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Research Article

EFFORTS TO IMPROVE VOLLEYBALL UNDERHAND PASSING LEARNING OUTCOMES THROUGH THE PROBLEM-BASED LEARNING MODEL

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Abstract:

Background: Students' mastery of basic volleyball skills, particularly underhand passing, remains relatively low due to limited engagement in learning activities, repeated technical errors, and learning outcomes that have not yet met the minimum mastery criteria. This condition indicates the need for an innovative learning model that actively involves students and emphasizes meaningful problem-solving in physical education learning. **Aims:** This research aimed to improve underhand passing skills in volleyball among fifth-grade students of SDN Terpadu 2 Unggulan Tana Tidung, North Kalimantan, through the implementation of the Problem-Based Learning (PBL) model. **Methods:** This research employed Classroom Action Research (CAR) using the Kemmis and McTaggart model, conducted in two cycles consisting of planning, action, observation, and reflection stages. Research instruments included observation sheets of student and teacher activities, an underhand passing skill performance test, documentation, and field notes. **Result:** The results showed a significant improvement in students' underhand passing skills, increasing from 35% in the pre-cycle to 70.5% in Cycle I and reaching 84% in Cycle II. This improvement was supported by revisions in the learning process through drill exercises, the use of instructional videos, and the application of PBL focusing on real-world problem-solving activities. **Conclusion:** The implementation of the Problem-Based Learning model effectively enhanced students' underhand passing skills, increased active participation, and fostered a more active, reflective, and contextual learning process. Therefore, PBL is an effective learning model for improving basic technical skills in physical education learning.

Keywords*:* Problem-Based Learning, Underhand Passing, Volleyball

Introduction

Physical Education, Sports, and Health (PJOK) is an essential component of the elementary school curriculum and plays a strategic role in developing students' motor abilities, social skills, and affective dimensions (Winarno, 2006). PJOK is understood as an educational process conducted through various systematically designed physical activities aimed at improving physical fitness, developing movement skills, mastering knowledge, and fostering healthy, active, sportsmanlike, and emotionally intelligent lifestyles (Syamsudin, 2013). (Walton-Fisette & Wuest, 2021) emphasize that learning in PJOK does not merely involve physical activities but also serves as an important medium for instilling values such as cooperation, sportsmanship, and courage in decision-making (Arantes et al., 2025; Raymond Ivano Avandi et al., 2025). Essentially, the PJOK learning process is not limited to the transfer of knowledge from teacher to students but aims to facilitate the holistic development of learners' potential (Nurcahyo et al., 2021).

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One of the learning materials in PJOK for fifth-grade students is volleyball. According to (Destriana et al., 2021) volleyball is a team sport involving two groups, each consisting of six players. The game begins with a serve, which is hitting the ball over the net to score points (Raymond et al., 2025; Zwart & Ewert, 2022). Each team is allowed a maximum of three contacts before returning the ball to the opposing team. Meanwhile, (Mulyadi & Pratiwi, 2020) state that volleyball is played by bouncing the ball using various parts of the body and allowing three contacts within the team's area before sending it back to the opponent. In volleyball, basic techniques play a crucial role, including passing. (Pradana & Winarno, 2024) explains that passing is a technique used to deliver the ball to a teammate as an initial step in organizing an attack strategy against the opposing team. Underhand passing is a fundamental element of volleyball gameplay.

Underhand passing in volleyball is one of the basic techniques used to control balls arriving at a low height, particularly those below waist level (Brown et al., 2025; Jiang et al., 2025). This technique is performed by extending both arms forward while maintaining a low body position to ensure stability (Amin et al., 2023). Underhand passing is a fundamental technique used to receive and control the ball using both forearms simultaneously, to direct the ball to a teammate or to the setter to initiate an attack (Dişlen Dağgöl & Demirkol, 2026; Safitri & Trisanti, 2025). Conceptually, underhand passing emphasizes coordination between body position, arm swing, and target accuracy, as the success of an attack in volleyball largely depends on the quality of this pass. According to (V. Sukumar, 2021) Underhand passing is performed with the knees bent, the torso slightly leaning forward, and both hands joined to form a flat rebounding surface. (Destriana et al., 2021) state that the main functions of underhand passing are to receive the opponent's first ball, to pass the ball to teammates, and to block or withstand attacks or smashes from the opposing team. This technique is crucial for handling hard serves or powerful smashes. Furthermore, research by (Susanto et al., 2021) reveals that underhand passing skills are closely related to arm muscle strength and players' levels of concentration; therefore, training this basic technique needs to be conducted repeatedly using varied methods to continuously improve accuracy and performance stability.

