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Analysis of Early Childhood Sensorimotor Stimulation through Local Wisdom-Based Obstacle Course Activities: A Descriptive Qualitative Study

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ABSTRACT

Sensorimotor stimulation is a fundamental aspect of early childhood development that supports children's ability to process sensory input and produce coordinated motor responses. However, learning activities in early childhood settings are often limited to simple gross motor exercises and rarely integrate culturally relevant and sensory-rich materials. This study aims to describe early childhood sensorimotor stimulation through local wisdom-based obstacle course activities. A descriptive qualitative approach was employed involving 12 children aged 4–6 years in Harapan Bangsa Kindergarten. Data were collected through structured observation, video documentation, and field notes, and analyzed using descriptive thematic analysis. The obstacle course consisted of walking on coconut shells, crawling through cardboard tunnels, zigzag walking among plastic bottles, and color sorting activities. The findings indicate that the activities stimulated dynamic balance, bilateral coordination, postural control, visual tracking, spatial orientation, and proprioceptive responses. Walking on coconut shells provided strong tactile and proprioceptive input that enhanced body awareness and balance control. Crawling and zigzag activities supported bilateral coordination and movement regulation, while color sorting strengthened visual-motor coordination. The study concludes that obstacle course activities based on local materials provide meaningful, contextual, and effective sensorimotor stimulation for early childhood development.

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ABSTRAK

Stimulasi sensorimotor merupakan aspek dasar dalam perkembangan anak usia dini yang berperan dalam kemampuan anak menerima, mengolah, dan merespons rangsangan sensorik melalui aktivitas motorik. Namun, pembelajaran di PAUD masih cenderung menggunakan aktivitas motorik sederhana dan belum banyak memanfaatkan media berbasis kearifan lokal yang kaya stimulasi sensorik. Penelitian ini bertujuan untuk mendeskripsikan stimulasi sensorimotor anak usia dini melalui kegiatan obstacle course berbasis kearifan lokal. Penelitian ini menggunakan pendekatan deskriptif kualitatif dengan melibatkan 12 anak usia 4–6 tahun di TK Harapan Bangsa. Data dikumpulkan melalui observasi terstruktur, dokumentasi video, dan catatan lapangan, kemudian dianalisis secara tematik deskriptif. Rangkaian aktivitas meliputi berjalan di atas tempurung kelapa, merangkak melalui terowongan kardus, berjalan zig-zag di antara botol plastik, dan kegiatan menyortir warna. Hasil penelitian menunjukkan bahwa aktivitas tersebut menstimulasi keseimbangan dinamis, koordinasi bilateral, kontrol postural, pelacakan visual, orientasi spasial, dan respons proprioseptif anak. Penggunaan tempurung kelapa memberikan stimulasi taktil dan proprioseptif yang memperkuat kesadaran tubuh dan kontrol keseimbangan. Aktivitas merangkak dan zig-zag membantu koordinasi gerak, sedangkan aktivitas menyortir warna meningkatkan koordinasi visual-motorik. Penelitian ini menyimpulkan bahwa permainan berbasis kearifan lokal dapat menjadi media stimulasi sensorimotor yang kontekstual, efektif, dan sesuai untuk anak usia dini.

KATA KUNCI
Stimulasi Sensorimotor; Obstacle Course; Kearifan Lokal; Anak Usia Dini; Perkembangan Motorik

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Introduction

Early childhood is a critical period for sensorimotor development because children learn to understand the world through movement, sensory exploration, and direct physical interaction with their environment. During this stage, the integration of sensory systems such as vestibular, proprioceptive, visual, and tactile systems plays an essential role in supporting balance, coordination, spatial awareness, and controlled movement. Effective sensory integration enables children to organize sensory information and produce appropriate motor responses, which become the foundation for more complex learning processes (Ayres, 2005). Motor development in early childhood is not merely about physical movement skills but also about how children process sensory input while

performing those movements. Activities such as walking, crawling, jumping, and balancing require continuous interaction between the brain and sensory systems to maintain posture and adapt movement. Children's motor skills develop progressively through repeated exposure to varied and meaningful movement experiences (Payne & Isaacs, 2017).

