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Enhancing students' basketball passing skills through cooperative game-based learning

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Abstract

Background: This study was motivated by the low learning outcomes of students in basketball passing techniques during Physical Education (PE) lessons at SMAN 11 Palembang. Limited variation in teaching methods made students less active and less able to understand proper passing techniques. **Objectives:** This study aimed to determine the effect of the Team Games Tournament (TGT) cooperative learning model on students' basketball passing skills. **Methods:** The study employed a quantitative approach using a one-group pretest–posttest experimental design. The sample consisted of 30 eleventh-grade students selected through purposive sampling. Data was collected using a wall bounce test to measure chest pass ability before and after the intervention. The treatment was conducted over five weeks with one session per week. Data were analyzed using the Shapiro–Wilk normality test and paired sample t-test with IBM SPSS Statistics. **Results:** The results showed a significant improvement in students' passing performance. The mean pretest score increased from 18.43 to 23.63 in the posttest, representing an improvement of 28.2%. Statistical analysis indicated a significance value of 0.000 ($p < 0.05$), confirming a significant difference between pretest and posttest scores. In addition, students' performance categories improved from predominantly "Less" before treatment to mostly "Good" and "Very Good" after treatment. **Conclusion:** In conclusion, the TGT cooperative learning model was effective in improving students' basketball chest pass skills and can be recommended as an engaging instructional strategy in physical education learning.

Keywords: Cooperative Learning; Team Games Tournament; Basketball Passing; Chest Pass; Physical Education.

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INTRODUCTION

Quality Physical Education (PE) learning is strongly influenced by teachers' pedagogical competence, particularly in designing effective instructional strategies, selecting appropriate teaching methods, and creating supportive learning environments. In contemporary physical education, learning is not only oriented toward improving physical fitness but also toward enhancing cognitive understanding, emotional regulation, teamwork, and social responsibility. Therefore, effective physical education instruction should promote holistic student development through meaningful, active, and student-centred participation (Casey & Goodyear, 2021; UNESCO, 2015).

Among various sports included in school physical education curricula, basketball is one of the most popular and widely implemented activities. Basketball provides rich opportunities for developing fundamental motor skills, coordination, decision-making abilities, teamwork, and tactical awareness. One of the most essential technical skills in basketball is passing, which plays a crucial role in maintaining ball possession, creating scoring opportunities, and enhancing overall team performance. Common passing techniques taught in school settings include the chest pass, bounce pass, and overhead pass. Mastery of these techniques is essential, as ineffective passing often results in turnovers and decreased game effectiveness (García-González et al., 2020).

Among these techniques, the chest pass is considered one of the most fundamental and frequently used skills due to its speed, accuracy, and efficiency in short- to medium-distance situations. It is typically used when players are not under intense defensive pressure and need to move the ball quickly between teammates. Previous studies have demonstrated that passing proficiency, particularly chest pass accuracy, significantly contributes to successful offensive play, team coordination, and overall game performance (Sgrò et al., 2021). Therefore, chest pass performance can serve as a valid indicator for assessing students' basketball passing skills in school-based physical education contexts.

Preliminary observations conducted at State Senior High School 11 Palembang revealed several issues related to students' basketball passing performance. Many students exhibited improper passing mechanics, insufficient arm strength, low accuracy, and limited hand-eye coordination. In addition, student engagement during lessons was relatively low, as indicated by minimal participation, lack of enthusiasm, and reluctance to actively engage in learning activities. These findings suggest that conventional teacher-centred instructional approaches may not effectively support active learning, skill acquisition, and student motivation.

Recent studies in physical education have emphasized the effectiveness of cooperative learning models in improving students' motor skills, motivation, communication, and social interaction. Cooperative learning

promotes positive interdependence, individual accountability, and active engagement, which are essential for meaningful learning experiences (Casey & Goodyear, 2021; Fernández-Río et al., 2022). One cooperative learning approach that integrates these elements is the Team Games Tournament (TGT) model. This model combines group collaboration, peer tutoring, structured competition, and game-based activities, encouraging students to actively participate while supporting each other's learning process.

Previous research has shown that cooperative learning models, including TGT, can enhance students' motivation, engagement, and academic performance across various subjects (Slavin, 2015; Kyndt et al., 2019). However, despite its widespread use in classroom settings, there is still limited empirical evidence regarding the effectiveness of TGT in improving specific psychomotor skills in physical education, particularly basketball passing skills in Indonesian secondary school contexts. Most prior studies have focused on cognitive outcomes or general participation rather than sport-specific technical performance.

Therefore, this study aims to address this gap by examining the effect of a cooperative game-based learning approach using structured team competition on students' basketball chest pass performance at State Senior High School 11 Palembang. The findings of this study are expected to contribute to the development of innovative instructional strategies in physical education and provide practical insights for teachers seeking to improve students' technical skills, motivation, and active participation through cooperative learning approaches.

