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Improving Volleyball Underhand Passing Skills through Student Teams Achievement Divisions (STAD): A Classroom Action Research in an Indonesian Senior High School

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ABSTRACT

This study was motivated by the low learning outcomes of volleyball underhand passing techniques among Grade X Class 8 students at SMA Negeri 2 Denpasar during the 2025/2026 academic year. Preliminary observations indicated that most students failed to achieve the Minimum Learning Mastery Criterion (MLMC) of 75. Although previous studies have demonstrated the effectiveness of the Student Teams Achievement Divisions (STAD) cooperative learning model in improving general academic achievement and Physical Education learning outcomes, limited evidence has specifically examined how STAD implemented through Classroom Action Research (CAR) systematically improves students' mastery of volleyball underhand passing skills across successive instructional cycles. The scientific contribution of this study lies in demonstrating the instructional mechanism through which cooperative interaction, peer tutoring, individual accountability, and continuous reflective improvement within the CAR framework collectively enhance psychomotor learning outcomes in volleyball. Unlike previous studies that mainly evaluated general learning achievement, this study provides empirical evidence of progressive skill development across instructional cycles while explaining the pedagogical processes underlying students' motor skill acquisition. This study aimed to improve students' learning outcomes in volleyball underhand passing techniques through the implementation of the STAD cooperative learning model. The research employed a two-cycle Classroom Action Research design involving 38 Grade X Class 8 students. Data were collected using volleyball underhand passing performance tests and analyzed through descriptive quantitative techniques. The findings revealed that classical learning mastery increased from 15.8% at the pre-test stage to 36.84% in Cycle I and reached 79.0% in Cycle II, representing an overall improvement of 63.20 percentage points. These findings indicate that the STAD cooperative learning model effectively improves students' technical performance, active participation, and collaborative learning. It can therefore be concluded that integrating STAD within a Classroom Action Research framework represents an effective instructional strategy for improving volleyball underhand passing skills while providing empirical evidence of how systematic instructional refinement contributes to psychomotor learning improvement in Physical Education.

STAD Learning Model, Underhand Passing, Volleyball, Learning Outcomes, Physical Education.

KEY WORDS

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A. Introduction

Physical Education plays a crucial role in developing students' physical competence, motor skills, teamwork, and lifelong healthy lifestyles through meaningful learning experiences. Effective Physical Education instruction should not only improve students' physical performance but also promote active participation, collaboration, critical thinking, and problem-solving skills during learning activities (Casey & Goodyear, 2021; Dyson, 2021). Consequently, selecting appropriate instructional models is essential to facilitate meaningful learning and improve students' psychomotor achievement.

One of the fundamental learning materials in senior high school Physical Education is volleyball. Volleyball requires students to master several basic techniques, including serving, passing, spiking, and blocking. Among these techniques, the underhand pass (forearm pass) is regarded as one of the most fundamental skills because it serves as the basis for receiving serves, controlling the ball, maintaining rallies, and initiating offensive attacks. Students who fail to master the underhand passing technique generally experience difficulties performing more advanced volleyball skills during game situations (Fenanlampir & Faruq, 2015). Therefore, improving students' mastery of underhand passing is a primary objective in volleyball instruction.

However, preliminary observations conducted among Grade X Class 8 students at SMA Negeri 2 Denpasar during the 2025/2026 academic year revealed that students' learning outcomes in the basic underhand passing technique remained unsatisfactory. Most students experienced difficulties performing the correct movement sequence, including improper body positioning, incorrect arm placement, and limited ball control. In addition, classroom observations indicated that the learning process was still predominantly teacher-centered, with students relying heavily on teacher demonstrations and receiving limited opportunities to engage in collaborative practice, peer feedback, and active discussion. These instructional conditions reduced students' participation, confidence, and motivation during learning activities, ultimately affecting their mastery of the underhand passing technique.

The results of the preliminary assessment further confirmed these findings. Only 6 of the 38 students (15.8%) achieved the Minimum Learning Mastery Criterion (MLMC) of 75, while 32 students (84.2%) failed to reach the expected level of mastery. These findings indicate that the existing instructional approach has not yet provided sufficient opportunities for students to actively construct knowledge, practice collaboratively, and continuously improve their technical performance. Consequently, a more student-centered instructional strategy is needed to improve learning outcomes in volleyball instruction.

One instructional model considered suitable for addressing these learning problems is the Student Teams Achievement Divisions (STAD) cooperative learning model. STAD emphasizes heterogeneous group learning, cooperative interaction, peer tutoring, individual accountability, and group recognition, allowing students to learn collaboratively while supporting one another in mastering instructional content (Slavin, 2020).

Recent international evidence has strengthened the position of cooperative learning as an effective instructional approach in Physical Education. Bores-García et al. (2021), through a systematic review, concluded that cooperative learning consistently improves students' motor competence, social interaction, learning engagement, and collaborative skills. Dyson et al. (2022) further reported that structured cooperative learning promotes meaningful participation and collaborative problem-solving during Physical Education lessons. Similarly, UNESCO (2024) emphasized that quality Physical Education should prioritize active participation, collaboration, and student-centered learning experiences to develop both technical competence and twenty-first-century skills. These findings indicate that cooperative learning has become one of the most recommended pedagogical approaches for improving learning quality in Physical Education.

