

Improving Children's Science Skills Through Play Activities in Outdoor Play

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Abstract

The natural environment provides a variety of stimuli to develop skills for direct observation and simple research for early childhood. They are invited to observe, identify patterns, collect data, and make conclusions based on evidence obtained through scientific procedures. These skills are essential in the scientific method and strengthen a child's scientific abilities. This study aimed to determine the skills of children's science processes when playing outdoors. This experimental research with a type of quasi-experimental design, using samples of students in group B of Taman Paud Doa Ibu Kindergarten, totaling 20 students. The results showed that outdoor play activities improved students' scientific abilities with indicators of children's ability to observe, compare, and classify. The results of this study also show that children's enthusiasm for learning and give birth to children's feelings of curiosity are very high.

Keywords: Science ability, playing outdoors, early childhood

INTRODUCTION

Science education in early childhood plays a crucial role in shaping their understanding of the surrounding world. However, in reality, there exists a significant gap between what should happen in the development of early childhood science abilities and what has been observed in the field. Within the education curriculum, science often receives insufficient attention as a subject in early childhood education. Many educational institutions for young children lack adequate resources, including laboratory equipment and teachers with sufficient knowledge and skills to teach science effectively. Furthermore, the learning patterns that still revolve around traditional academic approaches often fail to facilitate active science skill development in children. They are frequently provided with theoretical explanations of scientific concepts without engaging in experiments or practical activities that support a comprehensive understanding of the concepts.

In addition to inadequate curricula, the environment surrounding young children also plays a significant role in their science abilities development. However, limited access to natural environments and a lack of opportunities to interact with nature can hinder the development of their understanding and appreciation of scientific phenomena. As a consequence of this gap, young children often face difficulties in comprehending complex scientific concepts, lack interest in science, and struggle to connect scientific learning with

their everyday lives. Therefore, greater efforts are needed to address this gap and strengthen the development of early childhood science abilities. It is essential to implement changes in a more inclusive and interactive approach to learning, enhance supportive educational resources, and provide broader opportunities for children to interact with the natural environment and engage in enjoyable and meaningful science activities.

Education should provide a learning environment that jumps all aspects of a child's development. Early age is the foundation for the growth and maturity of children (Bambang Sujiono, 2005). Positive things experienced in childhood will have an influence on children's memory and behavior. In accordance with the characteristics of those who have uniqueness, curiosity, high imagination, and actively move. Play activities are intentionally designed and involve children actively exploring, discovering, imagining, and interacting with objects, people, and their natural world (Leggett & Newman, 2017) Educators have a role to play and can encourage holistic development by intentionally maintaining the child's thinking and engagement in a play-based learning environment. A review of the geography literature on children has emphasized the importance of play for children's quality of life and their geographical and social development, and has suggested that children's access to outdoor play is mediated by the classroom (Armstrong et al., 2019; Valentine & McKendrick, 1997).

Science learning at an early age has many benefits and significant value that can help children develop their understanding of the world around them. The early introduction to science in each individual is necessary so that their scientific experiences can be supported and grow as expected (Farida, 2021). The science learning environment involves children directly in observing events around them, thereby sharpening their reasoning and critical thinking abilities. Learning activities should facilitate children's curiosity, questioning ability, and finding answers scientifically (Intika & Jumiati, 2020).

