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Enhancing Basketball Chest Pass Skills through Student Teams–Achievement Divisions Cooperative Learning

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ABSTRACT

Mastery of fundamental basketball skills requires instructional strategies that promote active participation, peer interaction, and repeated motor practice. This study aimed to improve students' basketball chest pass skills through the Student Teams–Achievement Divisions (STAD) cooperative learning model. A Classroom Action Research (CAR) design was employed involving 28 eleventh-grade students at PGRI 4 Senior High School Denpasar during the 2025/2026 academic year. The study was conducted in one cycle consisting of two meetings following the Kemmis and McTaggart model, which included planning, action, observation, and reflection. Data were collected using a chest pass performance test assessed by two independent evaluators across three components: preparatory stance, execution, and follow-through. The data were analyzed using descriptive quantitative analysis by calculating mean scores, frequencies, percentages, and classical learning mastery based on the predetermined minimum achievement criterion. The results showed that classical learning mastery increased from 21.43% in the preliminary assessment to 82.14% after the implementation of STAD, exceeding the predetermined success criterion of 75%. The mean performance score also increased from 65.68 to 81.25. Improvements were observed across all components of chest pass performance. These findings indicate that STAD cooperative learning can effectively enhance students' fundamental basketball chest pass skills by facilitating peer tutoring, individual accountability, positive interdependence, and active collaborative practice. The STAD model may therefore serve as an alternative student-centered instructional strategy for developing fundamental motor skills in physical education.

KEY WORDS

Student Teams–Achievement Divisions (STAD), cooperative learning, basketball chest pass; motor skill learning, physical education

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A. Introduction

Physical Education, Sports, and Health (PESH) plays an important role in supporting students' holistic development by integrating physical, psychomotor, cognitive, and affective learning. Beyond promoting physical fitness, physical education provides students with opportunities to develop fundamental motor skills, knowledge, healthy lifestyle behaviors, sportsmanship, responsibility, and teamwork. Within the senior high

school curriculum, basketball represents an important learning context because it requires students to combine technical competence with communication, coordination, decision-making, and collaborative performance.

Among the fundamental skills required in basketball, the chest pass is essential for maintaining ball possession and facilitating effective team play. A properly executed chest pass requires coordinated movement involving an appropriate preparatory stance, controlled arm extension, a forward step, accurate ball release, wrist action, and an effective follow-through. Therefore, mastery of the chest pass should not be viewed merely as the ability to pass the ball to a teammate, but as a fundamental motor skill requiring coordinated technical execution. Effective physical education instruction should consequently provide students with sufficient opportunities to observe, practice, receive feedback, interact with peers, and progressively refine their movement performance.

However, a considerable discrepancy was identified between the expected and actual chest pass performance of eleventh-grade students at PGRI 4 Senior High School Denpasar. Preliminary observations showed that only six students (21.42%) achieved the Minimum Learning Achievement Criterion (KKTP) of 75, whereas twenty-two students (78.57%) did not reach the required standard. These findings indicate that most students had not yet developed adequate mastery of the fundamental chest pass technique.

The low level of achievement was accompanied by instructional and participation-related problems. Basketball instruction was predominantly delivered through conventional teacher-centered approaches, particularly direct explanation and whole-class demonstrations. Such practices provided limited opportunities for students to explore movements, interact with peers, provide feedback, and actively construct their understanding of the technique. Students with lower skill levels tended to become passive and hesitant to demonstrate their abilities, while more proficient students often dominated learning activities and game situations. Consequently, classroom interaction, cooperative practice, and peer-assisted learning were not optimally developed. These conditions suggest the need for an instructional strategy that can simultaneously facilitate technical practice, active participation, peer interaction, and individual responsibility.

Cooperative learning provides a potential pedagogical approach to address these instructional challenges. In contrast to teacher-centered instruction, cooperative learning organizes students into small groups in which they are encouraged to learn with and from one another while remaining responsible for their individual performance. One widely used cooperative learning approach is the Student Teams–Achievement Divisions (STAD) model. STAD organizes students into heterogeneous teams and emphasizes group interaction, individual accountability, peer support, and shared achievement. The team reward structure promotes positive interdependence because each student's progress contributes to the achievement of the group. In physical education, these characteristics are particularly relevant because motor skill development requires repeated practice, observation, corrective feedback, and active engagement.

Previous studies have provided evidence supporting the effectiveness of STAD in basketball instruction. Rahman, Kanca, and Wijaya (2017) reported better basketball passing performance among students taught through STAD, with the experimental group achieving a mean score of 82.919 compared with 78.114 in the control group. Abasi (2017) similarly reported an increase in chest pass performance from a pretest mean score of 41.247 to a posttest mean score of 79.989. Parwata, Kanca, and Putra (2019) also found higher basketball learning outcomes in the STAD experimental group than in the control group. Collectively, these findings indicate that STAD has considerable potential for improving basketball-related learning outcomes.

Despite these positive findings, an important research gap remains. Previous studies cited in this study have predominantly employed quantitative experimental designs and have primarily focused on comparing learning outcomes before and after an intervention or between experimental and control groups. Consequently, these studies provide evidence regarding the effectiveness of STAD but offer comparatively limited insight into how STAD is implemented as a reflective classroom intervention and which instructional mechanisms contribute to improvements in students' chest pass performance. Moreover, within the literature reviewed in the present study, limited attention has been given specifically to the use of STAD for improving basketball chest pass skills through a Classroom Action Research (CAR) framework that integrates action, observation, and reflection into the instructional improvement process.

