Dynamics of Nature-Based Learning in Developing Children's Motoricic Skills: Teacher and Parent Perspectives

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Abstract

A child's development, particularly in terms of motoric skills, is most formative during the first few years of life. One approach that is considered effective in optimizing children's motoric development is nature-based learning, which utilizes the natural environment as the main learning medium. This study aims to explore the dynamics of nature-based learning in developing early childhood motoric skills through literature studies. Articles, books, and scientific documents produced between 2015 and 2024 are reviewed in a literature review using a qualitative descriptive methodology.This study found that children's fine and gross motoric skills, as well as their social and emotional development, can benefit from learning in natural settings. However, its implementation in Indonesia still faces challenges, especially related to parents' perceptions of child safety and the limitations of teachers' creativity in designing outdoor activities. This study provides active support from parents and increasing teacher capacity as an effort to optimize nature-based learning in early childhood education.

Keywords: Early Childhood, motoric development, nature-based learning

Abstrak

Masa anak usia dini merupakan periode krusial bagi perkembangan anak, termasuk dalam aspek motorik. Salah satu pendekatan yang dinilai efektif dalam mengoptimalkan perkembangan motorik anak adalah pembelajaran berbasis alam (nature - based learning), yang memanfaatkan lingkungan alam sebagai media utama belajar. Penelitian ini mengeksplorasi dinamika pembelajaran berbasis alam dalam mengembangkan kemampuan motorik anak usia dini melalui studi literatur. Metode penelitian yang digunakan adalah kajian pustaka dengan pendekatan deskriptif kualitatif, mengkaji artikel, buku, dan dokumen ilmiah terbit tahun 2015–2024. Hasil studi menemukan bahwa perkembangan sosial dan emosional anak, keterampilan motorik (baik halus maupun kasar), dan waktu bermain semuanya dibantu oleh pembelajaran di lingkungan alami. Namun, implementasinya di Indonesia masih menghadapi tantangan, terutama terkait persepsi orang tua terhadap keamanan anak dan keterbatasan kreativitas guru dalam merancang kegiatan luar ruang. Studi ini merekomendasikan dukungan aktif dari orang tua dan peningkatan kapasitas guru sebagai upaya optimalisasi pembelajaran berbasis alam dalam pendidikan anak usia dini.

Kata Kunci: Anak usia dini, pembelajaran berbasis alam, perkembangan motorik

Background

The Childhood is a very rapid and fundamental period for early childhood development. At that age, parents are advised to optimize development because at that time there is a "golden age" that cannot be repeated and can determine the quality of human life in the future.[1] Consequently, it's critical to plan early childhood education lessons with the best interests of children's growth and development in mind.[2]There is strong evidence that stimulation education impacts children's cognitive development in the early years.[3]

The maturation of motor skills is an important factor to think about. One of the cornerstones of children's entire development is their motoric development in early infancy. Children who have developed strong motor skills are better able to engage with the world around them, both physically and socially. In addition to influencing motor skill development, this has an effect on children's cognitive and social growth.[4]

Children who participate in motoric activities carried out together in groups can improve their motoric skills, train cognitive functions such as focus and organizing actions, and help learn to count. [5] Integrating motoric activities into classroom learning activities can help children's overall development and make them better prepared to follow learning in school. Research shows that good motoric development in children usually goes hand in hand with their positive social skills, allowing children to play with friends and increase self-confidence.[6]

Early childhood has a different approach to learning compared to adults. They tend to learn through real objects, need time to absorb information, are actively involved in the learning process through play, and require challenging activities so that development can develop optimally.[7] As they play, kids build resilience to stress and difficulties and enhance their motoric, social, emotional, and cognitive abilities.[8] They also have a distinctive characteristic in learning, namely active learning through play. The linguistic development of youngsters between the ages of 5 and 6 is significantly impacted by active play activities, according to research.[9]

In this context, a learning approach that supports natural and enjoyable motoric development is very important. One approach that is starting to receive a lot of attention is nature-based learning. Nature-based learning is an approach that utilizes the natural environment as the main medium for learning.[10] Children are invited to interact directly with natural elements such as soil, water, trees, and animals, in exploratory and sensory activities. Cognitive and linguistic development in young children is greatly enhanced by nature-based learning

[1] Dyah Lintang Trenggonowati and Kulsum Kulsum, *Analisis Faktor Optimalisasi Golden Age Anak Usia Dini Studi Kasus Di Kota Cilegon*, Journal Industrial Servicess, 4.1, 2018, h. 48–56.

[2]Masitoh, (2014), *Strategi Pembelajaran TK*, Jakarta: Universitas Terbuka.

[3] Marilin Kristina, Ruly Nadian Sari, *Pengaruh Edukasi Stimulasi Terhadap Perkembangan Kognitif Anak Usia Dini,* Journal Of Dehasen Educational Review, 2.01, 2021, h. 1–5.

