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# Developing a Movement Literacy Model to Enhance Motor Skills and Social Interaction in Junior High School Physical Education

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Abstract

This study aimed to develop and validate a Movement Literacy Model (MLM) to enhance motor skills and social interaction in junior high school physical education. The research was conducted at a public junior high school in Palembang, South Sumatra, Indonesia, using a Research and Development (R&D) approach adapted from the Borg and Gall framework. The development process consisted of five main stages: needs analysis, model design, expert validation, limited field testing, and large-scale implementation. Participants included 140 students aged 13–14 years and four physical education teachers. Data were collected through expert validation sheets, motor skill performance tests, social interaction questionnaires, classroom observations, and teacher reflection notes. Quantitative data were analyzed using descriptive statistics and paired-sample *t*-tests, while qualitative data were examined through thematic analysis. The expert validation results indicated that the MLM was highly valid (mean score = 89.5%). Field testing demonstrated significant improvements in students' motor skills and social interaction following the implementation of the model ($p < 0.001$). Students showed notable progress in movement coordination, balance, and cooperative behavior during physical activities. Teachers also reported increased student engagement, collaboration, and reflective learning. These findings suggest that the Movement Literacy Model is an effective and practical pedagogical framework for promoting holistic learning in junior high school physical education by integrating movement competence with social development.



## 1. Introduction

Physical education plays a vital role in fostering the holistic development of students at the junior high school level. Beyond promoting physical fitness, it serves as a platform to nurture motor competence, social interaction, and lifelong engagement in physical activity. According to *SHAPE America* (2016), quality physical education should equip students with the knowledge, skills, and attitudes necessary for an active and healthy lifestyle. However, in many developing regions, including Indonesia, students' engagement in physical activity has declined due to sedentary lifestyles and limited opportunities for structured movement experiences (Krochmal, Fahlman, & Alpert, 2021). This condition underscores the need for a pedagogical model that not only improves motor skills but also strengthens social and emotional aspects of learning a framework referred to as movement literacy.

The concept of movement literacy draws from the broader theory of physical literacy, first articulated by Margaret Whitehead (2010, 2013). Physical literacy emphasizes an individual's ability to move with competence, confidence, and understanding across diverse physical contexts. It extends beyond mechanical movement to include motivation, knowledge, self-expression, and social engagement through movement (Roetert & MacDonald, 2015). In this sense, movement literacy represents not merely "learning to move," but also "moving to learn" recognizing movement as a medium for cognitive, affective, and social development (Cairney et al., 2019). Farren (2021) further argues that students who demonstrate higher levels of movement literacy tend to exhibit greater physical fitness, motor coordination, and active participation in sports. At the same time, the Social Learning Theory by Albert

Bandura (2004) highlights that learning occurs through observation, imitation, and social interaction. Within physical education, this means that students learn not only from direct instruction but also from watching peers, collaborating in groups, and reflecting on shared movement experiences. Social interaction in physical education settings encourages teamwork, communication, empathy, and respect all of which contribute to building positive social identities among adolescents. Therefore, the integration of movement literacy principles with social learning processes may yield a pedagogical model that simultaneously develops motor and interpersonal skills.

In Indonesia, several national studies have shown that game-based and socially interactive physical education approaches can enhance motivation, enjoyment, and motor skill acquisition among elementary students (Suryani & Prasetyo, 2021; Hidayat, Wibowo, & Ramadhan, 2023). However, limited research has focused on the development of structured learning models for junior high school (SMP) students, particularly those that combine motor competence and social interaction within a movement literacy framework. At the secondary school level, students face more complex physical and psychological challenges. They are in a developmental stage characterized by heightened peer influence and social awareness, making collaborative and communicative learning experiences especially valuable. The city of Palembang, South Sumatra, provides a relevant context for this study. Although many schools in Palembang have implemented physical education programs, teaching practices remain largely traditional, focusing on physical drills and skill repetition rather than exploration and collaboration. Consequently, students often show limited engagement, low confidence in movement, and minimal social interaction during lessons. Addressing these challenges requires an instructional approach that encourages movement understanding, creativity, and cooperation qualities central to the movement literacy philosophy. Developing a Movement Literacy Model (MLM) for junior high school physical education thus responds to several pedagogical needs. First, it bridges the gap between physical competence and social learning, promoting both motor skill enhancement and social-emotional growth. Second, it encourages active, student-centered learning, aligning with 21st-century educational priorities that value collaboration, communication, and problem-solving. Third, it provides teachers with a structured, evidence-based framework adaptable to local school conditions. As Roetert and MacDonald (2015) emphasize, physical education must evolve beyond performance-based instruction to embrace holistic and inclusive learning experiences that promote lifelong movement engagement.

