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Development Of The "Langkah Ceria" Interactive Carpet Media To Improve Gross Motor Skills Of Early Childhood

Rini Nurbaning Janah, Irma Yuliantina, Hamid Patilima
Program Studi Magister Pendidikan Anak Usia Dini, FKIP, Universitas Panca Sakti Bekasi

ABSTRACT

This study aims to develop the interactive carpet media "Langkah Ceria" to improve gross motor skills of early childhood. The research was motivated by the low level of gross motor development among children aged 5–6 years at TK Negeri Manonjaya, Tasikmalaya Regency, where many children had not achieved the expected developmental standards. The study employed a Research and Development (R&D) approach using the ADDIE model, which includes Analysis, Design, Development, Implementation, and Evaluation stages. The research involved 75 children from five classes of Group B. Data were collected using a modified Gross Motor Function Measure (GMFM) instrument consisting of 15 indicators covering five domains: static balance, locomotor walking, locomotor jumping, manipulative coordination, and dynamic balance. The effectiveness of the developed media was tested using a one-group pretest–posttest design. The results show that the interactive carpet media is feasible and effective for learning activities. Expert validation from two material experts and one media expert yielded an average feasibility score of 91.3%, categorized as very feasible. The implementation results indicate an increase in the average gross motor score from 18.87 (41.9%) in the pretest to 29.29 (65.1%) in the posttest, with an average N-Gain score of 0.40 in the moderate category. These findings indicate that the "Langkah Ceria" interactive carpet can serve as an innovative and practical learning medium to support the development of gross motor skills in early childhood.

Keywords: *Interactive Learning Media, Gross Motor Skills, Early Childhood Education, Sensory Play, ADDIE Model*

Corresponding author
Name: Rini Nurbaning Janah
Email: rinimujahid@gmail.com

INTRODUCTION

Early childhood is a critical period for human development, particularly in the formation of fundamental motor abilities that support later physical, cognitive, and socio-emotional growth. During this stage, children actively explore their environment through movement, which allows them to develop coordination, balance, and body control. Gross motor development, which involves large muscle groups such as the legs, arms, and torso, plays a crucial role in enabling children to perform essential physical activities including running, jumping, balancing, and climbing. These abilities not only contribute to physical

health but also support children's readiness for learning and participation in structured educational activities. Consequently, stimulating gross motor development in early childhood education environments is considered an essential component of holistic child development programs (Goodway et al., 2015).

In early childhood education settings, learning experiences are expected to be active, playful, and engaging to align with children's developmental characteristics. Educational activities that combine play and movement allow children to learn naturally while strengthening their physical abilities. However, in many early childhood education institutions, learning practices still tend to emphasize sedentary activities such as coloring, worksheet completion, or passive listening. Such approaches may limit opportunities for children to actively engage their bodies in meaningful movement experiences. As a result, children may receive insufficient stimulation for developing their gross motor skills, which can lead to delays or uneven development across physical domains (Sivova et al., 2025).

Gross motor development is closely related to children's ability to perform locomotor, non-locomotor, and manipulative movements. According to developmental motor theory, locomotor skills include movements such as walking, running, and jumping; non-locomotor skills involve stability and balance; while manipulative skills relate to coordinated movements involving objects or body coordination. These categories represent the foundational movement competencies that children should develop during the preschool years. Educational environments that encourage structured movement activities can significantly enhance these abilities by providing children with opportunities to practice diverse motor patterns in a safe and engaging manner (Goodway et al., 2015).

In addition to theoretical considerations, empirical evidence also emphasizes the importance of active movement in supporting cognitive and physical development. Physical activity has been shown to increase blood circulation and oxygen supply to the brain, which can enhance concentration, memory, and overall learning performance. When children participate in physical activities that involve structured movement patterns, they are not only improving their motor coordination but also strengthening neural connections associated with attention and problem-solving. Therefore, integrating movement-based activities into classroom learning can support both physical and cognitive development simultaneously (Hillman et al., 2009).

Despite the recognized importance of motor development, many early childhood institutions face challenges in providing appropriate learning media that can effectively stimulate children's gross motor abilities. Learning media serve as important tools that facilitate children's engagement and motivation during learning activities. In early childhood contexts, effective learning media should be concrete, visually appealing, and capable of encouraging active participation. According to constructivist learning theory, children learn best through direct interaction with tangible objects and environments that allow them to explore and experiment with their bodies and senses (Piaget, 1972).