However, based on initial observations in fifth-grade students at SDN Terpadu Unggulan 2 Tana Tidung, it was found that students' mastery of underhand passing techniques remained relatively low. Students experienced difficulties in mastering underhand passing skills in volleyball. After two weeks of learning activities, students' skill mastery was still categorized as low. This condition was indicated by numerous technical errors, particularly in foot and hand positioning when receiving the ball. Students' participation levels in learning activities were also minimal, accompanied by limited understanding of the material and underdeveloped skills. On the other hand, teachers faced challenges in designing effective learning strategies and tended to rely solely on textbooks as the primary learning resource. This situation was reflected in the low learning outcomes achieved by students, where out of 14 students participating in the learning process, only approximately 35% were able to perform underhand passing techniques properly in volleyball games. In fact, (Mulyadi & Pratiwi, 2020) emphasize that underhand passing is a basic technique that must be mastered, as it serves as the initial stage in building attack patterns in volleyball.

Literature review: The facts above indicate the presence of real problems in the PJOK learning process, particularly in the aspect of students' basic motor skills. According to (Hidayat, 2017) Teachers are required to be able to address learning obstacles that arise in the classroom. In this context, the Classroom Action Research (CAR) approach is a relevant method to apply. CAR

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allows teachers to implement learning actions based on real problems, reflect on the outcomes, and conduct continuous improvement cycles to achieve optimal learning results (Kunandar & Si, 2008).

To address the problem of low mastery of underhand passing techniques among students, the researcher chose to implement the Problem-Based Learning (PBL) model. Theoretically, this model is based on a constructivist approach, in which knowledge is actively constructed by learners through social interaction and contextual experiences. As explained by (Arends, 2015) PBL positions students at the center of the learning process; they learn not by passively receiving information, but by constructing understanding through solving real-life problems related to their daily experiences. Similarly, (Fathurrohman, 2015) states that Problem-Based Learning uses real (authentic), ill-structured, and open-ended problems as contexts for learners to develop problem-solving and critical thinking skills while simultaneously constructing new knowledge (Awaluddin et al., 2025; Maulana & Yopi Hutomo Bhakti, 2025). This approach is highly appropriate in the context of PJOK learning, which emphasizes the formation of movement understanding based on analysis and practical experience rather than merely imitating teacher instructions. (Wena, 2009) explains that problem-solving is a process involving the search for a combination of rules that can be applied to deal with new situations. Meanwhile, (Trianto, 2009) defines problem-based learning as an instructional approach that begins with various problems requiring authentic investigation aimed at finding real solutions to issues that genuinely occur in life.

Gap analysis: Furthermore, (Slavin, 2014) emphasizes that problem-based learning can increase students' intrinsic motivation and cognitive engagement, especially when learners perceive the assigned tasks as meaningful. PBL also provides opportunities for students to apply interdisciplinary knowledge and integrate social skills such as collaboration, communication, and decision-making, all of which are essential components in sports learning. According to (Eggen & Kauchak, 2012) the PBL approach not only teaches content but also develops higher-order thinking skills, including reflective and evaluative thinking.

In learning motor skills such as underhand passing in volleyball, the integration of theoretical understanding and practical experience is key (Purnomo et al., 2024). In line with the principles of experiential learning, learning becomes effective when students are actively engaged in the cycle of experience, reflection, conceptualization, and application. Thus, PBL is not only pedagogically relevant but also has a strong psychological and philosophical foundation in shaping a holistic and meaningful learning process. Therefore, the selection of the PBL model in the context of mastering underhand passing techniques among elementary school students is theoretically and empirically appropriate.

