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Implementation of the Deep Learning Model on Underhand Passing Skills in Volleyball Games at Elementary School

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Abstract

Physical education plays a crucial role in fostering students' motor, cognitive, and social development at the elementary school level. In volleyball learning, underhand passing is a fundamental skill; however, many students experience difficulties due to conventional drill-based instruction that emphasizes repetition rather than conceptual understanding. This study aimed to examine the effectiveness of implementing the Deep Learning model in improving underhand passing skills among sixth-grade students at Elementary School Cikeusik Rancakalong. The research employed Classroom Action Research (CAR) based on the Kemmis and McTaggart spiral model, consisting of three cycles: planning, action, observation, and reflection. The subjects of the study were 33 sixth-grade students. Data were collected through underhand passing skill tests and structured observation sheets, then analyzed using descriptive quantitative analysis to determine the percentage of learning completeness in each cycle. The findings indicated a consistent and significant improvement in students' learning outcomes. Learning completeness increased from 12.1% in the pre-cycle to 39.4% in Cycle I, 72.7% in Cycle II, and ultimately reached 90.9% in Cycle III, surpassing the predetermined classical mastery criterion. The results demonstrate that the Deep Learning model not only enhances technical execution but also strengthens students' conceptual understanding, reflective thinking, and motor awareness. Students became more capable of identifying movement errors and adjusting body positioning effectively. In conclusion, the Deep Learning model provides a structured, student-centered, and reflective instructional approach that effectively improves underhand passing skills and contributes to the development of innovative and meaningful physical education practices in elementary schools.

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INTRODUCTION

Education is a methodical process that involves meaningful interactions between educators and learners to develop attitudes, abilities, and knowledge in a cohesive way (Darling-Hammonda et al., 2020). Education is focused on character development and the full development of each person's potential in addition to academic success. Physical education plays a crucial role in the Indonesian national education system since it helps students acquire social skills, sportsmanship values, physical fitness, and healthy lifestyle habits beginning in elementary school (Mustafa, 2022). In line with this, (Lengkana et al., 2017) stress that Indonesian physical education regulations are intended to encourage holistic human development, which encompasses physical, mental, emotional, and social aspects, rather than only serving as supplementary topics. Implementing high-quality physical education instruction that supports national educational goals is crucial, as this policy approach emphasizes. During this phase, children's motor development occurs progressively and is greatly influenced by physical maturity, learning experiences, and the quality of planned motor stimulation (Sudirjo & Alif, 2018). In order to maximize students' motor potential and match it with their developmental features, physical education instruction must be scientifically and pedagogically developed

Volleyball is one of the core materials in the elementary school physical education curriculum (Risno et al., 2024). Among its basic techniques, the underhand pass plays a fundamental role as it underpins ball control, team coordination, and the continuity of rallies in the game (Kusuma & Kurniawan, 2021; Sugianti et al., 2023). In addition to proper movement, mastering this technique requires a knowledge of fundamental biomechanical concepts, including force control and rebound angle. However, on the field, it seems many elementary school students still struggle with accurate underhand passes. Unstable body balance, loose elbow position, incorrect ball contact, and poor coordination between arm and leg movements are common errors (Pratama & Wijayanti, 2022). This condition results in poor learning outcomes, suboptimal game performance, and decreased student confidence in match situations.

Based on initial observations at Cikeusik Rancakalong Elementary School, most sixth-grade students still lack basic skills in underhand passing techniques. Without understanding proper body posture, arm position, and the principles of ball contact, many students perform the movement automatically. The average score for students' underhand passing skills remains below the expected level, indicating an urgent need for improvement initiatives using creative teaching strategies.

These problems are inextricably linked to the dominant use of conventional learning methods that focus on repetitive drills without building in-depth conceptual understanding and reflection on learning (Anggara & Iskandar, 2024). This method frequently prioritizes ultimate performance over deep learning. Theoretically, a balanced integration of the cognitive, emotional, and psychomotor domains is necessary for efficient physical education learning. Therefore, innovative learning models are needed that not only improve students' technical skills (applied aspects) but also strengthen conceptual understanding and reflective thinking skills (theoretical aspects). A balance between these two aspects is crucial to ensure that motor skill improvement occurs consciously, systematically, and sustainably.