However, in many early childhood education settings, motor learning activities are still limited to repetitive and less challenging movements. These activities often do not fully engage multiple sensory systems simultaneously. As a result, opportunities for children to experience rich sensorimotor stimulation are still not optimally facilitated. This condition indicates the need for learning activities that are more contextual, engaging, and able to integrate sensory and motor experiences in a holistic way.

One learning approach that can provide such experiences is obstacle course activity. Obstacle courses involve a series of movement tasks that require children to pass through different challenges using various motor patterns. This activity effectively supports gross physical coordination, agility, and dynamic movement adaptation in early childhood classrooms (Asmawati, 2022). More importantly, obstacle courses allow children to actively engage in problem-solving during movement, which makes learning more meaningful and enjoyable. Traditional play approaches adapted into systematic course paths are also proven to stimulate long-term neuromuscular regulation (Fadillah, 2021).

In this study, the obstacle course was designed using local wisdom-based materials such as coconut shells, cardboard, and plastic bottles. These materials were chosen not only because they are easily accessible and economical, but also because they provide rich sensory stimulation. For example, coconut shells offer uneven and hard surfaces that stimulate tactile and proprioceptive responses when children step on them. This type of stimulation helps children develop body awareness and balance control through direct sensory experience. The utilization of regional items as active play apparatus successfully targets raw muscle extensions and intrinsic foot stability (Ramdani & Azizah, 2020).

The use of local and recycled materials also introduces an ethnopedagogical dimension in early childhood learning. Children become familiar with objects from their surrounding environment and learn that meaningful play activities can be created from simple materials. Providing structured contextual platforms using surrounding target resources is highly recommended to stimulate organic environmental tracking in young groups (Umar & Suryana, 2022). This aligns with the idea that learning should be contextualized, comprehensive, and inherently connected to the local environment (Suryana, 2021). Although previous studies have examined obstacle course activities in relation to gross motor development, limited research has focused on how such activities stimulate sensorimotor integration, particularly when using local wisdom-based materials. Therefore, this study aims to describe early childhood sensorimotor stimulation through obstacle course activities based on local wisdom. The focus is not only on motor outcomes but also on how children respond sensorily during movement activities.

Method

This study employed a descriptive qualitative approach to describe early childhood sensorimotor stimulation during local wisdom-based obstacle course activities. The qualitative design was chosen because the study focused on observing children's natural motor behaviors and sensory responses in a real play context without experimental manipulation.

The study was conducted at Harapan Bangsa Kindergarten involving 12 children aged 4–6 years, consisting of 6 boys and 6 girls. Participants were selected using purposive sampling based on their active participation in learning activities involving physical movement. The study focused on observing children's sensorimotor responses during structured play activities.

The obstacle course activity consisted of four sequential stations: (1) walking on coconut shells, (2) crawling through a cardboard tunnel, (3) zigzag walking between plastic bottles, and (4) color sorting activities using colored balls. These activities were designed to stimulate different aspects of sensorimotor integration, including balance, coordination, and sensory processing.

Data were collected through structured observation, video documentation, and field notes. Video recordings were used to capture detailed movement patterns, body adjustments, and sensory responses that may not be fully observed in real time. Field notes were used to record contextual behaviors and teacher–child interactions during the activity.

The observation instrument was developed based on sensorimotor indicators, including

dynamic balance, postural control, bilateral coordination, visual tracking, spatial orientation, proprioceptive response, and visual-motor coordination. The instrument was validated through expert judgment from early childhood education and motor development experts to ensure its relevance and clarity.

Data analysis was conducted using descriptive thematic analysis. The process included data reduction, coding of sensorimotor behaviors, categorization of emerging patterns, and interpretation of findings based on repeated observations. Triangulation of methods (observation, video documentation, and field notes) was used to enhance data credibility.

Ethical considerations were applied by obtaining permission from the school and informed consent from teachers and parents before data collection.

Result and Discussion

The observation results show that local wisdom-based obstacle course activities provide rich and varied sensorimotor stimulation for early childhood. Children were actively involved in each movement station and demonstrated different levels of sensorimotor responses depending on their age, confidence, and previous movement experience. The stimulation was not only seen in motor performance but also in how children processed sensory input to adjust their movements during the activity.