Based on observations in several Kindergartens, it is indicated that the implementation of science learning is still not optimal. The methods used are primarily demonstration and worksheets. Teachers tend to dominate the learning process, and children are given limited opportunities to ask questions, analyze events, and draw conclusions. An observation conducted at Taman PAUD DOa Ibu which has 20 students, shows that 11 students (55%) have not been able to identify the characteristics of objects, differentiate and classify objects, arrange sequences, and provide descriptions of specific objects and events. Seven students (35%) are unable to measure and use non-standard units of measurement. Similarly, in terms of comparing skills, five students (25%) face difficulties in comparing objects such as volume, color, and weight. On the other hand, the children also struggle to effectively communicate their knowledge, both orally and in writing, to teachers, peers, and other adults. Children's interest in the introduction of simple science is disturbed due to ineffective and uninteresting teaching, where the teacher relies only on pictures and explanations that make the child lose interest and quickly forget the material. Children even feel bored with this way of learning. Activities outside the classroom are carried out during the child's physical motor development, such as gymnastics, running, jumping, and so on. This condition has an impact on the level of children's science learning outcomes. Science learning is carried out roughly, does not displease children and narrows children's learning space in exploring science (Wijaya & Dewi, 2021). Therefore, researchers have designed outdoor play activities that can motivate and increase children's interest in conducting simple science experiments.

The purpose of learning science is that children can develop their potential by studying science so that they can get to know the scope of science and apply fundamental aspects to overcome problems. Therefore, science learning programs should stimulate children's understanding, interest, and appreciation of the surrounding environment (Mirawati &

Nugraha, 2017) The emphasis of learning is not on the introduction of certain science concepts but as a medium of providing experience and stimulating aspects of child development through science learning experiences.

According to (Zahro et al., 2019), outdoor learning and play can provide new science learning experiences for children. Children can learn directly from their environment. The environment can be a source of learning for children. Active outdoor play, sometimes referred to as active free play or independent play is defined here as unstructured physical activity that takes place outdoors in a child's leisure time (Brussoni et al., 2015; A. D. Gustiana et al., 2019; Istifadah, 2020) and provides experience for children to learn objects directly (Zeptyani & Wiarta, 2020). Aspects of cognitive development, including children's science skills, can be stimulated (Ratnasari, 2020)

Children generally have a great interest in outdoor games, so teachers and schools provide facilities, space, and time to allow them to participate (Dahlan, 2019) Learning conducted in the form of play outside the classroom emphasizes how children can demonstrate an activity actively, looking for activities that offer challenges and excitement (Little & Wyver, 2010). The goal is that children interact with the environment, have experience and life skills (Herawati, Fauziah & Syafrida, 2021)), and provide opportunities for children to gain a significant body, social, and cultural experiences (Storli & Hansen Sandseter, 2019). Learning outside increases children's interest and perseverance to study an object more carefully in the open (Erвина et al., 2021)

Outdoor game activities provide opportunities for children to move actively and involve a variety of rough and smooth muscles, which have implications for improving the physical health of students. Outdoor games will have long and short-term effects on the health of students, including enhancing cardiovascular, musculoskeletal, and mental health. Outdoor play can also benefit motor development, vision, cognition, vitamin D levels, and mental health (Tandon et al., 2012) That recommendation is based on the fact that being outdoors correlates strongly with physicality. Activities for kids. with children's academic performance in the future (Tandon et al., 2017)

A natural environment rich in exciting and unexpected things can arouse children's curiosity. They often want to find out why something happened or how something works. By playing outdoors, children are invited to explore and explore, which reinforces their desire to learn about science. Outdoor play also involves practical activities relevant to science. For example, children can learn to plant plants, care for gardens, or build simple structures using natural materials. This kind of activity helps them understand the principles of science in real action.

METHOD

The research method used is experimental quantitative research using quasi-experimental designs. This study was used because the research sample was heterogeneous (Amal et al., 2019; Sugiyono, 2017). The research variable consisted of free variability, namely outdoor play, and the dependent variable was the child's science ability. The sample used a saturated sample, which took the entire population of students in group B of Taman Paud Doa Ibu Kindergarten, which amounted to 20 students.

This research was conducted by providing treatment to students by involving students outside the classroom through gardening games and observing the yard outside the classroom. Using a Likert scale of 1-4 then, data was collected through observation sheets from students' test results on children's abilities in the scientific process with indicators a) observing plant shapes, b) comparing differences in tree species, c). classify tree species.