METHOD

Research Design

This study employed a quantitative approach using a quasi-experimental method with a one-group pretest–post-test design. In this design, a single group of participants was assessed before the intervention (pretest), exposed to the treatment, and then reassessed after the intervention (post-test). The treatment consisted of implementing the Team Games Tournament (TGT) cooperative learning model during basketball lessons. This design was selected because the study was conducted in a natural school setting where

random assignment and the formation of a separate control group were not feasible. Although this design allows the researcher to measure changes before and after treatment, it may be vulnerable to threats to internal validity such as maturation, testing effects, and external influences. Therefore, the findings should be interpreted with caution.

Participants

The participants were 30 students from class XI.13 at State Senior High School 11 Palembang during the 2025/2026 academic year. Participants were selected using purposive sampling, based on several considerations: (1) similar initial basketball skill levels based on teacher evaluation, (2) regular attendance in physical education classes, and (3) accessibility for the implementation of the intervention program. All participants were senior high school students aged approximately 16–17 years. Based on school health records, students had normal physical conditions and were considered fit to participate in basketball learning activities.

Ethical Considerations

This study was conducted with official research permission issued by the Department of Education of South Sumatra Province under permit number 420/0812/SMA.1/Disdik.SS/2025. All research procedures were carried out in accordance with applicable research ethics principles and the Declaration of Helsinki. Prior to data collection, participants were informed about the purpose, procedures, potential risks, and benefits of the study, and written informed consent was obtained from all participants before their involvement in the research.

Research Instruments

Basketball passing performance was assessed using the 30-second wall chest pass test, in which students repeatedly performed chest passes against a designated wall target. The score was determined by counting the number of valid passes completed within 30 seconds. The same testing procedure was applied during the pretest and post-test to ensure consistency of measurement. This procedure is consistent with established basketball passing assessment practices described by Canlı et al. (2018). A pilot test conducted before the main study yielded a Cronbach's alpha coefficient of

0.86, indicating satisfactory internal consistency among the items, provided that the coefficient was calculated from an appropriate set of related items. To maintain scoring objectivity, standardized testing procedures and observation sheets were used, and the same evaluator assessed students during both testing sessions.

Intervention Procedure

The intervention consisted of implementing the Team Games Tournament (TGT) cooperative learning model during basketball instruction over a five-week period, with one session conducted each week. Each session lasted approximately 90 minutes and was structured into several stages. The lesson began with warm-up activities to prepare students physically for participation. This was followed by teacher explanations and demonstrations of proper chest pass techniques, including body position, hand placement, force application, and passing accuracy. After the instructional phase, students participated in cooperative group practice, where they worked in heterogeneous teams to practice chest pass skills collaboratively and support one another's learning. Next, students engaged in tournament-based games in which teams competed through structured skill challenges and game situations. At the end of each session, feedback and reflection activities were conducted to evaluate student performance, reinforce key learning points, and encourage improvement in subsequent meetings. Through the TGT model, students were actively involved in teamwork, repeated skill practice, and friendly competition designed to enhance motivation, engagement, and basketball passing performance.

Data Analysis

Data was analyzed using IBM SPSS Statistics. Descriptive statistics were calculated for pretest and post-test scores. Prior to hypothesis testing, the Shapiro–Wilk test was used to examine data normality. Since the data were normally distributed, a paired sample t-test was conducted to determine whether there was a significant difference between pretest and post-test scores. To determine the practical magnitude of improvement, Cohen's d effect size was also calculated and interpreted as small (0.20), medium (0.50), or

large (0.80). In addition, the percentage increase in scores from pretest to post-test was calculated. Statistical significance was set at $p < 0.05$.

RESULT

This study aimed to examine the effect of the Team Games Tournament (TGT) cooperative learning model on students' basketball chest pass learning outcomes at State Senior High School 11 Palembang. A total of 30 students participated in the study. All participants completed a pretest before the intervention and a post-test after five weeks of treatment using the TGT learning model.

Table 1. Descriptive Statistics of Pretest and Post test Scores

Variable	N	Mean	SD	Mean Difference	Percentage Increase
Pretest	30	18.43	2.16	-	-
Post test	30	23.63	2.28	5.20	28.2%

The descriptive results showed a clear improvement in students' basketball passing performance after the intervention. The mean pretest score was 18.43, which increased to 23.63 in the post-test. This indicates a mean improvement of 5.20 points, equivalent to an increase of approximately 28.2%. Before the intervention, most students were categorized in the lower performance levels, with many students classified as Very Less and Less. After the intervention, performance categories shifted positively, with many students classified as Good and Very Good. These findings indicate that students demonstrated better passing accuracy, consistency, and technical execution following the implementation of the TGT model.