[4]Catherine. M Capio, *The Importance of Motor Skills for Children's Development,* Early Childhood Research Quarterly*,* 61, 2024, h. 1–10.

[5]Kesha N. Hudson, Michael T. Willoughby, "The Multiple Benefits of Motor Competence Skills in Early Childhood", *RTI Press Research Brief*, Kamis 17 April 2025.

[6] Indri Ariani and others, *Perkembangan Motorik Pada Anak Usia Dini Indri*, Jurnal Pendidikan Dan Konseling, Vol. 4, 2022, h.1349–58.

[7] Reni Amiliya, Siti Aminah, *Pembelajaran Berbasis Alam Untuk Pendidikan Anak Usia Dini Natural-Based Learning for Early Childhood Education*, Jurnal Al-Abyadh, Vol. 3, Issue 2, 2020, h.59–73.

[8]Sanne L. Nijhof and others, *Healthy Play, Better Coping: The Importance of Play for the Development of Children in Health and Disease,* Neuroscience and Biobehavioral Reviews, Vol. 95, September 2018, h. 421–29.

[9] Riska A Harnawati, Adevia M Chikmah, and Istiqomah D Andari, *Pengaruh Metode Bermain Aktif Terhadap Perkembangan Bahasa Anak Usia 5-6 Tahun*, Siklus : Journal Research Midwifery Politeknik Tegal, Vol. 12, Issue 2, 2023.

[10] Avril Johnstone and others, *Nature-Based Early Childhood Education and Children's Physical Activity, Sedentary Behavior, Motor Competence, and Other Physical Health Outcomes,* Journal of Physical Activity and Health, Vol. 19, 2022, h. 456–72.

activities including loose pieces, according to research.[11]

This approach is believed to be able to stimulate children's gross and fine motoric skills more optimally than conventional learning methods that are mostly carried out indoors.[12] In practice, activities such as walking on uneven ground, climbing trees, lifting stones, or making works from natural materials, stimulate children's coordination, balance, and muscle strength. [13] Matching activities can improve children's fine motoric skills, especially finger and eye coordination. [14] In addition, activities in nature also tend to involve active play that encourages freedom of movement, which is important for children's neuromotoric development.[15]

Many Indonesian preschools and kindergartens have not yet adopted nature-based practices for their youngest students. [16] [17] The implementation of nature-based learning in Indonesia still faces various challenges, especially related to the perceptions and roles of teachers and parents. Some parents still feel anxious if their children play outdoors because of the risk of injury or concerns about cleanliness. On the other hand, some teachers feel limited in designing relevant and safe activities in the open environment, especially if there is no policy support from educational institutions.[18]

Teachers and parents are the two most influential people in a child's early education, therefore it's crucial to look at the dynamics of nature-based learning from both points of view. Understanding the perceptions, experiences, and challenges they face can provide a more comprehensive picture of how nature-based learning is carried out and the extent to which this approach contributes to children's motoric development.

This studyexplored the dynamics of nature-based learning in developing early childhood motoric skills, by discussing in more depth the experiences and views of teachers and parents. And discuss some forms of motoric activities as nature-based learning that can be applied to early childhood education. Theoretically and pragmatically, this study should help improve models for early childhood education that take into account children's unique developmental needs.

Literature Review

Early Childhood Motoric Development

The process of motoric development in early childhood has a significant impact on children's preparedness for a variety of life experiences, such as learning, social relationships, and emotional control. According to research, motoric development occurs gradually and is interrelated between the development of the nervous system, sensory experiences, and

[11] Elza Pristikasari, Mustaji, Miftakhul Jannah, *Implementasi pembelajaran berbasis alam dengan loose parts untuk meningkatkan kemampuan kognitif dan bahasa pada anak TK*, Jurnal Basicedu, Vol. 5, Issue 5, 2020, 3(2), h. 524–32.

[12] K. Coyle, "Back to School: Back Outside! How Outdoor Education and Outdoor School Time Create High Performance Students", https://www.nwf.org/Educational-Resources/Reports/2010/09-01-2010-Back-to-School-Back-Outside, diakses pada tanggal 15 Februari 2025.

[13] Susan Herrington and Mariana Brussoni, *Beyond Physical Activity: The Importance of Play and Nature-Based Play Spaces for Children's Health and Development*, Current Obesity Reports, Vol 4, Issue 4, 2015, h. 477–83.

[14] Heri Y Muslihin, Aini Loita, Nina N Rospiani, *Kegiatan Mencocok Dalam Peningkatan Perkembangan Motorik Halus Anak Usia Dini Di TK Sejahtera I Kecamatan Sindangkasih,* Jurnal Pendidikan dan Konseling, Vol. 4, 2022, h. 3935–41.

[15] Ingunn Fjørtoft, *The Natural Environment as a Playground for Children: The Impact of Outdoor Play Activities in Pre-Primary School Children*, Early Childhood Education Journal, Vol. 29, Issue 2, 2001, h. 111–17.

