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Small Ball Game Learning Model Through the Application of Simple Tools for Elementary School Students

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Abstract

This study aims to develop a small-ball game learning model through the use of simple equipment for elementary school students. The common problems encountered in teaching small-ball games include limited facilities and infrastructure, as well as the lack of learning modifications suited to the characteristics of elementary school students. The research method used is a development study with a Research and Development (R&D) approach. The subjects of the study were 60 fourth- and fifth-grade elementary school students. The learning model was developed by modifying game equipment using simple, easily obtainable materials adjusted to students' motor abilities. The results show that the small-ball game learning model using simple equipment is effective in improving basic motor skills, learning motivation, and students' active participation in physical education learning. Expert validation indicates that the model is feasible to implement, with a feasibility rate of 87.5%, and the effectiveness of learning increased by 78.3%. This learning model can serve as an alternative solution for schools with limited facilities to optimize small-ball game learning in elementary schools.

Keywords: Model, Small-Ball Games, Simple Equipment, Elementary School, Physical Education.

Introduction

Physical education is an integral part of overall education, aiming to develop physical fitness, motor skills, critical thinking skills, emotional stability, social skills, reasoning, and moral behavior through physical activity and sports (Rosdiani, 2020). In the context of elementary school education, physical education plays a strategic role in establishing the foundation of motor skills and a healthy lifestyle from an early age. Physical education instruction in elementary schools must be designed according to the developmental characteristics of children, who are in the developmental stage from fundamental movement to specific movement (Hidayat, 2021).

Small ball games are one of the learning materials in the elementary school physical education curriculum, which includes various types of games such as baseball, rounders, baseball, softball, and cricket (Mahendra, 2020). Learning small ball games significantly contributes to the development of basic movement skills such as throwing, catching, hitting, and running, which are fundamental skills for children's motor development (Suharjana, 2021). Furthermore, small ball

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games can also develop cognitive aspects through understanding game strategies, affective aspects through teamwork, sportsmanship, and discipline, and social aspects through interaction with peers (Firmansyah, 2020).

However, the implementation of small ball games in elementary schools still faces various obstacles and challenges. Initial observations in several elementary schools indicate that small ball games learning has not been running optimally (Kusuma, 2022). The main problem identified is the limited availability of adequate sports facilities and infrastructure, especially in schools located in areas with limited access to sports facilities. Standard equipment for small ball games, such as bats, gloves, bases, and balls with standard specifications, is often unavailable or in very limited quantities, making it impossible to accommodate all students in one class (Pratama, 2021).

These limited facilities and infrastructure impact the overall quality of physical education instruction. Many physical education teachers struggle to convey small ball games, resulting in less engaging learning and student inactivity (Wibowo, 2020). This situation is exacerbated by teachers' lack of creativity in modifying learning and utilizing alternative tools available locally. Yet, modifying learning is a key to successful physical education instruction in elementary schools (Suherman, 2021).

Another equally significant problem is the use of standard equipment that is inappropriate for the physical characteristics and motor skills of elementary school students. Small ball game equipment designed for adults or athletes is inappropriate in size, weight, and difficulty level for elementary school-aged children (Nugraha, 2022). The use of this inappropriate equipment can increase the risk of injury, decrease student motivation to learn, and hinder optimal motor skill development. Elementary school students require equipment modifications tailored to their body size, strength, and skill level to perform movements correctly and feel confident (Setiawan, 2020).

Several previous studies have shown that modifying learning and the use of simple aids can improve the effectiveness of physical education instruction in elementary schools. Research conducted by Rahman (2021) showed that modifying equipment and game rules can increase student participation and enthusiasm in small ball game instruction. Similarly, research by Wijaya (2020) demonstrated that the use of learning media tailored to student characteristics can improve learning outcomes for basic motor skills. However, there are still limited comprehensive and systematic learning models for small ball games specifically developed using simple, readily available tools and appropriate for school conditions in Indonesia.

Developing a learning model for small ball games using simple tools is crucial to address these challenges. These simple tools are made from materials that are readily available locally, inexpensive, safe to use, and can be modified to suit learning needs (Hartono, 2021). Examples of simple tools that can be used include balls made from used paper or cloth, modified bats made from wood or bamboo, bases made from cardboard or carpet, and gloves made from flannel. Using these simple tools not only addresses facility limitations but can also improve.

