



Development of a Basic Athletic Movement-Based Game Model for Javelin Throw in Elementary School Physical Education

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Abstract
<p>Objectives. The objective of this study was to develop a game-based model focused on fundamental athletic movements, specifically for the javelin throw event, to be used in physical education classes. The model was intended to improve students' motor skills in a fun and engaging way and to serve as an effective teaching tool for physical education teachers at the elementary level.</p> <p>Materials and Methods. This research employed a development research design based on the model by Borg and Gall, which consists of seven stages: (1) information gathering, (2) initial draft design, (3) expert validation and revision, (4) small-scale trial and revision, (5) large-scale trial and revision, (6) final product development, and (7) effectiveness testing. The small-scale trial was conducted with 4th-grade students at SDN 16 Poso, and the large-scale trial involved 5th-grade students at the same school. Data were collected through observation, expert validation forms, and pre-test and post-test assessments. Effectiveness was measured using a <i>t</i>-test analysis.</p> <p>Results. The results of the study revealed that the developed game-based model for teaching the javelin throw significantly enhanced students' fundamental movement skills. Through both small-scale and large-scale trials conducted at SDN 16 Poso, the model demonstrated high levels of engagement and effectiveness. Statistical analysis using the <i>t</i>-test showed that the calculated <i>t</i>-value was greater than the <i>t</i>-table value, indicating a significant improvement in students' performance after implementing the model. The final product consists of five simple and interactive games: basket throw, accurate throw, cone target throw, ball ring throw, and turbo throw. These games not only made the learning process more enjoyable but also effectively supported the development of javelin-specific motor skills in upper elementary school students.</p> <p>Conclusion. The fundamental movement game model for the javelin throw developed in this study is empirically proven to be effective in enhancing students' motor skills in upper elementary physical education classes. The model provides a practical and enjoyable approach to teaching athletic skills and can be a valuable resource for teachers in implementing physical education curricula. Future researchers are recommended to expand the application of this model to other athletic events or to different age groups to assess its broader applicability. Additionally, longitudinal studies could be conducted to examine the long-term impact of the model on students' motor development and interest in athletics.</p>
<p>Keywords : Game-based learning, Javelin throw, Fundamental motor skills, Physical education, Elementary school.</p>

Introduction

Physical Education, Sports, and Health serves as a medium to promote the development of motor skills, physical abilities, knowledge, reasoning, appreciation of values (Kuswoyo et al., 2020) (such as attitude, mental, emotional, and social aspects), and the habituation of a healthy lifestyle, all of which contribute to balanced growth and development (Rosdiani, 2012:21). Therefore, education is considered incomplete without physical education, as movement through physical activity offers positive benefits for children's overall growth and development.

Elementary school years are an ideal period for learning various specific motor skills. Generally, the optimal age range for learning such skills is between 3 to 13 years (Husdarta, 2010:103). Furthermore, Singer (in Sukadiyanto, 2012:1) stated that intensive practice and experiences in various motor skills lead to greater ease in mastering them. Thus, individuals who have had a wide range of movement experiences during childhood will find it easier to acquire new motor skills later on. The objectives of physical education in elementary schools also take into account learning goals, student abilities, instructional methods, learning materials, facilities, and learning activities.

(Kuswoyo & Betaubun, 2019) The content of Physical Education, Sports, and Health consists of several aspects, including games and sports, development activities, self-testing/gymnastics, rhythmic movement, aquatic activities, outdoor education, and health education. Among these, the games and sports component is particularly favored by children. Activities in this aspect can be carried out individually, in pairs, or in groups. Games also promote values such as teamwork, sportsmanship, honesty, tolerance, and self-confidence.