[16] Sunanik Sunanik, *Pembelajaran Berbasis Alam Untuk Anak Usia Dini Di Tk Alam Alazhar Kutai Kartanegara,* Al-Madrasah: Jurnal Pendidikan Madrasah Ibtidaiyah, Vol. 3, Issue 1, 2018, h. 81–110.

[17] Adzkiah Annuha, *The Effectiveness of Nature-Based Learning on Early Childhood Gros,* Jurnal PENA PAUD, Vol. 5 Issue 2, 2024, h. 143–56.

[18] M Sari, W Wuryandani, *Persepsi Guru PAUD Terhadap Pembelajaran Berbasis Alam Di Indonesia. Jurnal Pendidikan Anak Usia Dini*, Jurnal Pendidikan Anak Usia Dini, Vol. 15, Issue 1, 2021, h. 34–45.

environmental exploration. [19] Everyday physical activity helps with the development of gross motor abilities, like running and jumping, and fine motor skills, like writing and gripping, which entail more intricate eye-hand coordination. [20] Research also shows that better motoric skills at an early age are positively correlated with higher cognitive and social development during school.[21]Consequently, in order to help children reach their full developmental potential, it is crucial to implement treatments that promote motoric development from a young age.

Nature-Based Learning

Nature-based learning is a pedagogical approach that integrates direct experiences in nature into learning activities. According to the research, spending time in nature can help youngsters develop their critical thinking skills, imagination, and learning experiences [22] In their study, Skar, Gundersen, and O'Brien found that when youngsters engage with nature in a hands-on way, they are more likely to take an interest in their environment, become better observers, and unleash their imaginations. [23] In addition, this approach also strengthens children's emotional connection with nature, which contributes to the development of environmental awareness from an early age. Holistic learning, which encompasses children's physical, cognitive, emotional, and social elements, can be optimized by the application of nature-based learning in early childhood education.[24]

Benefits of Nature-Based Learning for Children's Motoric Skills

Several studies have shown that nature-based learning has significant benefits for early childhood motoric development. In a study by Dankiw, children who are frequently involved in outdoor activities showed improvements in gross motoric skills such as balance, agility, and muscle strength compared to children who study more indoors.

In addition, McCree, Cutting, and Sherwin stated that activities such as climbing, running on uneven ground, and playing in diverse natural environments help children improve coordination and physical endurance.[25]Interaction with unstructured environments encourages children to take appropriate risks (positive risk-taking), which is an important part of neuromotoric development. [26] Overall, nature-based activities not only improve gross motoric skills but also enrich fine motoric skills through activities such as collecting leaves, stacking stones, or making crafts from natural materials.

Teacher and Parent Perceptions of Nature-Based Learning

The effectiveness of implementing nature-based learning is highly dependent on how teachers and parents perceive it. Research has shown that educators with a firm belief in the value of nature-based learning are more inclined to incorporate outdoor activities into their

[19] Karen E. Adolph, Justine E. Hoch, *Motor Development: Embodied, Embedded, Enculturated, and Enabling*, Annual Review of Psychology, Vol. 70, 2019, h. 141–64.

[20]Klaus Libertus, Petra Hauf, *Editorial: Motor Skills and Their Foundational Role for Perceptual, Social, and Cognitive Development,* Frontiers in Psychology, Vol. 8, Maret 2017, h. 6–9.

[21] Lisa M. Barnett and others, *Correlates of Gross Motor Competence in Children and Adolescents: A Systematic Review and Meta-Analysis*, Sports Medicine, Vol. 46, Issue 11, 2016, h. 63–88.

[22] Richard Louv, (2019) *Our Wild Calling: How Connecting with Animals Can Transform Our Lives—and Save Theirs.* Algonquin Books.

[23]Margrete Skar, Vegard Gundersen, Liz O'Brien, *How Nature Connectedness Promotes Children's Wellbeing: Evidence from an International Study*, Journal of Outdoor and Environmental Education, Vol. 25, Issue 1, 2022, h. 45–61.

[24] Louise Chawla, *Childhood Nature Connection and Constructive Hope: A Review of Research on Connecting with Nature and Coping with Environmental Loss*, People and Nature, Vol. 2, Issue 3 2020, h. 619–42.

[25]Mel McCree, Roger Cutting, Dean Sherwin, *The Hare and the Tortoise Go to Forest School: Taking the Scenic Route to Academic Attainment via Emotional Wellbeing Outdoors*, Early Child Development and Care, Vol. 188. Issue 7, 2018, h. 980–96.

[26] Mariana Brussoni and others, *Risky Play and Children's Safety: Balancing Priorities for Optimal Child Development,* International Journal of Environmental Research and Public Health, Vol. 9, Issue 9, 2012, h. 3134–48.

lessons, even when faced with constraints such as a lack of resources or official backing.[27]However, parental perceptions are often challenging. Many parents expressed concerns about safety, risk of injury, and cleanliness when children play outsid.[28]Children may not have as many chances to play outside due to these worries. The study's authors also found that parents' socioeconomic status and level of outdoor experience significantly impact their views on nature-based learning.[29]Consequently, one way to get parents on board with this strategy is to teach them why outdoor play is so crucial for their children's growth and development.