Rationale of the study: The effectiveness of the PBL model in PJOK learning has been demonstrated by several studies. (Tamrin et al., 2025) showed that the PBL model significantly improved underhand passing skills among junior high school students through exploratory strategies and group discussions. (Padhillah, 2025) in her study at SMPN 22 Jambi City, she concluded that PBL successfully improved students' learning outcomes in underhand passing techniques by fostering awareness of movement errors. (Triviona et al., 2025) Also reported similar results, the application of the PBL learning model has been proven effective in improving learning outcomes in volleyball underhand passing techniques in each cycle. (Kurniawan & Hidayat, 2023) reinforced that PBL positively impacts mastery of basic techniques and teamwork among Senior High School. Meanwhile, (Putra et al., 2025) The implementation of the Project-

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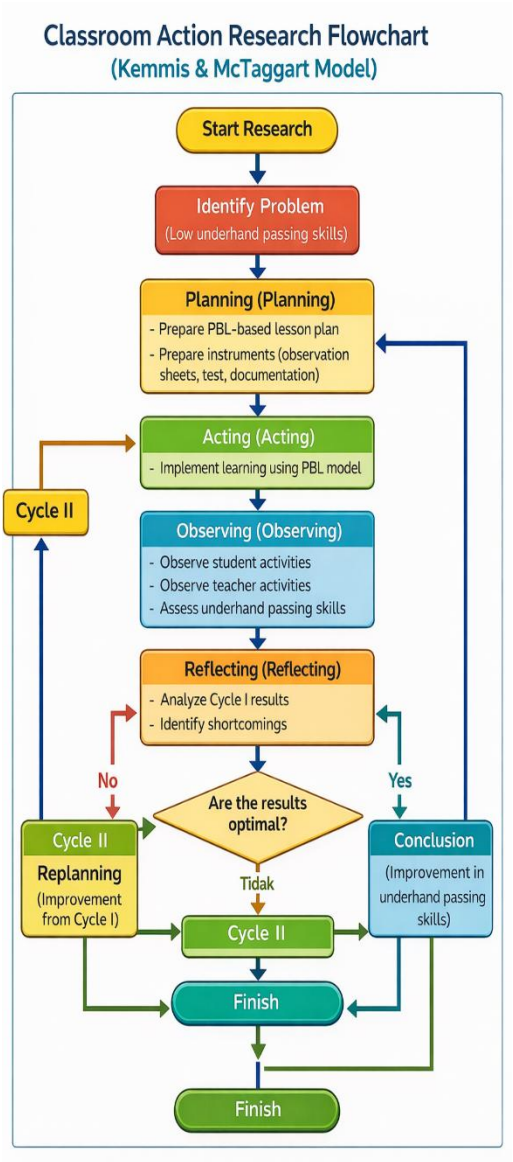
Based Learning model can improve the learning outcomes of class VIII A4 students at SMP Negeri 1 Singaraja in the 2024/2025 academic year as a whole.

Based on reflections on real field conditions and findings from previous studies, the researcher believes that the implementation of the PBL model within a Classroom Action Research framework can serve as an effective solution for improving basic underhand passing skills in volleyball among fifth-grade students at SDN Terpadu Unggulan 2 Tana Tidung. It is expected that the application of this model will not only address technical skill deficiencies but also foster active engagement, self-confidence, and deeper understanding of PJOK learning materials

Material & Methods

This study employed a Classroom Action Research (CAR) approach aimed at improving students' underhand passing skills in volleyball through the implementation of the Problem-Based Learning (PBL) model among fifth-grade students at SDN Terpadu 2 Unggulan Tana Tidung, North Kalimantan. The CAR model used in this study refers to the framework proposed by Kemmis and McTaggart (Kemmis et al., 2014; Miroud, 2025), which consists of four cyclical stages: (1) planning, (2) acting, (3) observing, and (4) reflecting.



