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Enhancing Fine and Gross Motor Skills through Innovative Plant-Themed Worksheets: A Development Research at TKK Kemala Bhayangkari 08 Bajawa

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ABSTRACT

Objective: This study aimed to develop and validate plant-themed children's worksheets (LKA) specifically designed to stimulate the physical and motor development of early childhood students. This study addresses the gap in available teaching materials at TKK Kemala Bhayangkari 08 Bajawa, which previously relied on generic, non-contextual resources that were less effective in engaging children's active movement and coordination. **Method**: This study employed a Research and Development (R&D) approach using the 4-D development model: Define, Design, Develop, and Disseminate. Data were collected through expert validation (media, content, and learning design specialists), teacher interviews, and direct observations. The feasibility of the product was measured using Likert-scale questionnaires, and its effectiveness was evaluated by comparing children's motor skill performance before and after the implementation of the developed LKA. **Results**: The findings indicate that the plant-themed LKA is highly feasible and effective. The expert validation scores reached an average of 3.38 (good/valid category). The implementation results showed a significant improvement in children's physical-motor abilities, with fine motor skills increasing by 25% and gross motor skills by 29%. Furthermore, the media received high practicality ratings from teachers (95%) and parents (90%), who noted increased student engagement owing to the contextual nature of the plant-based activities. **Novelty**: This study contributes to early childhood education by providing a context-based LKA that integrates local environmental themes (plants) with specific physical-motor exercises. Unlike standardised worksheets, this developed media bridges the gap between cognitive understanding of nature and physical activity, offering a replicable model for teachers in rural or specific ecological regions to develop localised teaching aids for children.

INTRODUCTION

The early childhood period, universally acknowledged as the "golden age", represents a critical and unparalleled phase of human development, characterised by rapid growth across all developmental domains (Diananda, 2025; Diem-Wille, 2018). During these formative years, children establish foundational competencies in the cognitive, socio-emotional, linguistic, and physical-motor spheres, which collectively underpin their future academic trajectory and personal well-being. Within this holistic framework, physical-motor development serves as a key indicator of neurological maturation and overall health (Yulianis et al., 2025). This domain encompasses both gross motor skills, which involve the coordinated use of large muscle groups for essential movements such as balancing, running, and jumping, and fine motor skills, which require precise control of small muscles for critical pre-academic tasks such as writing, drawing, and manipulating objects (Brewer, 2017; Magill & Anderson, 2010; Rosenbaum, 2009; Szabo, 2021). Insufficient or inappropriate stimulation during this sensitive period can precipitate persistent developmental delays, adversely affecting a child's self-efficacy and capacity to successfully engage with the demands of formal education (Bandura, 1993; Rosepti, 2022).

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Notwithstanding its established significance, a discernible chasm often exists between developmental theory and classroom practice in many Early Childhood Education (ECE) settings (Cohen, 2017; Price, 2017). For example, TKK Kemala Bhayangkari 08 Bajawa continues to use the Children's Worksheet (Lembar Kerja Anak or LKA) as a central instructional tool. A pressing pedagogical challenge identified here is the pronounced over-reliance on conventional, mass-produced worksheets sourced from commercial publishers. These "ready-made" materials are frequently imbued with abstract, decontextualised content that bears little resemblance to the learners' daily experiences and immediate environment. Consequently, such generic resources often fail to ignite intrinsic curiosity or encourage active physical participation, fostering a sedentary learning culture where children complete monotonous tasks devoid of meaningful personal connections to the subject matter (Cereda, 2024; Ostroff, 2016; Rickards, 2025).

Extant educational research robustly supports the efficacy of contextual learning an approach that deliberately anchors instructional content to learners' real-world environment as a powerful strategy for enhancing engagement, understanding, and retention (Johnson, 2002; Reddy & Revathy, 2024). For a community like Bajawa, where daily life is interwoven with rich and diverse flora, a plant-themed pedagogical approach holds immense yet underutilised potential. However, while the thematic value of plants is recognised, the systematic and intentional integration of localised botanical themes into specially designed worksheets aimed at targeted motor stimulation remains a notably underexplored area of research. Prevailing plant-themed LKAs predominantly emphasise cognitive exercises, such as labelling plant parts or colour recognition, while largely overlooking the incorporation of structured motor challenges. These could include activities such as tracing intricate leaf venation, creating collages with natural materials, or embodying physical movements that mimic plant growth—all designed to refine coordination, strength, and control.

To address this gap, the present study aims to develop and empirically validate an innovative, contextualised LKA centred on the theme of local plants. The novelty of this instructional media lies in its integrative, dual-purpose design: it seamlessly merges cognitive environmental awareness with deliberate, high-intensity motor activities that specifically challenge eye-hand coordination, bilateral integration, and muscle control. Guided by the Educational Design Research (EDR) framework and employing the systematic 4-D development model (Define, Design, Develop, and Disseminate), this research endeavors to produce a product that is not only theoretically rigorous as vetted by experts in media, content, and learning design but also demonstrably practical and effective in authentic classroom implementation.