Research Method

This research made use of a literature study, also known as a literature review, to compile its data by analyzing relevant theoretical frameworks presented in a variety of published works. [30] Exploring several scientific articles, books, and similar documents as sources of data or references that are relevant to the research being conducted.

This research is qualitative descriptive research. It aims to describe phenomena systematically based on literature reviews without collecting data directly through observation or interviews. This study's data analysis procedure follows the three steps of content analysis: data reduction, data presentation, and conclusion drafting.[31]

Literature studies allow researchers to explore theories, concepts, previous research results, and the views of experts related to the dynamics of nature-based learning and its influence on the motoric development of early childhood. These theories are obtained through database searches such as Google Scholar, Google Scholar, and Science Direct. The articles used are the results of research in the last ten years, namely between 2015 and 2024. From the results of this review, a number of articles were obtained that were relevant to the research objectives.

Results

The results of several studies show that nature-based learning has been proven effective in improving the motoric development of early childhood, both gross and fine motoric skills. In an experimental study, children who participated in nature-based learning experienced a significant increase in gross motoric skills, such as balance and coordination of movement, compared to the group using conventional methods.The conventional method is where learning is carried out in the classroom with artificial media such as book, pencil, or worksheet where motoric activity is limited. Similarly, when children engage in nature-based learning activities with sand, it helps them develop fine motor skills like touching and scraping.[32]

Furthermore, a systematic review revealed that nature-based early childhood education contributes positively to increasing children's physical activity and motoric competence, as well

[27] Julie Ernst, *Early Childhood Educators' Use of Natural Outdoor Settings as Learning Environments: An Exploratory Study of Beliefs, Practices, and Barriers*, Environmental Education Research, Vol. 20, Issue 6, 2014, h. 735–52.

[28] G Spano and others, *Parental Concerns and Children's Outdoor Activities: An Investigation during and after COVID-19 Pandemic Lockdown in Italy*, Children, Vol. 9, Issue 6, 2022.

[29] Janine K Coates, Helena Pimlott-Wilson, *Learning While Playing: Children's Forest School Experiences in the UK*, British Educational Research Journal, Vol. 45, Issue 1, 2019, h. 21–40.

[30] Miza N Adlini and others, *Metode Penelitian Kualitatif Studi Pustaka*, Edumaspul: Jurnal Pendidikan, Vol. 6, Issue 1, 2022, h. 974–80.

[31] Sugiyono, (2010), *Metode Penelitian Pendidikan Pendekatan Kuantitatif, Kualitatif, Dan R&D*, Bandung: Alfabeta, h 10.

[32] Maria Prihartini, "Penerapan Model Pembelajaran Berbasis Alam Untuk Meningkatkan Kemampuan Motorik Halus Anak Kelompok B Di TKK Mardi Wiyata Malang" Universitas Negeri Malang, Kamis, 17 April 2025).

as reducing inactive behavior.[33] The natural environment provides rich multisensory stimulation, allowing children to develop motoric skills through exploration and play that involves multiple senses. To enhance the quality of early childhood learning, Wulansari (2015) stressed the significance of creating a structured nature-based learning paradigm.[34] The inverse is also true: children's health and development might suffer when they are unable to play outside.[35]

Research shows that nature-based Early Childhood Education (ECE) has a positive impact on children's social-emotional development. Through a quantitative approach, it was found that children involved in nature-based ECE showed improvements in social skills, self-regulation, and environmental awareness. A qualitative approach strengthened these findings by identifying that these improvements may be due to the greater variety of play types available in natural environments. Including risky play, sociodramatic play, and opportunities to interact prosocially with peers and teachers.

Natural environments are considered to provide more opportunities for children's active engagement and encourage the development of imagination, creativity, and emotional connections to nature. In general, nature-based environments are preferred by children and provide broad benefits in supporting self-regulation practices and healthy social relationships. This suggests that the integration of natural environments in early childhood learning not only increases play experiences but also improves children's overall emotional and social development. Young children (ages 4-5) can benefit from the nature-centered learning approach in terms of improved fine motor skills.[36]

To help primary school pupils become more naturally intelligent, the researcher created an environment-based model of physical exercise.[37] They created four game models that involve direct interaction with nature, such as "nature exploration" and "imitating animals". However, this study also indicates that this kind of approach has not been widely implemented in the physical education curriculum in Indonesia. The implementation of nature-based learning also requires the active role of educators as facilitators.