The research design consisted of two cycles, with each cycle encompassing the four stages described above. The second cycle was conducted after reflection on the first cycle, which indicated the need for improvements to the implemented actions. The research subjects were all fifth-grade students of SDN Terpadu 2 Unggulan Tana Tidung, totaling 14 students. The study was conducted at the school during the even semester of the 2024/2025 academic year and took place on Tuesdays and Thursdays during Physical Education (PJOK) class hours.

The research instruments used in this study included: (1) student activity observation sheets to assess students' engagement during the learning process; (2) teacher activity observation sheets to evaluate the extent to which the teacher implemented the Problem-Based Learning syntax according to the lesson plan; (3) an underhand passing skill test in the form of a practical assessment using a scoring rubric covering body position, arm swing, accuracy of ball direction, and teamwork; and (4) documentation, such as activity photographs and field notes.

The assessment instrument for underhand passing skills was validated based on indicators

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from the Regulation of the Minister of Education and Culture of the Republic of Indonesia No. 23 of 2016 and the basic technical criteria outlined in volleyball instructional textbooks (Aboubakre Bouasla et al., 2025; Fàbregues & Guetterman, 2025).

Qualitative data obtained from observations and field notes were analyzed descriptively through data reduction, data display, and conclusion drawing. Meanwhile, quantitative data from the underhand passing skill tests were analyzed using the percentage of learning mastery technique, with the minimum mastery criterion for learning objectives (KKTP) set at 70.

$$\text{Learning Completion (\%)} = \frac{Number\ of\ students\ completed}{number\ of\ students}\ X\ 100\%$$

The research was declared successful if ≥75% of students achieved a passing skill score below the learning objective completion criteria (KKTP)

Results

This research was conducted in two cycles using the Classroom Action Research (CAR) model, which consists of planning, implementation, observation, and reflection stages as developed by Kemmis and McTaggart. Data were collected through: (1) direct observation during the learning process to record teacher and student activities; (2) practical underhand passing skill tests administered at the end of each cycle; and (3) informal interviews and reflective discussions with students and teachers to evaluate the learning process and outcomes of the actions. This research aims to improve the underhand passing skills in volleyball games of fifth-grade students at SDN Terpadu 2 Unggulan Tana Tidung, North Kalimantan, by applying the Problem-Based Learning (PBL) learning model.

Table 1. Results of classroom action research

Name	Pre-Cycle	Cycle I	Cycle II
ARR	70	70	84
ALN	75	76	80
ARF	60	68	76
JL	69	73	87
MF	55	65	78
MI	68	72	88
MNA	69	70	89
MR	72	73	88
MWP	70	72	85
MP	72	73	85
NHM	56	65	78
RA	55	70	83
SN	60	65	84
AM	71	75	90
Percentage	35%	70,5%	84%
Number of passes	6	10	14

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In Cycle I, the planning stage included the development of PBL-based learning materials, consisting of teaching modules, volleyball underhand passing skill assessment instruments, student activity observation sheets, and learning support media. The lesson plan focused on introducing and practicing basic volleyball underhand passing techniques using a problem-based approach. The lesson was implemented in two meetings, where the teacher presented contextual problems on how to counter an opponent's serve using the underhand passing technique. Students were encouraged to discuss in small groups, find appropriate technical solutions, and practice them directly. Student activity was observed through observation sheets covering discussion activity, passing technique accuracy, and sportsmanship. Evaluation of learning outcomes in Cycle I showed a student completion rate of 70.5%, with 10 students completing the test (scores above the minimum competency criteria) and 4 students not completing the test (29.5%) out of a total of 14 students who took the test. Some obstacles encountered were a lack of consistent hand and foot coordination, as well as difficulty in forming a good and correct hand bounce area. Based on the completion rate of 70.5%, the completion rate in Cycle I was "not yet complete," as the completion rate needed to reach 75%.