The novelty of the present study therefore lies in examining STAD not merely as an instructional treatment for producing higher learning scores, but as a classroom-based intervention for improving specific components of fundamental chest pass performance through a reflective action research process. The study

considers improvements across the preparatory stance, execution, and follow-through phases while examining instructional mechanisms associated with STAD, particularly peer tutoring, individual accountability, positive interdependence, and collaborative practice. This perspective is expected to provide a more process-oriented understanding of how cooperative learning can facilitate fundamental motor skill development in physical education.

The STAD model is particularly relevant to the identified classroom problems because heterogeneous group organization enables students with different skill levels to participate collaboratively. More proficient students can assist their peers through demonstrations, feedback, and peer tutoring, while students with lower skill levels can practice within a more supportive learning environment. At the same time, individual accountability encourages every student to actively develop their own performance because individual progress contributes to team achievement. These characteristics provide a pedagogical rationale for implementing STAD as an alternative to predominantly teacher-centered basketball instruction. The theoretical rationale is consistent with the principles of positive interdependence, individual accountability, and supportive learning communities described in the literature used in this study.

Accordingly, this study aimed to improve eleventh-grade students' fundamental basketball chest pass skills through the implementation of the Student Teams–Achievement Divisions (STAD) cooperative learning model.

B. Theoretical framework and Literature review

Cooperative Learning in Physical Education

Cooperative learning is a student-centered pedagogical approach in which learners work together in structured small groups to achieve shared learning goals while maintaining responsibility for their individual performance. Unlike conventional group work, cooperative learning requires purposeful interaction among group members, individual accountability, positive interdependence, interpersonal communication, and active participation. These characteristics make cooperative learning particularly relevant to physical education because the acquisition of motor skills requires not only repeated physical practice but also observation, feedback, communication, and interaction among learners.

Within physical education, cooperative learning provides opportunities for students with different levels of motor competence to participate meaningfully in the learning process. Students can observe their peers, exchange feedback, identify movement errors, and provide assistance during skill practice. Consequently, learning is not exclusively dependent on teacher demonstrations but also occurs through peer interaction and collaborative practice. This pedagogical environment can potentially reduce passive participation and create more equitable opportunities for students to develop their motor competence.

Recent international evidence supports the relevance of cooperative learning in physical education. Schulze and von Huth (2022), in a systematic review involving 23 studies and 3,699 children and adolescents, found that 71% of the reported outcomes showed significant positive effects of cooperative learning compared with traditional teaching approaches, with particularly strong outcomes in the social domain. Similarly, Zach, Shoval, and Shulruf (2023), reviewing 44 studies of cooperative learning interventions in physical education, identified potential benefits across physical, social, affective, and cognitive domains, although they emphasized the need for greater methodological specificity regarding particular cooperative learning strategies.

These findings are particularly relevant to the present study because basketball instruction involves both individual motor performance and interpersonal cooperation. The ability to execute a technically correct pass develops through repeated practice, whereas effective passing in actual play also depends on interaction and coordination with teammates. Therefore, a cooperative instructional environment may provide an appropriate pedagogical context for simultaneously facilitating technical development and collaborative learning.

Student Teams–Achievement Divisions (STAD)

Student Teams–Achievement Divisions (STAD) is a structured cooperative learning model originally developed within the broader theoretical framework of cooperative learning. The model organizes students into heterogeneous teams consisting of learners with different levels of ability and encourages team members to support one another in mastering the learning material. The theoretical foundation of STAD emphasizes

positive interdependence and individual accountability, meaning that students are expected to contribute to team achievement while remaining individually responsible for their own learning performance.

According to Slavin (2005), STAD generally involves several interrelated instructional components: class presentation, team study, individual assessment, individual improvement, and team recognition. During class presentation, the teacher introduces the learning objectives, concepts, or skills to be mastered. Students subsequently work within heterogeneous teams to practice and consolidate their understanding. Individual performance is then assessed so that each student remains personally accountable for learning. Individual improvement contributes to the overall achievement of the team, while team recognition provides reinforcement for collective effort.

In physical education, these principles can be adapted from cognitive learning activities to motor-skill practice. Following teacher demonstration of a motor task, students can work in heterogeneous groups to repeatedly practice the movement, observe their teammates' performance, identify errors, and provide corrective feedback. More proficient students can serve as peer models without replacing the teacher's instructional role, while students experiencing difficulties receive additional opportunities for assistance and practice.

This process is particularly relevant to the present study. The initial classroom observations showed considerable differences in students' chest pass proficiency and participation. Less-skilled students tended to be passive and reluctant to demonstrate their abilities, whereas more proficient students tended to dominate learning activities. Through heterogeneous grouping and shared team responsibility, STAD provides a mechanism through which these differences can be transformed into opportunities for peer-assisted learning.