Table 2. Homogeneity Test Results (Levene's Test)

Levene Statistic	df1	df2	Sig. Value	Interpretation
1.284	1	58	0.200	Homogeneous Variance

A homogeneity test was conducted using Levene's Test. The analysis produced a significance value of 0.200 ($p > 0.05$), indicating that the data had equal variance and were statistically homogeneous.

Table 3. Normality Test Results (Kolmogorov–Smirnov)

Variable	Statistic	Sig. Value	Interpretation
Pretest	0.118	0.200	Normal Distribution
Post-test	0.121	0.200	Normal Distribution

The normality of the data distribution was examined using the Kolmogorov–Smirnov test. The results showed significance values of 0.200 for the pretest data and 0.200 for the post-test data. Since both values were greater than 0.05, the pretest and post-test scores were considered normally distributed.

Table 4. Paired Sample t-Test Results

Variable Comparison	Mean Difference	t-value	df	Sig. (2-tailed)	Decision
Pretest – post-test	-5.20	16.463	29	0.000	Significant

To determine whether the TGT cooperative learning model significantly affected students' basketball passing outcomes, a paired sample t-test was performed. The analysis revealed a calculated t-value of 16.463 with a significance level of 0.000 ($p < 0.05$). Therefore, the null hypothesis (H_0) was rejected, and the alternative hypothesis (H_1) was accepted. These results indicate that the implementation of the Team Games Tournament (TGT) cooperative learning model had a statistically significant positive effect on improving students' basketball chest pass skills. Overall, the results demonstrate that the TGT model effectively improved students' basketball passing performance. Students not only achieved higher post-test scores but also showed meaningful progress in performance categories after participating in cooperative learning activities based on teamwork, structured competition, and repeated skill practice.

DISCUSSION

The findings of this study demonstrate that the implementation of a cooperative learning model with a structured team-based tournament approach significantly improved students' basketball chest pass performance at State Senior High School 11 Palembang. The increase in post-test scores indicates that the instructional intervention was effective in enhancing students' passing accuracy, coordination, and technical execution. Beyond numerical improvement, these results highlight the importance of creating an active, student-centred, and collaborative learning environment that supports psychomotor skill development in physical education.

These findings are consistent with previous research emphasizing the effectiveness of cooperative learning in physical education settings. Cooperative learning has been shown to enhance students' engagement, motivation, and skill acquisition by promoting meaningful participation and shared responsibility (Casey & Goodyear, 2021). Similarly, a systematic review by Fernández-Río et al. (2022) reported that structured cooperative learning models significantly improve motor performance, social interaction, and students' confidence. The present study extends these findings by providing empirical evidence that cooperative, game-based learning with competitive elements is also effective in improving specific sport-related technical skills, particularly basketball chest pass performance.

From a motor learning perspective, the effectiveness of this instructional model can be explained through the principle of deliberate practice. Repeated and structured practice opportunities provided during group activities and tournament sessions allow students to refine movement patterns, improve coordination, and achieve greater consistency in skill execution. According to motor learning theory, frequent and meaningful practice is essential for skill acquisition and performance improvement (Schmidt et al., 2019). In this study, students were actively engaged in continuous passing drills within a meaningful game context, which likely contributed to their improved performance.

In addition, social interaction and peer learning played a crucial role in enhancing students' skill development. Through cooperative group work, students were able to observe their peers, provide feedback, and learn through social modelling. This aligns with social learning theory, which posits that individuals learn new behaviors by observing and imitating others (Bandura, 1986). The presence of peer support and collaborative feedback may have helped students correct errors more effectively and develop better technical understanding.

The inclusion of competitive elements in the form of structured tournaments also contributed to increased motivation and engagement. The combination of cooperation and competition created a learning environment that was both supportive and stimulating. According to self-determination

theory, learning activities that satisfy students' needs for competence, autonomy, and relatedness can enhance intrinsic motivation and lead to improved learning outcomes (Deci & Ryan, 2000). In this study, students appeared more enthusiastic and actively involved, suggesting that the tournament structure successfully fostered motivation and effort during practice.

Furthermore, from a cooperative learning framework, the model applied in this study emphasizes key principles such as positive interdependence, individual accountability, and promotive interaction. Each student was responsible for contributing to team success while also improving their individual performance. This dual responsibility likely encouraged greater participation and accountability, resulting in more effective learning experiences. Previous meta-analyses have confirmed that cooperative learning environments can significantly improve both academic and skill-based outcomes compared to traditional teacher-centred approaches (Kyndt et al., 2019).

The findings of this study provide important practical implications for physical education teachers, particularly in the implementation of innovative basketball instruction. The cooperative game-based learning approach used in this study created a more interactive and student-centred learning environment by integrating teamwork, structured competition, and active participation during practice activities. Compared with conventional teacher-centred instruction, this approach encouraged students to engage more intensively in learning tasks, communicate with peers, and repeatedly practice passing techniques in meaningful game situations. As a result, students demonstrated significant improvements in basketball passing skills. These findings are consistent with previous studies showing that cooperative and game-based learning models can effectively improve basketball learning outcomes, student engagement, and psychomotor performance in physical education settings (Wijendra et al., 2024; Perdima et al., 2026).