Research Methods

This study employed a research and development (R&D) method, adapting the ADDIE development model, which consists of five stages: Analysis, Design, Development, Implementation, and Evaluation (Sugiyono, 2020). The ADDIE model was selected based on its systematic and flexible structure, widely used in research on learning product development, and demonstrated effective results. The study was conducted in three public elementary schools in

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Makassar City, South Sulawesi, selected using purposive sampling, reflecting the representativeness of schools with limited sports facilities. The subjects were 60 fourth and fifth grade students, consisting of 32 boys and 28 girls, aged 9-11.

The first stage was a needs analysis conducted through direct observation of physical education lessons, in-depth interviews with physical education teachers and principals, and documentation of the condition of sports facilities and infrastructure available at the schools (Pratama, 2021). An analysis was also conducted on the characteristics of elementary school students, including physical, motor, cognitive, affective, and social aspects, to ensure the learning model developed was appropriate for their developmental level. The needs analysis revealed that the three schools had significant limitations in small ball game equipment, and teachers required learning guidance with simple tool modifications.

The design phase began with the development of a small ball game learning model framework that encompassed learning objectives, learning materials, learning strategies, learning media and tools, and an evaluation system (Wibowo, 2020). The learning model design was structured by considering the principles of effective physical education learning, such as the principle of appropriateness to child development, the principle of variation and progression, the principle of safety, and the principle of enjoyment and motivation. At this stage, various simple tools were also designed to be used in the learning process, such as balls made of flannel and dacron, bats made of modified pine wood with appropriate sizes and weights, bases made of used carpets with different colors, and gloves made of flannel with foam padding. All equipment designs were created with safety, ease of manufacture, affordability, and suitability to student characteristics in mind.

The development phase included the creation of the learning model product and validation by experts. The product developed was a guidebook for a learning model for playing small ball games using simple equipment, complete with illustrations, photos, and video tutorials on how to make the equipment and implement the learning process (Mahendra, 2020). Validation was conducted by three experts: a physical education expert, a motor learning expert, and an instructional media expert. The validation instrument used a validation sheet with a Likert scale of 1-5, covering aspects of content suitability, presentation suitability, language suitability, and graphic suitability. The expert validation results were then analyzed and used as a basis for product revisions before pilot testing.

The implementation phase consisted of three trial stages: a small-scale trial with 10 students, a medium-scale trial with 20 students, and a large-scale trial with 60 students (Hidayat, 2021). At each trial stage, learning observations were conducted using teacher and student activity observation sheets, basic motor skills were measured using standardized throwing, catching, hitting, and running skill tests, and questionnaires were completed to gather student and teacher responses to the developed learning model. Learning was conducted in eight sessions, each lasting 2 x 35 minutes. Each session included a warm-up, core activities with various games and skill exercises using simple tools, as well as cool-down and reflection activities.

The evaluation phase was conducted formatively during the development process and summatively after implementation to assess the effectiveness of the learning model (Setiawan, 2020). Formative evaluation was conducted after each trial phase to obtain feedback for improvements from students and teachers, while summative evaluation was conducted by comparing pre-test and post-test results of students' basic movement skills and analyzing student and teacher questionnaire response data. The data collected included qualitative data in the form

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of observations, interviews, and field notes, as well as quantitative data in the form of expert validation scores, basic movement skills test results, and questionnaire response scores.

The data analysis technique used was qualitative descriptive analysis for observation and interview data, and quantitative descriptive and inferential analysis for validation data, skills tests, and questionnaires (Sugiyono, 2020). The product feasibility analysis used a feasibility percentage formula with the criteria of very feasible if the percentage is more than 80 percent, feasible if the percentage is between 60-80 percent, quite feasible if the percentage is between 40-60 percent, and not feasible if the percentage is less than 40 percent. The analysis of the effectiveness of the learning model used a paired sample t-test to compare the results of the pre-test and post-test of students' basic movement skills with a significance level of 0.05. Analysis was also carried out on skill improvement by calculating the N-gain score to categorize the level of learning effectiveness. All data were analyzed using SPSS version 25 software to ensure the accuracy and validity of the analysis results.