Contemporary literature further supports the use of cooperative structures in physical education. A recent systematic review by Bores-García et al. found that cooperative learning research in physical education has frequently addressed sport, motor skills, physical abilities, motivation, group climate, and teacher–student interaction. The authors nevertheless emphasized the importance of implementing cooperative learning as a genuine pedagogical model rather than simply placing students into groups. More recently, Kim and Park (2024) emphasized that cooperative learning in physical education can support physical activity engagement and interpersonal skill development when its essential cooperative elements are properly implemented.

Furthermore, Zhou, Wang, and Li's (2023) bibliometric analysis of 169 publications demonstrated increasing scholarly attention to cooperative learning in physical education and identified motor skills, intrinsic motivation, cooperative learning, and pedagogical models among the major research themes. These findings strengthen the theoretical rationale for investigating STAD not only as a general classroom management strategy but also as a pedagogical mechanism for facilitating the acquisition of specific sport-related motor skills.

Fundamental Chest Pass Skills in Basketball

The chest pass is one of the fundamental passing techniques in basketball and plays an important role in ball circulation, offensive organization, and cooperation among players. The technique is generally performed by holding the ball approximately at chest level with both hands and propelling it directly toward a teammate through coordinated movement of the upper and lower extremities. Mastery of the chest pass requires accuracy, appropriate force production, body coordination, timing, and technically correct follow-through.

In the present study, chest pass performance is conceptualized as a motor skill consisting of three sequential components: preparatory stance, execution, and follow-through. This conceptualization is consistent with the assessment instrument used in the study, which evaluates six indicators for the initial stance, five indicators for execution, and five indicators for the final stance.

During the preparatory phase, students establish an appropriate body position before passing. Essential components include appropriate foot positioning, knee flexion, balanced posture, secure ball control with the fingers spread, and suitable elbow positioning. This phase provides the postural stability required to generate and transfer force efficiently during the subsequent movement.

During the execution phase, the student coordinates a forward step with extension of the arms and releases the ball toward the intended target. Appropriate timing of the release and wrist action contribute to the direction, velocity, and accuracy of the pass. The movement should involve coordinated contributions from the lower and upper body rather than relying solely on arm strength.

The follow-through phase completes the movement after ball release. Proper follow-through involves continued arm extension, appropriate hand and wrist orientation, and visual attention toward the direction of the pass. The importance of these phases is reflected in the preliminary findings of the present study, where students demonstrated several technical deficiencies, including parallel foot positioning, excessively abducted elbows, excessive reliance on arm force, inappropriate ball-release timing, and incorrect follow-through.

The existing references in the manuscript also support the importance of technically correct fundamental basketball skills as the basis for developing more advanced skills, particularly Mahendra (2017) and the official PERBASI training material (2022). Thus, improvement in chest pass performance should be evaluated not merely through whether the ball reaches a teammate but through the quality and coordination of the movement across its sequential phases.

Motor Skill Learning and Peer-Assisted Practice

From a motor-learning perspective, the development of chest pass proficiency requires repeated task-specific practice accompanied by opportunities to receive information about movement performance. Students need sufficient practice trials to progressively refine coordination, identify technical errors, and develop increasingly consistent movement patterns. In a conventional teacher-centered physical education environment, however, the amount of individualized feedback that one teacher can provide to every student may be limited.

Cooperative learning can complement teacher feedback by creating structured opportunities for peer observation and peer-assisted practice. Within STAD teams, students can observe movement demonstrations, practice repeatedly, compare their execution with established performance criteria, and receive immediate feedback from teammates. Such interaction may increase both the quantity of practice opportunities and students' awareness of technical movement components.

Importantly, cooperative learning should not be interpreted as replacing teacher instruction. Instead, the teacher remains responsible for establishing technically appropriate performance criteria, demonstrating the skill, monitoring group activities, correcting misconceptions, and ensuring that peer feedback is consistent with the intended movement pattern. Peer-assisted practice then functions as an additional instructional mechanism that increases student engagement and opportunities for feedback.

Recent research reinforces the relevance of this relationship. International reviews indicate that cooperative learning in physical education has been associated with outcomes extending across physical, cognitive, social, and affective domains. Zhou et al. (2023) similarly identified motor skills as an important theme within the growing international literature on cooperative learning in physical education. Therefore, STAD provides a theoretically relevant structure for connecting social interaction with the repeated practice and feedback required for motor skill development.

Conceptual Relationship between STAD and Chest Pass Skill Development

Based on the theoretical and empirical literature, STAD cooperative learning is expected to facilitate the development of basketball chest pass skills through several interconnected mechanisms. Heterogeneous team practice promotes positive interdependence and individual accountability, while peer observation, feedback, and repeated practice provide students with opportunities to identify and correct technical errors. These learning processes are expected to facilitate improvements in the preparatory stance, execution, and follow-through phases of the chest pass. Accordingly, this theoretical framework provides the rationale for implementing STAD as a classroom-based intervention to improve students' fundamental basketball chest pass skills.

Figure 1. Conceptual Framework of the Study



Figure 1 illustrates the proposed conceptual mechanism through which STAD cooperative learning facilitates the development of students' fundamental basketball chest pass skills.

C. Methods

Research Design

This study employed a Classroom Action Research (CAR) design to improve students' fundamental basketball chest pass skills through the implementation of the Student Teams–Achievement Divisions (STAD) cooperative learning model. Classroom Action Research was selected because it provides a systematic framework for identifying classroom-based instructional problems, implementing targeted pedagogical actions, observing changes in students' learning performance, and reflecting on the effectiveness of the intervention to improve subsequent instructional practices (Arikunto, Suhardjono, & Supardi, 2021).