(Riyanto & Kuswoyo, 2019) One of the sports that aligns with the basic competencies of the 2013 elementary school curriculum is athletics, specifically in teaching basic movement skills such as walking, running, jumping, and throwing. These competencies are aligned with the core curriculum standards, which emphasize presenting factual and conceptual knowledge in a clear, logical, and systematic manner, through expressive movements that reflect healthy children, and behaviors that reflect faith and noble character. The basic competency, in particular, focuses on practicing variations and combinations of

basic movements walking, running, jumping, and throwing with proper control through games or traditional activities.

Based on observations and interviews with physical education teachers in several elementary schools in North Poso District, Poso Regency, several challenges were identified. Many teachers lacked creativity and variety in their teaching approaches, often relying on monotonous and conventional methods. As a result, students showed low enthusiasm and interest in participating in lessons on basic athletic movements, particularly in the javelin throw. To address these challenges in teaching the basic movements of the javelin throw, it is essential to conduct research and develop a game-based learning model using simple games tailored to elementary school students.

Materials and Methods

Study Participants.

This research was conducted at SDN 16 Poso Kota Utara, located in Poso Kota Utara District, Poso Regency. The study targeted upper-grade elementary school students as its primary subjects. A small-scale trial was conducted with 23 fourth-grade students, while a large-scale trial involved 30 fifth-grade students from the same school. Participants were selected based on accessibility and their grade level, ensuring they represented the intended target group for the development of the javelin throw movement learning model.

Study organization.

This study employed a research and development (R&D) approach. The research followed a modified version of the development model proposed by Borg and Gall (1983), which originally included ten steps: (1) information gathering, (2) planning, (3) developing the initial product, (4) preliminary field testing, (5) revising the product for the main trial, (6) main field testing, (7) revising the product for operational use, (8) operational field testing, (9) final product revision, and (10) dissemination and implementation. However, for this study, these ten steps were simplified into seven essential stages suitable for a product-oriented study:

1. Information gathering
2. Product analysis
3. Initial product development
4. Expert validation
5. Small-scale field testing
6. Large-scale field testing
7. Final product development

The data used in this study consisted of both qualitative and quantitative data. Qualitative data were collected through interviews with classroom teachers and expert feedback from content specialists and practitioners involved in the model trials. Quantitative data were obtained from observation sheets used to assess the implementation and effectiveness of the developed model.

The urgency of this study lies in the need to bridge the gap between curriculum expectations and practical implementation in physical education, especially in teaching complex athletic skills in a manner that is safe, engaging, and effective for young learners. Without innovative teaching strategies, students may miss critical opportunities to develop foundational movement patterns that support overall physical literacy and long-term athletic potential.

The novelty of this research lies in the development of a game-based instructional model specifically tailored to teaching the javelin throw to elementary school students. Unlike traditional methods that often rely on direct instruction or simplified drills, this model incorporates playful, interactive games that are not only aligned with javelin-specific motor skills but also adapted to the developmental stage of children. This approach ensures that learning becomes both meaningful and enjoyable, increasing students' motivation and active participation.

By addressing these challenges through a structured development process, this study aims to provide a practical and innovative solution for physical education teachers, contributing to more inclusive and comprehensive athletics education at the elementary level.

Statistical analysis.

The data analysis in this study employed both descriptive quantitative and descriptive qualitative methods to evaluate the effectiveness and feasibility of the developed learning model. Descriptive quantitative analysis was conducted to interpret the numerical data obtained from expert evaluations of the initial product draft and from observation sheets used during classroom trials. These included rating scales assessing the relevance, clarity, and applicability of the game-based model for teaching the javelin throw. Meanwhile, descriptive qualitative analysis was applied to examine insights from interviews with physical education teachers during the preliminary study and to analyze suggestions and feedback from experts

both before and after the field trials. This combination of quantitative and qualitative approaches provided a comprehensive understanding of the model's strengths, limitations, and areas for improvement, ultimately supporting the refinement of the final product.