Results and Discussion

The results of the research on the development of a small ball game learning model through the application of simple equipment demonstrated very satisfactory results at each stage of development. The needs analysis phase identified several fundamental problems in teaching small ball games in elementary schools, where the three schools involved in the study had similar limitations in terms of sports facilities and infrastructure. Initial observations indicated that small ball game learning was rarely implemented optimally due to the limited availability of equipment, with an average of only 2-3 sets of equipment required to be shared by more than 30 students in a single class (Kusuma, 2022). This situation resulted in very long waiting times for students and severely limited movement activities, resulting in inadequate learning objectives.

Interviews with physical education teachers revealed that they experienced difficulties teaching small ball games due to a lack of clear guidance on how to modify learning by utilizing alternative equipment available locally (Wibowo, 2020). Most teachers still relied on using standard equipment as per the manual. Consequently, when equipment was unavailable, learning became ineffective or even replaced with other, more easily implemented materials. An analysis of student characteristics indicates that fourth and fifth grade elementary school students are at a very appropriate developmental stage for learning small ball game skills, as they already possess sufficient hand-eye coordination and the cognitive abilities to understand simple game rules (Santrock, 2020). However, the use of standard equipment that is too heavy and bulky often hinders their skill development and can even lead to frustration.

Based on the results of this needs analysis, the design phase focused on developing a comprehensive learning model with modifications to simple equipment tailored to the characteristics of elementary school students. The learning model was designed with a systematic structure that includes specific and measurable learning objectives, learning materials arranged progressively from easy to difficult, varied and enjoyable learning strategies, and an authentic evaluation system (Mahendra, 2020). The simple equipment design developed includes several main types of equipment adjusted for size, weight, and safety. The game ball is made of flannel sewn together in layers with dacron filling, resulting in a ball with a diameter of 18 cm and a weight of approximately 100 grams, which is much lighter and safer than a standard ball. The bats were modified from pine wood, measuring 50 cm long, with a 3 cm handle diameter, and a 5 cm

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bat head diameter. They weigh approximately 250 grams, making them suitable for elementary school students.

The base, or home plate, was designed using recycled carpet cut into 40 x 40 cm squares, each colored differently for easy identification. The catcher's mitts were made of stitched flannel with 2 cm of foam padding on the palms to provide adequate protection without compromising flexibility. All equipment was designed with safety in mind, with no sharp or hard parts that could harm students, and ease of construction using readily available materials from hardware stores or even recycled materials (Hartono, 2021). Cost was also a key consideration, with the total cost of a complete set of equipment for 10 students only around 300,000-400,000 rupiah, significantly cheaper than standard equipment, which can cost millions of rupiah.

The development phase resulted in a highly detailed and comprehensive learning model guidebook. This guidebook consists of several chapters covering an introduction to the learning model, a guide to making simple tools with step-by-step illustrations and photos, a lesson plan for eight sessions, a description of the learning material with demonstration images, variations in game formats and learning activities, and a learning evaluation guide (Pratama, 2021). Each lesson plan is designed with a clear structure, including learning objectives, required tools and materials, learning steps from warm-up to cool-down, and a skills assessment rubric. Variations in game formats were developed with varying levels of difficulty, starting with individual activities such as throwing and catching, then pair activities, small group activities, and finally, the full game with modified rules.

Expert validation of the developed product showed very positive results with a high level of feasibility. Validation by physical education experts resulted in a feasibility score of 88.2 percent, with comments that the developed learning model closely aligns with the principles of physical education learning in elementary schools and possesses high innovative value in terms of modifying learning tools (Rosdiani, 2020). The motor learning expert gave a rating of 86.4 percent, noting that the learning progression was very good and aligned with the developmental stages of children's motor skills, and that the tool modifications were appropriate for developing students' eye-hand coordination and locomotor skills. The learning media expert gave a rating of 87.9 percent, appreciating the completeness of the illustrations, photos, and video tutorials, which significantly assisted teachers in implementing the learning model. The average expert validation score reached 87.5 percent, which is considered very appropriate, allowing the product to be piloted with minor revisions based on expert suggestions and input (Sugiyono, 2020).

