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The Effectiveness of Nature-Based Learning on Early Childhood Gross Motor Development

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Abstrak
Penelitian ini bertujuan untuk mengevaluasi efektivitas pembelajaran berbasis alam terhadap perkembangan keterampilan motorik kasar pada anak usia dini. Metode penelitian yang digunakan adalah eksperimen dengan desain pretest-posttest, melibatkan dua kelompok: kelompok eksperimen yang menjalani pembelajaran berbasis alam dan kelompok kontrol dengan metode konvensional. Hasil penelitian menunjukkan bahwa kelompok eksperimen mengalami peningkatan signifikan pada skor rata-rata keterampilan motorik kasar dari 19.70 menjadi 26.20 ($p < 0.05$). Sebaliknya, kelompok kontrol hanya menunjukkan peningkatan kecil dengan rata-rata perubahan sebesar 1.30 ($p < 0.05$). Temuan ini mengindikasikan bahwa pembelajaran berbasis alam lebih efektif dibandingkan metode konvensional dalam mendukung perkembangan keterampilan motorik kasar anak usia dini. Kesimpulan penelitian menekankan pentingnya integrasi pembelajaran berbasis alam dalam kurikulum pendidikan anak usia dini untuk mendukung perkembangan motorik serta aspek perkembangan lainnya. Penelitian lanjutan direkomendasikan untuk mengeksplorasi berbagai pendekatan pembelajaran berbasis alam dan dampaknya terhadap perkembangan anak secara holistik.

Kata kunci: Pembelajaran Berbasis Alam, Keterampilan Motorik Kasar, Anak Usia Dini, Pendidikan

Abstract
This study aims to evaluate the effectiveness of nature-based learning in developing gross motor skills in early childhood. The research method used was an experiment with a pretest-posttest design involving two groups: an experimental group undergoing nature-based learning and a control group with conventional methods. The results showed that the experimental group experienced a significant increase in the mean score of gross motor skills from 19.70 to 26.20 ($p < 0.05$). In contrast, the control group only showed a small increase with an average change of 1.30 ($p < 0.05$). This finding indicates that nature-based learning is more effective than conventional methods in supporting early childhood gross motor skill development. The conclusions emphasize the importance of integrating nature-based learning in the early childhood education curriculum to support motor development and other developmental aspects. Further research is recommended to explore different nature-based learning approaches and their impact on holistic child development.

Keywords: Nature-Based Learning, Gross Motor Skills, Early Childhood, Education

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PENDAHULUAN

Nature-based learning has become one of the approaches that is gaining increasing attention in early childhood education in Indonesia. This approach involves introducing children to the natural environment and utilizing nature as a learning space rich in sensory and motor stimulation. Stimulation is the foundation for shaping abilities in early childhood. (Daryati, 2024). In this context, nature-based learning is important in supporting early childhood gross motor development, including physical skills such as running, jumping, and climbing. These competencies are essential for children's physical health, balance, and coordination, the foundation for their holistic development. (Smuđa et al., 2020).

Nature-oriented pedagogy, also known as outdoor education, is a methodology that uses nature as the primary medium for the educational process. Children are encouraged to participate in a wide array of physical activities, such as running, jumping, climbing, and engaging in games in natural settings, which can enhance their gross motor competence. (Raval, 2023). Environmental involvement stimulates children to be active in exploring the environment and stimulates their curiosity about exploring the environment. (Daryati, 2024). Engagement with the natural environment can improve children's gross motor skills through intrinsic stimulation that the indoor environment cannot provide. (De Giorgio, 2017).

Gross motor skills encompass physical abilities requiring substantial muscle coordination, including running, jumping, and climbing. (Smuđa et al., 2020).. These competencies are essential for children's holistic physical development and well-being. Children who participate in outdoor activities show a marked improvement in gross motor proficiency compared to those who are mostly indoors. (Mancini, Rigoli, Cairney, et al., 2016)..

The main research variable in this study is children's gross motor development, which is measured through their ability to perform specific physical activities before and after the implementation of nature-based learning. (Mancini, Rigoli, Heritage, et al., 2016).. Physical abilities influence the exploration of children's curiosity. (Daryati, 2024)Factors that influence gross motor development include the frequency and type of physical activity and the environment in which the activity takes place. Natural environments provide more opportunities for gross motor development compared to man-made environments, which often limit children's space for movement and exploration. (Choi & Byun, 2010). Exploring a safe and friendly natural environment with children makes children develop well. (Suryadi, 2022).