The improvement in students' passing skills may be explained by the collaborative learning process embedded within the instructional model. Cooperative learning promotes peer interaction, mutual support, and shared

responsibility, allowing students to learn technical movements through observation, feedback, and repeated practice with teammates. Furthermore, the incorporation of game elements and tournament-style competition increased students' motivation and enjoyment during the learning process. Previous research has reported that cooperative learning approaches, including Teams Games Tournament (TGT) and other collaborative strategies, positively influence basketball skill acquisition and learning motivation because students become more actively involved in the instructional process (Alamsyah et al., 2023; Dony et al., 2023).

In addition, the game-based structure used in this study provided students with authentic movement experiences that closely resembled actual game situations. This condition enabled students to practice passing skills contextually rather than through isolated drills, thereby enhancing decision-making, coordination, and movement accuracy. Similar findings were reported in recent studies indicating that game-based basketball learning improves students' technical mastery and participation because learning activities become more meaningful, enjoyable, and adaptive to students' characteristics (Perdima et al., 2026; Saputra, 2026). The approach may also be particularly beneficial for students who are less confident or less active in traditional instructional settings because cooperative interaction can reduce anxiety and encourage greater participation (Kusuma, 2023).

Despite the positive findings, several limitations of this study should be acknowledged. First, the study involved a relatively small sample drawn from a single school, which may limit the generalizability of the findings to broader educational contexts. Second, the absence of a control group restricts the ability to determine whether the observed improvements were solely caused by the intervention. Third, the intervention period was relatively short, making it difficult to evaluate the long-term effects of cooperative game-based learning on students' basketball skill retention and overall learning development. Therefore, future studies are recommended to employ larger and more diverse samples, utilize randomized controlled experimental designs, and implement longer intervention periods to obtain stronger empirical evidence. Future research may also investigate the effectiveness of

cooperative game-based learning models in improving other basketball skills such as dribbling, shooting, defensive movement, and tactical decision-making.

Overall, this study strengthens the growing body of evidence that cooperative and game-based instructional models can effectively enhance basketball learning outcomes in physical education. By combining structured practice, peer collaboration, active participation, and motivational game elements, cooperative game-based learning offers a comprehensive pedagogical framework for improving students' technical skills and learning experiences in basketball instruction (Wijendra et al., 2024; Perdima et al., 2026).

CONCLUSIONS

This study concludes that the implementation of a cooperative learning model with a structured team-based tournament approach had a significant positive effect on students' basketball chest pass performance at State Senior High School 11 Palembang. The improvement in post-test scores compared to pretest results indicates that the intervention effectively enhanced students' passing accuracy, coordination, and overall technical execution. These findings confirm that an active, collaborative, and student-centred learning environment can support the development of psychomotor skills in physical education.

The effectiveness of this approach can be attributed to the integration of cooperative teamwork, active participation, structured practice, and enjoyable competition, which collectively increased students' motivation and engagement during the learning process. Therefore, this model can be considered a practical and innovative instructional strategy for teaching basketball passing skills in school settings. Future studies are recommended to employ larger and more diverse samples, include control groups, and extend the duration of the intervention to provide more robust and generalizable evidence regarding its effectiveness in physical education contexts.

AUTHOR CONTRIBUTIONS

Conceptualization: R.A., W.I.B., & I. Methodology: R.A., W.I.B., I., & H.Y.; Investigation: R.A.; Data curation: R.A.; Formal analysis: R.A. & W.I.B.; Project administration: R.A.; Supervision: W.I.B., I., & H.Y.; Visualization: R.A. & W.I.B; Writing – original draft: R.A.; Writing – review & editing: R.A. & W.I.B. All authors have read and approved the final version of the manuscript and agree to be accountable for the integrity and accuracy of the work.

ETHICAL STATEMENT

The study was conducted in accordance with ethical principles for research involving human participants. Formal permission to conduct the study was obtained from the relevant educational authorities and SMAN 11 Palembang prior to data collection. The research procedures were coordinated with the school and Physical Education teacher before the study was conducted.

INFORMED CONSENT

Written informed consent was obtained from the participants' parents or legal guardians prior to participation in the study. In addition, assent was obtained from all participating students. Participation was voluntary, and participants were informed that they could withdraw from the study at any time without penalty.

DECLARATION OF GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

During the preparation of this manuscript, the authors used ChatGPT (OpenAI) solely to improve language, grammar, and readability. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the accuracy, integrity, and content of the publication.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest with any party in the implementation of this research.

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