Despite these advances, several important research gaps remain. Most previous studies focused primarily on general academic achievement, student engagement, or overall Physical Education outcomes rather than specifically examining students' mastery of volleyball underhand passing techniques. Furthermore, previous investigations rarely employed a Classroom Action Research (CAR) design to evaluate the progressive improvement of students' psychomotor skills across successive instructional cycles. Existing studies have also provided limited empirical evidence explaining how cooperative interaction, peer tutoring, individual

accountability, and continuous instructional reflection collectively contribute to students' motor skill acquisition during volleyball learning. Consequently, a significant knowledge gap remains regarding the pedagogical mechanisms through which the STAD cooperative learning model improves technical volleyball skills within authentic classroom settings.

The novelty of this study extends beyond merely implementing the Student Teams Achievement Divisions (STAD) cooperative learning model in Physical Education. Unlike previous studies that generally evaluated cooperative learning in terms of overall academic achievement or general Physical Education outcomes, this study explains the instructional mechanism through which cooperative interaction, peer tutoring, individual accountability, and continuous reflective improvement within a Classroom Action Research (CAR) framework contribute to students' psychomotor learning. By systematically evaluating students' mastery of volleyball underhand passing across two instructional cycles, this study provides empirical evidence of progressive motor skill acquisition while demonstrating how iterative instructional refinement enhances learning effectiveness. Therefore, this study contributes not only practical evidence regarding the effectiveness of STAD in volleyball instruction but also enriches the pedagogical understanding of how cooperative learning can be integrated with Classroom Action Research to improve psychomotor learning outcomes in Physical Education.

Based on the foregoing discussion, this study aims to improve students' learning outcomes in the basic underhand volleyball passing technique through the implementation of the Student Teams Achievement Divisions (STAD) cooperative learning model among Grade X Class 8 students at SMA Negeri 2 Denpasar during the 2025/2026 academic year. It is expected that the findings of this study will provide empirical evidence regarding the effectiveness of STAD as an innovative instructional strategy for improving students' technical skills, active participation, collaborative learning, and psychomotor achievement in Physical Education, while simultaneously contributing to the development of cooperative learning pedagogy through a Classroom Action Research approach.

B. Theoretical framework and Literature review

Theoretical Framework

Cooperative Learning Theory

Cooperative Learning Theory serves as the primary theoretical foundation of this study because the Student Teams Achievement Divisions (STAD) model is developed based on the principles of cooperative learning. Cooperative learning emphasizes learning through small heterogeneous groups in which students work together to achieve shared academic goals while maintaining individual accountability. According to Johnson and Johnson (2022), effective cooperative learning is characterized by five essential elements: positive interdependence, individual accountability, face-to-face interaction, interpersonal skills, and group processing. Likewise, Gillies (2021) argued that cooperative learning promotes active engagement, communication, problem-solving, and collaborative knowledge construction.

Within the context of Physical Education, these principles enable students to learn motor skills more effectively because they receive continuous opportunities to observe, discuss, practice, and provide feedback to their peers. Consequently, Cooperative Learning Theory explains why collaborative instructional models such as STAD are expected to improve students' psychomotor learning outcomes.

Student Teams Achievement Divisions (STAD)

Student Teams Achievement Divisions (STAD) is one of the most widely implemented cooperative learning models developed by Slavin (2020). The model consists of five instructional stages: class presentation, team learning, individual assessment, individual improvement scoring, and team recognition. These stages integrate cooperative interaction with individual accountability, ensuring that students actively participate in learning while taking responsibility for their own achievement.

In volleyball instruction, STAD provides opportunities for students to discuss movement techniques, practice collaboratively, observe peers' performances, and provide constructive feedback during learning activities. Consequently, STAD operationalizes the principles of Cooperative Learning Theory into practical

classroom strategies that are expected to improve students' mastery of volleyball underhand passing techniques.

Learning Process in STAD: Constructivism, Social Learning, and Motor Learning

The effectiveness of the STAD cooperative learning model can also be explained through the integration of Constructivist Theory, Social Learning Theory, and Motor Learning Theory. Constructivism emphasizes that students actively construct knowledge through meaningful learning experiences and social interaction. Within STAD, students develop their understanding of volleyball techniques by discussing movement concepts, solving problems collaboratively, and reflecting on their learning experiences.

Social Learning Theory complements this perspective by explaining that students acquire new skills through observation, imitation, modeling, and feedback. During cooperative learning activities, students observe demonstrations from teachers and peers, imitate correct movement patterns, receive immediate feedback, and progressively improve their performance through repeated practice.

Furthermore, Motor Learning Theory explains how repeated practice combined with constructive feedback facilitates the acquisition and refinement of movement skills. According to Fitts and Posner, learners progress through cognitive, associative, and autonomous stages of motor learning. The collaborative practice environment created through STAD accelerates this progression by providing students with continuous opportunities to practice, receive peer support, correct technical errors, and refine movement execution. Therefore, these three theoretical perspectives collectively explain the pedagogical mechanisms through which STAD improves students' mastery of volleyball underhand passing skills.