Research has found that the use of natural materials in activities such as playing with sand and pounding leaves can develop fine motoric skills in early childhood in Semarang Kindergarten.[38]Children at Tunas Mekar PAUD who are 5 or 6 years old might benefit from the utilization of mosaic media crafted from natural resources to enhance their fine motor abilities.[39] Kindergarteners' fine motor skills are greatly enhanced by engaging in activities like playing collage with natural materials.[40] Additionally, students at Salsabila

[33]S. Dankiw, K. A., Tsiros, M. D., Baldock, K. L., & Kumar, *Nature-Based Early Childhood Education and Children's Physical Activity, Sedentary Behavior, Motor Competence, and Other Physical Health Outcomes: A Mixed-Methods Systematic Review*, International Journal of Environmental Research and Public Health, Vol. 17, Issue 11, 2020, h. 1–23.

[34] Betty Y Wulansari, "Pengembangan Model Pembelajaran Berbasis Alam Untuk Meningkatkan Kualitas Proses Belajar Anak Usia Dini". Tesis. Yogyakarta : Program Pascasarjana, Universitas Negeri Yogyakarta, Kamis, 17 April 2015.

[35]Khairul F Ne'matullah and others, *The Impact of Outdoor Play on Children's Well-Being: A Scoping Review*, Masyarakat, Kebudayaan dan Politik, Vol. 35, Issue 3, 2022, h. 282–96.

[36]Dewi Yuliana, Syaipul Bahri, *Kemampuan Motorik Halus Anak Usia 4-5 Tahun Melalui Model Pembelajaran Sentra Alam Di PAUD (Kober) Bintang Kecil Kecamatan Karawaci Kota Tangerang*, Ceria: Jurnal Program Studi Pendidikan Anak Usia Dini, Vol.8, Issue 1, 2019, h. 54.

[37] Kusriyanti, P Sukoco, *Pengembangan Model Aktivitas Jasmani Berbasis Alam Sekitar Untuk Meningkatkan Kecerdasan Naturalis Siswa*, Jurnal Pendidikan Jasmani Indonesia, Vol. 16, Issue 1, 2020, h. 65–77.

[38] Lulu Innafisah Sumadyo, 'Penggunaan Media Bahan Alam untuk Mengembangkan Keterampilan Motorik Halus Anak Usia Dini", Skripsi, Kamis, 17 April 2023.

[39] H. L Anisah, *Upaya Meningkatkan Kemampuan Kognitif Anak Melalui Media Bahan Alam Pada Anak Usia 5-6 Tahun Di PAUD Vioretty*, Pengembangan Pendidikan, Vol. 8, Issue 1 2024, h. 18–22.

[40] Sumarni and others, *Penerapan Kegiatan Bermain Kolase Menggunakan Bahan Alam Untuk Meningkatkan*

Kindergarten who are 5-6 years old can benefit from STEAM-based learning through the use of loose pieces in their fine motor development. However, there are still hurdles that must be faced, such as a lack of training for instructors in implementing this strategy and limited access to green open places. Despite the success of the athletic learning model's nature-based games in Merauke, the majority of teachers there continued to use more traditional, indoor-based methods of instruction.[41] This shows that although there is great potential in using the natural environment as a learning medium, its application is still limited.

Some types of nature-based learning that have been proven effective in developing early childhood motoric skills will be explained as follows. First, mosaic activities with natural materials such as dry leaves, seeds, and pebbles can improve children's fine motoric skills. Through this activity, children learn to stick, arrange, and cut materials according to patterns, train eye-hand coordination and accuracy. This exercise improved children's fine motor skills from 59.16% in the first cycle to 76.11% in the second, according to the findings of this research.[42]

Second, weaving with natural materials such as banana stems, bamboo, or pandan leaves can train children's hand and finger coordination. This activity encourages children to focus and be patient in arranging weaving patterns. A study at Tunas Harapan I Babulu Kindergarten showed an increase in children's fine motoric skills from 58.3% in cycle I to 90% in cycle III after doing nature-based weaving activities.[43]

Third, children's fine motor abilities can be enhanced through stringing activities involving natural objects like seeds, shells, or little pieces of wood. This activity trains children to hold, insert, and arrange small objects, which are important for the development of fine hand muscles and eye-hand coordination. Children in the 5–6 age range benefit greatly from stringing exercises that make use of natural materials in order to hone their fine motor abilities, according to research.[44]

Fourth, traditional games such as *jalankurung*or coconut shell stilts can improve children's gross motoric skills. This activity involves balance, coordination, and large muscle strength, which are important for children's physical development.[45] This study shows that traditional nature-based games are effective in developing gross motoric skills in early childhood.

Fifth, swimming as an aquatic activity can develop children's gross motoric skills. Movement in water trains muscle strength, coordination, and body balance. Research emphasized that aquatic activities are an effective alternative in developing gross motoric skills in early childhood.[46] Finally, activities such as climbing, running on uneven ground, carrying natural objects (logs, stones, water), and creating works of art from leaves, clay, or sand are very

Perkembangan Motorik Halus Anak, Journal of Classroom Action Research, Vol. 5. Issue 2, 2023.