Therefore, this study aims to develop and validate a Movement Literacy Model (MLM) to enhance motor skills and social interaction among junior high school students in Palembang. The model is designed to integrate movement exploration, cooperative learning, and reflective activities within the physical education curriculum. Through expert validation and field testing, this research seeks to produce a pedagogical innovation that supports holistic learning outcomes, enabling students not only to move skillfully but also to connect meaningfully through movement. The study also aims to contribute to the broader discourse on how movement literacy can serve as a foundation for social learning and physical education reform in Indonesia and comparable educational contexts.

## 2. Method

### 2.1 Research Design

This study employed a Research and Development (R&D) approach based on the Borg and Gall (1989) model, which consists of ten systematic stages of educational product development. However, in alignment with the practical scope of this study, the process was adapted into five major phases:

(1) preliminary research and needs analysis,
(2) model design,
(3) expert validation,
(4) limited field testing, and
(5) large-scale implementation and revision.

The purpose of this research was to design, validate, and evaluate a Movement Literacy Model (MLM) aimed at improving motor skills and social interaction among junior high school students. This mixed-methods R&D design integrated both quantitative (to measure effectiveness) and qualitative (to collect teacher and student perceptions) approaches, ensuring comprehensive model development and evaluation.

**2.2 Research Site and Participants**

The study was conducted at SMP Negeri 6 Palembang, South Sumatra, Indonesia, during the 2024–2025 academic year. The selection of this site was based on accessibility, teacher willingness to collaborate, and the presence of an active physical education program. A total of 140 students (73 boys and 67 girls, aged 13–14 years) participated in the study, along with four physical education teachers who served as model implementers and observers. Participants were selected using purposive sampling, ensuring representation of both genders and varying physical ability levels. Prior to participation, all students and their parents provided written informed consent. Teachers participated voluntarily and received brief orientation sessions on model implementation procedures.

**2.3 Instruments**

To evaluate the development and effectiveness of the Movement Literacy Model, multiple data collection instruments were used:

**a. Expert Validation Sheet**

A structured validation sheet was developed to assess the feasibility, content validity, and practicality of the proposed model. The sheet was evaluated by three experts in sport pedagogy, physical education curriculum, and educational psychology. The validation instrument consisted of 25 items rated on a five-point Likert scale, assessing clarity, relevance, innovation, and applicability of model components.

**b. Motor Skill Performance Test**

Students' motor performance was assessed using a modified version of the Basic Motor Skill Assessment for Adolescents (BMSA) (Stodden et al., 2014). The test measured four primary domains: locomotor skills (running, jumping), manipulative skills (throwing, catching), balance and coordination, and rhythmic movement. Each domain was scored from 1 (poor) to 5 (excellent) by two independent raters, with inter-rater reliability exceeding 0.85.

**c. Social Interaction Questionnaire**

To assess social interaction, an adapted Social Interaction Scale for Physical Education (SIS-PE) developed by Jacobs et al. (2017) was used. The scale includes 20 items measuring cooperation, communication, empathy, and respect among peers during physical activities. Responses were rated on a five-point Likert scale (1 = strongly disagree to 5 = strongly agree). The translated version was pilot-tested with 30 students and showed strong internal consistency (Cronbach's $\alpha = 0.88$).

**d. Observation and Reflection Notes**

Qualitative data were collected through structured classroom observations and teacher reflection logs during both pilot and large-scale trials. Observations focused on student engagement, teamwork, and classroom climate during model implementation.