Results

Model Development The development results of the fundamental athletic movement model for the throwing event designed for elementary school students were compiled into a manuscript that can be presented as a physical education learning model. **Needs Analysis Results** Overall, two general objectives were revealed during the preliminary study or needs analysis:

- (a) To determine the importance of developing a basic athletic movement game model for the throwing event in elementary schools.
- (b) To identify the challenges and supporting factors in the development of this model.

The game model was developed based on problems identified through field observations and interviews with physical education teachers in elementary schools. From this process, the main objectives for developing the fundamental movement game model in the throwing event were established. Additionally, this stage helped identify key characteristics of the subjects and the teaching environment relevant to the development of the model.

Data from Needs AnalysisThe development of the model was based on observations and interviews with physical education teachers, students, and an assessment of school conditions. Key findings included: (a) Existing throwing-based game activities were monotonous and lacked variety. (b) Teachers were unsure of how to effectively fill 4 x 35 minutes of PE class time for fifth-grade students with engaging activities. (c) Learning time was used ineffectively, with students spending more time resting than practicing movement tasks. (d) Teachers lacked creativity in modifying teaching equipment to support more varied learning. (e) Students had not yet mastered basic throwing movements. (f) Students showed low enthusiasm and were difficult to manage due to monotonous teaching methods.(g) Based on these findings, there is a need for a physical education learning model focused on throwing that meets curricular objectives while supporting teachers in delivering engaging content. The model should address:

1. Cognitive aspects (understanding of rules and teacher instructions),
2. Affective aspects (social behavior, responsibility, cooperation, honesty),
3. Psychomotor aspects (basic throwing movement skills).

(h) The developed model consists of simple games that are aligned with the learning objectives, the developmental stage of elementary students, and motor skill components. This model is expected to increase student interest and improve basic athletic movement skills in the throwing event.

Model Feasibility After collecting data and drafting the model, expert validation was conducted. The aim was to assess the feasibility and validity of the model based on expert evaluations. Three experts were involved, consisting of sports lecturers and physical education teachers.

Table 1. The summary of expert assessments is presented in

Expert Code Total Score	
A1	23
A2	22
A3	22

Table 2. Based on the scoring scale, the categories are:

Formula	Range	Category
$X < (\mu - 1\sigma)$	$X < 7.7$	Poor
$(\mu - 1\sigma) \leq X < (\mu + 1\sigma)$	$7.7 \leq X < 15.3$	Fair

Formula	Range	Category
$(\mu + 1\sigma) \leq X$	$15.3 \leq X$	Good

Where:

1. X = Total subject score
2. μ = Ideal mean = $23 \times (1 + 0)/2 = 11.5$
3. σ = Ideal standard deviation = $1/6 \times (23 \times 1) = 3.8$

From the expert evaluations, all three scores (23, 22, 22) fall into the “Good” category ($X \geq 15.3$), with an average score of 22.33. Therefore, the model is considered valid and feasible for implementation.

Model Effectiveness *Small Group Trial Results* After expert evaluation and the first round of revisions, the model was tested on a small group at SDN 16 Poso. The findings include:

1. The model is feasible for elementary students.
2. The activities are easy to understand, supporting effective implementation.
3. Clear instructional guidelines are essential to ensure comprehension.

Large Group Trial Results Following small-group trials and revisions, a large-group trial was conducted with 30 elementary students. The five games tested include:

1. Basket Throw Game
2. Target Throw Game
3. Cone Throw Game
4. Ring Throw Game
5. Turbo Throw Game

Appendix: Research Data (Turbo Throw Movement)

Table 3. Mean scores before and after the model implementation.

Test	Mean	Std. Dev.	Variance
Pretest	79.83	2.479	6.144

Test	Mean	Std. Dev.	Variance
Posttest	90.53	2.726	7.430

The results show an increase in average scores, from 79.83 before the implementation to 90.53 after, indicating improvement in student performance.

b. Correlation Coefficient Pearson correlation = 0.213 Significance = 0.259 (> 0.05)
This indicates no significant correlation between pre- and post-test scores.