One relevant approach is the Deep Learning model. This approach emphasizes in-depth understanding, active student involvement, critical thinking, and reflective practice in the learning process (Kurniawan, 2025). Ar-Rasyid et al. (2025) showed that implementing the Deep Learning method in elementary schools significantly increased student engagement in the learning process. In the context of physical education, Butsiarah & Zaum (2025) suggested that Deep Learning can be used as a medium for evaluating basic athletic movement skills, so that students not only perform movements but also understand the quality and process of movement. In addition, Turmuzi (2025) reported that the Deep Learning approach in Physical Education learning in elementary schools contributed to increased active participation and student reflection on learning.

The majority of research currently concentrates on broad facets of student involvement or on certain basic movement abilities like athletics, despite several studies showing the beneficial potential of deep learning in raising engagement and the caliber of physical education learning. To date, studies specifically examining the implementation of Deep Learning models in improving fundamental volleyball technical skills, particularly underhand passing in elementary schools, are still very limited. Thus, there is a research gap that needs to be

filled, particularly in the context of integrating conceptual understanding of movement with improving technical skills in large ball games.

This description explains how this study applies a Deep Learning model specifically to volleyball underhand passing training in primary schools, providing a fresh viewpoint. This study aims to enhance students' technical proficiency while simultaneously fostering reflective participation in the learning process and expanding their comprehension of movement principles. Thus, this research is expected to provide theoretical contributions to the development of innovative learning models in physical education and practical contributions for teachers in designing more meaningful, contextual, and student-centered learning.

In line with this, the purpose of this study is to examine the implementation of the Deep Learning model in improving volleyball underhand passing skills in elementary school students. Specifically, this study aims to analyze the model's effectiveness in improving technical skills, deepening conceptual understanding of movement principles, and encouraging active and reflective student engagement in the physical education learning process.

The enhancement of volleyball underhand passing skills at the primary school level, which has not been thoroughly investigated in prior physical education research, is something that this study especially integrates with the Deep Learning model to bring innovation.

METHOD

This study used Classroom Action Research (CAR) which aims to improve student learning outcomes through the application of a specific learning model. The research was conducted in three cycles, where each cycle consists of four main stages: (1) planning, (2) implementation of the action, (3) observation, and (4) reflection, referring to the cyclical and continuous CAR model (Utomo et al., 2024).

The research was conducted at Cikeusik Public Elementary School in the 2025/2026 academic year. The subjects were 33 sixth-grade students, consisting of 20 boys and 13 girls.

In the planning stage, the researcher prepared learning tools in the form of a Teaching and Learning Plan, observation sheets, skill assessment instruments, and scenarios for implementing the Deep Learning model. The action implementation stage was carried out by implementing the Deep Learning model in volleyball material, especially in underhand passing skills which included: (1) Preparation (2) Execution of Movement, and (3) Advanced Movement. The observation stage was carried out to observe the activities of students and teachers during the learning process using the prepared observation sheets. The reflection stage was carried out to evaluate the results of the actions in each cycle and determine improvements in the next cycle.

Research data was collected through practical skills tests and observation sheets. The data obtained were then analyzed descriptively and quantitatively using percentage analysis to determine the level of student learning completion. Quantitative data, in the form of student learning outcomes for each cycle, were presented in numerical and percentage form.

The learning completion criteria are determined based on the Minimum mastery criteria, which is a score of 75. Classical learning completion is declared achieved if the percentage of students who achieve the Minimum mastery criteria score is in the majority category or according to the set target. Aspects assessed in underhand passing skills include: (1) preparation, (2) execution of movements, and (3) advanced movements.

The results of the data analysis in each cycle are used as a basis for reflection to improve learning planning in the next cycle. Thus, the CAR process is not only oriented towards improving learning outcomes but also towards continuously improving the quality of the learning process.

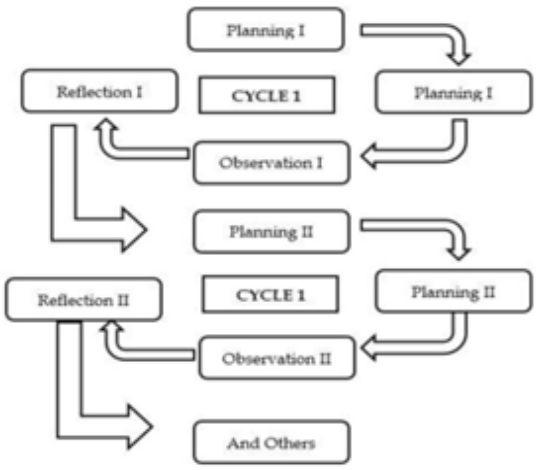

Figure 1. Kemmis & Taggart Classroom Action Research Flow.