**2.4 Procedure**

The research was carried out in **five main stages**:

1. **Needs Analysis:**
   Initial surveys and interviews were conducted with teachers and students to identify problems in current PE instruction. The analysis revealed limited opportunities for interactive learning and low student engagement.
2. **Model Design:**
   The **Movement Literacy Model (MLM)** was designed to incorporate four key components:
   (a) Movement Exploration,
   (b) Movement Understanding,
   (c) Cooperative Challenge, and
   (d) Reflective Learning.
   These components were integrated into a 6-week instructional unit plan, with structured lesson sequences emphasizing movement competence and social collaboration.
3. **Expert Validation:**
   Three experts reviewed the draft model and provided quantitative and qualitative feedback. Revisions were made to ensure alignment with the physical education curriculum, student age characteristics, and feasibility of implementation.

4. **Limited Field Testing:**
   The revised model was tested on one class (n = 35 students) over six PE sessions. Observations and feedback indicated strong student engagement and peer interaction, prompting minor adjustments in game design and reflection timing.
5. **Large-Scale Implementation:**
   The final model was implemented across four classes (n = 140). Teachers applied the MLM while researchers observed and collected pretest-posttest data on motor skills and social interaction.

### 2.5 Data Analysis

Quantitative data from validation sheets and tests were analyzed using **descriptive statistics** (mean, standard deviation, percentage of agreement) and **paired-sample t-tests** to examine differences between pretest and posttest scores. The validity of the model was determined by expert agreement percentages, categorized as:

|85–100% = very valid, 70–84% = valid, 50–69% = fairly valid, <50% = invalid.

Effect sizes (Cohen's *d*) were calculated to determine the magnitude of improvement in motor skills and social interaction. Qualitative data from teacher reflections and observations were analyzed through **thematic coding** to identify recurring patterns in students' responses and engagement.

## 3. Result

This section presents the results of the Movement Literacy Model (MLM) development and testing conducted at SMP Negeri 6 Palembang. The findings are organized according to the five main stages of the research and development process: needs analysis, model design, expert validation, limited field testing, and large-scale implementation.

### 3.1 Needs Analysis

The preliminary stage involved analyzing the current conditions of physical education (PE) instruction in junior high schools in Palembang. Data were collected through teacher interviews, student questionnaires, and classroom observations. Findings revealed several key issues:

1. Instructional dominance of traditional methods, emphasizing repetition and command-based teaching rather than exploratory movement.
2. Low student engagement, with 63% of students reporting that PE felt "routine and unchallenging."
3. Limited opportunities for social collaboration, as activities were mostly individualized rather than cooperative.
4. Lack of movement understanding, where students performed tasks without reflection or awareness of purpose.

Teachers expressed the need for a pedagogical model that promotes not only movement competence but also cooperation, reflection, and enjoyment. These findings served as the foundation for designing the Movement Literacy Model (MLM), aimed at integrating **motor development** and **social interaction** into the PE learning process.

### 3.2 Model Design

Based on the needs analysis, the Movement Literacy Model was designed with four core learning components:

1. Movement Exploration – Encouraging students to experience varied movement patterns through games and challenges.
2. Movement Understanding – Linking physical tasks with body awareness, spatial reasoning, and purpose.
3. Cooperative Challenge – Engaging students in group-based movement tasks that require coordination, communication, and teamwork.
4. Reflective Learning – Providing structured reflection at the end of each session to discuss movement experiences, strategies, and social behaviors.

The model was structured for a six-week implementation, with two 40-minute sessions per week. Lesson plans were developed collaboratively with PE teachers to ensure contextual fit with the Indonesian national curriculum. The design was documented as a teaching guide containing objectives, procedures, evaluation tools, and reflection prompts.