[41] Adi Sumarsono, *Implementasi Model Pembelajaran Atletik Melalui Permainan Berbasis Alam*, Agistra: Jurnal Keguruan dan Ilmu Pendidikan, Vol. 4, Issue 2, 2017, h. 83–90.

[42] Vivi Desrianti, Serli Marlina, *Peningkatan Kemampuan Motorik Halus Anak Melalui Kegiatan Mozaik Bahan Alam di PAUD Kasih Ibu Mekar Sari Sawahlunto Program Studi Pendidikan Guru Pendidikan Anak Usia Dini* , Jurnal Pendidikan Tambusai, Vol. 8, Issue 3, 2024, h. 42157-42168.

[43] Ngatemi, Muhammad A Musi, Ineke Alriani, *Meningkatkan Kemampuan Motorik Halus Anak Usia Dini Melalui Kegiatan Menggunting*, NANAEKE: Indonesian Journal of Early Childhood Education, Vol 3, Issue 2, 2020, h. 101.

[44] Hatia Gay, Bahran Taib, Haryati Haryati, *Penerapan Kegiatan Meronce Berbahan Alam untuk Meningkatkan Motorik Halus Pada Anak Usia 5-6 Tahun*, Jurnal Ilmiah Cahaya Paud, Vol. 2. Issue 1, 2020, h. 30–44.

[45] Wiwin Kaoci, Bahran Taib, Dewi M Ummah, *Perkembangan Fisik Motorik Kasar Anak Melalui Permainan Tradisional "Jalan Tempurung"*, Jurnal Ilmiah Cahaya Paud, Vol 3. Issue 1, 2021, h. 11–22.

[46] Yudha Febrianta, *Alternatif Mengembangkan Kemampuan Motorik Kasar Anak Usia Dini Dengan Aktivitas Akuatik (Berenang)*, Al Athfal: Jurnal Pendidikan Anak, Vol. 2, Issue 2, 2016, h. 85–95.

helpful in stimulating children's neuromuscular systems.[47]

These activities can be implemented with the principle of low-cost and high-impact, meaning that they only require a little cost but have a lot of impact and can be adjusted to the local context of each region in Indonesia. Overall, nature-based learning offers a holistic approach that supports children's motoric development through direct interaction with the surrounding environment. Integrating this method into the early childhood education curriculum can provide long-term benefits in children's physical, cognitive, and social-emotional aspects.

In addition to physical and emotional development, nature-based learning has also been associated with cognitive growth in early childhood. Studies indicate that children who engage in outdoor and nature-based activities exhibit higher levels of attention, curiosity, and problem-solving abilities. For instance, outdoor environments naturally prompt inquiry-based learning as children encounter unpredictable phenomena, such as weather changes or animal behavior, which stimulate their questioning and reasoning skills.

A study found that students exposed to environmental education demonstrated improved critical thinking and academic performance. The diverse and unstructured stimuli offered by nature allow children to learn at their own pace while fostering independence and resilience. Furthermore, nature-based learning supports language development as children describe their experiences, name objects, and engage in storytelling activities based on their outdoor exploration.

Improving executive processes including working memory, inhibitory control, and cognitive flexibility is another major advantage to cognition. These skills are essential for self-regulation and academic readiness. Natural settings, with their reduced distractions and calming effect, are especially beneficial for children with attention difficulties. Moreover, nature-based learning fosters environmental stewardship from an early age. By developing an emotional connection with nature, children become more aware of sustainability issues and are more likely to adopt pro-environmental behaviors later in life. This is crucial in the context of the current global environmental crisis, as early exposure to ecological concepts can shape lifelong attitudes. Lastly, successful implementation of nature-based learning requires systemic support. Educators need professional development opportunities to effectively integrate nature into their pedagogy. Infrastructure such as school gardens, green play spaces, and access to natural reserves should be prioritized in early childhood settings. Policymakers and curriculum developers also play a key role in legitimizing and institutionalizing this approach within the national education framework.

Despite its numerous benefits, nature-based learning also presents several practical challenges that must be addressed to ensure its widespread adoption. One significant barrier is the lack of adequate green space in many urban areas, which limits opportunities for outdoor exploration. Schools located in densely populated regions often lack safe and accessible natural environments, making implementation difficult without infrastructural support.

Furthermore, cultural attitudes and parental concerns about safety, hygiene, or academic rigor may hinder acceptance of outdoor learning. Some educators may also feel unprepared or lack confidence in managing outdoor activities or aligning them with curriculum standards. Therefore, comprehensive training and resource development are essential to equip teachers with the skills and knowledge required to facilitate effective nature-based learning experiences.

[47] Ingunn Fjørtoft, Jostein Sageie, *The Natural Environment as a Playground for Children. Landscape Description and Analyses of a Natural Playscape*, Landscape and Urban Planning, Vol. 48, Issue 1–2, 2000, h. 83–97.