RESULTS AND DISCUSSION

The study was conducted at Cikeusik Rancakalong Elementary School during the odd semester of the 2025/2026 academic year. The study spanned the pre-cycle stage through the third

cycle.

The subjects were 33 sixth-grade students with heterogeneous abilities in volleyball skills, particularly underhand passing. All students served as respondents because this study used a Classroom Action Research (CAR) approach aimed at improving the overall learning process in the classroom.

The research results will be discussed in the following sections based on the pre-cycle, cycle I, cycle II, and cycle III stages. The research question, which addresses the effectiveness of using a Deep Learning model to improve underhand passing skills, will be answered by thoroughly analyzing and discussing each finding.

Data on student learning completion at each stage of the research is presented in **Table 1.**

Table 1. Improvement in Underhand Passing Skill Completion in Each Cycle

Stage	Student complete (n)	Student complete (%)	Student imcomplited (n)	Student imcomplited (%)
Pre-cycle	4	12,1%	29	87,9%
Cycle I	13	39,4%	20	60,6%
Cycle II	24	72,7%	9	27,3%
Cycle III	30	90,9%	3	9,1%

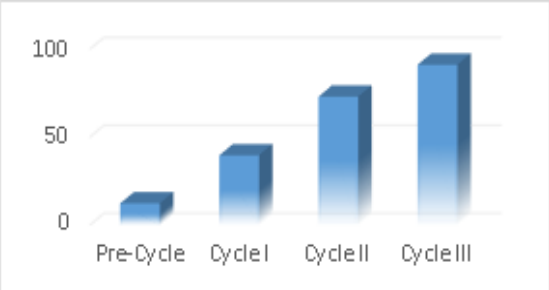

Figure 1. Graph of Improvement in Underhand Passing Skill Completion

Table 1 shows a significant and consistent increase in learning completion from the pre-cycle stage to stage III. In the initial stage, the completion percentage was still 12.1%, indicating that most students had not yet mastered the underhand pass technique. However, after the Deep Learning-based learning model was gradually implemented over three cycles, the completion percentage increased to 90.9% in the second stage.

Each cycle serves as a stage of improvement and refinement of the previous cycle, so that technical errors can be systematically minimized. The pattern of improvement that occurs in each cycle shows that the actions taken are not temporary but rather have a cumulative impact on mastery of the underhand passing technique. Therefore, this improvement is not the result of repeated practice; it is the result of a learning process that emphasizes reflection, conceptual understanding, and active student involvement in developing their own knowledge.

Figure 1 shows a consistent and progressive upward trend in each cycle of action. The completion rate, which was only 12.1% in the pre-cycle stage, increased to 39.4% in cycle I, then significantly increased to 72.7% in cycle II, and reached 90.9% in cycle III. The continuously increasing line pattern indicates that the implementation of the Deep Learning model has a sustainable impact on improving student skills. Tables and images that are large and won't fit can be placed transversely to 2 columns, preferably placed in ba-gian top of the page or the bottom to make it easier to lay out. For example in Figure 2 flowchart on Android-based mobile learning application that formats such as JPEG. If the table is large, it is difficult to transverse arranged, then it must be changed in the first image format so they can be styled with ease.

Specifically, 29 students (87.9%) failed to meet the minimum completion criteria in the pre-cycle stage, while only 4 students (12.1%) achieved learning completion. This low initial achievement indicates that most students still face significant difficulties in mastering the basic technique of underhand passing in volleyball. This difficulty is reflected in various frequent technical errors, including unstable body position, arm angles that do not form an optimal bounce plane, and lack of coordination between leg and arm movements during passing. This condition indicates that the previous learning process tends to emphasize repetition of mechanical movements, but does not fully lead students to a complete conceptual understanding of the principles of underhand passing movements.