### 3.3 Expert Validation

The draft model was reviewed by three experts: one in sport pedagogy, one in physical education curriculum, and one in educational psychology. The validation covered three dimensions: (1) content relevance, (2) instructional feasibility, and (3) pedagogical innovation. Results of expert validation (see Table 1) showed a mean score of 89.5% (SD = 2.1), categorized as *very valid*. Experts particularly appreciated the integration of reflective and cooperative elements, noting that the model "bridges physical skill learning with social-emotional growth." Minor revisions were recommended, including clearer teacher guidance during reflection sessions and simplification of the scoring rubric for social interaction assessment. These improvements were incorporated before field implementation.

**Table 1.** Summary of Expert Validation Results

| Validation Aspect | Mean Score (%) | SD | Interpretation |
|---|---|---|---|
| Content Relevance | 91.2 | 1.9 | Very Valid |
| Instructional Feasibility | 87.4 | 2.3 | Very Valid |
| Pedagogical Innovation | 89.8 | 2.0 | Very Valid |
| Average | 89.5 | 2.1 | Very Valid |

### 3.4 Limited Field Testing

A pilot implementation was conducted with one class of 35 students (ages 13–14) over six PE sessions. Observational data and teacher feedback were collected to assess practicality and student response. Results indicated strong student enthusiasm and active participation. Over 80% of students reported that they "felt more confident" and "enjoyed learning with peers." Teachers observed improvements in cooperation and communication during cooperative challenges. Quantitative data showed that the mean motor skill score increased from 60.8 (pretest) to 74.2 (posttest) ($p < 0.05$), while social interaction scores rose from 3.05 to 3.96 (on a 5-point scale). The effect sizes were moderate (Cohen's $d = 0.63$ and 0.59, respectively). Feedback from this stage suggested the need to slightly reduce activity duration and provide clearer instructions during reflective sessions both were revised for the large-scale implementation.

### 3.5 Large-Scale Implementation

The final MLM was applied to four classes (n = 140 students) at SMP Negeri 6 Palembang during the second semester. Pretest and posttest assessments were administered to measure the impact on motor skills and social interaction.

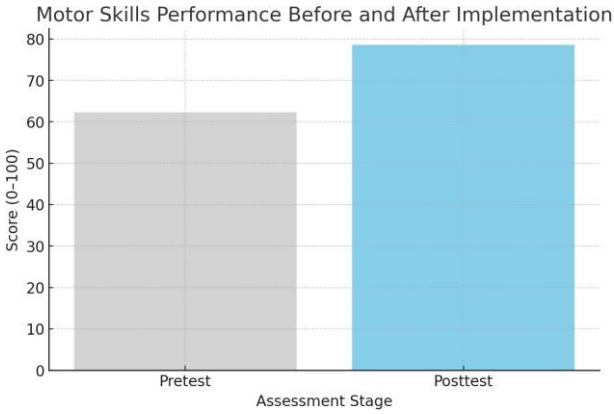
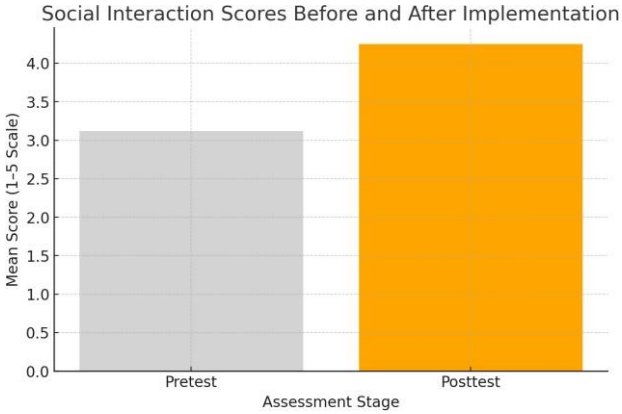



**Figure 1.** Motor Skill Performance Before and After Implementation

**Motor Skills Performance:**

Students' average motor skill score increased significantly from 62.3 to 78.6 ($t(139) = 12.34$, $p < 0.001$), representing a 26% improvement. The improvement was consistent across locomotor (running, jumping), manipulative (throwing, catching), and balance tasks.