Data were analyzed using parametric inferential statistics that require data normality to test hypothetically using paired sample t-test analysis (Frey, 2023; me & Chua, 1991)

RESULTS AND DISCUSSION

Outdoor play activities are play activities carried out outside the classroom which are specifically designed to determine the ability of students to observe, compare, and classify. In analyzing data, the ability of students begins with conducting a data normality test (D'Agostino & Stephens, 1986).

Table 1. Pretest and Posttest Data Normality Test Tests of Normality

	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Posttest	.216	20	.015	.916	20	.083
Pretest	.219	20	.013	.920	20	.101

a. Lilliefors Significance Correction

Based on the above table on the Shapiro-Wilk normality test on the pretest with a value of 0.83 and a posttest of 0.101, with a confidence level of 95% and an alpha value of 0.05. Based on the alpha value, the pretest, and posttest values are greater than 0.05, so the data is normally distributed.

Table 2. Calculation Results Deskriptif Pretes dan Postest

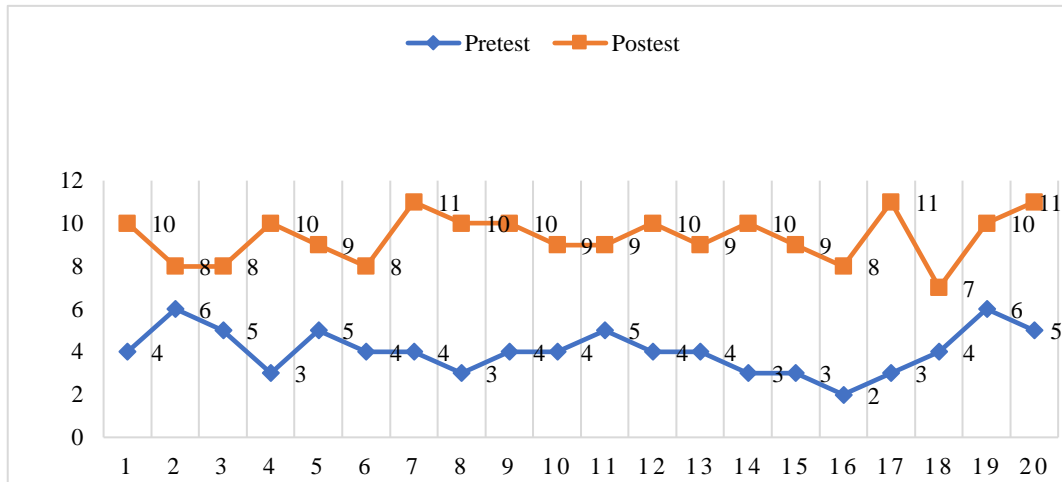
	Descriptive Statistics					
	N	Minimum	Maximum	Sum	Mean	Std. Deviation
Pretest	20	2	6	81	4.05	1.050
Posttest	20	7	11	187	9.35	1.137
Valid N (listwise)	20					

The pretest class, 20 people with a minimum value of 2, a maximum of 6 total scores of 81, and a mean value of 4.05 with a standard deviation of 1,050. The average score in the posttest class is 9.35, the minimum score is 7; the maximum is 11, and the total score is 187 with a standard deviation of 1.137. By looking at the mean postes value higher than the test value, outdoor play activities improve the science process in students.

Tabel 3. Uji hipotesis paired sampel t test

Pair 1 Pretest-Postes	Nilai t hitung	Nilai t tabel	df	Sig.
	14.582	1.729	19	0.00

The calculated t value is 14.528 and the table t value is 1.729 with P value = 0.00; with this result, the H_0 hypothesis stating there is no difference is rejected, and the H_1 hypothesis 1 stating there is a difference is accepted. This means that it can be concluded that outdoor play activities can improve the ability of the scientific process in Taman PAUD Doa Ibu Kindergarten.