When the Deep Learning model was applied in Cycle I, the number of students who achieved learning completion increased to 13 students (39.4%). There was an increase of 27.3% compared to the pre-cycle stage, which indicates a positive response to the implementation of a learning approach that is more oriented towards exploration, reflection, and the meaning of movement. In this phase, students are not only asked to practice the movement repeatedly, but are also directed to understand the relationship between body position, arm angle, and the direction of the

ball's bounce as biomechanical units in the underhand passing technique. In addition, students are trained to identify and reflect on their movement errors through discussions and directed feedback. This approach is in line with the findings of (Angga & Sari, 2025) who emphasized that the implementation of Deep Learning in Physical Education learning emphasizes the active involvement of students through the process of movement analysis, reflection, and rational understanding of each physical activity carried out.

This reflective process gradually fosters students' awareness of the fundamental principles of underhand passing techniques, so that learning is no longer mechanical but begins to lead to deeper conceptual understanding. This finding aligns with (Lasmi, 2025) opinion, which states that immersive learning models in educational contexts can create a more meaningful learning environment, encourage active student participation, and strengthen comprehensive understanding of movement concepts through cognitive and reflective engagement.

In Cycle II, student completion rates again significantly increased, reaching 72.7%, or 24 students. This achievement indicates that the conceptual understanding developed in the previous cycle is beginning to be more consistently internalized in students' movement practices. Visible changes are reflected not only in the increased completion rate but also in the increasingly consistent and controlled quality of movement performance. Students are no longer simply imitating movement patterns demonstrated by the teacher, but are now able to apply underhand passing techniques more adaptively in simple game situations.

Furthermore, at this stage, there is a clearer integration between the cognitive and psychomotor domains. Students begin to understand the technical reasons behind each stage of movement from the starting position, contacting the ball with the arms, to coordinating the leg push so that the motor actions performed are based on conceptual awareness, not just mechanical habits. This shows that a Deep Learning-based learning approach not only quantitatively improves motor skills but also improves the quality of understanding underlying motor skills. These results support the idea that meaningful learning that emphasizes active engagement, reflection, and conceptual understanding can significantly improve students' motor skills (Rahmadani, 2026). These findings also support previous research (Sahrun et al., 2026) which found that a deep learning-based Physical Education learning model overall improved students' conceptual understanding and motor skills in elementary schools.

Cycle III demonstrated the most significant improvement, with a learning completion rate of 90.9%. This achievement not only demonstrates consistent progress from the previous cycle but also exceeds the completion indicator established in the study. Quantitatively, there was a substantial increase compared to the initial pre-cycle level, where completion was only 12.1%. The gradual and sustained increase to 90.9% demonstrates the systematic and effective nature of the intervention process.

The application of a Deep Learning model to teaching underhand passing has been shown to promote progressive skill improvement, both technically and conceptually. Students not only demonstrated improvements in body stability, arm angle, and motor coordination, but also demonstrated the ability to apply techniques with greater precision and confidence in a game context. The consistent pattern of improvement from pre-cycle to Cycle III indicates that a learning approach emphasizing exploration, reflection, and meaningful movement has a sustained impact on skill acquisition. Thus, these findings strengthen the argument that the Deep Learning model is effective in comprehensively and structurally improving underhand passing skills in elementary school students.

CONCLUSION

The implementation of the Deep Learning model in volleyball underhand passing learning in grade VI of Cikeusik Public Elementary School showed a very significant increase, marked by an increase in learning completeness from the pre-cycle stage by 12.1% to 90.9% in cycle III. This change reflects the effectiveness of systematically and reflectively designed actions in improving the quality of students' technical mastery. The results of this study demonstrate that the immersive learning approach transforms students into active participants and engages them in the process of understanding through critical thinking, reflection, and discovering the connection between ideas and actions. Students not only learn volleyball underhand passing techniques but also learn basic biomechanical principles such as body position, arm angle, ball bounce point, and proper movement coordination. Through a contextual, reflective, and meaning-oriented learning process, conceptual understanding and motor practice are integrated simultaneously. This aligns with the principles of Deep Learning, which empha-

size knowledge construction, the transfer of understanding to new situations, and continuous improvement through feedback.

Conceptually, this study contributes to the development of physical education learning innovations in elementary schools by strengthening empirical evidence that student-centered, reflective, and error analysis-based learning strategies are effective in improving sports technical skills.

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