In Cycle II, improvements were made by revising the teaching module, adding drill sessions on underhand passing techniques, and using video tutorials as visual examples. The time for practical exercises was also extended to provide students with the opportunity to further master basic techniques. Cycle II continued to use a problem-based approach, with longer practice sessions and direct feedback to improve student technique. Observations showed a significant increase in student activity, with the majority of students successfully improving movement coordination and forming a better rebound surface. Evaluation of the results in Cycle II showed a student completion rate of 84%, with all 14 students completing the course (scores above the Learning Objective Achievement Criteria/KKTP). Although there were a few obstacles, such as the difficulty of a small number of students in maintaining body stability when receiving the ball, this was better compared to Cycle I. Based on the percentage of completion of 85%, the completion category in Cycle II was "Complete", because the completion exceeded 85%, which is considered an indicator of the success of the applied learning model.

Based on the results of the study, the implementation of the *Problem-Based Learning* (PBL) model was proven to be effective in improving underhand passing skills in volleyball among fifth-grade students at SDN Terpadu 2 Unggulan Tana Tidung. This progress was clearly reflected in the improvement of students' learning mastery, which increased from 35% in the pre-cycle to 70.5% in Cycle I and reached 84% in Cycle II. The PBL model, grounded in the constructivist theories of Vygotsky and Piaget, emphasizes students' active roles in constructing knowledge through contextual and collaborative learning experiences. In this study, students were engaged in solving real problems related to volleyball passing strategies, which indirectly stimulated their basic motor skills through discussion, exploration, and practice.

The findings of this study are supported by research conducted by (Padhillah, 2025) which demonstrated that the PBL model improved students' learning outcomes in underhand passing skills at the junior high school level through contextual approaches, group exercises, and the use of relevant instructional media. In Padhillah's study, students also experienced significant improvement after being presented with authentic problems that required appropriate passing strategies to solve. Additional theoretical support comes from (Mayer, 2009) who emphasized the importance of multimedia learning, particularly the use of visual materials such as videos, to enhance the acquisition of procedural knowledge. This was evidenced in Cycle II of the present

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study, where the inclusion of instructional videos and extended practice time resulted in more optimal outcomes compared to the previous cycle (Orr et al., 2023; Yudhi Kharisma et al., 2025).

Furthermore, the success of PBL implementation in this study was influenced by a systematic reflection process as designed in the Classroom Action Research model proposed by Kemmis and McTaggart, in which each cycle consists of planning, action, observation, and reflection stages. Reflection on Cycle I revealed challenges related to movement coordination and basic passing techniques, which were subsequently addressed in Cycle II through module revisions, drill-based practice, and immediate feedback. This approach aligns with (Syamsinar, 2024) who noted that early cycles of PBL often encounter students' adaptation difficulties to independent learning; however, with appropriate instructional reinforcement, significant progress can be achieved.

Finally, PBL-based learning in this study not only enhanced the technical aspects of volleyball skills but also encouraged active student participation in discussions, improved sportsmanship, and fostered stronger teamwork. These findings indicate that PBL, as a holistic instructional model, effectively addresses the development of students' cognitive, affective, and psychomotor competencies simultaneously. Therefore, the results of this study are consistent with previous findings and further strengthen the position of Problem-Based Learning as an effective instructional strategy in the context of physical education at the elementary school level.

Conclusions

Based on the results of the classroom action research conducted over two cycles, it can be concluded that the implementation of the Problem-Based Learning (PBL) model significantly improved underhand passing skills in volleyball among fifth-grade students at SDN Terpadu 2 Unggulan Tana Tidung. This improvement was evidenced by the increase in students' learning mastery, from 35% in the pre-cycle to 70.5% in Cycle I, and reaching 84% in Cycle II. The improvements implemented in the form of revised teaching modules, the addition of visual media, and drill-based practice proved effective in helping students master underhand passing techniques more effectively.

These findings are consistent with constructivist theoretical perspectives and are supported by similar studies, which indicate that PBL promotes active learning, contextual problem solving, and the development of motor skills. In addition to cognitive and psychomotor aspects, this model also enhanced students' affective domains, such as sportsmanship and teamwork. Therefore, Problem-Based Learning is a suitable instructional strategy for physical education in elementary schools, as it is capable of creating meaningful and sustainable learning experiences.

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