The study followed the Kemmis and McTaggart action research framework, consisting of four interconnected stages: planning, action, observation, and reflection. The research was conducted in one cycle comprising two instructional meetings. The study was concluded after Cycle I because the predetermined criterion for successful learning mastery had been achieved. Thus, an additional cycle was not conducted. This procedure was consistent with the improvement-oriented nature of classroom action research, in which reflection on the results of each cycle determines whether further instructional action is required. The reflective, collaborative, and participatory characteristics of action research also enabled the instructional intervention to be evaluated within the authentic physical education learning environment (Mertler, 2025).

Participants and Research Setting

The study involved 28 eleventh-grade students at PGRI 4 Senior High School Denpasar during the 2025/2026 academic year. The research was conducted in the class in which difficulties in mastering the fundamental basketball chest pass technique had been identified during preliminary observation. All students in the class participated in the instructional intervention and performance assessment.

Before the implementation of STAD, a preliminary assessment was conducted to establish students' baseline chest pass performance. The preliminary findings indicated considerable variation in students' technical proficiency and provided the empirical basis for implementing a cooperative instructional intervention. During the intervention, students were organized into heterogeneous learning teams to facilitate peer interaction, collaborative practice, individual participation, and mutual assistance in mastering the chest pass technique.

Classroom Action Research Procedure

The research procedure was implemented through the four stages of the Kemmis and McTaggart model: planning, action, observation, and reflection.

During the planning stage, the instructional intervention was prepared based on the problems identified during preliminary observation. The researchers prepared STAD-based learning activities, organized students into heterogeneous teams, established the technical criteria for chest pass performance, and prepared the performance assessment instrument used to observe students' skill development.

During the action stage, basketball chest pass instruction was implemented using the STAD cooperative learning model. Students participated in heterogeneous teams and engaged in structured practice activities that provided opportunities for peer observation, discussion, feedback, and repeated practice. The learning activities emphasized positive interdependence, individual accountability, active participation, and cooperation among team members. Students with different levels of skill proficiency were encouraged to assist one another while each student remained individually responsible for demonstrating the required chest pass performance.

During the observation stage, students' chest pass performance was systematically assessed throughout the intervention. Observation focused on three sequential components of the chest pass technique: preparatory stance, execution, and follow-through. Students' performance was evaluated using predetermined observable indicators representing the technical characteristics of each phase.

During the reflection stage, the results of the performance assessment and classroom observations were reviewed to determine the extent to which the intervention had improved students' chest pass skills. The results were compared with the predetermined success criterion. Because the percentage of students achieving the minimum learning achievement criterion exceeded the required 75% level in Cycle I, the intervention was considered successful and no additional action cycle was conducted.

Research Instrument

Students' fundamental basketball chest pass skills were measured using a performance-based assessment instrument. The instrument was designed to assess the complete sequence of the chest pass movement rather than merely determining whether the ball successfully reached the intended target.

The instrument consisted of 16 observable performance indicators organized into three components. The preparatory stance consisted of six indicators, the execution phase consisted of five indicators, and the follow-through phase consisted of five indicators. These components represented the sequential technical performance required to execute a basketball chest pass correctly.

The preparatory stance focused on students' initial body positioning and readiness before passing. The execution phase assessed the coordination of body movement, arm extension, ball release, and wrist action during the pass. The follow-through phase evaluated the completion of the passing movement after ball release. The use of these three components allowed students' technical development to be examined across the complete movement sequence.

Instrument Validity and Assessment Transparency

The chest pass performance instrument was used to evaluate observable technical components of the movement across the preparatory stance, execution, and follow-through phases. However, no formal quantitative evidence of instrument validity, such as a Content Validity Index (CVI) or other psychometric validity coefficient, was available for the present study. Therefore, no numerical validity coefficient is reported. This limitation is acknowledged to maintain methodological transparency and to avoid making validity claims that are not supported by documented evidence.

The performance indicators were applied consistently throughout the preliminary assessment and Cycle I to enable comparison of students' chest pass performance across the two assessment periods. Future studies are recommended to undertake formal content validation involving experts in basketball, physical education, and motor learning and to report appropriate quantitative validity indices before implementing the instrument in broader research contexts.

Assessment Procedure and Inter-Rater Reliability

Students' chest pass performance was assessed by two assessors using the same performance assessment instrument. Both assessors evaluated the same three technical components—preparatory stance, execution, and follow-through—using the predetermined performance indicators. The use of two assessors was intended to reduce dependence on a single observer when evaluating students' motor performance.

The available research records do not contain a formal statistical estimate of inter-rater reliability, such as an Intraclass Correlation Coefficient (ICC) or Cohen's kappa. Consequently, no inter-rater reliability coefficient is reported in this study. The assessment results should therefore be interpreted with this methodological limitation in mind.

The absence of a formal inter-rater reliability coefficient is explicitly reported to ensure transparency regarding the assessment procedure. Future research should establish assessor agreement before formal data collection through assessor training, standardized scoring criteria, pilot assessment, and statistical examination of inter-rater reliability. For continuous performance scores, an appropriate reliability statistic such as the Intraclass Correlation Coefficient may be considered.