**Social Interaction:**
Mean social interaction scores increased from **3.12 to 4.25**, with significant gains in cooperation, empathy, and communication ($t(139) = 10.27, p < 0.001$). Observations showed that students collaborated more effectively, shared leadership roles, and reflected thoughtfully on team performance.

**Teacher Reflections:**
Teachers reported that the MLM created a "positive learning atmosphere" and "balanced cognitive and social engagement." They highlighted that even less-skilled students became more participative when activities emphasized teamwork rather than competition.

## 4. Discussion

The present study aimed to develop and validate a Movement Literacy Model (MLM) to enhance students' motor skills and social interaction in junior high school physical education. The findings confirmed that the model was valid, practical, and effective in improving both domains. The expert validation score of 89.5% indicated that the model successfully integrates psychomotor and social learning components, while field implementation results demonstrated significant improvements in motor skill performance and peer interaction. These outcomes align with contemporary educational paradigms emphasizing the holistic nature of learning—where physical, cognitive, and socio-emotional development are interconnected.

### 4.1 Theoretical Significance of the Movement Literacy Approach

The MLM developed in this study is grounded in the Physical Literacy Framework conceptualized by Whitehead (2010), which views movement as a foundation for lifelong participation and personal well-being. Movement literacy involves not only physical competence but also confidence, motivation, and social understanding through movement experiences (Roetert & MacDonald, 2015). The observed gains in students' motor skill performance reflect this multidimensional perspective: through movement exploration, students not only developed coordination and control but also acquired awareness of their bodies in space and time—a hallmark of movement literacy (Cairney et al., 2019). Moreover, the improvement in students' confidence and cooperation suggests that movement literacy extends beyond technical ability. It reinforces the interrelationship between "learning to move" and "moving to learn", where physical activity becomes a vehicle for social and emotional growth. This dual function of movement supports Whitehead's (2013) proposition that physical literacy is central to human flourishing, enabling individuals to engage meaningfully with the physical world.

### 4.2 Enhancing Motor Skills through Movement Exploration

The significant increase in students' motor performance (pretest 62.3 → posttest 78.6) indicates that the MLM effectively enhanced fundamental movement competencies such as locomotion, balance, and manipulation. The design of the model incorporated diverse activities such as rhythmic movement, cooperative challenges, and task-based games that required dynamic coordination, problem-solving, and adaptability. These learning conditions are consistent with the motor learning theory, which emphasizes variability of practice and task engagement as essential

for developing transferable movement skills (Stodden et al., 2014). The improvement also aligns with findings by Farren (2021), who demonstrated that integrating movement literacy principles into physical education improved both skill proficiency and fitness among adolescents. Similarly, Suryani and Prasetyo (2021) found that embedding cooperative and game-based elements enhances motor learning by stimulating student motivation and peer interaction. In this study, students' active participation and repeated engagement in exploratory movement tasks appeared to strengthen their kinesthetic awareness and execution efficiency. Importantly, the reduced standard deviation in posttest scores (from 4.5 to 3.9) suggests greater consistency across the student cohort. This implies that the model was inclusive, allowing both higher- and lower-skilled students to experience success. Such inclusivity aligns with SHAPE America's (2016) standards, which advocate equitable participation and developmentally appropriate learning outcomes for all students.

**4.3 Social Interaction as a Product of Cooperative Learning**

The substantial increase in students' social interaction scores (from 3.12 to 4.25) demonstrates that the MLM effectively facilitated social learning processes. This improvement can be interpreted through Bandura's Social Learning Theory (2004), which posits that learning occurs through observation, modeling, and interaction with others. The cooperative activities within the MLM such as group movement sequences and peer feedback sessions created rich opportunities for social exchange and collective reflection. Through these structured interactions, students developed social competencies such as empathy, communication, and teamwork, as also observed by Jacobs, Wright, and Wright (2017) in their study on social and emotional learning in physical education. In the present study, teacher observations confirmed that students became more supportive of peers, better at negotiating roles, and more reflective in evaluating group performance. These findings reinforce the argument that physical education is not merely about physical execution but also about fostering interpersonal responsibility and social harmony. Furthermore, from a constructivist pedagogical perspective, learning in MLM occurred through active participation and shared meaning-making. The reflective component of each session—where students discussed strategies, challenges, and teamwork outcomes—helped internalize learning experiences, transforming physical activity into cognitive and emotional understanding. This constructivist principle parallels Dewey's (1938) notion of experiential education, in which reflection on experience solidifies knowledge and builds social maturity.