Learning Outcomes Theory

Learning outcomes refer to measurable changes in students' knowledge, attitudes, and skills following instructional activities. In Physical Education, psychomotor learning outcomes represent students' ability to perform movement skills accurately, efficiently, and consistently. Therefore, in this study, learning outcomes are reflected in students' mastery of the volleyball underhand passing technique after participating in learning activities using the Student Teams Achievement Divisions (STAD) cooperative learning model. Improvements in these outcomes indicate the effectiveness of cooperative learning strategies in enhancing students' psychomotor competence.

Literature Review

Previous studies consistently demonstrate that cooperative learning positively influences students' engagement, collaboration, motivation, and learning achievement in Physical Education. Bores-García et al. (2021) concluded through a systematic review that cooperative learning significantly improves students' motor competence and social interaction. Dyson et al. (2022) further reported that cooperative learning creates meaningful learning environments by encouraging active participation and collaborative problem-solving. Similarly, Casey and Goodyear (2021) emphasized that student-centered instructional models enhance learning quality by engaging students in collaborative knowledge construction.

Research specifically investigating the Student Teams Achievement Divisions (STAD) model has also reported positive outcomes. Lazim (2017) found that STAD improved students' learning achievement through structured cooperative activities, while Laa et al. (2017) reported increased learning interest and academic performance. Nevertheless, these studies primarily focused on general learning outcomes and provided limited explanation regarding the instructional mechanisms through which STAD enhances students' psychomotor competence.

Furthermore, only a limited number of studies have implemented STAD using a Classroom Action Research approach to evaluate progressive improvements in specific sports skills across multiple instructional cycles. Consequently, empirical evidence explaining how cooperative interaction, peer tutoring, individual accountability, and continuous instructional reflection contribute to motor skill acquisition in volleyball learning remains limited.

Therefore, this study extends previous research by integrating Cooperative Learning Theory, Constructivist Theory, Social Learning Theory, and Motor Learning Theory to explain the pedagogical mechanisms underlying the implementation of STAD. In addition, this study contributes empirical evidence regarding the effectiveness of STAD in improving students' mastery of volleyball underhand passing techniques through a systematic Classroom Action Research approach.

Table 1. Summary of Previous Studies and Research Gap

Author	Research Focus	Main Findings	Research Limitation	Research Opportunity
Bores-García et al. (2021)	Cooperative learning in PE	Improved motor competence and collaboration	Did not investigate STAD specifically	Evaluate STAD in volleyball skill learning
Dyson et al. (2022)	Cooperative learning implementation	Improved participation and engagement	Focused on general PE learning	Examine technical volleyball skills
Casey & Goodyear (2021)	Student-centered learning	Enhanced meaningful learning	No Classroom Action Research	Evaluate learning progression across CAR cycles
Gillies (2021)	Cooperative learning	Improved communication and collaboration	Limited psychomotor analysis	Explain instructional mechanisms affecting motor learning
Present Study	STAD + CAR + Volleyball Underhand Passing	Progressive improvement across two cycles	—	Explains how cooperative interaction, peer tutoring, individual accountability, and reflective improvement enhance psychomotor learning outcomes

Conceptual Framework

The conceptual framework of this study proposes that the implementation of the Student Teams Achievement Divisions (STAD) cooperative learning model creates a collaborative learning environment that promotes students' active participation. Through cooperative interaction, peer tutoring, and repeated motor skill practice, students progressively improve their mastery of the volleyball underhand passing technique, resulting in higher learning outcomes.

Figure 1. Conceptual Framework of the Study

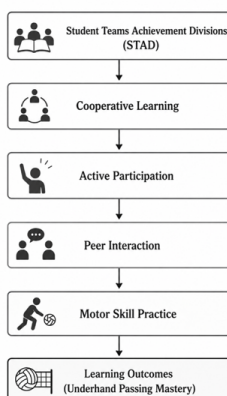


Figure 1 illustrates that the implementation of STAD serves as the primary instructional intervention that encourages cooperative learning. Increased active participation and peer interaction provide students with more opportunities to practice, receive immediate feedback, and refine their motor performance. Continuous practice and collaborative learning ultimately contribute to improved mastery of volleyball underhand passing skills and higher learning outcomes.

C. Methods

This study employed a Classroom Action Research (CAR) design aimed at improving students' learning outcomes in the basic underhand volleyball passing technique through the implementation of the Student Teams Achievement Divisions (STAD) cooperative learning model. Classroom Action Research is defined as a systematic inquiry into learning activities intentionally conducted within a classroom setting to improve the quality of instruction (Arikunto, 2019). The study was conducted in two cycles, with each cycle consisting of four stages: planning, action implementation, observation, and reflection. The research was carried out in May 2026 at Niti Mandala Renon Field, Denpasar.

The participants were 38 students from Grade X Class 8 of SMA Negeri 2 Denpasar during the 2025/2026 academic year, comprising 17 male students and 21 female students. The object of the study was the students' learning outcomes in the basic underhand volleyball passing technique following the implementation of the Student Teams Achievement Divisions (STAD) cooperative learning model.

Implementation of the STAD Cooperative Learning Model

The classroom action research was conducted over two instructional cycles, with each cycle consisting of two meetings (90 minutes per meeting). Each cycle followed the four stages of Classroom Action Research: planning, action, observation, and reflection.

