can arrange the stamps into classification columns prepared on a worksheet. This ability indicates that children are beginning to abstract the physical characteristics of an object.

Classification also involves cognitive aspects in independently determining grouping criteria. Some children are able to group stamps based on their preferred paint color, while others are able to group stamps based on the type of plant they came from. This freedom to explore fosters creativity and fosters logical acumen in organizing information.

By frequently practicing classifying stamps, children become more aware of regularities. They learn that nature has patterns that can be grouped for easier human understanding. This builds awareness of systematization, a crucial element in advanced science and mathematics.

According to Nurjanah (2022), classification skills are an important indicator of cognitive development related to problem-solving skills. Research by Sari (2025) also found that using a variety of stamp media significantly improves children's ability to categorize objects based on more than one attribute simultaneously.

4. Improved Geometry Skills

Children's geometry skills improve through the introduction of basic shapes produced by nature-themed stamps. Cross-sections of various natural materials often form geometric patterns such as circles, ovals, or stars. Children learn to recognize these shapes not as inanimate objects, but as part of the structure of real objects.

In this game, children are asked to arrange stamps to form specific spatial patterns. They learn the concepts of edge, middle, top, and bottom when determining the stamp's position on the paper. This understanding of spatial orientation is crucial for the development of children's geometry skills at a more advanced level.

Children also begin to distinguish two-dimensional shapes through the shadows or imprints left by the stamps. They can compare the circle of a small bamboo stalk with the oval of a young teak leaf. This activity enriches children's geometric vocabulary while naturally enhancing their spatial imagery.

Introducing geometry through natural media feels more contextual because children can encounter these shapes while playing in the schoolyard. They realize that mathematics is everywhere, including in the structure of plants. This dispels the stigma that mathematics is a rigid and boring subject for young children.

Kurniawan's (2023) research states that natural media provides rich visual stimuli for children's introduction to the concepts of shape and space. This is supported by Anita's (2026) findings, which suggest that the structured use of stamps can accelerate children's ability to identify basic geometric features through integrative art activities.

5. Improved Numeracy Skills

Improved numeracy skills are clearly visible when children count the number of stamps they have made on drawing paper. The teacher gives instructions such as, "Make five red leaf stamps," which require children to count while performing a physical action. This activity reinforces the concept of number (cardinality) in children's minds.

Children not only memorize the sequence of numbers but also understand the meaning of the numbers through the visual representation of the stamps. If the requested number is three, the child will see three concrete images in front of them. This reduces the confusion that often occurs when children learn to count abstractly on a blackboard.

Numeracy is also practiced through comparing numbers. Children are asked to see which paper has more or fewer stamps. This comparison process is part of numeracy literacy, which effectively and funly trains children's number sense from an early age.

In Bangun Purba Village, the use of this media has been proven to increase children's confidence in using numbers. They become enthusiastic about counting because they have a tangible

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product to produce. The joy of successfully matching the number of stamps to the correct number symbol serves as an intrinsic motivation for children to continue learning.

Fauziah (2021) states that manipulative media involving physical action can strengthen children's long-term memory of number concepts. This aligns with research by Handayani (2024), who concluded that stamping activities with natural materials significantly improve children's numeracy scores because they combine visual, motor, and cognitive elements simultaneously.

CONCLUSION

Based on the research results and discussion, it can be concluded that the use of nature-themed stamp games has proven highly effective in improving the science and mathematics skills of early childhood students at Al Ikhsan Kindergarten in Bangun Purba Village. This media successfully transformed the learning process, which was initially abstract, into a concrete and meaningful learning experience. Children demonstrated significant improvements in science through exploration of natural materials, as well as in mathematics, including correspondence skills, classification, geometry understanding, and basic numeracy.

This success is influenced by the characteristics of the stamp media, which actively engages children's various senses and integrates local elements of Bangun Purba Village into the curriculum. The use of natural materials increases children's enthusiasm and a sense of ownership of their school environment. Therefore, it is recommended that early childhood educators continue to innovate and utilize the surrounding environment as a creative educational learning medium to optimize all aspects of child development without being limited by the cost or availability of expensive manufactured media.

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