The main problem in implementing nature-based learning is educators' and parents' lack of understanding and support. (Cui et al., 2016). Education based on a feeling of comfort and by the child's ability is memorable for the child. (Daryati, 2024). Many educators still feel more comfortable with traditional classroom learning methods and lack confidence in managing outdoor activities.

(Jayasuriya et al., 2016).. Although the benefits of nature-based learning are recognized, its implementation is still limited due to concerns about safety and a lack of adequate facilities. (Brussoni et al., 2012).. Another issue is environmental constraints, such as limited access to safe and well-maintained open spaces. (Jeon & Jun, 2021). Many schools in urban areas have limited access to nature, making it difficult to organize nature-based learning activities regularly. (Mancini, Rigoli, Heritage, et al., 2016).

Children living in urban areas have less opportunity to interact with nature, which may limit their gross motor development. (Jayasuriya et al., 2016).. Gross motor development is a bridge to other developmental abilities in children. (Daryati, 2024). Policies and curricula that do not fully support integrating nature-based learning in early childhood education are a significant challenge. (Brussoni et al., 2012).Rigid curricula often make it difficult for teachers to allocate time and resources for outdoor activities. According to a report from UNICEF (2022), education policies need to be more flexible to accommodate nature-based learning approaches. (Cui et al., 2016).

Recent research shows that nature-based learning has a significant positive impact on early childhood gross motor development. (Raval, 2023). Gross motor development is stimulated when it is frequently stimulated. (Daryati, 2023). Children who frequently engage in outdoor activities improve balance, coordination, and muscle strength (Smuđa et al., 2020). Children who learn outdoors tend to be more physically active, which is important for their health and physical development (De Giorgio, 2017). In addition, children who engage in nature-based learning also show improvements in social and emotional skills (Brussoni et al., 2012). Outdoor activities allow children to cooperate, share, and develop interpersonal skills (Mancini, Rigoli, Cairney et al., 2016). (Mancini, Rigoli, Cairney, et al., 2016).Nature-based learning is beneficial for physical development and children's social and emotional development. (Jeon & Jun, 2021).

Penelitian ini bertujuan untuk mengkaji efektivitas pembelajaran berbasis alam terhadap perkembangan motorik kasar anak usia dini (Mancini et al., 2016). Studi ini akan menilai perubahan keterampilan motorik kasar anak-anak sebelum dan sesudah keterlibatan dalam program pembelajaran berbasis alam. Akibatnya, penelitian ini diharapkan dapat meningkatkan pemahaman tentang kemanjuran pembelajaran berbasis alam dalam mempromosikan perkembangan motorik kasar pada anak-anak (Jayasuriya et al., 2016).

Urgensi penelitian ini terletak pada kebutuhan untuk menemukan metode pembelajaran yang efektif dalam mendukung perkembangan fisik anak usia dini (Brussoni et al., 2012). Perkembangan fisik efektif dilakukan bila menggunakan media peraga dan sesuai tahapan usia anak (Surbakti, 2021). Mengingat pentingnya perkembangan motorik kasar untuk kesehatan dan kesejahteraan anak, pendekatan pembelajaran berbasis alam menawarkan potensi besar yang perlu dieksplorasi lebih lanjut (Raval, 2023). Bersumber dari alam anak dapat mengenal berbagai macam ilmu pengetahuan (Daryati, 2021). Ilmu pengetahuan bersumber dari alam menjadi pendekatan pembelajaran yang

menggunakan penerapan menjelajah secara langsung (Apriani, 2021). Penelitian ini diharapkan dapat memberikan dasar empiris bagi para pendidik dan pembuat kebijakan untuk mengintegrasikan pembelajaran berbasis alam ke dalam kurikulum pendidikan anak usia dini. Selain itu, penelitian ini penting untuk mengatasi kekhawatiran dan hambatan yang dihadapi dalam implementasi pembelajaran berbasis alam (Mancini, Rigoli, Cairney, et al., 2016). Dengan bukti empiris yang kuat, dapat diberikan rekomendasi yang konkret untuk mendukung pembelajaran berbasis alam, termasuk saran praktis untuk pendidik dan orang tua (Brussoni et al., 2012).

This research will contribute to the nature-based learning process in early childhood gross motor development. The successful application of this methodology is anticipated to foster a healthier and more active generation, ready to face future challenges. It will also contribute to improving the quality of early childhood education and formulating more adaptive policies that support nature-based learning.

RESEARCH METHOD

This study utilized a quantitative approach with a quasi-experimental research design. The experimental framework consisted of two groups: one group (experimental cohort) engaged in a nature-based learning program, while the other group (control cohort) followed traditional indoor learning.