The implementation of the learning model through three trial stages provided valuable data on the model's effectiveness and practicality. A small-scale trial with 10 students demonstrated that students were very enthusiastic about using the simple tools and found learning more enjoyable. Observations showed that the level of active student participation reached 92 percent, with almost all students engaged in learning activities without any students simply waiting their turn as is the case in conventional learning (Kusuma, 2022). However, several technical challenges were encountered related to the ball's durability, which was easily damaged by hard hits. Therefore, revisions were made by adding additional stitching and replacing the filling with a combination of dacron and foam rubber to increase the ball's durability. The results of the small-scale trial also indicated the need for additional game variations for students with more advanced skills to keep them challenged and prevent boredom.

A medium-scale trial with 20 students was conducted after product revisions based on the results of the small-scale trial. At this stage, learning was conducted over a longer period of four sessions to more comprehensively observe student skill development (Hidayat, 2021).

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Observations showed a significant improvement in fundamental motor skills from the first to the fourth session, with students demonstrating improved throwing technique with greater accuracy, the ability to catch the ball with more precise hand position, hitting technique with a more coordinated swing, and the ability to run and stop on base with better control. Student questionnaire responses showed a very high level of satisfaction, at 89.3 percent. Students stated that they really enjoyed learning with simple tools because they felt more confident, were less afraid of being hit by a hard ball, and could perform movements better. Physical education teachers who observed the learning also responded positively, at 87.8 percent, stating that the learning model was very practical to implement and provided an effective solution to the limited facilities they experienced.

A large-scale trial with 60 students was conducted as the final stage of implementation to test the effectiveness of the learning model more broadly and in-depth. The learning was carried out over 8 meetings using a pre-test and post-test design to measure the improvement of students' basic motor skills (Setiawan, 2020). The pre-test results showed that students' initial throwing skills had an average score of 62.4 out of a scale of 100, catching skills with an average score of 58.7, hitting skills with an average score of 54.3, and running skills with an average score of 68.2. After participating in learning for 8 meetings using the developed model, the post-test results showed a very significant improvement in all aspects of skills. Throwing skills improved to an average score of 84.6, representing a 22.2-point increase, or 35.6 percent; catching skills improved to an average score of 82.3, representing a 23.6-point increase, or 40.2 percent; hitting skills improved to an average score of 79.8, representing a 25.5-point increase, or 47.0 percent; and running skills improved to an average score of 86.5, representing an 18.3-point increase, or 26.8 percent.

Statistical analysis using a paired-sample t-test showed that the improvement in basic motor skills in all four aspects was statistically significant, with a p-value of less than 0.05. This indicates that the small ball game learning model using simple equipment effectively improves students' basic motor skills (Sugiyono, 2020). The N-gain score calculation shows that the average skill improvement is in the medium to high category, with the N-gain for throwing skills of 0.59 in the medium category, catching skills of 0.57 in the medium category, hitting skills of 0.56 in the medium category, and running skills of 0.58 in the medium category. The total average N-gain score for all skill aspects is 0.58 which is in the medium category, indicating that the effectiveness of learning is quite good in improving students' basic motor skills. Observation data on learning activities shows that the level of active student participation during learning reaches an average of 91.7 percent, the level of student enthusiasm reaches 89.4 percent, and the level of student understanding of the learning material reaches 85.6 percent.

Discussion

A more in-depth analysis of the learning process reveals several key factors contributing to the effectiveness of the developed learning model. The first factor is the suitability of equipment modifications to student characteristics. Lighter, smaller, and safer equipment makes students feel more confident and less afraid to try movements (Nugraha, 2022). This contrasts sharply with learning with standard equipment, where many students, especially girls and those with reduced motor skills, feel fearful and reluctant to actively participate due to concerns about being hit by a hard ball or being unable to swing a heavy bat. Appropriate equipment modifications eliminate these psychological barriers and allow all students to actively engage in learning without undue fear.

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The second factor is the variety of learning activities designed to be progressive and enjoyable, where learning does not begin immediately with complex, full-fledged games but proceeds through systematic stages (Mahendra, 2020). Students are first introduced to individual activities to master basic skills such as how to hold the ball correctly, how to throw with a proper swing, and how to catch with the correct hand position. Once basic skills are mastered, learning progresses to pair activities to develop short-range throwing and catching skills, then small-group activities to introduce elements of competition and cooperation, and finally, modified games that mimic real-life games. This progressive approach ensures that students build a strong foundation of skills before facing more complex challenges, thereby reducing frustration and increasing a sense of accomplishment.