To overcome these limitations, creative strategies can be employed, such as the use of portable natural materials, rooftop gardens, or partnerships with local parks and environmental organizations. Encouraging community involvement can also foster a shared responsibility for children's holistic development through nature. Ultimately, building a strong foundation for nature-based education involves not only teacher preparedness and infrastructure but also a cultural shift that values experiential, nature-integrated learning as a legitimate and impactful educational approach.

Discussion

The results of this study confirm that nature-based learning is an effective approach in optimizing the development of motoric skills in early childhood, both gross and fine motoric skills. This finding supports the theory that early childhood is a crucial "golden age" period for children's growth and development.[48] Through direct interaction with natural elements, children not only learn to manage their bodies, but also develop cognitive and social skills that are important for school readiness.

The motor skills of young children benefit greatly from nature-based learning in preschool and kindergarten. Both fine and gross motor abilities can flourish in an environment rich in sensory experiences, such as nature.When compared to traditional playgrounds, children's motoric fitness, balance, and coordination are noticeably enhanced when they play in natural settings.[49] In addition, outdoor learning improves children's physical skills, especially in motoric development and independent exploratory play.

Nature-based activities such as mosaics with dry leaves, weaving with banana stems, stringing seeds, playing with shell walking, and swimming in open water have been proven effective in improving children's motoric skills. These activities allow for rich multisensory stimulation, strengthening children's hand-eye coordination, balance, muscle strength, and body control. This means that nature-based learning provides real experiences that children really need for active learning, as emphasized that early childhood learns optimally through games and challenges that directly involve the body.[50]The outdoors also inspires kids to play a wide range of games, which enhances their education. Research shows that children's cognitive, social-emotional, and motor development are all positively impacted when they play in natural settings.[51] Because of the abundance of natural features like trees, water, and rocks, kids are able to learn from their surroundings and grow as individuals via play and discovery.

From a socio-emotional perspective, nature-based learning also has a positive impact. Children involved in this learning show increased self-regulation skills, positive social interactions, and emotional connections to the environment.[52] A freer and more diverse natural environment compared to conventional classeswherechildren spend more time in class and have less motor activity allows them to develop creativity, imagination, and problem-solving skills in real contexts.

Moreover, nature-based learning contributes to the development of executive functions in young children, including cognitive flexibility,inhibitory control, and working memory. These skills are foundational for school readiness and long-term academic success. Activities that involve planning, sequencing, and adapting behavior such as building with natural blocks or navigating through uneven terrain naturally engage children's executive functions in a meaningful way.

Another key finding that emerges from this study is the importance of sensory integration in

[48]Trenggonowati and Kulsum.

[49]Fjørtoft.

[50]Amiliya and Aminah.

[51]Usep Kustiawan, *Designing Clothing Patterns to Promote Fine Motor Skills: A Research and Development Project*, International Journal of The Whole Child, Vol. 6, Issue 2, 2021, h. 9–18.

[52]Johnstone and others.

motor development. Nature provides diverse tactile, auditory, and visual stimuli that cannot be replicated in traditional classroom environments. Children walking barefoot on grass, listening to rustling leaves, or observing the movement of insects are engaged in experiences that promote neural connections essential for motor planning and sensory-motor integration. These kinds of inputs are especially beneficial for children who may have developmental delays or sensory processing challenges.

Cognitively, nature-based learning fosters curiosity and a sense of discovery, which are important drivers of intrinsic motivation. When children are engaged in outdoor learning environments, they are more likely to ask questions, make predictions, and test hypotheses core components of scientific thinking. This aligns with findings from previous studies showing that children in nature-based settings tend to exhibit higher levels of concentration and creativity than their peers in traditional classrooms.

In real-world settings, the application of nature-based learning is influenced not only by teaching strategies but also by the relationships and interactions between teachers and families. Teachers often serve as facilitators who design meaningful outdoor experiences, yet many still feel constrained by limited training or facilities. This underscores the importance of institutional support through professional development and the provision of safe, child-friendly outdoor environments.

On the other hand, parental involvement significantly influences the success of this learning model. While some parents express enthusiasm due to the visible benefits on children's physical health and engagement, others remain hesitant, often citing concerns about safety, hygiene, or the perception that outdoor activities are less "academic." Strengthening communication between schools and parents, organizing joint activities, and providing evidence-based education on the benefits of nature-based learning can help shift these perceptions.

Moreover, simple nature activities carried out at home such as gardening, nature walks, or playing with natural materials can complement school programs. These activities not only reinforce motoric development but also foster meaningful family interactions. Building a strong school-home connection, with aligned values around outdoor learning, can lead to more sustainable and impactful outcomes for children's development.

However, in its implementation in Indonesia, there are still many challenges encountered. The perception of parents who tend to worry about the risk of injury, cleanliness, and the perception of teachers who feel less skilled in designing nature-based activities are the main obstacles.[53] These obstacles indicate the need to increase teacher and parent literacy regarding the benefits of nature-based learning, as well as the importance of environmental support, such as the provision of green open spaces in the school environment.