This study adopted a quantitative technique with an experimental design that included two groups. The experimental cohort participated in nature-based learning, while the control cohort followed traditional indoor learning. This design aims to evaluate changes in children's gross motor skills before and after the intervention. The experimental cohort will undergo the intervention through nature-based learning. In contrast, the control cohort will not be exposed to the intervention, allowing for a comparative assessment of the impact of the methodology.

Population and Sample

This study took place at Excellentia Nature School Pamekasan, Madura, with a population consisting of all kindergarten students aged 4-6 years. Using the purposive sampling technique, 20 children were selected as samples, which were divided into two groups: the experimental group and the control group.

The experimental group consists of 10 children who will follow a nature-based learning program. The program involves outdoor physical activities such as running, jumping, climbing, and balancing to stimulate children's gross motor development. The control group, comprising 10 children, will follow conventional indoor learning with structured and purposeful physical activities.

Research Objective

This study aims to evaluate the effectiveness of nature-based learning in improving early childhood gross motor skills. Specific objectives to be achieved include:

1. Measuring Improvement in Gross Motor Skills:

The study's primary goal was to measure changes in children's gross motor skills before and after participation in the nature-based learning program. The gross motor skills measured include running, jumping, climbing, and maintaining balance.

2. Comparing Learning Effectiveness:

Comparing the effectiveness of nature-based learning with conventional indoor learning in improving children's gross motor skills. This is done to see if nature-based learning methods support children's physical development more than conventional methods.

Data Collection Techniques and Instrument Development

Data Collection Techniques

1. Observation: Direct observation of children's gross motor skills (running, jumping, climbing, balance) with field notes.
2. Gross Motor Test: Pre-test and post-test to measure skill changes before and after the intervention.
3. Questionnaire: Exploring children's physical habits, parental support, and perceptions of nature-based learning.
4. Interviews: Semi-structured with teachers and parents using an interview guide for in-depth information.

Instrument Development

1. Gross Motor Test: Developed based on child development standards and expert validation.
2. Questionnaire: Closed and open formats, trialed to ensure clarity.
3. Interview Guide: Designed for experiential exploration, validated, and trialed.
4. Data Collection Procedure
5. Preparation: Socialisation and participation permission.
6. Pre-Test: Measuring initial skills.
7. Intervention: Nature-based program (experimental group) and conventional learning (control group).
8. Post-Test: Measures changes after the intervention.
9. Additional Data Collection: Questionnaires and interviews.
10. Data Analysis: Statistics to evaluate the effectiveness of interventions

Data Analysis

Data from the pre-test and post-test will be analyzed using descriptive and inferential statistics. A paired t-test will test the difference in pre-test and post-test scores within each group. An unpaired t-test (independent t-test) will be used to compare the differences between the experimental and control groups.

RESULTS AND DISCUSSION

RESULTS

Respondents' characteristics are an important element in any research, especially in the context of early childhood education. In this study, the main focus is to explore the effect of nature-based learning on children's gross motor development. An in-depth understanding of respondents' characteristics is necessary to ensure that the research results can be interpreted appropriately and relevantly.

The results of the respondents' characteristics will be analyzed to provide a clearer picture of the population involved in this study; in order to get a clear picture of the research subjects, the following are the characteristics of the respondents who are divided into two groups namely the experimental group and the control group. These characteristics include variables of age, gender, and socioeconomic status, which can be seen in the following table:

Table 1. Age Characteristics

Age (years)	f	(%)
4	8	40%
5	6	30%
6	6	30%
Total	20	100%

From these results, it can be inferred that the majority of respondents were under the age of 4, which may indicate that this age group was more involved in the study. This may also indicate that the programs or interventions studied may be more relevant or accessible to children of this age.

Table 2. Gender Characteristics

Gender	f	(%)
Male	10	50%
Female	10	50%
Total	20	100%

There was a perfect balance between male and female gender, 10 respondents each (50%). This balance indicates that the study is not biased towards either gender, so the results obtained can be considered more representative and generalizable to both groups.

Table 3. Socioeconomic Characteristics

Socioeconomic Status	f	(%)
High	5	25%
Medium	11	55%
Low	4	20%
Total	20	100%

This data shows that the majority of respondents come from middle socioeconomic status, which may impact their access to education and other resources and may also affect the study's results, especially when it comes to socioeconomic factors that influence learning.

Tabel 4. Karakteristik Pendidikan

Parents' Educational Background	f	(%)
Primary Education	6	20%
Secondary Education	15	50%
Higher Education	9	30%
Total	20	100%

The majority of respondents' parents had a secondary level of education, which may influence how they support their children's education. Parents' education often relates to the educational values they instill in their children and their support in learning.