Planning Stage. The researcher prepared lesson plans based on the STAD cooperative learning model, observation sheets, performance assessment rubrics, learning materials, volleyball equipment, and heterogeneous student groupings based on students' initial performance levels.

Action Stage. The instructional activities followed the five stages of the STAD model proposed by Slavin (2020): (1) class presentation, in which the teacher explained the learning objectives and demonstrated the correct underhand passing technique; (2) team learning, during which students practiced collaboratively in heterogeneous groups while discussing movement techniques and providing peer feedback; (3) individual assessment, in which each student independently performed the underhand passing skill without assistance from group members; (4) individual improvement scoring, where students' performances were compared with their previous achievements to determine individual progress; and (5) team recognition, where groups demonstrating the highest collective improvement received recognition and positive reinforcement.

Observation Stage. During each learning session, two observers independently monitored students' participation, peer interaction, learning motivation, and technical performance using structured observation sheets and assessment rubrics.

Reflection Stage. Following each cycle, the researcher analyzed students' performance, identified instructional strengths and weaknesses, and determined improvements for the subsequent cycle. Revisions implemented in Cycle II included more structured peer tutoring, additional teacher guidance, extended practice time, and more intensive feedback to improve students' mastery of the underhand passing technique.

Research Instrument

Data were collected using an underhand volleyball passing performance test. According to Fenanlampir and Faruq (2015), sports skill assessments are designed to measure students' ability to perform specific motor skills accurately and consistently. In this study, each student was given six opportunities to perform an underhand pass toward a predetermined target. Each successful performance received one point, whereas unsuccessful attempts received zero points. The total score obtained by each student was subsequently converted into a percentage score.

Students' performances were evaluated using a structured assessment rubric consisting of five performance indicators:

Table 2. Assessment Rubric for Underhand Passing Performance

Assessment Indicator	Description	Score (1–4)
Initial stance	Correct body position before executing the pass	1–4
Arm position	Proper forearm position during ball contact	1–4
Ball contact	Accuracy of forearm-ball contact	1–4
Ball direction	Accuracy in directing the ball toward the target	1–4
Body balance	Stability and follow-through after performing the pass	1–4

Each indicator was assessed using a four-point rating scale ranging from 1 (poor) to 4 (excellent). The combined scores were converted into percentages, and students achieving a score of 75 or above were categorized as having achieved the Minimum Learning Mastery Criterion (MLMC).

To ensure the quality of the assessment instrument, the performance assessment rubric was reviewed by two experts in Physical Education to establish content validity before data collection. To improve the objectivity and consistency of the assessment, students' performances were independently evaluated by two qualified Physical Education assessors using the same scoring rubric. Prior to the assessment, both assessors participated in a calibration session to ensure a common understanding of the assessment criteria and scoring procedures. The final score for each student was calculated as the average of the two assessors' ratings. Although assessor calibration and standardized scoring procedures were implemented to enhance inter-rater consistency, quantitative measures of inter-rater reliability, such as the Intraclass Correlation Coefficient (ICC) or Cohen's Kappa, were not calculated and should be considered a limitation of this study.

Ethical Considerations

Prior to data collection, official permission to conduct the research was obtained from the principal of SMA Negeri 2 Denpasar. All participants received an explanation regarding the objectives and procedures of the study before the implementation of the research. Students participated voluntarily in all learning activities, and no student was compelled to participate. The confidentiality of participants' identities and assessment results was maintained throughout the research process, and all collected data were used exclusively for academic and research purposes.

Data Analysis

The collected data were analyzed using descriptive quantitative analysis. According to Sudijono (2018), descriptive quantitative analysis is employed to summarize research findings through percentage calculations and descriptive statistics. Students' scores were obtained by comparing the total score achieved with the maximum possible score and converting the results into percentages. Individual learning mastery was determined based on the Minimum Learning Mastery Criterion (MLMC) of 75, while classical learning mastery was calculated as the percentage of students achieving individual mastery relative to the total number of participants. The research was considered successful if at least 75% of the students achieved the predetermined mastery criterion (Mulyani & Haji, 2023).

To complement the descriptive analysis, the Normalized Gain (N-Gain) was calculated to determine the magnitude of students' learning improvement between the pre-test and Cycle II. The N-Gain score was calculated using the following formula: $N\text{-Gain} = (\text{Post-test} - \text{Pre-test}) / (\text{Maximum Score} - \text{Pre-test})$

The resulting N-Gain values were interpreted according to the following criteria: low (<0.30), moderate ($0.30\text{--}0.69$), and high (≥ 0.70). This analysis provides additional evidence regarding the effectiveness of the Student Teams Achievement Divisions (STAD) cooperative learning model by quantifying the extent of students' improvement beyond the percentage of learning mastery.

D. Result and Discussion

Description of the Research Findings

This classroom action research was conducted with 38 students from Grade X Class 8 of SMA Negeri 2 Denpasar during the 2025/2026 academic year. The study aimed to improve students' learning outcomes in the basic underhand volleyball passing technique through the implementation of the Student Teams Achievement Divisions (STAD) cooperative learning model. The research was carried out in two cycles, each consisting of four stages: planning, action implementation, observation, and reflection.