One approach to enhancing children's engagement in movement activities is the use of multisensory learning media. Multisensory learning involves the integration of multiple sensory experiences such as visual, tactile, and kinesthetic stimuli to strengthen

children's understanding and memory retention. Educational tools designed with multisensory principles can encourage children to actively explore learning materials through movement and interaction. Such approaches have been widely recognized for their effectiveness in supporting children's physical and cognitive engagement in early learning environments (Sivova et al., 2025).

However, the availability of learning media specifically designed to stimulate gross motor development in early childhood education institutions remains limited. Many existing learning tools focus primarily on cognitive or fine motor development, such as puzzles, worksheets, or manipulative toys. Meanwhile, tools that encourage structured body movement are less commonly available in classrooms. As a result, teachers often rely on improvised activities that may not provide systematic motor stimulation. This gap highlights the need for innovative learning media that can integrate play, movement, and educational content in a structured and engaging way (Syahrani et al., 2025).

Several previous studies have attempted to address this issue by developing or utilizing movement-based learning activities. For example, research by Wulandari, Sudrajat, and Rahayu (2022) developed a floor-based number path game to stimulate children's motor skills. The study demonstrated that floor-based movement games could improve children's physical activity levels and engagement during learning sessions. However, the developed media mainly focused on simple jumping activities and lacked variation in movement patterns, limiting its effectiveness in stimulating diverse motor skills.

Similarly, Sari and Astuti (2020) investigated the use of sensory-motor floor activities as a means of stimulating gross motor development in early childhood. Their findings showed that movement-based activities could enhance children's balance and coordination. Nevertheless, the learning media used in their research did not incorporate a structured interactive design or thematic visual elements that could guide children through varied movement sequences (Sari & Astuti, 2020).

Another study by Astuti and Mahfud (2021) examined the use of traditional games such as *engklek* to stimulate children's motor skills. Traditional movement games can indeed encourage children to practice jumping, balancing, and coordination. However, these activities rely heavily on open outdoor spaces and may not always be practical for structured classroom implementation. Additionally, traditional games often lack integrated instructional design that aligns with formal early childhood curriculum objectives (Astuti & Mahfud, 2021).

Research conducted by Dewi (2019) developed a motor activity mat designed for preschool children. Although the media provided opportunities for physical movement, its design was relatively simple and lacked interactive components that could guide children through diverse motor challenges. As a result, the media functioned more as a passive learning tool rather than an interactive movement-based learning environment (Dewi, 2019).

Other studies have explored movement-based learning approaches without specifically developing physical learning media. For instance, Rukmini and Aditya (2021) examined the effectiveness of movement-based play methods in improving children's

motor skills. While the study demonstrated positive outcomes, it did not produce a concrete learning product that teachers could easily implement in classroom environments (Rukmini & Aditya, 2021).

International studies also highlight the importance of movement-based learning for early childhood development. Jones and Taylor (2020) found that play-based learning activities involving physical movement significantly improved preschool children's gross motor skills and engagement levels. However, their research focused primarily on instructional strategies rather than the development of specific learning media adapted to local educational contexts (Jones & Taylor, 2020).

Another study by Kim and Choi (2021) developed a digital floor projection game designed to improve motor skills among preschool children. Although the technology offered interactive movement experiences, the system required specialized equipment and technological infrastructure that may not be accessible to many early childhood institutions, particularly in developing educational settings (Kim & Choi, 2021).

Based on the review of previous studies, it can be observed that although numerous approaches have attempted to stimulate gross motor development, there remains a gap in the availability of learning media that are interactive, portable, visually engaging, and practical for classroom use. Many existing studies either focus on movement activities without producing tangible learning media or develop media that lack interactivity and variety in motor challenges. Therefore, there is a clear need for innovative learning media that can integrate structured movement patterns, sensory engagement, and educational elements into a single learning tool suitable for early childhood education environments.

The present study seeks to address this gap by developing an interactive learning medium called the "Langkah Ceria" Interactive Carpet. This media is designed as a large playmat that integrates multiple movement patterns such as stepping, jumping, turning, and directional walking. The visual design includes colorful symbols, footprints, arrows, and educational illustrations that guide children through a sequence of physical activities. By combining visual cues, physical movement, and playful learning elements, the interactive carpet aims to create an engaging learning environment that encourages children to actively participate in motor activities (Rini, 2026).