Data Analysis

Data were analyzed using descriptive quantitative analysis to examine changes in students' fundamental basketball chest pass performance from the preliminary assessment to Cycle I. The analysis included individual performance scores, class mean scores, frequencies of students achieving and not achieving the minimum learning achievement criterion, percentages, and classical learning mastery.

The individual performance score was calculated as follows:

$$S_i = \frac{X_i}{X_{\max}} \times 100$$

where S_i represents the individual performance score, X_i represents the score obtained by an individual student, and $X_{\max}$ represents the maximum possible score.

The class mean score was calculated using:

$$\bar{X} = \frac{\sum X}{N}$$

Where $\bar{X}$ represents the class mean score, $\sum X$ represents the sum of all students' scores, and N represents the total number of students.

Classical learning mastery was calculated using:

$$P = \frac{n}{N} \times 100\%$$

where P represents the percentage of classical learning mastery, n represents the number of students who achieved the minimum learning achievement criterion, and N represents the total number of students.

A student was classified as achieving mastery when obtaining a chest pass performance score of 75 or higher (≥ 75). Conversely, a student obtaining a score below 75 was categorized as not achieving mastery. At the classroom level, the intervention was considered successful when at least 75% of the students achieved the minimum learning achievement criterion.

Changes in learning performance were evaluated by comparing the preliminary assessment and Cycle I results. The comparison focused on: (1) the class mean score, (2) the number of students achieving mastery, (3) the number of students not achieving mastery, and (4) the percentage of classical learning mastery. The analysis was descriptive and was intended to evaluate improvement within the classroom action research cycle rather than to test inferential statistical hypotheses.

The success of the classroom action was determined using both individual and classical learning mastery criteria. Individual mastery was achieved when a student obtained a chest pass performance score of at least 75. Classical mastery was achieved when at least 75% of the 28 participating students met or exceeded the individual mastery criterion.

The decision to continue or terminate the action research cycle was based on this predetermined classical mastery criterion. When the criterion was achieved in Cycle I, the intervention was considered to have met the expected classroom improvement target, and an additional cycle was not conducted.

D. Result and Discussion

Preliminary Chest Pass Performance

The preliminary assessment was conducted to establish students' baseline performance before the implementation of the Student Teams–Achievement Divisions (STAD) cooperative learning model. The results indicated that students generally experienced difficulties in performing the fundamental components of the basketball chest pass correctly

Table 1. Students' Chest Pass Performance in the Preliminary Assessment

Indicator	Result
Number of students	28
Students achieving mastery	6
Students not achieving mastery	22
Classical mastery	21.43%
Mean score	65.68
Minimum mastery criterion	≥ 75

As shown in Table 1, only 6 of the 28 students (21.43%) achieved the minimum mastery criterion, whereas 22 students (78.57%) remained below the required score of 75. The class mean score of 65.68 was also substantially below the predetermined mastery criterion. These findings indicate that the problem was not limited to a small number of students but represented a broader classroom-level learning difficulty.

More importantly, observations of students' movement patterns revealed several recurring technical problems. During the preparatory phase, some students positioned their feet parallel rather than adopting a balanced stance. During execution, several students placed their elbows excessively outward, relied predominantly on arm strength without sufficient body coordination, and released the ball either too early or too late. In the follow-through phase, incomplete arm extension and limited wrist action were also observed. These errors suggest that students had not yet developed a consistent sequence of movement across the preparatory, execution, and follow-through phases of the chest pass. These baseline technical deficiencies are documented in the original results.

From an instructional perspective, the low baseline performance also needs to be understood in relation to the learning conditions identified during preliminary observation. Students with lower skill levels tended to participate passively, while more proficient students were more dominant during practice. Opportunities for systematic peer learning and corrective feedback were limited. Consequently, the baseline findings provided both an empirical and pedagogical rationale for implementing STAD, which reorganized learning around heterogeneous teams, peer assistance, repeated practice, and individual responsibility.

Implementation of STAD in Cycle I

Based on the preliminary findings, STAD was implemented during Cycle I through heterogeneous team-based learning activities. Students were provided with structured opportunities to observe demonstrations, practice the chest pass repeatedly, interact with teammates, provide peer feedback, and improve their individual performance within the team-learning environment.

The intervention emphasized that team participation did not replace individual responsibility. Each student was expected to develop and demonstrate his or her own chest pass performance while simultaneously

contributing to the learning of other team members. This structure was particularly relevant to the initial classroom condition, in which differences in skill proficiency had previously resulted in unequal participation.

During the learning process, peer interaction became an important component of practice. More proficient students were able to demonstrate movement patterns and assist teammates in identifying technical errors, while less proficient students received more immediate opportunities for correction and repeated practice. The instructional process therefore shifted from predominantly teacher-centered instruction toward a more participatory learning environment.

Students' Chest Pass Performance after Cycle I

Following the implementation of STAD, students' chest pass performance showed substantial improvement.