Furthermore, educational policies in Indonesia have not fully integrated nature-based pedagogies into the national curriculum. There remains a tendency to prioritize academic competencies and measurable achievements, which often relegates play-based and exploratory learning to a secondary status. This results in limited time allocated for outdoor activities and insufficient resources for training teachers in outdoor education practices.

In addition, it is also important for educators and parents to utilize the natural resources available in the surrounding environment. Simple activities such as walking in the park, playing with sand, or collecting leaves can be effective means of developing children's motoric skills. The point is the use of natural materials from the surrounding environment that are low-cost and high-impact. In addition, training for teachers in

designing and implementing nature-based activities is needed to ensure that children get maximum benefits from this approach.

Professional development for teachers is critical..Many early childhood educators express a lack of confidence in managing outdoor environments and designing nature-integrated lesson plans. Structured training programs should focus not only on the theoretical foundations of nature-based education but also on practical strategies for risk management, safety protocols, and assessment methods suited for outdoor contexts. Collaborative planning, peer mentoring, and observation of model practices can also build teacher efficacy in this domain.

Additionally, partnerships with local communities, government agencies, and environmental organizations can support the development of nature-based learning. Schools can collaborate with local parks, botanical gardens, and ecological centers to organize field trips and outdoor learning sessions. Such partnerships can provide both logistical support and a wider variety of learning experiences, enriching the curriculum without putting excessive strain on school resources.

To ensure sustainability, there should be policy-level interventions that promote the inclusion of nature-based education in teacher training curricula and accreditation standards. Guidelines and frameworks tailored to the Indonesian context could serve as references for schools across different regions, especially those with limited access to natural environments. In urban areas, innovations such as rooftop gardens, portable plant kits, or nature simulation corners can help bring elements of nature into confined spaces.

The significance of parental participation in promoting learning in natural settings should not be overlooked either. Parents are more inclined to support their children's outdoor learning experiences when they themselves recognize and cherish these opportunities. Simple activities such as gardening, nature walks, or observing insects can become meaningful learning opportunities when guided by an adult who encourages reflection and conversation. Schools can involve parents through workshops, outdoor family events, and take-home nature activity kits that strengthen the school-home connection.

Thus, the integration of nature-based learning into the Early Childhood Education (PAUD) curriculum in Indonesia needs to be optimized. This is not only to support children's motoric development, but also as a long-term investment in the formation of healthy, adaptive, creative, and environmentally friendly children. This study encourages training programs for PAUD teachers and educational campaigns for parents so that perceptions and support for nature-based learning are increasingly positive.

Establishing mutual trust and shared goals between teachers and parents is essential to maximize the impact of outdoor learning. When both parties are actively engaged and aligned, children receive consistent support across environments, which strengthens the continuity of their developmental experiences both at school and at home. This collaborative approach fosters a sense of community around the child's learning journey, reinforcing the value of nature as a shared educational space.

The study's results support the idea that learning in natural settings has many positive effects on children's growth and development in the early years. The natural environment is a dynamic classroom that supports not only physical growth but also emotional, social, and cognitive well-being. While the implementation of this approach in Indonesia still faces obstacles, the potential impact on child development justifies increased investment and commitment from all educational stakeholders. Future research should explore scalable models of nature-based learning suitable for diverse settings and assess long-term developmental outcomes associated with this approach.

Conclusion

Based on the results of the literature study, it can be concluded that nature-based learning has a positive influence on the motoric development of early childhood, both in terms of gross motoric skills and fine motoric skills. Children involved in nature-based activities show significant improvements in balance, coordination, muscle strength, and manipulative skills such as stringing, weaving, and making mosaics. In addition, nature-based learning also supports children's social-emotional development through exploratory activities and active play in the open environment.

Although the effectiveness of this approach has been proven in various studies, its implementation in Indonesia still faces challenges, especially in terms of parental perceptions of child safety and the limited ability of teachers to design nature-based activities. Therefore, a deep understanding of teachers and support from parents is needed to encourage the successful implementation of nature-based learning in early childhood education.

Based on the above findings, it is recommended :

1. For parents
   Parents support children playing in nature, such as parks, gardens or yards, so that they get used to interacting with nature, thus supporting motoric development. Then, eliminate excessive worries about dirt or injury but still supervise children without limiting their exploration. Parents should also use natural materials at home as learning media such as leaves, sand, or seeds.
2. For teachers
   Teachers should design learning activities that involve the surrounding nature, such as school gardens, yards, or natural materials. Teachers combine motoric aspects in thematic activities, for example, imitating animal movements when learning about animals to stimulate body coordination. Teachers also increase children's creativity in using the local environment, such as weaving water hyacinth. In addition, teachers can also take training related to outdoor learning.
3. For further researchers
   Future research is recommended to conduct empirical field studies on the effectiveness of various types of nature-based activities in improving early childhood motoric skills in various different social and cultural settings in Indonesia.

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