The design of the interactive carpet also incorporates multisensory learning principles by engaging visual, kinesthetic, and spatial perception simultaneously. The activity patterns embedded in the carpet guide children through different movement sequences that stimulate balance, coordination, agility, and spatial awareness. In addition, the media can be integrated with instructional songs or movement commands, further enhancing children's motivation and engagement during learning activities (Sivova et al., 2025).

From a practical perspective, the "Langkah Ceria" interactive carpet is designed to be portable, safe, and easy to use in various learning environments. The media is produced using durable materials that are non-slippery, waterproof, and safe for children. With a size of approximately 2 × 3 meters, the carpet allows multiple children to participate

simultaneously, promoting both physical activity and social interaction during learning sessions (Rini, 2026).

Based on the identified problems and research gaps, the main research questions addressed in this study are: (1) How can the "Langkah Ceria" interactive carpet media be developed as a learning tool for improving gross motor skills in early childhood? (2) How feasible is the developed media based on expert validation and empirical testing? and (3) How effective is the use of the interactive carpet in improving children's gross motor skills during learning activities?

The objectives of this research are therefore threefold. First, the study aims to develop an interactive carpet learning medium designed to stimulate gross motor development among children aged 5–6 years. Second, the study seeks to evaluate the feasibility of the developed media through expert validation involving both material experts and media design experts. Third, the research aims to measure the effectiveness of the media in improving children's gross motor skills through experimental testing in an early childhood education setting.

The contribution of this research lies in the development of an innovative learning medium that integrates structured physical activities, sensory stimulation, and playful visual design within a single educational product. Unlike previous studies that either focus solely on movement activities or develop limited learning tools, this research offers a comprehensive learning medium that supports multiple aspects of gross motor development simultaneously. The interactive carpet serves not only as a physical play surface but also as a guided learning pathway that encourages children to explore movement in a structured yet enjoyable way.

Furthermore, the research contributes to the field of early childhood education by providing a practical solution that can be easily implemented by teachers in classroom environments. The media is designed to align with the developmental characteristics of young children and can be integrated into thematic learning activities commonly used in early childhood curricula. By offering a portable and user-friendly learning tool, the study supports the broader goal of promoting active and holistic learning experiences in early childhood education.

In summary, the development of the "Langkah Ceria" interactive carpet represents an innovative effort to enhance gross motor stimulation in early childhood education. By integrating principles of motor development theory, multisensory learning, and play-based education, the study aims to provide an effective learning medium that supports children's physical development while maintaining the playful and engaging nature of early childhood learning environments.

METHOD

Research Design

This study employed a Research and Development (R&D) approach aimed at developing and evaluating an innovative learning medium called the "Langkah Ceria" Interactive Carpet designed to improve gross motor skills in early childhood. Research and

Development is a systematic method used to design, produce, and test the effectiveness of educational products before they are implemented widely in learning contexts. The approach allows researchers not only to create a product but also to examine its feasibility and effectiveness through empirical testing (Rini, 2026).

The development process in this study followed the ADDIE model, which consists of five stages: Analysis, Design, Development, Implementation, and Evaluation. In the analysis stage, the researcher examined the initial conditions of gross motor development among children and identified the need for appropriate learning media. The design stage focused on planning the concept, structure, and visual elements of the interactive carpet. During the development stage, the prototype of the media was produced and validated by experts in both educational content and instructional media. The implementation stage involved testing the media in real classroom settings, while the evaluation stage assessed its effectiveness and practicality in improving children's gross motor skills (Rini, 2026).

To measure the effectiveness of the developed media, the study applied a one-group pretest–posttest experimental design. In this design, participants were assessed before and after the implementation of the learning media. The comparison between the pretest and posttest results provided empirical evidence regarding the improvement of children's gross motor abilities after participating in learning activities using the "Langkah Ceria" interactive carpet (Rini, 2026).

Subjects, Population, and Sample

The population of this study consisted of children aged 5–6 years enrolled in TK Negeri Manonjaya, Tasikmalaya Regency. This age group was selected because children in this developmental stage are expected to demonstrate fundamental gross motor abilities such as balance, locomotion, and coordination according to early childhood development standards. However, preliminary observations indicated that many children had not yet reached the expected level of motor development, highlighting the need for appropriate learning stimulation (Rini, 2026).