The third factor is the use of varied, student-centered learning methods, where teachers use more than just demonstration and command methods, but also integrate problem-solving, cooperative learning, and game-based learning (Wibowo, 2020). Students are given the opportunity to explore different ways of performing movements, try different game variations, and even invent their own rules in small groups. This approach not only develops motor skills but also fosters students' critical thinking, creativity, and social skills. Observations show that students greatly enjoy the opportunity to create and collaborate with their peers, which in turn increases their intrinsic motivation to learn.

The fourth factor is strong support from physical education teachers who have received training and a thorough understanding of the learning model through workshops and intensive mentoring (Suherman, 2021). These teachers not only understand how to create simple tools and implement lesson plans, but also the philosophy and pedagogical principles underlying the learning model. This allows teachers to implement the model with appropriate flexibility, adapt it to the specific conditions of their classrooms, and provide constructive feedback to students. The active, enthusiastic, and supportive role of teachers significantly contributes to successful learning, serving not only as instructors but also as facilitators, motivators, and role models for students.

Another interesting finding from this study is the positive impact of the learning model on students' affective and social aspects, although these aspects were not the primary focus of measurement in the study (Firmansyah, 2020). Observations indicate that learning with simple tools creates a more inclusive and cooperative atmosphere, where students of all abilities can participate and contribute to the game. Students with poor motor skills do not feel left out or embarrassed because they can perform movements well using adapted equipment, while students with better motor skills can develop leadership and mentoring skills by helping their peers. These positive social interactions contribute to the development of values such as cooperation, sportsmanship, empathy, and respect for others.

The results of this study are consistent with previous research showing that modifications to learning materials and equipment have a positive impact on the quality of physical education learning in elementary schools. Rahman's (2021) study found that modifications to equipment and game rules can increase student participation by up to 85 percent, which aligns with the findings of this study, which showed a participation rate of 91.7 percent. Wijaya's (2020) study also showed that learning media tailored to student characteristics can significantly improve fundamental movement skill learning outcomes, supporting the findings of this study regarding significant improvements in fundamental movement skills across all aspects. However, this study makes a unique contribution by developing a comprehensive and systematic learning model that focuses not only on equipment modification but also integrates aspects of instructional design, learning strategies, and a holistic evaluation system.

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From a practical perspective, the learning model developed in this study has several advantages that make it highly applicable to elementary schools in Indonesia, especially those with limited facilities (Hartono, 2021). The first advantage is its very affordable cost, where with minimal investment, schools can provide sufficient equipment for one class. The second advantage is ease of construction, as the tools can be made by teachers or even involve students in the process as part of practical skills and entrepreneurship learning. The third advantage is flexibility, as the tools can be modified and adapted to the specific conditions and needs of each school. The fourth advantage is sustainability, as damaged tools can be easily repaired or rebuilt without having to wait for government procurement funding.

However, this study also identified several limitations and challenges in implementing the learning model. The first limitation is the durability of simple tools, which are not as durable as standard tools made from high-quality materials, requiring more frequent maintenance and replacement (Saputra, 2022). The second challenge is the need for adequate training and mentoring for teachers to implement the model effectively, as not all teachers possess sufficient creativity and pedagogical understanding to modify learning. The third challenge is the need for support from the school, especially the principal, in providing time, space, and resources for tool creation and learning implementation. The fourth challenge is the need for a shift in mindset from learning that is oriented towards standards and formalities to learning that is more flexible, creative, and centered on student needs.

Conclusion

The research successfully developed a highly feasible and effective small ball game learning model for elementary school physical education. The model, validated by experts, significantly improved students' fundamental motor skills—such as throwing, catching, hitting, and running—and greatly enhanced classroom engagement and understanding. By utilizing simple, modified equipment and a progressive teaching approach, it effectively overcame common psychological and physical barriers to participation. This practical and student-centered solution provides a valuable, accessible framework for schools with limited facilities, offering both a significant practical contribution to PE instruction and a theoretical advancement in context-appropriate educational modifications.

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