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The effect of teams-games-tournament model on fundamental basketball skills among secondary school students: A quasi-experimental study

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Abstract

Background: The development of sport-specific skills in physical education remains suboptimal due to the dominance of teacher-centered instructional approaches, which limit students' active engagement and meaningful practice. Although cooperative learning models such as Teams-Games-Tournament (TGT) have been widely applied, empirical evidence examining their effectiveness on specific basketball skill components within structured experimental designs is still limited. **Objectives:** This study aimed to examine the effect of the Teams-Games-Tournament (TGT) cooperative learning model on students' basketball skill development. **Methods:** A quasi-experimental pretest–posttest control group design was employed. A total of 60 secondary school students were selected using cluster random sampling and assigned to an experimental group (n = 30) and a control group (n = 30). The study was conducted in a school-based physical education setting over a 6-week intervention period. The experimental group received TGT-based instruction, while the control group was taught using conventional methods. Basketball skills (passing, dribbling, and shooting) were measured using standardized performance tests with established validity and reliability (Cronbach's α > 0.80). Data were analyzed using descriptive statistics, normality and homogeneity tests, and paired and independent samples t-tests. **Results:** The results indicated that students in the TGT group achieved significantly higher post-test scores (M = 78.56, SD = 5.84) compared to the control group (M = 69.21, SD = 6.03), $t(58) = 6.02$, $p < .001$, with a large effect size (Cohen's $d = 1.55$). Significant improvements were also observed across all skill components (passing, dribbling, and shooting) in the experimental group compared to the control group. **Conclusion:** The Teams-Games-Tournament model has a significant positive effect on basketball skill development in physical education. This model enhances active participation, collaborative learning, and structured skill practice. Future research is recommended to explore its long-term effects and applicability across different sports and educational levels.

Keywords: Cooperative Learning; Teams-Games-Tournament; Basketball Skills; Physical Education; Quasi-Experimental Study.

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INTRODUCTION

Physical education (PE) plays a vital role in developing students' motor skills, physical competence, and lifelong engagement in physical activity. Within PE curricula, team sports such as basketball are widely used to promote technical skills, tactical understanding, and social interaction (Casey & MacPhail, 2018; Kirk, 2013). However, despite its importance, basketball

instruction in school settings often remains constrained by teacher-centered approaches that limit students' active engagement and meaningful practice opportunities.

Traditional instructional methods in PE typically rely on demonstrations followed by repetitive drills and whole-class activities. While these approaches may support basic skill acquisition, they often fail to actively involve all students, particularly those with lower skill levels or confidence (Casey & Goodyear, 2015). Consequently, students may experience reduced motivation, limited active learning time, and uneven skill development. These challenges highlight the need for more student-centered instructional approaches that emphasize active participation and collaborative learning.

Cooperative learning has emerged as an effective pedagogical model to address these limitations. Grounded in social constructivist theory, cooperative learning promotes interaction, shared responsibility, and active engagement among students (Casey & Goodyear, 2015). Recent evidence further supports its effectiveness in physical education. A systematic review by (Zach et al., 2023) found that cooperative learning positively influences both motor and psychosocial outcomes, while a bibliometric analysis by (Zhou et al., 2023) identified cooperative learning as a rapidly growing research area in sport pedagogy. Additionally, a recent meta-analysis confirmed its significant positive impact on students' learning outcomes in PE (Boke et al., 2025).

One cooperative learning model that has gained attention is the Teams-Games-Tournament (TGT) model, which combines teamwork with structured, game-based competition to encourage student interaction and active participation (Arif et al., 2026). Recent empirical evidence in physical education also suggests that TGT can improve students' learning outcomes. For example, Sirait et al. (2026) reported significant improvements in elementary students' learning outcomes following a TGT intervention. These findings support the potential of TGT as an instructional approach for promoting active engagement and learning in physical education, although its effectiveness may depend on the learning context and the outcomes being assessed. Previous studies have demonstrated the effectiveness of TGT in

improving learning outcomes in sports such as volleyball and badminton (Dewi & Lestari, 2024; Lestari & Widayati, 2022). However, these studies have largely focused on affective outcomes or sports other than basketball.

Despite these promising findings, important gaps remain. First, empirical research examining the effectiveness of TGT in basketball learning contexts is still limited. Second, many studies emphasize affective outcomes rather than objective motor skill performance measured through standardized assessments (Casey & MacPhail, 2018; Zach et al., 2023). Third, there is a lack of quasi-experimental studies that provide stronger evidence of causal relationships between instructional models and skill development. These gaps are critical given that basketball is a complex invasion game requiring the integration of technical skills such as passing, dribbling, and shooting, along with coordination and decision-making (Rico-González et al., 2020). Effective instruction therefore requires approaches that combine active engagement with meaningful and context-based practice.