Table 2. Students' Chest Pass Performance after Cycle I

Indicator	Cycle I Result
Number of students	28
Students achieving mastery	23
Students not achieving mastery	5
Classical mastery	82.14%
Mean score	81.25
Minimum mastery criterion	≥75

Table 2 demonstrates that 23 of the 28 students (82.14%) achieved the minimum mastery criterion following the intervention, leaving only 5 students (17.86%) below the required level. The class mean score increased to 81.25, exceeding the minimum achievement criterion of 75. These results indicate that improvement occurred not only in the overall class mean but also in the distribution of mastery across students.

The reduction in the number of students who had not achieved mastery—from 22 students at baseline to only 5 students after Cycle I—is particularly meaningful. It indicates that the improvement was not confined to students who were already relatively proficient before the intervention. Instead, a substantial proportion of initially non-mastering students reached the expected performance standard after participating in STAD-based learning. Furthermore, the classical mastery rate of 82.14% exceeded the predetermined classroom success criterion of 75%. Therefore, Cycle I was considered successful and an additional action cycle was not required.

Comparison of Preliminary Assessment and Cycle I

To provide a clearer representation of learning improvement, Table 3 compares the principal performance indicators between the preliminary assessment and Cycle I.

Table 3. Comparison of Students' Chest Pass Performance before and after STAD Implementation

Indicator	Preliminary Assessment	Cycle I	Change
Mean score	65.68	81.25	+15.57 points
Students achieving mastery	6	23	+17 students
Students not achieving mastery	22	5	–17 students
Classical mastery	21.43%	82.14%	+60.71 percentage points

Table 3 reveals two complementary patterns of improvement. First, the class mean increased by 15.57 points, from 65.68 to 81.25. Second, and more importantly for the classroom action research objective, classical mastery increased by 60.71 percentage points, from 21.43% to 82.14%. Thus, the findings demonstrate improvement both in the overall level of performance and in the proportion of students who reached the expected learning standard.

The increase from 6 to 23 students achieving mastery means that 17 additional students reached the minimum performance criterion after Cycle I. At the same time, the number of non-mastering students

decreased from 22 to 5. This distributional change provides a more meaningful indication of classroom improvement than the mean score alone because it demonstrates that the gains were broadly reflected across the class.

It is important, however, to interpret these findings within the methodological scope of classroom action research. The results demonstrate substantial within-class improvement following the implementation of STAD, but the absence of a control group and inferential causal design means that the improvement should not be interpreted as definitive evidence that STAD alone caused the observed changes.

Figure 2. Improvement in Students' Classical Learning Mastery

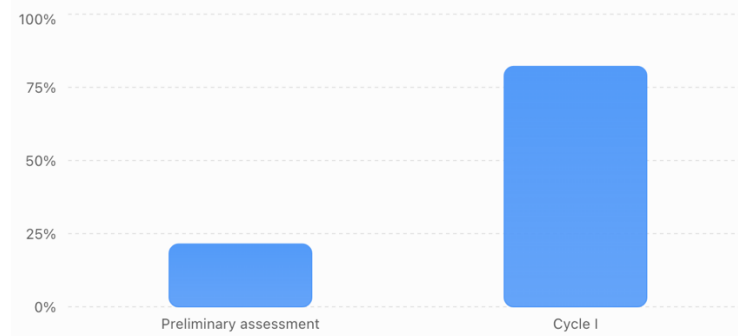


Figure 2 visually demonstrates the substantial increase in classical learning mastery following the implementation of STAD. While only 21.43% of students met the mastery criterion during the preliminary assessment, the proportion increased to 82.14% after Cycle I. The post-intervention result also exceeded the predetermined classroom success criterion of 75%, indicating that the expected improvement target was achieved within the first action cycle.

Improvement in the Technical Components of the Chest Pass

The observed improvement was also reflected in the quality of students' movement execution. Following the STAD intervention, students demonstrated better performance across the three technical phases of the chest pass: preparatory stance, execution, and follow-through. In the preparatory phase, students showed greater consistency in positioning their feet, bending their knees, positioning their fingers correctly on the ball, and maintaining an appropriate elbow position. These improvements suggest greater readiness and postural control before initiating the pass.

During the execution phase, students demonstrated improved coordination between arm extension and forward body movement. Ball release became more appropriately timed, and wrist action was more consistently incorporated into the passing movement. These changes are important because an effective chest pass requires coordinated movement rather than reliance on arm strength alone.

Improvement was also observed during the follow-through phase. Students demonstrated more complete arm extension, more appropriate hand positioning after ball release, and better visual orientation toward the intended target. Taken together, these changes indicate that the improvement was not restricted to the final outcome of the pass but was reflected across the sequential technical components of the movement. These technical changes are consistent with the movement improvements reported in the original discussion.

Why Did Students' Performance Improve?

The improvement observed after Cycle I can be interpreted through several interconnected learning mechanisms embedded in STAD. The first mechanism was peer tutoring. Heterogeneous team organization enabled students with relatively stronger chest pass skills to provide demonstrations, explanations, and corrective feedback to teammates who experienced technical difficulties. This interaction increased students' access to immediate feedback during practice rather than making feedback dependent exclusively on the teacher.

The second mechanism was individual accountability. Although students practiced within teams, each student remained responsible for demonstrating individual skill mastery. This feature reduced the possibility

that less-skilled students would remain passive while more proficient students dominated the activity. Individual responsibility within a cooperative structure therefore encouraged more active participation across different skill levels.