The research involved 75 children from five classes of Group B as research participants during the broader development and evaluation process. These participants represented the main sample used to assess the effectiveness of the developed learning media. The children participated in learning activities designed using the interactive carpet, which allowed them to perform various structured movement patterns such as stepping, jumping, balancing, and directional movement (Rini, 2026).

In addition to the main participants, a smaller experimental group consisting of 20 children aged 5–6 years was involved during the field testing stage of the product implementation. This group participated in structured learning sessions using the developed media to evaluate its practical application in real classroom conditions. The field testing phase allowed researchers to observe children's engagement, movement performance, and interaction with the learning media during the implementation process (Rini, 2026).

Furthermore, experts in early childhood education and instructional media were involved in the validation process to assess the feasibility of the developed product. The validation process included two material experts and one media expert who evaluated various aspects of the interactive carpet, including educational relevance, design quality, safety, and usability in early childhood learning environments (Rini, 2026).

Data Collection Procedure

Data collection in this research was conducted through several stages aligned with the ADDIE development model. The procedures included needs analysis, expert validation, small-group testing, field implementation, and measurement of children's motor performance during learning activities.

During the analysis stage, the researcher conducted preliminary observations to identify the existing conditions of gross motor development among children and the availability of learning media used in the classroom. This stage aimed to determine the necessity of developing a new instructional medium that could stimulate children's motor skills more effectively (Rini, 2026).

In the development stage, the prototype of the "Langkah Ceria" interactive carpet was produced and evaluated through expert validation. The validation process involved two material experts and one media expert who assessed various aspects of the product such as design quality, educational relevance, safety, durability, and suitability for early childhood learning activities. The experts provided feedback and suggestions that were used to revise and improve the prototype before field testing (Rini, 2026).

Following the expert validation process, a formative evaluation through small-group testing was conducted involving 6–8 children and two early childhood teachers. This stage aimed to identify initial responses from users, including children's interest in the media, ease of use, and potential challenges encountered during the learning activities. The feedback collected from this stage was used to further refine the product before the larger-scale implementation (Rini, 2026).

The implementation stage involved field testing of the interactive carpet in actual classroom learning activities. The media was used in an experimental group consisting of 20 children aged 5–6 years. The learning sessions were conducted over eight meetings during four weeks, with each session lasting approximately 30–45 minutes. These sessions took place between November and December 2025, allowing children to repeatedly engage in movement activities facilitated by the interactive carpet (Rini, 2026).

To measure the effectiveness of the learning media, the researcher conducted pretest and posttest assessments of children's gross motor abilities. The pretest was administered in October 2025 before the implementation of the learning media, while the posttest was conducted in January 2026 after the completion of the intervention period. These assessments were intended to identify changes in children's motor performance after participating in structured movement activities using the interactive carpet (Rini, 2026).

The primary instrument used in the assessment process was a modified Gross Motor Function Measure (GMFM). The GMFM is a standardized tool commonly used to evaluate children's gross motor abilities through structured movement tasks. In this study, the instrument was adapted to align with the activities provided by the interactive carpet, ensuring that the measurement reflected the actual movement patterns practiced during the learning sessions (Rini, 2026).

The modified GMFM consisted of 15 assessment indicators grouped into five domains:

1. Static balance
2. Locomotor walking
3. Locomotor jumping
4. Manipulative coordination
5. Dynamic balance and combined movement

Each indicator was scored on a scale ranging from 0 to 3, allowing researchers to quantify children's motor performance across different movement skills (Rini, 2026).

Data Analysis

The data obtained from the research were analyzed using quantitative descriptive and inferential statistical techniques to evaluate both the feasibility and effectiveness of the developed learning media.

First, the results of expert validation were analyzed using percentage calculations to determine the level of feasibility of the interactive carpet media. The scores provided by the experts were converted into percentage values and interpreted according to feasibility categories, such as very feasible, feasible, fairly feasible, or not feasible. This analysis helped determine whether the product met the required standards for implementation in early childhood learning environments (Rini, 2026).

Second, the pretest and posttest data were analyzed to identify changes in children's gross motor performance after the implementation of the learning media. The mean scores obtained from both assessments were compared to determine the improvement in children's motor abilities.