Theoretically, this study contributes to the corpus of early childhood pedagogy by proposing a replicable model of environmentally grounded instructional design. Practically, the findings are intended to provide educators at TKK Kemala Bhayangkari 08 Bajawa and comparable institutions with a strategic blueprint for creating autonomous, cost-effective, and deeply relevant teaching aids. Ultimately, this research transcends addressing localised needs; it seeks to enrich the global scholarly discourse on innovative, developmentally appropriate learning media that effectively promote holistic physical motor development in the early years.

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RESEARCH METHOD

Research Design This study adopted the Educational and Design Research (EDR) framework, specifically utilising the Research and Development (R&D) method. The development procedure follows the 4-D model proposed by Thiagarajan, which consists of four systematic stages: Define, Design, Develop, and Disseminate (Aimmah & Amin, 2025; Hamsa, 2014; Syam & Furwana, 2022). This model was selected for its structured approach to producing and validating educational products that are both effective and practical for classroom use. The research was conducted through the following four stages:

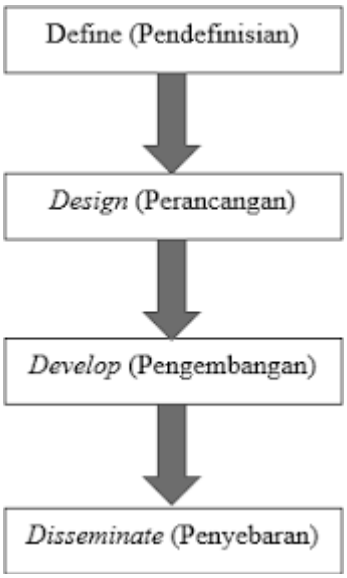

Figure 1. Procedures The research

Define: In this initial stage, a front-end analysis was performed to identify the fundamental problems facing physical-motor development at TKK Kemala Bhayangkari 08 Bajawa. This includes learner analysis, task analysis, and the specification of instructional objectives based on the national curriculum for early childhood education.

Design: The design phase involved preparing prototype plant-themed children's worksheets (LKA). The activities were structured to integrate motor stimulation, such as drawing, colouring, and tracing, with botanical themes. During this phase, the researcher also constructed evaluation instruments for expert validation and teacher feedback.

Develop: The development stage focused on producing physical media and securing professional validation. The prototype was reviewed by media, content, and learning design experts. Based on their feedback, the LKA was revised before being subjected to a limited trial with students to measure its effectiveness in improving motor skills of the students.

Dissemination: The final stage involved the limited distribution of the final LKA to educators at TKK Kemala Bhayangkari 08 Bajawa. The goal was to promote the use of contextual teaching materials as substitutes for generic worksheets.

Participants and Data Sources The subjects of this study were the students of TKK Kemala Bhayangkari 08 Bajawa. Data were gathered from multiple sources to ensure triangulation and reliability: (1) expert validators providing technical evaluation of the media, (2) teachers and parents providing practicality feedback, and (3) students providing primary data on motoric skill improvement through direct observation.

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Instruments and Data Analysis Data collection instruments included expert validation sheets, observation checklists for motor performance, and interview guides. The data were analysed using qualitative and quantitative descriptive techniques. Expert and teacher feedback were calculated using a Likert scale (1-4) to determine the average score and feasibility category. Meanwhile, the improvement in physical-motor skills was measured by comparing pre- and post-test observation percentages to determine the effectiveness of the developed LKA.

RESULTS AND DISCUSSION

Results

This study aimed to develop a Child Worksheet (LKA) with a plant theme and evaluate its impact on the physical-motor skills of children at TKK Kemala Bhayangkari 08 Bajawa. After the implementation of the LKA, data were collected through observations and assessments of the children's physical motor skills before and after the use of the LKA. The following are more in-depth and compelling research results, accompanied by a results table 1.

A. Improvement of Physical-Motor Skills

Children's physical-motor skills were measured using a rating scale covering both fine and gross motor skills. Assessments were conducted before and after LKA use over a four-week period. The following table shows the average scores for children's physical-motor skills.

Table 1. Comparison of Average Student Motor Skills Before and After Using LKA

Skills Aspect	Before LKA (Average Score)	After LKA (Average Score)	Improvement (%)
Fine Motor Skills	68%	85%	25%
Gross Motor Skills	62%	80%	29%
Total Physical Skills	65%	83%	28%

B. Analysis of Child Involvement

Children's engagement during learning activities was measured using an observation scale that included aspects of enthusiasm, participation, and social interaction. The following table shows the results of the observations of children's engagement.

Table 2. Comparison of Average Student Engagement Before and After Using LKA

Engagement Criteria	Before LKA (Average Score)	After LKA (Average Score)	Improvement (%)
Enthusiasm	70%	90%	20%
Participation	65%	88%	23%
Social Interaction	60%	85%	25%

C. Feedback from Teachers and Parents

Feedback from teachers and parents was also collected to evaluate LKA effectiveness. The survey results showed that:

a. A total of 95% of teachers reported that children were more active and enthusiastic about learning after using LKA.