The third mechanism was positive interdependence and collaborative practice. Students worked toward shared team learning while supporting one another's individual improvement. This structure transformed differences in skill proficiency from a potential source of unequal participation into an instructional resource for peer learning.

The fourth mechanism was the creation of a more supportive learning environment. Students were provided with repeated opportunities to perform the chest pass, observe peers, receive feedback, identify technical errors, and attempt corrected movements. Such repeated cycles of performance and feedback are particularly relevant to the development of motor skills because technical improvement requires opportunities to translate feedback into subsequent movement attempts.

These mechanisms are also consistent with the original manuscript, which identifies peer tutoring, individual accountability, collaboration, and a supportive learning environment as explanations for the observed improvement.

Relationship with Previous Studies

The present findings are consistent with previous studies reporting positive outcomes from cooperative learning approaches in physical education. However, the contribution of the present study should not be limited to demonstrating that students obtained higher scores after STAD implementation. More importantly, the classroom action research design provides insight into how STAD operated within an authentic physical education setting.

The findings suggest that heterogeneous team practice, peer assistance, individual accountability, and repeated opportunities for feedback provided a learning structure that addressed the participation problems identified during the preliminary observation. In this respect, the present study extends the findings of previous research by linking changes in chest pass performance with observable classroom learning processes rather than reporting achievement outcomes alone.

This interpretation is consistent with the research gap already identified in the manuscript, namely that previous studies have tended to emphasize quantitative outcomes, while fewer studies have examined the classroom processes through which STAD may facilitate the development of a specific basketball skill.

Theoretical and Practical Interpretation

From a theoretical perspective, the findings support the proposed conceptual relationship between cooperative learning processes and motor skill development. Heterogeneous team practice created opportunities for peer observation and interaction; individual accountability encouraged active participation; and repeated practice with feedback facilitated correction of technical movement patterns. These processes correspond to the conceptual framework proposed in this study, in which STAD is expected to support improvements in the preparatory stance, execution, and follow-through components of the chest pass.

From a practical perspective, the findings indicate that STAD can provide physical education teachers with a structured alternative to predominantly teacher-centered chest pass instruction. Rather than positioning the teacher as the sole source of demonstration and corrective feedback, STAD distributes learning opportunities across heterogeneous teams while maintaining individual performance responsibility. This approach may be particularly useful in classes characterized by considerable variation in students' initial skill levels.

Nevertheless, the findings should be interpreted within the boundaries of the study design. The study involved only 28 students from one class at one school, was conducted within one action cycle, and did not employ a control group. Therefore, the results primarily demonstrate successful improvement within the specific classroom context studied and should not be generalized broadly without further investigation. The original manuscript itself acknowledges limitations relating to sample size, one-cycle implementation, and limited generalizability.

Discussion

The present study showed a substantial improvement in students' basketball chest pass performance following the implementation of the Student Teams–Achievement Divisions (STAD) cooperative learning model. Classical mastery increased from 21.43% in the preliminary assessment to 82.14% after Cycle I, while the class mean score increased from 65.68 to 81.25. These findings indicate that the intervention was associated with improvement not only in overall class performance but also in the proportion of students who reached the predetermined mastery criterion.

The improvement can be explained through several pedagogical mechanisms embedded in STAD. First, the use of heterogeneous learning teams created opportunities for students with different skill levels to interact during practice. In the preliminary condition, lower-skilled students tended to be passive while more proficient students were more dominant, resulting in limited opportunities for peer learning. STAD changed this learning structure by placing students in teams where participation and mutual assistance became central to the learning process. This arrangement allowed less-skilled students to observe more proficient peers, receive immediate feedback, and practice the movement repeatedly in a less teacher-dependent environment.

Second, peer tutoring and peer observation likely contributed to the improvement in technical performance. The chest pass is a sequential motor skill that requires students to coordinate the preparatory stance, execution, and follow-through. During team-based practice, students were able to observe how peers positioned their feet, extended their arms, released the ball, and completed the movement. This form of peer-assisted practice provided students with more frequent opportunities to identify technical errors and correct them during subsequent attempts. The original findings indicate that the major improvements occurred in these technical components, including body positioning, arm extension, timing of release, wrist action, and follow-through.

Third, individual accountability is an important mechanism that distinguishes STAD from unstructured group work. Although students practiced cooperatively, each learner remained responsible for demonstrating individual performance. This feature is particularly relevant in physical education because group activities may otherwise allow less confident or less skilled students to participate minimally while more competent students dominate the task. By maintaining individual responsibility within a cooperative structure, STAD encouraged all students to remain engaged in practice and improvement. The mechanism is consistent with the original discussion, which identifies individual accountability as one of the factors supporting learning improvement.

Fourth, positive interdependence may have strengthened students' motivation to support one another. In STAD, the learning progress of individual students contributes to the performance of the team. This creates a learning environment in which students have a reason to assist peers rather than merely compete with them. In the context of chest pass learning, this means that students are encouraged to provide demonstrations, corrective comments, and encouragement during repeated practice. Thus, differences in initial ability can become a resource for peer learning rather than a source of unequal participation.