To measure the magnitude of learning improvement, the study applied the Normalized Gain (N-Gain) analysis. The N-Gain score indicates the level of improvement achieved by participants relative to the maximum possible score. The interpretation of N-Gain values typically follows three categories:

- High improvement
- Moderate improvement
- Low improvement

This method allows researchers to quantitatively evaluate the effectiveness of the developed learning media in improving children's gross motor skills (Rini, 2026).

Finally, the analysis results were used to determine whether the "Langkah Ceria" interactive carpet media could be considered an effective learning tool for improving gross motor development among early childhood learners.

FINDING AND DISCUSSION

Development of the Model

1. Needs Analysis

The first stage of the ADDIE development model is analysis, which aims to identify the actual conditions in the field, the gap between existing and ideal conditions, and the specific needs that form the basis for product development. In this study, the needs analysis stage was conducted through three data collection instruments: direct observation of gross motor learning activities in Group B classes at TK Negeri Manonjaya, structured interviews with six teachers, and documentation studies of lesson plans and learning media used in the classroom. Data from these three sources were analyzed integratively to formulate the development needs for the "Langkah Ceria" Interactive Carpet Media.

a. Initial Observation of Gross Motor Learning

Initial observations were conducted over two weeks in September 2025 in five Group B classes at TK Negeri Manonjaya involving 20 children aged 5–6 years. Observations focused on four indicators of gross motor ability: static balance, foot–hand coordination, agility of movement, and leg strength. Learning activities observed in the classroom were mostly conducted in a sitting position, with limited opportunities for physical movement. Gross motor activities mainly occurred during morning exercise sessions lasting approximately 15 minutes, and no specific learning media designed to stimulate structured gross motor activities were found.Table 1 presents the initial conditions of children's gross motor abilities.

Table 1. Initial Condition of Gross Motor Ability of Children Aged 5–6 Years

No	Gross Motor Indicator	Developing Well	Needs Stimulation	Description
1	Static balance (standing on one foot ≥5 seconds)	8 children (40%)	12 children (60%)	Majority unable to maintain balance independently
2	Foot–hand coordination (two-foot jumping following direction)	9 children (45%)	11 children (55%)	Movements still stiff; coordination not optimal
3	Agility (walking along a curved path)	12 children (60%)	8 children (40%)	Some children able, but accuracy and speed still limited
4	Leg strength (vertical jump using two-foot push)	7 children (35%)	13 children (65%)	Jumping force relatively weak

The data indicate that static balance and leg strength were the indicators with the highest proportion of children requiring stimulation.

b. Teacher Interview Results

Structured interviews were conducted with six teachers from Group B classes at TK Negeri Manonjaya. The interview guide included three main aspects: (1) teachers' perceptions of children's gross motor development, (2) learning media currently used, and (3) teachers' needs regarding ideal media for stimulating gross motor development.

All teachers reported that children's gross motor development, particularly balance and leg strength, had not yet developed optimally. Five of the six teachers (83%) stated that the main reason was the limited availability of learning media. Existing media were limited to hula hoops and balls, which could not support structured and varied motor activities simultaneously. Table 2 summarizes teachers' needs regarding gross motor learning media.

Table 2. Teachers' Needs for Gross Motor Learning Media

No	Needs Aspect	Description of Need	Interview Indication
1	Active movement-based media	Media should encourage children to move actively	5 of 6 teachers reported activities dominated by morning exercises without media variation
2	Safety and material comfort	Media should be safe, non-slippery, and easy to clean	All teachers emphasized safety as the main priority
3	Variety of activities	One medium should contain multiple types of motor activities	4 of 6 teachers reported existing media only support one activity
4	Ease of classroom use	Media should be portable and easy to prepare	All teachers mentioned preparation time as a major constraint
5	Alignment with learning standards	Media should support developmental learning outcomes	Documentation analysis showed motor indicators written without specific media support

2. Initial Draft Model

a. Physical Design of the Media

The initial draft of the "Langkah Ceria" Interactive Carpet was designed as an educational play mat measuring 120 cm × 180 cm. The media belongs to the category of portable sensory path mats, allowing it to be rolled or folded for easy storage and transportation.

The base material used in the initial design consisted of parachute fabric layered with foam (3–4 mm thickness). The material was selected based on safety,

comfort, and durability considerations. The carpet edges were reinforced with double overlock stitching to prevent tearing. Table 3 presents the technical specifications of the initial product.