Picture 1. Pre-test and Post-test Comparison Chart

Science learning involves observation, experimentation, and logical reasoning. Children are taught to observe phenomena, collect data, and draw conclusions based on existing evidence. It trains children in critical thinking and analyzing situations objectively. These critical thinking skills are invaluable in everyday life as well as being an important basis in the development of more complex academic abilities later in life. Children can practice their logic skills by conducting simple experiments through the process of science, where they learn to relate the cause and effect of the treatment carried out. In addition to being the basis of the scientific method, learning science process skills also provide valuable opportunities for children to learn the properties of the science (Fatimah et al., 2019)

Science games that are done outdoors are games that greatly impact children's cognitive abilities in children aged 5-6 years. Play activities in science game activities are very appropriate to stimulate aspects of the development of children aged 5-6 years because they utilize science teaching materials from the child's environment that match the characteristics of cognitive, physical, language, social-emotional development and religious and moral values in children aged 5-6 years. Intended cognitive abilities include recognizing existing objects, grouping based on shape and type, classifying based on size, and so on. Outdoor play allows children to explore nature and their surroundings. They can observe plants, animals, and various natural phenomena such as weather, water cycles, and seasonal changes. Through this exploration, children learn to appreciate biodiversity, understand the importance of safeguarding the environment, and gain knowledge about the world around them.

The existence of space for children to mobility, using body parts in outdoor learning activities is a stimulation for children's physical motor development. Outdoor games allow children to move freely, engage in physical activity, and develop gross motor skills. They can run, jump, climb, and play with natural objects. This activity helps improve children's physical fitness, coordination, and muscle strength (Hasmawaty, 2017) The results of research conducted by (Nurdin, 2022) showed that the higher the activity of children outdoors, the higher the level of physical motor development.

The use of learning methods outside the classroom has a strong effect in increasing children's intelligence, encouraging mastery of various areas of learning, as well as increasing their achievement compared to classmates. Outdoor or outdoor games have an important value in children's development. When children play outdoors, they engage in physical activity that involves body movement, social activities, and exploration of the

surrounding environment. They are also better able to understand lessons when learning outside the classroom. Learning outside the classroom not only focuses on understanding the material but also prioritizes their ability to apply it directly. The purpose of education outside the classroom is for children to be able to adapt to the environment and the natural surroundings, as well as appreciate the importance of life skills and experiences in the environment and the surrounding nature (D. Gustiana et al., 2017)

In the play, children will interact with peers, communicate, and practice sympathy and empathy will train children's social-emotional skills. Science learning in a collaborative context can help children develop their social skills. Through group activities, children can learn to work together, share knowledge, and communicate well. They learn to respect and value the opinions of others, as well as learn to build arguments that are based on solid evidence. Science learning also involves problem-solving, which allows children to think creatively and work together in finding solutions. Children's interaction with natural objects around them can foster children's love for God's creation, and gratitude for the blessings given. Children's ideas and knowledge can be awakened not only depending on the characteristics of objects, but children understand an object by processing the information received so that new ideas can be obtained and built to solve problems related to environmental events around children.

The benefits of outdoor learning can be seen in improving children's skills, knowledge, and understanding through relationships built on real experiences. The stimulus-rich outdoor environment becomes an effective means of sparking creative thinking and learning, providing opportunities for challenge, inquiry, critical thinking, and reflection (Ratnasari, 2020) Through outdoor learning, children realize that the real world doesn't always fit models or books, but this doesn't mean that what they find is wrong. Instead, it helps them develop an understanding of real-world complexity and strengthens critical thinking skills. Outdoor learning allows children to understand the interconnectedness of subjects taught at school with their daily lives. Children's behavior can change when outdoors. Some are more talkative, while others become calmer and more focused when interacting with outdoor nature.