Another important explanation concerns the role of repeated practice and immediate feedback. Motor skill learning requires multiple opportunities to perform, evaluate, and correct movement patterns. In a conventional teacher-centered lesson, one teacher must supervise many students, limiting the amount of individualized feedback each learner can receive. Through STAD, part of the feedback process is distributed across team members. As a result, students receive more frequent information about their performance and more opportunities to immediately apply corrections. This mechanism may explain why improvements were observed across the preparatory, execution, and follow-through phases rather than only in the final outcome of the pass.

The findings are consistent with previous studies reporting positive effects of cooperative learning on student participation and skill development in physical education. However, the contribution of the present

study goes beyond simply confirming that cooperative learning is associated with better performance. The current Classroom Action Research provides a process-oriented explanation of how STAD may operate during the learning of a specific basketball skill. In particular, the findings suggest that heterogeneous grouping, peer tutoring, individual accountability, positive interdependence, and repeated corrective practice form an interconnected mechanism through which chest pass performance can improve.

This interpretation also helps clarify the relationship between the theoretical framework and the empirical findings of the study. The proposed conceptual mechanism assumes that STAD creates a cooperative team structure, which then promotes positive interdependence and individual accountability. These conditions increase opportunities for peer observation, feedback, and repeated practice, which in turn support improvements in the preparatory stance, execution, and follow-through phases of the chest pass. The observed improvement in students' movement performance is therefore broadly consistent with the conceptual framework developed in this study.

Theoretical Implications

The findings provide several theoretical implications for cooperative learning in physical education. First, the results support the view that cooperative learning should not be understood merely as placing students into groups. Its potential value depends on the presence of structured learning mechanisms, particularly heterogeneous grouping, individual accountability, mutual assistance, and meaningful peer interaction. In this study, these mechanisms appear to have supported students' engagement with the technical demands of the chest pass.

Second, the findings suggest that STAD may be theoretically relevant not only for academic achievement but also for motor skill development. The improvement observed across the three technical phases of the chest pass indicates that cooperative learning structures can facilitate processes that are essential to motor learning, such as observation, repetition, error detection, corrective feedback, and refinement of movement patterns.

Third, the study contributes to the literature by connecting cooperative learning theory with specific technical components of a sport skill. Rather than treating chest pass performance as a single outcome score, the study considers improvement across the preparatory stance, execution, and follow-through. This provides a more process-oriented understanding of how cooperative learning may influence the development of complex movement sequences.

At the same time, these theoretical implications should be interpreted cautiously. Because the study used a classroom action research design without a control group, the findings cannot establish that STAD alone caused the observed improvement. Rather, the study provides contextual evidence that the mechanisms embedded in STAD were associated with meaningful improvement within the participating class.

Practical Implications

The findings also have practical implications for physical education teachers. First, STAD can be used as a structured alternative to predominantly teacher-centered instruction when students demonstrate heterogeneous levels of motor skill proficiency. Instead of relying exclusively on teacher demonstrations and feedback, teachers can organize heterogeneous teams in which students observe, assist, and provide feedback to one another while remaining individually accountable for their own performance.

Second, teachers should not implement STAD simply by dividing students into groups. The effectiveness of the approach depends on carefully structuring the learning process. Teams should be heterogeneous, each student should have a clear individual responsibility, peer feedback should be directed toward specific technical indicators, and sufficient opportunities should be provided for repeated practice.

Third, the chest pass assessment indicators used in this study can be integrated into the instructional process as formative feedback criteria. Students can be guided to observe specific aspects of the preparatory stance, execution, and follow-through rather than giving general comments such as “good” or “incorrect.” This may make peer feedback more focused and technically meaningful.

Fourth, STAD may be particularly useful in classes where the teacher must manage students with wide differences in initial skill levels. By using peer-assisted practice, teachers can distribute learning support across the classroom while continuing to supervise overall instructional quality. Nevertheless, the teacher remains responsible for ensuring that peer feedback is technically accurate and that all students participate meaningfully.

Contribution of the Study

The main contribution of this study lies in demonstrating that the value of STAD in physical education may be explained through an identifiable learning mechanism rather than by outcome improvement alone. The findings suggest the following process:

heterogeneous team practice → positive interdependence and individual accountability → peer observation and feedback → repeated corrective practice → improvement in preparatory stance, execution, and follow-through → improved chest pass performance.

This process-oriented interpretation strengthens the contribution of the study because it explains not only what improved, but also how and why the improvement may have occurred.

D. Conclusion

The implementation of the Student Teams–Achievement Divisions (STAD) cooperative learning model was associated with a substantial improvement in eleventh-grade students’ fundamental basketball chest pass performance. The proportion of students achieving the predetermined mastery criterion increased markedly after the intervention, indicating that STAD provided a supportive instructional structure for improving performance across the preparatory stance, execution, and follow-through phases of the chest pass.

The findings suggest that structured cooperative learning can be effectively applied in physical education to promote more active participation, peer-assisted practice, and individual responsibility during motor skill learning. However, the results should be interpreted within the context of a single-class classroom action research design and should not be generalized beyond similar instructional settings without further investigation.

The main contribution of this study is the demonstration of a process-oriented application of STAD in basketball skill learning, showing how cooperative team structures can be linked to the improvement of specific technical components of the chest pass.

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F. Conflict of Interest

The authors declare that there is no conflict of interest.

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