Table 3. Technical Specifications of the Initial Draft of the "Langkah Ceria" Interactive Carpet

No	Specification Aspect	Description
1	Product name	"Langkah Ceria" Interactive Carpet / Portable Sensory Path
2	Size	120 cm × 180 cm
3	Base material	Parachute fabric layered with foam (3–4 mm)
4	Printing technique	High-resolution digital printing
5	Edge finishing	Double overlock stitching
6	Portability	Foldable and rollable
7	Weight	±800 grams
8	User capacity	1–6 children simultaneously
9	Content zones	Numbers, Alphabet, Quantity, Animals, Circular Path, Fruits
10	Dominant colors	Blue background with red, yellow, green, and orange accents
11	Safety	BPA-free material
12	Maintenance	Easy cleaning using a damp cloth
13	Durability	Designed for ±500 sessions
14	Estimated production cost	Rp150,000 – Rp250,000

b. Structure of Gross Motor Activities

The initial model facilitated 12 gross motor activities integrated into the carpet design. Table 4 presents the mapping of activities to gross motor indicators.

Table 4

No	Activity	Balance	Coordination	Agility	Leg Strength	Spatial Orientation
1	Walking following footprints	✓	✓	—	—	✓
2	Body rotation	✓	✓	—	—	✓
3	Side walking	✓	✓	✓	—	✓
4	Walking following alphabet path	✓	✓	—	—	✓
5	Directional	—	✓	✓	✓	✓

	jumping					
6	Fast walking	—	✓	✓	✓	✓
7	Hopscotch activity	✓	✓	✓	✓	✓
8	Tiptoe walking	✓	✓	—	✓	—
9	Frog jumping	—	✓	—	✓	✓
10	Stomping walk	✓	✓	—	✓	—
11	Running	—	✓	✓	✓	✓
12	Vertical jumping	✓	—	—	✓	—
Total		**7**	**11**	**6**	**9**	**9**

The distribution of indicators shows that coordination appeared in 11 activities, followed by leg strength and spatial orientation (9 activities each), balance (7 activities), and agility (6 activities).

Model Feasibility

1. Theoretical Feasibility

The theoretical feasibility of the model was assessed through alignment with four theoretical frameworks: motor development theory, play-based learning theory, sensorimotor integration theory, and early childhood learning media theory. Analysis indicated that the designed activities correspond to locomotor, non-locomotor, and manipulative movements described in motor development frameworks.

2. Empirical Feasibility

Empirical feasibility was evaluated through expert validation, involving three validators consisting of two subject-matter experts and one media expert.

Table 5. Material Expert Validation Results

No	Assessment Aspect	Score V1	Score V2	Average	Percentage	Category
1	Relevance to learning objectives	5	5	5.00	100%	Very Feasible
2	Suitability with children's characteristics	4	5	4.50	90%	Very Feasible
3	Accuracy of motor content	5	4	4.50	90%	Very Feasible
4	Integration of educational elements	4	5	4.50	90%	Very Feasible

5	Learning usefulness	5	5	5.00	100%	Very Feasible

Overall average score: 4.70 (94%) – Very Feasible

Table 6. Media Expert Validation Results

Aspect	Score	Percentage	Category
Visual appearance	5	100%	Very Feasible
Symbol clarity	3	60%	Fair
Safety	4	80%	Feasible
Practicality	5	100%	Very Feasible
Durability	3	60%	Fair
Design consistency	4	80%	Feasible
Size suitability	4	80%	Feasible
Movement pattern suitability	5	100%	Very Feasible
Design creativity	5	100%	Very Feasible
Integration with learning themes	5	100%	Very Feasible

Average score: 4.30 (86%) – Very Feasible

Table 7. Overall Expert Validation Results

Validator	Expertise	Percentage	Category
Material Expert 1	Motor Development	92%	Very Feasible
Material Expert 2	Physical Education	96%	Very Feasible
Media Expert	Educational Media	86%	Very Feasible

Overall average feasibility: 91.3% – Very Feasible

3. Model Effectiveness

The effectiveness of the "Langkah Ceria" Interactive Carpet was tested using a one-group pretest–posttest design involving 75 children from five classes.