One of the most dominant findings appears in the walking on coconut shells activity. At the beginning of the activity, most children showed hesitation and unstable balance due to the uneven and curved surface of the coconut shells. However, after repeated attempts, children gradually improved their ability to adjust posture, distribute body weight, and maintain balance. Older children (5–6 years) demonstrated better postural control and faster adaptation compared to younger children (4 years). This indicates that motor maturity and experience influence the effectiveness of sensorimotor integration during movement activities. Balanced movement development is known to scale incrementally across chronological aging milestones (Gallahue et al., 2012).

Similarly, crawling through the cardboard tunnel stimulated strong bilateral coordination. Children were required to coordinate both sides of the body in a rhythmic movement pattern. Most children were able to complete the task successfully, although some still showed inconsistent movement rhythm. This activity also supported spatial awareness as children adjusted their body position in a confined space. This baseline structural progression aligns with established educational handbooks regarding childhood motor framework scaffolding (Sumantri, 2020).

The zigzag walking activity between plastic bottles required children to integrate visual information with motor planning. Children needed to quickly process visual cues to avoid obstacles while maintaining forward movement. This condition trained agility, focus, and movement control. Meanwhile, the color sorting activity highlighted visual-motor coordination, where children matched colors accurately while controlling hand movements. Overall, the obstacle course provided multisensory stimulation involving vestibular, proprioceptive, tactile, and visual systems. These sensory inputs worked simultaneously to support adaptive motor responses during play.

Table 1. Summary of Sensorimotor Stimulation at Each Activity Station.

Activity Station	Sensorimotor Focus	Children's Responses	Interpretation
Walking on coconut shells	Balance, proprioception, tactile	Initially hesitant, then became stable after practice	Improves body awareness and postural control
Crawling through tunnel	Bilateral coordination, spatial awareness	Movement becomes more rhythmic and coordinated	Strengthens left–right body coordination
Zigzag between bottles	Visual tracking, motor planning	Careful at first, then faster with adaptation	Enhances movement control and decision-making
Color sorting	Visual-motor coordination	Fairly good and focused performance	Strengthens eye–hand coordination

From a theoretical perspective, the findings support sensory integration theory, which emphasizes that organized sensory input helps children produce adaptive motor responses (Ayres, 2005). In this study, coconut shells provided natural proprioceptive and tactile feedback that encouraged children to continuously adjust their posture and movement. This aligns with the idea that sensory-rich environments contribute to better motor regulation in early childhood.

Furthermore, the crawling and zigzag activities reflect the importance of movement variability in motor development. Children's motor skills develop through repeated exposure to varied

movement experiences (Payne & Isaacs, 2017). The obstacle course design in this study provided such variability, allowing children to engage in different motor patterns within a single learning activity.

The use of local materials also strengthens the contextual dimension of learning. Coconut shells, cardboard, and plastic bottles are familiar objects in children's environment, making the learning process more meaningful and relatable. This supports the concept of ethnopedagogy, where local culture and environment become part of the learning process (Umar & Suryana, 2022). Overall, the combination of narrative findings and structured table presentation shows that obstacle course activities based on local wisdom are effective in stimulating integrated sensorimotor development in early childhood. The activities not only support motor coordination but also enhance sensory processing and adaptive movement behavior in a natural learning context.

Conclussion

This study concludes that local wisdom-based obstacle course activities provide effective and meaningful sensorimotor stimulation for early childhood. The activities involving walking on coconut shells, crawling through cardboard tunnels, zigzag movements between plastic bottles, and color sorting tasks stimulate various aspects of sensorimotor development, including dynamic balance, bilateral coordination, postural control, visual tracking, spatial orientation, and visual-motor coordination.

The use of coconut shells as a learning medium provides natural proprioceptive and tactile stimulation that supports children's body awareness and balance control. Meanwhile, crawling and zigzag activities encourage coordination and motor planning, while color sorting strengthens visual-motor integration.

Overall, obstacle course activities based on local materials create a holistic, contextual, and enjoyable learning experience that supports integrated sensorimotor development in early childhood. This approach can be used as an alternative learning strategy for teachers in designing developmentally appropriate physical activities that utilize locally available materials.

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Disclosure statement

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