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b. Ninety% of parents observed an improvement in their child's physical-motor skills at home, such as drawing and playing outdoors.

The results showed that the use of LKA with a plant theme significantly improved children's physical motor skill. The visible improvements in fine and gross motor skills indicate that the activities designed in the LKA are not only engaging but also effective in stimulating children's physical development. The increased involvement of children during the activity shows that the plant theme succeeded in attracting their attention and making them more active. Positive feedback from teachers and parents confirmed that this LKA is beneficial not only in the school environment but also at home, creating a synergy between formal and informal education.

Discussion

The development of the plant-themed Children's Worksheet (LKA) at TKK Kemala Bhayangkari 08 Bajawa has a significant positive impact on the physical-motor development of early childhood learners. The findings revealed that after the implementation of the developed media, there was a substantial increase in both fine and gross motor skills, with an overall improvement of 28%. This success can be attributed to several pedagogical factors, primarily the integration of contextual learning and structured activities within the 4-D development framework.

The primary strength of plant-themed LKA lies in its contextual relevance. Unlike generic, mass-produced worksheets that often present abstract concepts, this medium utilises themes that children in Bajawa encounter daily. According to the theory of contextual teaching and learning, children learn best when they can relate new information to their environment. Using "plants" as a central theme, the LKA provides a concrete stimulus that encourages children to observe, touch, and replicate natural shapes. For instance, activities such as colouring specific local leaf patterns or tracing the stem of a plant require precise neuromuscular coordination, which directly facilitates the 25% increase in fine motor skills.

Furthermore, the 29% improvement in gross motor skills highlights the effectiveness of integrating physical movement into a traditionally sedentary worksheet. The developed LKA does not merely focus on paper-and-pencil tasks; it includes instructions that prompt children to mimic plant growth or participate in outdoor planting activities. This aligns with the principle that physical-motor stimulation in early childhood should be holistic and involve both small and large muscle groups. The high engagement rate (90% enthusiasm) suggests that the plant theme effectively bridges the gap between cognitive curiosity and physical action, making the learning process more enjoyable and less burdensome for children.

The expert validation results, which yielded an average score of 3.38 (good), confirmed that the media was technically sound. However, the lower score for "letter shape and size" (2.63) during the initial phase served as a critical point for revision. In the final version, the typography was adjusted to be more "child-friendly", ensuring that the visual instructions did not overwhelm the children's cognitive load. This adjustment is vital because, in early childhood education, the visual presentation of a worksheet is as important as its content. If the visual design is too complex, it can hinder the child's focus on the motoric task at hand.

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In conclusion, the results of this study suggest that localised, theme-based learning media are far more effective than standardised materials in promoting physical-motor growth. The high practicality ratings from teachers (95%) and parents (90%) indicate that this LKA is not only an effective educational tool but also a practical solution for schools in specific ecological regions. This research provides a replicable model for educators to develop their own contextual media, thereby reducing their dependency on generic materials and ensuring that learning remains relevant to a child's immediate world.

CONCLUSION

Fundamental Finding: This study concludes that the development of plant-themed children's worksheets (LKA) is highly effective in enhancing the physical-motor skills of early childhood learners at TKK Kemala Bhayangkari 08 Bajawa. The implementation of this media resulted in a significant improvement in total physical skills, increasing from 65% to 83%. Specifically, gross motor skills improved by 29% and fine motor skills by 25%, demonstrating that the designed activities successfully stimulated both large- and small-muscle coordination. Expert validation and student trials further confirmed that the media is feasible, attractive, and contextually relevant for the target age group. **Implication:** This study's findings suggest that contextual learning media, which utilise themes from a child's immediate environment, are superior to generic, mass-produced materials. By integrating local themes, such as plants, educators can create a more engaging and less monotonous learning atmosphere that encourages active physical participation. This study serves as a practical reference for early childhood education (PAUD) institutions to develop innovative and sustainable teaching materials that align with the specific characteristics and needs of their students. Despite the positive results, this study has certain limitations. The scope of the research was limited to a single institution, TKK Kemala Bhayangkari 08 Bajawa, which may limit the generalisability of the findings to other regions with different environmental characteristics. Additionally, while the development followed the 4-D model, the dissemination stage was conducted on a limited scale within the local Ngada region. Furthermore, the study focused primarily on physical-motor skills, leaving other developmental aspects, such as cognitive or social-emotional growth, for separate observation. **Future Research:** Future research should focus on retesting the effectiveness of this plant-themed LKA across a broader range of kindergartens in the Ngada region and beyond to ensure its universal applicability to other contexts. Subsequent studies should develop similar contextual learning media using different themes to further improve the overall quality of education in TKK institutions. Moreover, longitudinal studies should be conducted to evaluate the long-term impact of such contextual worksheets on children's interest in nature and their continued physical development.

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