Table 5. Characteristics of nature-based learning

Nature-based Learning	f	(%)
Yes	10	50%
No	10	50%
Total	20	100%

This balance indicates that half of the respondents have experience in nature-based learning, which can be an important factor in understanding how this learning method affects children's development and learning outcomes.

The experimental group consisted of early childhood children who did nature-based learning, while the control group was conventional classroom learning. Based on the data's characteristics, a paired t-test was chosen for the experimental group because the pretest and posttest data showed normal distribution. This test determined the average difference in gross motor skills scores before and after the nature-based learning intervention. At the same time, the control group pretest and

posttest data did not meet the assumption of normality, so the Wilcoxon Signed-Rank Test was more appropriate to use and details can be seen in table 6.

Table 6: Experiment Group and Control Group

Group	Change in median mean		Score Change	*p*
	Pretest	Post-test		
Experiment	19.70	26.20	6.50	0.001
Control	15.5	19.5	4	0.002

Wilcoxon & t-test

Based on Table 6. The results of the mean pretest score of 19.70 and post-test of 26.20 obtained a p-value of 0.001; the t-test shows that there is a significant increase in gross motor skills after the intervention, while for the control group the results of the mean median pretest score of 15.5 and posttest of 19.5 without requiring the assumption of normal distribution, with a p-value of 0.002, the Wilcoxon test shows that there is a significant increase in gross motor skills after conventional learning. However, the increase is smaller compared to the experimental group.

The accompanying graph supports the statistical analysis results presented in Table 6. It illustrates that nature-based learning resulted in superior mean scores across all gross motor activities compared to traditional learning methods. The increase in mean scores observed in the experimental group (nature-based learning) indicates that the nature-based intervention significantly improved children's gross motor skills more than the conventional pedagogical approach.

The significant p-value test results (0.001 for the t-test in the experimental group and 0.002 for the Wilcoxon test in the control group) reinforce the idea that the observed disparity is not simply incidental, but rather a consequence of the particular learning intervention, while both instructional methods showed significant improvement, thus the need for a picture that suggests that the nature-based approach provides an additional advantage in the cultivation of gross motor skills, as evidenced by the higher posttest mean scores relative to the control group, thus seen in the graph as follows:

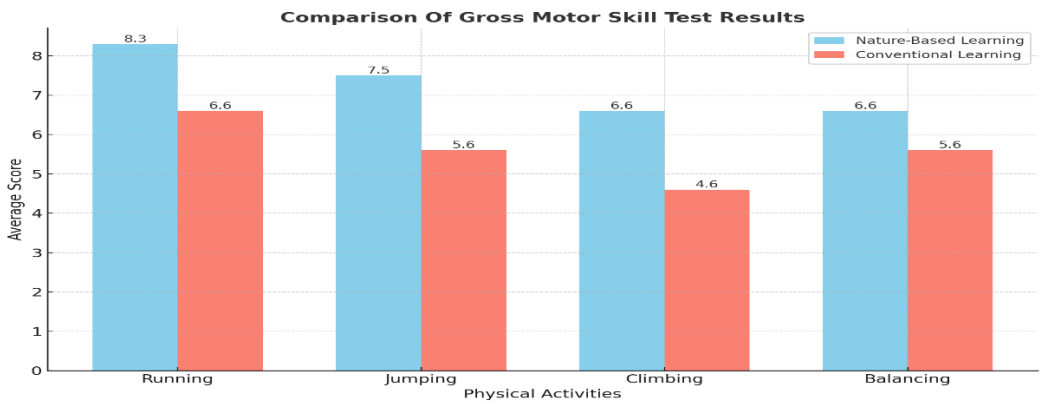

Figure 1. Graph of gross motor test results of experimental and control groups

The graph depicts a comparative analysis of gross motor test results between children engaged in nature-based learning and those in conventional learning across four physical activities: running, jumping, climbing, and balance maintenance. The findings show that participants in the nature-based learning group demonstrated superior mean scores across all activities assessed relative to their conventional counterparts, in running, the experimental group achieved a mean score of 8.3, contrasting with the control group's score of 6.6, For the jumping activity, the experimental group recorded a score of 7.5, surpassing the control group's 5.6. The climbing activity reflected a difference in the mean score in the experimental group of 6.6 and 4.6 for the control group. In maintaining balance, the experimental group achieved a mean score of 7.5, while the control group only scored 5.6. The data suggests that the nature-based learning methodology improves children's gross motor skills more than conventional pedagogy, as evidenced by the higher mean scores across all physical activities evaluated.