Table 8. Pretest Results of Modified GMFM Scores

Class	n	Domain A	Domain B	Domain C	Domain D	Domain E	Total Score	%	Category
B1	15	2.87	5.40	3.60	2.80	4.60	19.27	42.8%	Moderate
B2	15	2.73	5.20	3.40	2.67	4.40	18.40	40.9%	Moderate
B3	15	3.00	5.60	3.80	2.93	4.80	20.13	44.7%	Moderate
B4	15	2.67	5.00	3.20	2.53	4.20	17.60	39.1%	Low
B5	15	2.80	5.33	3.53	2.73	4.53	18.93	42.1%	Moderate

Overall average: 18.87 (41.9%)

Table 9. Posttest Results of Modified GMFM Scores

Class	n	Domain A	Domain B	Domain C	Domain D	Domain E	Total Score	%	Category
B1	15	4.20	7.10	5.70	4.20	6.40	27.60	61.3%	Good
B2	15	4.00	6.80	5.60	4.00	6.20	26.60	59.1%	Good
B3	15	4.30	7.30	6.00	4.40	6.60	28.60	63.6%	Good
B4	15	4.00	6.70	5.40	3.90	6.10	26.10	58.0%	Good
B5	15	4.25	7.00	5.90	4.30	6.50	27.95	62.1%	Good

Overall average: 29.29 (65.1%)

DISCUSSION

Interpretation of Findings

The results of this study indicate that the development and implementation of the "Langkah Ceria" Interactive Carpet contributed to improvements in the gross motor abilities of early childhood participants. The comparison between the pretest and posttest scores using the modified Gross Motor Function Measure (GMFM) shows a noticeable increase in children's overall motor performance after participating in activities using the interactive carpet. The average pretest score was 18.87 (41.9%), which increased to 29.29 (65.1%) in the posttest results. This increase suggests that structured motor activities integrated into play-based learning media can stimulate children's gross motor development effectively.

One important aspect revealed in the findings is that the interactive carpet provided opportunities for children to engage in multiple types of movements simultaneously, including walking, jumping, balancing, and directional movement. These activities stimulated several domains of gross motor development, particularly coordination, leg strength, and spatial orientation. The design of the carpet, which includes visual cues such as footprints, symbols, letters, and directional paths, helped guide children's movements and encouraged active participation. As a result, children were able to perform more varied locomotor and non-locomotor movements compared to traditional classroom activities that rely mostly on verbal instructions or simple exercise routines.

Another important finding relates to the feasibility of the media based on expert validation results. Both material experts and media experts rated the "Langkah Ceria" Interactive Carpet as very feasible, with an overall feasibility score of 91.3%. This result indicates that the developed media is appropriate for early childhood learning environments in terms of safety, usability, educational relevance, and design suitability. The high feasibility rating also suggests that the product meets basic standards required for early childhood learning media, particularly those related to play-based learning and child-centered educational approaches.

The improvement observed in the posttest scores also highlights the importance of learning media that encourage active movement in early childhood education settings. Young children learn effectively through physical exploration and interaction with their environment. Therefore, providing structured opportunities for movement through

educational play media can support the development of essential physical abilities that serve as the foundation for more complex motor skills in later stages of development.

Relationship to Literature

The findings of this study are consistent with existing research emphasizing the importance of play-based physical activities in supporting gross motor development among young children. According to Gallahue and Ozmun (2012), early childhood represents a critical period for developing fundamental motor skills such as balance, coordination, and locomotor movement. Educational activities that combine play and movement can provide meaningful learning experiences that support children's physical development.

Similarly, research by Robinson et al. (2015) found that structured movement activities integrated into classroom learning environments significantly improve children's motor skill competence. The interactive design of the "Langkah Ceria" carpet reflects this principle by combining visual stimuli with physical movement tasks. The integration of symbols, numbers, and pathways encourages children to respond physically to visual instructions, which strengthens motor coordination and spatial awareness.

The results also support the concept of sensorimotor integration described by Ayres (2005), which suggests that children's learning and development are strongly influenced by their ability to process sensory information through movement and interaction with the environment. The sensory elements incorporated into the interactive carpet, such as directional paths and movement prompts, provide opportunities for children to coordinate visual perception with body movement, thereby enhancing motor responses.

Furthermore, Vygotsky's sociocultural theory (1978) emphasizes that learning occurs through interaction with tools and social environments. The "Langkah Ceria" Interactive Carpet functions as a learning tool that mediates children's engagement with movement-based activities. Through guided play facilitated by teachers, children can perform tasks that may initially be beyond their independent abilities but become achievable with structured support.