Table 4. Significance of Differences

Mean Difference	t-value	df	Sig. (2-tailed)
-10.700	-17.916	29	0.000

Since $t_{\text{calculated}} > t_{\text{table}}$ ($17.916 > 2.045$), the difference is statistically significant.

Discussion

1. Product Refinement

Based on the data presented in the table above, it can be concluded that the fundamental athletic movement game model for the throwing event, designed for elementary school students, is both suitable and feasible for use in school-based learning. Moreover, it has proven to be effective in enhancing students' fundamental athletic movement skills in the throwing event. A comparison of the initial and final test results indicates significant progress. The initial test score was 1604, after which the students were exposed to the newly developed athletic movement game model for the throwing event. The final test, or post-test, was conducted to evaluate the effectiveness of the developed model, yielding a score of 2212. This confirms that the athletic movement game model for the throwing event is effective in improving students' fundamental athletic skills in elementary schools.

Considering both the strengths and weaknesses of the product, several suggestions for its improvement have been made. These recommendations include:

- a. The use of more equipment and ensuring the comfort and safety of students could enhance their ability to fully engage in the movement activities provided by the teacher.
- b. Given the characteristics and understanding levels of the students, it is crucial for teachers to offer direct practice so that students can better understand and perform unfamiliar movements.

- c. The characteristics and understanding of students necessitate direct hands-on practice to help them master new movements.

2. Product Discussion

The fundamental athletic movement game model for the throwing event, developed by the researcher, aims to assist teachers or coaches in delivering athletic movement instruction, enhancing students’ skills in the throwing event, and providing a reference for teaching materials. This model was designed based on the specific needs of children in physical education activities, particularly in teaching fundamental athletic movements for elementary school students. After evaluating the product and identifying areas for improvement, the following advantages of this model can be highlighted:

- a. It significantly improves students’ fundamental athletic movement skills in the throwing event.
- b. The model increases student participation and enthusiasm in learning fundamental athletic movements, as it is designed in the form of a game.
- c. The students experience comfort and safety during the learning process.
- d. The model is more effective and efficient in delivering lessons on athletic movement in the throwing event.
- e. It provides valuable support for teachers/coaches in the educational process at schools.
- f. The model serves as a useful reference for learning materials in schools.
- g. It contributes to knowledge in the field of physical education, particularly at the elementary school level.
- h. The model is structured systematically, progressing from easier to more complex tasks.
- i. It encourages students to think quickly and accurately.

3. Product Limitations

While this development research has been conducted to the best of the researcher’s abilities, there are still several limitations that need to be acknowledged. These limitations should be considered when generalizing the findings of the research. The identified limitations include:

- a. The field trials would benefit from being conducted on a larger scale.
- b. The product, while effective, is still far from perfect.
- c. The available resources and facilities are limited.
- d. The explanations and rules within the model for teaching athletic movements in the throwing event could still be improved.

Conclusions.

Based on the results of the research and the development of the basic movement game model for athletics in the throwing event for elementary school students, it can be concluded that this model is effective and feasible to be applied in school learning. The implementation of this game model shows a significant improvement in students' basic athletic skills, particularly in the throwing event, as evidenced by the comparison between the pre-test and post-test scores, which show a significant increase.

The strengths of this model lie in its ability to enhance student participation and enthusiasm in learning basic athletics, as it is presented in the form of fun games. In addition, this model also provides comfort and safety for students during the learning process, and helps teachers and coaches deliver the material more effectively and efficiently.

However, this study also acknowledges several limitations, such as the limited scope of field testing, limited facilities used, and certain aspects of the model that still require improvement. Nevertheless, this basic athletics movement game model for the throwing event makes a significant contribution to the development of basic athletics learning at the elementary school level and provides useful references for physical education.

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Conflict of interest

Have no conflict of interest to declare.

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