Based on the preliminary observations and pre-test results, students' proficiency in performing the basic underhand volleyball passing technique was relatively low. Most students were unable to execute the technique correctly. Common errors included improper body positioning, incorrect arm posture during ball contact, and poor control of the ball's direction after contact. Furthermore, the learning process was predominantly teacher-centered, resulting in limited student participation and insufficient collaboration during instructional activities.

The pre-test results revealed that only 6 out of 38 students (15.8%) achieved the Minimum Learning Mastery Criterion (MLMC) of 75, while 32 students (84.2%) did not meet the required level of mastery. These findings indicate that students' learning outcomes in the basic underhand volleyball passing technique required considerable improvement.

To address these issues, the Student Teams Achievement Divisions (STAD) cooperative learning model was implemented. This instructional approach emphasizes cooperative group learning, individual accountability, peer tutoring, and group recognition as strategies to improve students' learning outcomes in the basic underhand volleyball passing technique.

The preliminary findings indicate that students' learning difficulties were not merely reflected in the low percentage of learning mastery but also in weaknesses in the quality of movement execution and classroom engagement. Students tended to rely on teacher demonstrations and had limited opportunities to practice collaboratively or receive constructive feedback from their peers. These conditions suggest that improving learning outcomes requires not only repeated technical practice but also an instructional approach that actively engages students in cooperative learning and peer interaction.

Cycle I

Planning

During the planning stage of Cycle I, the researcher prepared the lesson module, observation sheets, assessment instruments for evaluating underhand volleyball passing skills, and the necessary learning facilities and equipment. Students were assigned to heterogeneous learning groups based on their pre-test performance to ensure balanced group composition.

Action Implementation

The instructional activities were conducted following the procedures of the Student Teams Achievement Divisions (STAD) cooperative learning model. The teacher explained the fundamental concepts and demonstrated the correct execution of the underhand passing technique. Subsequently, students worked collaboratively within their groups to discuss, observe, and practice the technique while providing peer feedback under teacher supervision.

Observation

The observation results indicated that students became more actively engaged in the learning process compared with the preliminary condition. Students demonstrated greater willingness to ask questions, discuss movement errors, and support their peers during practice sessions. Nevertheless, several students still lacked confidence when executing the underhand passing technique, and collaboration within some groups had not yet developed optimally.

Cycle I Evaluation Results

The results of the underhand volleyball passing skills assessment conducted at the end of Cycle I are presented in Table 3.

Table 3. Students' Learning Outcomes in Cycle I

Category	Number of Students	Percentage
Achieved Mastery	14	36.84%
Did Not Achieve Mastery	24	63.16%
Total	38	100%

The findings presented in Table 3 indicate that the implementation of the STAD cooperative learning model began to produce positive changes in students' learning performance. Although the percentage of classical learning mastery increased from the preliminary condition to 36.84%, the expected success criterion of 75% had not yet been achieved. This outcome suggests that students were still adapting to the cooperative learning procedures, particularly in providing peer feedback and participating actively in group discussions. Nevertheless, improvements in classroom interaction, learning motivation, and students' willingness to practice collaboratively indicate that the instructional intervention successfully established the foundation for subsequent learning improvement in Cycle II.

Reflection

Based on the observation and evaluation results from Cycle I, several improvements were identified for implementation in Cycle II, including providing more detailed demonstrations, increasing teacher guidance during practice sessions, strengthening peer tutoring activities, extending opportunities for repeated motor skill practice, and introducing team recognition to enhance students' motivation and collaborative engagement.

Cycle II

Planning

During the planning stage of Cycle II, instructional improvements were made based on the reflection findings from Cycle I. The teacher clarified learning procedures, increased the intensity of guidance provided to each learning group, allocated additional practice time, and introduced group rewards to recognize teams demonstrating the highest levels of collaboration and participation.

Action Implementation

The instructional activities continued to employ the Student Teams Achievement Divisions (STAD) cooperative learning model. Students demonstrated greater familiarity with the learning procedures, allowing collaborative discussions and peer tutoring to occur more effectively. The teacher continuously monitored students' performances, provided immediate corrective feedback, and encouraged active participation throughout the learning process.

Observation

The observation results revealed substantial improvements in students' learning engagement. Students participated more confidently in collaborative discussions, demonstrated greater willingness to provide constructive feedback to peers, and showed improved consistency in performing the underhand passing technique. The frequency of technical errors decreased considerably, indicating meaningful progress in students' motor skill development.

Cycle II Evaluation Results

The evaluation conducted at the end of Cycle II demonstrated a significant improvement in students' learning outcomes. The results are presented in Table 4.

Table 4. Students' Learning Outcomes in Cycle II

Category	Number of Students	Percentage
Achieved Mastery	30	79.0%
Did Not Achieve Mastery	8	21.0%
Total	38	100%

The results presented in Table 4 demonstrate that the instructional revisions implemented following the reflection phase of Cycle I effectively enhanced students' learning performance. Increased opportunities for cooperative practice, peer tutoring, and repeated motor skill training enabled students to perform the underhand passing technique more accurately and consistently. The achievement of the predetermined classical learning mastery criterion indicates that the STAD cooperative learning model successfully facilitated meaningful improvements in students' learning outcomes.