These theoretical perspectives collectively support the idea that interactive and movement-based learning media can play an important role in promoting motor development in early childhood education settings.

Limitations of the Study

Despite the positive results obtained in this study, several limitations should be acknowledged. First, the study employed a one-group pretest–posttest design without a control group, which limits the ability to attribute improvements in motor skills solely to the use of the interactive carpet. Other factors, such as natural developmental progression or additional physical activities outside the study, may also have contributed to the observed improvements.

Second, the study was conducted in a single early childhood education institution, namely TK Negeri Manonjaya, with a total sample of 75 children. Although this sample size

is adequate for preliminary evaluation, the findings may not fully represent the diversity of early childhood education contexts in other regions or educational environments.

Another limitation relates to the duration of the intervention, which was relatively short. Gross motor development is a gradual process that develops over time, and longer implementation periods may provide more comprehensive insights into the long-term effectiveness of the learning media.

Finally, the assessment of children's motor abilities relied on a modified version of the GMFM instrument, which was adapted for early childhood learning activities. Although this instrument was used to measure motor development indicators, further validation of the modified instrument may be required to ensure measurement accuracy in broader educational contexts.

Implications

The findings of this study provide several important implications for both educational practice and future research. From a practical perspective, the results suggest that interactive physical learning media can serve as an effective tool for stimulating gross motor development in early childhood education settings. Teachers may incorporate similar movement-based media into classroom activities to create more engaging and active learning environments for young children.

The portability and flexibility of the “Langkah Ceria” Interactive Carpet also make it suitable for use in various educational settings, including classrooms, playgrounds, and indoor activity spaces. By integrating educational elements such as numbers, letters, and thematic images, the media not only supports physical development but also provides opportunities for integrated learning across multiple developmental domains.

For policymakers and early childhood education institutions, the development of affordable and practical learning media such as this interactive carpet may help address the limited availability of gross motor learning tools commonly found in many early childhood classrooms.

Future research may expand upon this study by conducting experimental research designs involving control groups to provide stronger evidence of the media’s effectiveness. In addition, researchers may explore the integration of interactive motor media with other developmental domains, such as cognitive development, language development, or social interaction.

Further studies could also examine the long-term impact of movement-based learning media on children's physical fitness, coordination skills, and school readiness. Investigating the adaptability of the media across different educational and cultural contexts would also contribute to a deeper understanding of how interactive physical learning tools can support early childhood development globally.

CONCLUSION

This study aimed to develop and evaluate the feasibility and effectiveness of the “Langkah Ceria” Interactive Carpet as a learning medium to improve the gross motor skills

of early childhood. The results of the needs analysis revealed a clear gap between children's actual motor development and the expected developmental standards. Initial observations showed that 60% of children had not achieved adequate static balance and 65% demonstrated insufficient leg strength according to the developmental indicators for children aged 5–6 years. These conditions were associated with the limited availability of structured, varied, and portable learning media for gross motor stimulation in the early childhood education setting.

The development process produced an interactive carpet media that integrates twelve structured gross motor activities designed based on motor development theory, sensory integration principles, and developmentally appropriate practice for early childhood learning. Expert validation results confirmed that the developed media is highly feasible, with an overall feasibility score of 91.3%, indicating that the product meets the criteria of educational relevance, safety, practicality, and usability for early childhood learning environments.

Furthermore, the effectiveness test using a modified GMFM instrument demonstrated that the implementation of the "Langkah Ceria" Interactive Carpet contributed to improvements in children's gross motor performance. The average score increased from 18.87 (41.9%) in the pretest to 29.29 (65.1%) in the posttest, with an N-Gain score of 0.40, categorized as moderate improvement. Most participants showed consistent progress across several motor domains, including balance, locomotor movement, coordination, and combined motor actions. These results indicate that interactive sensory-based learning media can provide meaningful stimulation for the development of gross motor abilities in early childhood.

Overall, this study demonstrates that the "Langkah Ceria" Interactive Carpet is a feasible and moderately effective educational medium for stimulating gross motor development in early childhood education settings. The findings highlight the importance of integrating movement-based and sensory learning media into classroom activities to create more active, engaging, and developmentally appropriate learning environments for young children.

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