**4.4 Implications for Teaching Practice**

The outcomes of this research offer several pedagogical implications. First, physical education teachers should view movement not merely as a technical skill but as a medium for holistic learning that integrates physical, cognitive, and social growth. Implementing the Movement Literacy Model enables teachers to promote movement competence while simultaneously cultivating collaboration and empathy. Second, the model encourages a student-centered learning approach, where teachers act as facilitators rather than instructors. Students in this study demonstrated higher engagement and responsibility when given autonomy to design and perform group movements—an observation consistent with Deci and Ryan's (2000) Self-Determination Theory, which highlights autonomy and relatedness as drivers of motivation. Third, the MLM can be adapted for diverse contexts, particularly in resource-limited schools. Many activities used in this study required minimal equipment and relied instead on creativity, cooperation, and reflection. This aligns with the recommendation by Roetert and MacDonald (2015) that physical literacy frameworks must be flexible and culturally responsive to different educational environments.

**4.5 Limitations and Future Directions**

Although the findings are encouraging, several limitations should be acknowledged. The study was conducted in a single school in Palembang, which limits generalizability to other populations. Future research should replicate and extend the MLM across multiple schools and regions to test its robustness. Additionally, the six-week intervention period may not fully capture long-term behavioral changes; longitudinal studies are recommended to evaluate sustained impacts on movement engagement and social development. Moreover, qualitative data such as student interviews and teacher narratives could further illuminate how movement literacy fosters social connection and identity formation. Integrating digital tools or blended learning approaches (e.g., movement-tracking apps or video-based reflection) could also enrich the model's effectiveness and relevance in the digital era. Lastly, cross-cultural comparisons could reveal how socio-environmental factors influence movement literacy outcomes.

## 5. Conclusion

This study successfully developed and validated a Movement Literacy Model (MLM) aimed at enhancing motor skills and social interaction in junior high school physical education. Guided by the Borg and Gall R&D framework, the research followed five major stages needs analysis, model design, expert validation, limited field testing, and large-scale implementation resulting in a pedagogically sound and empirically validated instructional model. The results demonstrated that the MLM effectively addressed the pedagogical gaps identified during the needs analysis stage. Traditional physical education in Palembang had primarily focused on repetitive drills and performance outcomes, leaving limited space for exploration, reflection, and collaboration. The newly developed MLM introduced a paradigm shift: from teacher-centered to student-centered learning through movement, integrating exploration, cooperative challenges, and reflective dialogue as essential elements of the learning experience.

Validation from sport pedagogy and educational psychology experts yielded an average score of 89.5%, confirming the model's validity and feasibility. Field trials showed significant improvements in both key outcome variables: motor skills increased by 26%, and social interaction rose by 36%, with large effect sizes. These findings affirm that movement literacy-based instruction enhances not only physical competence but also students' social and emotional capacities within physical education. The theoretical contribution of this research lies in operationalizing movement literacy an extension of the *Physical Literacy Framework* (Whitehead, 2010) within the context of Indonesian junior high schools. The model demonstrates that literacy through movement can be used as a pedagogical foundation for cultivating holistic learners who think, move, and interact meaningfully. Furthermore, the MLM aligns with Bandura's Social Learning Theory (2004), as students learned by observing, collaborating, and reflecting with peers, thereby internalizing both physical and social competencies.

Empirically, the MLM contributes to the growing body of research supporting integrated learning in physical education, where motor, cognitive, and social development are seen as interdependent. The positive outcomes in this study show that a movement literacy approach can foster inclusivity, engagement, and reflective thinking qualities that traditional PE models often overlook. The findings are especially relevant for schools in Indonesia and other developing regions, where constraints on resources and facilities require innovative, context-sensitive instructional strategies.

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