The substantial increase in classical learning mastery observed in Cycle II indicates that the instructional revisions implemented after the reflection stage effectively addressed the learning difficulties identified in Cycle I. Increased teacher guidance, more structured peer tutoring, extended opportunities for repeated practice, and continuous feedback enabled students to perform the underhand passing technique with greater confidence, coordination, and consistency. These findings demonstrate that the effectiveness of STAD is strengthened when cooperative learning activities are continuously refined through reflective classroom action research.

Comparison of Learning Outcomes Across Research Cycles

To examine the improvement in students' learning outcomes, a comparison of the results obtained in Cycle I and Cycle II is presented below.

Table 5. Comparison of Students' Learning Outcomes Across the Research Cycles

Indicator	Pre-test	Cycle I	Cycle II
Students Achieving Mastery	6	14	30
Students Not Achieving Mastery	32	24	8
Learning Mastery Rate	15.8%	36.84%	79.0%

The comparison presented in Table 5 demonstrates a consistent upward trend in students' learning mastery throughout the classroom action research. Rather than representing isolated improvements, the progressive increase across both instructional cycles indicates that continuous refinement of instructional strategies through Classroom Action Research effectively enhanced students' acquisition of volleyball underhand passing skills. These findings suggest that cooperative learning environments emphasizing peer interaction, active participation, and repeated practice contribute substantially to students' psychomotor development.

Figure 2. Percentage of Learning Mastery Across Research Cycles

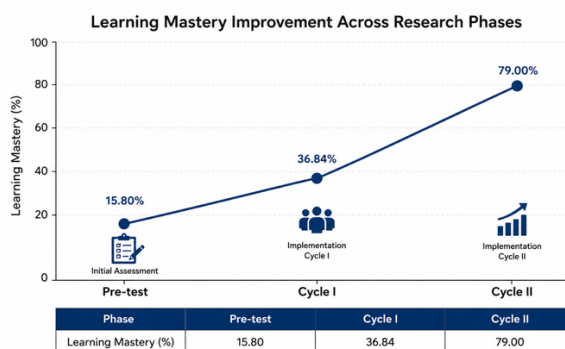


Figure 1. Learning Mastery Across Research Phases

Figure 2 illustrates a consistent upward trend in students' learning mastery throughout the classroom action research. The most substantial improvement occurred between Cycle I and Cycle II following instructional refinements based on reflective evaluation. This trend demonstrates that the progressive implementation of the STAD cooperative learning model effectively enhanced students' mastery of the volleyball underhand passing technique.

Learning Improvement Analysis

The implementation of the Student Teams Achievement Divisions (STAD) cooperative learning model produced substantial improvements in students' learning outcomes throughout the classroom action research. Classical learning mastery increased from 15.80% during the pre-test to 36.84% in Cycle I, representing an improvement of 21.04 percentage points. Following instructional revisions implemented in Cycle II, learning mastery further increased to 79.00%, corresponding to an additional improvement of 42.16 percentage points. Overall, students' learning mastery improved by 63.20 percentage points from the pre-test to the end of Cycle II. The progressive increase in learning mastery indicates that the instructional improvements implemented across the research cycles successfully facilitated students' motor skill acquisition. The largest improvement observed between Cycle I and Cycle II suggests that greater familiarity with the STAD learning procedures, enhanced peer tutoring, more intensive teacher guidance, and increased opportunities for repeated practice contributed substantially to students' technical performance.

Furthermore, the magnitude of the improvement demonstrates clear educational significance. The substantial increase in the proportion of students achieving the Minimum Learning Mastery Criterion indicates that the STAD cooperative learning model not only improved students' performance statistically but also produced meaningful educational benefits by promoting active participation, collaborative learning, individual accountability, and sustained motor skill practice. These findings confirm that STAD represents an effective instructional approach for improving students' mastery of the volleyball underhand passing technique.

The progressive improvement observed throughout the classroom action research demonstrates that learning gains occurred as a cumulative result of continuous instructional refinement rather than from a single instructional intervention. The reflective process implemented after each cycle enabled the teacher to identify students' learning difficulties and modify instructional strategies accordingly. Consequently, improvements in learning outcomes were accompanied by increased student participation, more effective peer tutoring, enhanced collaborative interaction, and greater confidence in performing the underhand passing technique. These findings highlight the importance of combining cooperative learning with reflective instructional improvement to optimize psychomotor learning in Physical Education.

Discussion

The findings of this study indicate that the effectiveness of the Student Teams Achievement Divisions (STAD) cooperative learning model lies not merely in increasing students' learning mastery but in transforming the learning process into a more collaborative, student-centered, and reflective environment. The progressive improvement observed throughout the classroom action research suggests that students' psychomotor development was facilitated by continuous instructional refinement, cooperative interaction, and repeated opportunities for meaningful practice. These findings demonstrate that improvements in volleyball underhand passing skills resulted from the interaction between instructional design and students' active engagement rather than from repeated practice alone.