DISCUSSION

This study aims to determine the effectiveness of nature-based learning on developing gross motor skills in young children. The research focuses on comparing two different learning methods: nature-based learning and conventional learning, and their impact on children's gross motor skills.

The effect of nature-based learning shows that it significantly impacts the development of gross motor skills in young children. In nature-based learning, direct interaction with the environment improves gross motor skills through various fun and educational physical activities. Physical activities such as running, jumping, and playing outdoors are essential for early childhood gross motor development; these activities provide additional benefits for children's physical and mental health. (Hartini & Agustin, 2024)..

Other research emphasizes the importance of proper stimulation to improve the gross motor skills of 4–5-year-old children. In nature-based learning, children can perform coordinated body movements through various outdoor games and activities, directly contributing to their motor development. (Asfinolia, 2023), besides that by Fadjariyanti & Fathiyah (2022) Traditional games, such as Cakbikak, can strengthen muscles and improve gross motor skills, making it an effective learning model in nature-based learning. Gross motor stimulation can make children more focused on stimulating other general abilities. (Adisti, 2023).

The study's results also showed that physical activities carried out outdoors, such as obstacle course games, can improve children's gross motor skills. (Fauzia, 2023) These activities are fun and challenge children to move and interact with their environment, improving their motor skills. Research by Paspiani shows that song and movement exercises can also contribute to gross motor

development, by combining elements of music and movement that appeal to young children. (Paspiani, 2015).

The paired t-test and Wilcoxon Signed-Rank Test results on the effect of learning on gross motor skills in children after applying two different learning methods, nature-based learning and conventional learning, will be discussed.

The paired t-test results in the experimental group showed a significant increase in gross motor scores, with a mean pre-test score of 19.70, a post-test score of 26.20, and a p-value of 0.000 ($p < 0.05$). (Ozgen, 2023). This indicates that nature-based learning has a significant positive effect on children's gross motor skill development. In contrast, the Wilcoxon test results in the control group showed a similarly significant improvement, with a median change of +1.30 and a p-value of 0.005 ($p < 0.05$). *(Environmental- And Nature-Based Education*, 2011).Although both groups showed improvement, the paired t-test results showed that the experimental group experienced greater improvement than the control group.

This comparison suggests that while conventional learning can result in improved motor skills, nature-based learning appears more effective in improving those skills. Previous research by (*Nature-Based Education*, 2020) It also supports these findings where nature-based learning is shown to be more effective in improving children's motor and social skills compared to traditional learning methods, however, it is important to note that although the control group showed improvement, there is an argument that more interactive and collaborative learning approaches, such as learning project-based or cooperative, can be more effective compared to conventional learning (Atmojo et al., 2023). Interactive learning can be obtained from the natural environment and the potential for safe play for children. (Amelia, 2022). Research by Kamalisabeti shows that more innovative learning methods can significantly improve students' understanding and skills, which suggests that there is potential to increase the effectiveness of conventional learning through method modifications. (Kamalisabeti, 2023).

The results of the Wilcoxon test showed that despite the improvement, the control group's rate of improvement was smaller than the experimental group. This suggests that while conventional learning can provide positive outcomes, there is a need to explore more innovative methods to achieve better outcomes.

Contradictions and Mismatched Results: The study also lacked an exploration of contradictions or inconsistent outcomes between the experimental and control groups. For example, although nature-based learning shows higher effectiveness, research by Murthy (2022) shows that more focused and interactive educational programs can also produce good results in gross motor skills. Therefore, even though there is a peningkatan dalam kelompok kontrol, pendekatan pembelajaran yang lebih interaktif mungkin lebih efektif dalam konteks tertentu.

The results of the paired t-test and the Wilcoxon test showed that both learning methods positively affected children's gross motor skills. However, nature-based learning showed a more significant improvement compared to conventional learning. Further research is needed to explore different learning approaches and how they can be integrated to achieve optimal outcomes in children's gross motor skills development. The results of the comparison between the results of the paired t-test and the Wilcoxon Signed-Rank Test in the context of improving gross motor skills in children after the application of two different learning methods, nature-based learning, and conventional learning, and added research on conformity and inconsistency, as well as relevant contradictions.

The limitations of this research on a small sample size (only 20 respondents) may affect the generalization of results, so future research should involve a larger and more diverse sample size with random sampling or stratification methods to improve the generalization of results.

CONCLUSION

The study showed that nature-based learning significantly influenced the improvement of early childhood gross motor skills. Although both groups experienced improvements, the changes that occurred in the experimental group were greater and more significant than in the control group. These findings indicate that nature-based learning methods are more effective in developing children's gross motor skills than conventional indoor learning.

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