Research findings by (Diningrat, 2019) suggest that playing in an outdoor learning environment is very important for children's lives. Allowing them to interact with playgrounds promises children to promote well-being and healthy growth and development. Outdoor play supports cognitive development and motor skills (Herrington & Studtmann, 1998) Experts believe in the benefits of outdoor play in supporting children's growth and development. In line with (Jayasuriya et al., 2016), that Outdoor Play is beneficial for children's health, including for the prevention of obesity and chronic diseases. Outdoor play activities are also important for various aspects of their cognition, learning, and well-being. Outdoor playtime is specifically designed as an activity that has one of the strongest and most consistent physical activity correlations in young children (Sadaruddin et al., 2022) as children play harder when outdoors compared to indoors. Outdoor play also encourages social-emotional and cognitive development through exposure to nature, activities involving problem-solving skills and creativity, and unique opportunities for imaginative groups and free play

The results of research conducted by (Ratnasari, 2020) found the influence of outdoor learning on children's numeracy literacy. Reinforced by findings in the United States that schools that use outdoor learning not only impact children's science skills but also social, language, arts and math skills. Through outdoor games, it can be observed that children's resilience abilities can be trained and formed. This is due to learning while playing activities that involve challenging games, adventure, and freedom (Manurung et al., 2021) In addition,

outdoor play allows children to experience freedom of movement more broadly, which in turn allows them to express their talents (Dewi & Handayani, 2019) This experience affects the development of personality, self-confidence, problem-solving abilities, and unyielding attitude in children.

Preschool-aged children will benefit from learning science, as they will understand science concepts and their relationship to everyday life. Science skills have an important and useful role because almost all daily activities involve the use of scientific concepts and principles (Oktavia et al., 2020); developing the ability to learn and apply scientific methods is key in increasing knowledge about the surrounding environment through process skills and learning activities and adopting a scientific attitude to overcome various problems, while increasing awareness of the greatness and power of the Creator of the universe (Fatmawati, Fadillah, 2013). According to psychologists, children can more easily understand complex and abstract concepts when given concrete examples that are appropriate to the situations and conditions they face. Through hands-on experience in discovering concepts through interaction with real physical objects, children can develop better understanding (Khoiri, 2021). Science learning encompasses science products, processes, and attitudes. Therefore, a learning model is needed that can accommodate these aspects. By using this learning model, early childhood can learn science comprehensively and in accordance with the principles of early childhood science learning that are concrete and fun (Wijaya & Dewi, 2021)

Science learning involves the stages of planning, execution, and evaluation. In planning, teachers compile objectives, media, materials, and learning methods. The implementation of learning involves teacher explanations of natural phenomena which are then discussed together, exploration of the surrounding environment, and the integration of science literacy with art. Learning evaluation is carried out by measuring students' understanding of science concepts, science processes, and the application of science content (Noor, 2020) Positive and engaging science learning at an early age can influence children's interest in science in the future. When children engage in experiments, discoveries, and activities involving science, they can feel joy and satisfaction in exploring natural phenomena. This can spark their interest to continue learning and developing further science knowledge in the future. In addition, learning science at an early age also helps children get to know various professions in the field of science, such as scientists, doctors, engineers, and environmentalists. This can open their horizons to diverse career options in the future and motivate them to pursue science as a career choice.

Furthermore, according (Herlinda, 2018), in outdoor play activities, teachers can also develop and instill character education in children conditionally, habituation, and teachers become models for children. To achieve the expected science learning goals, teachers are expected to design activities that encourage children to make their own decisions, and find ideas in each given game, for example, making a tunnel in the sand, playing water using containers, and so on.

Overall, outdoor games have a significant influence on a child's development in various aspects. Through hands-on experience with the real world, children can develop better skills, knowledge, and understanding. The stimulus-rich outdoor environment also stimulates creative thinking and deep learning. In addition, children learn to face challenges, develop critical thinking skills, and understand the relevance of subjects to everyday life. Through interaction with nature and the outdoor environment, they can also discover their potential better. Therefore, outdoor games play an important role in enriching children's overall holistic development.

CONCLUSION

The results showed that outdoor play activities improved students' science skills with indicators of children's ability to observe, compare, and classify. The implications of this research are expected to provide recommendations for educators and educational practitioners to consider the importance of outdoor play activities in developing children's scientific abilities.

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