The success of the STAD cooperative learning model can be attributed to several interconnected instructional processes. First, the STAD model provides students with opportunities to engage actively in learning through collaborative discussions and cooperative group activities. These interactions enable students to assist one another in understanding the correct underhand passing technique, identify movement errors, and provide constructive feedback during practice sessions. Rather than passively receiving information from the teacher, students actively participated in constructing knowledge through peer interaction and repeated motor practice. This collaborative learning environment increased students' confidence, motivation, and responsibility for both individual and group achievement.

Second, the combination of individual accountability and group responsibility encouraged students to participate actively throughout the learning process. Since each student's performance contributed to the overall team achievement, all group members were motivated to improve their technical performance while simultaneously supporting their peers. This instructional characteristic distinguishes STAD from conventional

teacher-centered instruction, where learning often depends primarily on teacher explanation and individual practice.

Third, repeated practice accompanied by immediate teacher guidance and peer feedback enabled students to refine their movement execution progressively. Students became increasingly capable of correcting body positioning, arm movement, ball contact, and follow-through during the underhand passing technique. Consequently, the quality of students' motor performance improved consistently throughout the research cycles.

These findings can be interpreted from the perspective of Constructivist Learning Theory, which emphasizes that knowledge is actively constructed through meaningful learning experiences rather than passively transmitted by teachers. During the implementation of STAD, students learned by discussing movement techniques, observing demonstrations, practicing collaboratively, and reflecting on their own performances. Such learning experiences enabled students to develop deeper conceptual understanding while simultaneously improving their psychomotor competence. This interpretation supports Vygotsky's view that social interaction plays a fundamental role in cognitive and skill development through collaborative learning activities.

The present findings also support the principles of Cooperative Learning Theory, which emphasize positive interdependence, face-to-face interaction, individual accountability, collaborative skills, and group processing (Johnson & Johnson, 2022). Within the STAD learning environment, these instructional principles encouraged students to work collaboratively toward common learning goals while maintaining responsibility for their individual performance. As a result, students demonstrated higher levels of engagement, participation, and learning motivation throughout the instructional process.

Furthermore, the findings align with Social Interdependence Theory, which proposes that successful learning occurs when group members recognize that their individual success depends on the success of the entire group. The heterogeneous grouping strategy implemented through STAD created opportunities for higher-achieving students to provide peer tutoring while lower-achieving students benefited from continuous assistance and encouragement. This positive interdependence fostered collaborative responsibility and created a supportive learning atmosphere that facilitated technical skill development.

The improvement in students' underhand passing performance can also be explained through Motor Learning Theory. According to Fitts and Posner, motor skill acquisition progresses through cognitive, associative, and autonomous stages. During Cycle I, students were primarily engaged in the cognitive stage as they attempted to understand the correct movement sequence. Following repeated practice, corrective feedback, and collaborative peer learning implemented throughout Cycle II, students gradually progressed toward the associative stage, where movement execution became more accurate, coordinated, and consistent. The repeated opportunities for practice provided through STAD therefore accelerated students' motor learning and contributed directly to the observed improvement in learning outcomes.

The present findings also demonstrate that the success of the STAD model cannot be attributed to a single instructional component. Rather, the improvement resulted from the interaction among cooperative learning principles, structured peer tutoring, individual accountability, and reflective instructional refinement implemented throughout the Classroom Action Research cycles. This interaction enabled students to receive continuous feedback, identify movement errors, and progressively refine their motor performance. Consequently, the findings extend previous research by explaining not only that STAD improves learning

outcomes but also how the instructional processes embedded within STAD contribute to students' psychomotor learning in Physical Education.

The findings of the present study are consistent with numerous recent international studies investigating cooperative learning in Physical Education. Dyson (2020) reported that cooperative learning enhances students' participation, collaboration, and psychomotor development through structured peer interaction. Similarly, Casey and Goodyear (2021) argued that student-centered pedagogical models create more meaningful learning experiences by encouraging students to actively construct knowledge rather than relying solely on teacher instruction. Gillies (2021) further concluded that cooperative learning promotes communication skills, collaborative problem-solving, and student engagement, all of which contribute positively to learning achievement.

The present findings are also supported by Johnson and Johnson (2022), who emphasized that positive interdependence and individual accountability are key mechanisms underlying successful cooperative learning. Likewise, Hastie and Casey (2021) demonstrated that models-based practice in Physical Education improves both technical skill acquisition and students' motivation through structured collaborative learning experiences. More recently, UNESCO (2024) highlighted that quality Physical Education should prioritize active participation, collaboration, and meaningful student engagement, principles that are strongly reflected in the implementation of the STAD cooperative learning model.

Although the findings are generally consistent with previous studies, this research provides an additional contribution by specifically examining the implementation of STAD to improve volleyball underhand passing mastery through a Classroom Action Research approach. Unlike many previous studies that evaluated general academic achievement or overall Physical Education outcomes, this study demonstrates how continuous instructional reflection, peer tutoring, repeated motor practice, and individual accountability collectively contribute to the progressive improvement of students' technical volleyball skills across multiple learning cycles.

From a practical perspective, the findings of this study provide valuable guidance for Physical Education teachers seeking to improve students' volleyball learning outcomes. Teachers are encouraged to organize heterogeneous learning groups that facilitate cooperative interaction among students with different ability levels. Structured peer tutoring activities should be incorporated to enable students to provide constructive feedback and assist one another in correcting technical errors. Furthermore, teachers should allocate sufficient opportunities for repeated motor skill practice, provide immediate corrective feedback throughout learning activities, and implement team recognition strategies to strengthen students' motivation and collaborative responsibility. By integrating these instructional components, Physical Education teachers can create more engaging, student-centered learning environments that effectively improve students' mastery of volleyball techniques and other psychomotor skills.

Study Limitations

Several limitations should be considered when interpreting the findings of this study. First, the research employed a Classroom Action Research design involving a single class of 38 students from one senior high school, limiting the generalizability of the findings to broader educational contexts. Second, the intervention was implemented over only two instructional cycles, which may not fully capture students' long-term retention of volleyball underhand passing skills. Third, although performance assessments were conducted by two qualified assessors using standardized scoring procedures, quantitative inter-rater reliability statistics were not

calculated. Finally, this study focused exclusively on psychomotor learning outcomes and did not examine cognitive understanding, affective development, or students' perceptions of the STAD learning experience. Future studies are therefore encouraged to employ experimental or quasi-experimental designs with larger and more diverse samples, longer intervention periods, and more comprehensive outcome measures to strengthen the empirical evidence regarding the effectiveness of the STAD cooperative learning model in Physical Education.

Overall, the findings of this study strengthen the evidence supporting the implementation of the Student Teams Achievement Divisions (STAD) cooperative learning model in Physical Education. Beyond demonstrating improved learning outcomes, this study contributes to the literature by explaining the pedagogical mechanisms through which cooperative interaction, peer tutoring, individual accountability, repeated motor practice, and continuous instructional reflection collectively enhance students' psychomotor learning. Accordingly, the study provides both theoretical and practical contributions to the development of student-centered instructional practices for teaching fundamental volleyball skills.

E. Conclusion

This Classroom Action Research demonstrates that the implementation of the Student Teams Achievement Divisions (STAD) cooperative learning model effectively improved students' learning outcomes in the basic volleyball underhand passing technique among Grade X Class 8 students at SMA Negeri 2 Denpasar. The progressive increase in learning mastery across the two instructional cycles indicates that integrating cooperative learning with continuous instructional reflection can effectively enhance students' psychomotor performance.

The main contribution of this study lies in providing empirical evidence that the integration of the STAD cooperative learning model within a Classroom Action Research framework facilitates progressive improvement in volleyball underhand passing skills through cooperative interaction, peer tutoring, individual accountability, and repeated motor practice. This study therefore extends existing evidence by demonstrating not only the effectiveness of STAD but also its application as a systematic instructional strategy for improving psychomotor learning in Physical Education.

Practically, the findings suggest that Physical Education teachers may adopt the STAD cooperative learning model to create more active, collaborative, and student-centered learning environments, particularly for teaching fundamental sports skills such as volleyball underhand passing. Physical Education teachers are encouraged to implement the Student Teams Achievement Divisions (STAD) cooperative learning model as an instructional strategy to improve students' psychomotor learning outcomes. Teachers should organize heterogeneous learning groups that encourage peer tutoring and collaborative learning, provide clear demonstrations of movement techniques, facilitate active discussions, offer immediate corrective feedback during practice sessions, and allocate sufficient opportunities for repeated motor skill practice. The integration of individual accountability and team recognition can further enhance students' motivation, participation, responsibility, and collaborative engagement throughout the learning process.

Curriculum developers should consider incorporating cooperative learning approaches, particularly the STAD model, into Physical Education curricula and instructional guidelines. The present findings demonstrate that cooperative learning supports student-centered instruction while simultaneously fostering psychomotor competence, collaborative problem-solving, communication skills, and teamwork. Integrating

cooperative learning into curriculum design is therefore consistent with twenty-first-century learning principles that emphasize active participation, collaboration, and meaningful learning experiences.

School leaders and administrators should support the implementation of innovative instructional models by providing continuous professional development opportunities for Physical Education teachers. Schools should facilitate workshops and collaborative learning communities that enable teachers to improve their pedagogical competence in implementing cooperative learning strategies effectively. In addition, adequate sports facilities, instructional equipment, and sufficient learning time should be provided to maximize the effectiveness of cooperative learning activities in Physical Education classes.

Future studies are recommended to employ experimental or quasi-experimental research designs involving control and experimental groups to provide stronger evidence regarding the effectiveness of the Student Teams Achievement Divisions (STAD) cooperative learning model. In addition, future research should involve larger and more diverse samples drawn from multiple schools and different educational levels to improve the generalizability of the findings.

Further investigations are also encouraged to examine the long-term effects of STAD on students' psychomotor performance by implementing longer intervention periods and follow-up assessments. Moreover, future studies may integrate STAD with digital learning technologies, video-assisted feedback, motion analysis applications, or artificial intelligence-based learning systems to enhance students' motor skill acquisition and learning engagement in Physical Education.

Finally, future research should expand the scope of investigation by examining additional outcome variables, including learning motivation, self-efficacy, teamwork, critical thinking, communication skills, and students' cognitive and affective learning outcomes. Such studies would provide a more comprehensive understanding of the effectiveness of cooperative learning models in Physical Education.

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G. Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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