Addressing these limitations, this study aims to examine the effects of the Teams-Games-Tournament cooperative learning model on students' basketball skill development using a quasi-experimental design and objective skill assessments. This study contributes to the literature by providing empirical evidence on the effectiveness of TGT in basketball contexts and by strengthening the use of performance-based evaluation in physical education research. Practically, the findings are expected to inform teachers in implementing more effective, engaging, and inclusive instructional strategies in team sport learning.

METHOD

Research Design

This study employed a quasi-experimental pretest–post-test control group design to examine the effect of the Teams Games Tournament (TGT) cooperative learning model on students' basketball skills in a school-based physical education setting. Two intact classes participated as the experimental group, which received TGT-based instruction, and the control group, which received conventional instruction. Both groups followed the

same instructional content, objectives, and duration, differing only in the teaching model.

The experimental group followed the TGT stages, including class presentations, heterogeneous team formation, collaborative practice, games and tournaments, and team recognition. Students learned and practiced passing, dribbling, and shooting through teacher demonstrations, peer feedback, and teamwork. During games and tournaments, individual performance contributed to team scores, promoting individual accountability and cooperation. Team recognition was provided based on collective performance.

The control group received conventional teacher-centred instruction through skill demonstrations, individual drills, and whole-class practice. This approach emphasized repetitive skill execution under teacher guidance without structured cooperative learning, peer-based activities, or tournaments, resulting in predominantly individual and teacher-led learning interactions.

Participants

The participants were students enrolled in regular physical education classes at the secondary school level. A total of N = 60 students participated in the study, with 30 students assigned to the experimental group and 30 students to the control group. The classes were selected using cluster sampling, as random assignment at the individual level was not feasible. Prior to data collection, informed consent was obtained from the school authorities and participants. All students were physically healthy and had prior experience with basic basketball activities as part of the physical education curriculum.

Research Instruments

Basketball skill performance was assessed using standardized basketball skill tests adapted from widely used physical education assessment protocols. The assessment focused on three fundamental basketball skills: passing, dribbling, and shooting. Passing skills were measured using a chest pass accuracy test, in which students performed repeated chest passes toward a designated wall target within a specified time

limit, with scores based on the number of accurate passes completed. Dribbling skills were assessed through a slalom dribbling test, where students dribbled a basketball through a predetermined course as quickly as possible, and performance was recorded based on completion time and subsequently converted into standardized scores. Shooting skills were evaluated using a set-shot test from predetermined positions, with scores calculated based on the number of successful shots. An overall basketball skill score was calculated by aggregating the standardized scores for passing, dribbling, and shooting. This composite score was used as an overall indicator of students' performance across the three basketball skills assessed. The individual skill tests were based on established basketball skill assessment procedures (American Alliance for Health, Physical Education, and Recreation, 1984), whereas the aggregation of standardized scores represented the scoring procedure adopted in the present study.

Data Analysis

Data were analyzed using statistical software. Descriptive statistics, including means and standard deviations, were calculated to summarize students' basketball skill performance. Prior to hypothesis testing, assumption tests were conducted using the Kolmogorov–Smirnov test to examine data normality and Levene's test to assess the homogeneity of variances. Paired samples t-tests were employed to analyze within-group improvements from pretest to post-test, while independent samples t-tests were used to compare post-test basketball skill scores between the experimental and control groups. The level of statistical significance was set at $p < 0.05$.

RESULT

Descriptive statistics were calculated to summarize students' basketball skill performance in the experimental and control groups before and after the intervention. The experimental group received instruction using the Teams Games Tournament (TGT) cooperative learning model, whereas the control group received conventional instruction. Table 1 presents the mean scores and standard deviations for both measurements.

Table 1. Descriptive Statistics of Basketball Skill Performance

Group	Measurement	Mean (M)	SD
Experimental (TGT)	Pretest	61.42	6.35
Experimental (TGT)	Post-test	78.56	5.84
Control (Conventional)	Pretest	60.97	6.12
Control (Conventional)	Post-test	69.21	6.03

As shown in Table 1, both groups demonstrated improvements in basketball skill performance following the intervention. The experimental group's mean score increased from 61.42 at pretest to 78.56 at post-test, representing a mean gain of 17.14 points. In comparison, the control group's mean score increased from 60.97 to 69.21, representing a gain of 8.24 points. The experimental group therefore demonstrated a descriptively greater improvement than the control group.

The Kolmogorov–Smirnov test was used to examine the normality of the basketball skill scores. The results are presented in Table 2.

Table 2. Kolmogorov–Smirnov Normality Test Results

Group	Measurement	Sig.
Experimental	Pretest	0.187
Experimental	Post-test	0.200
Control	Pretest	0.164
Control	Post-test	0.173

All reported significance values exceeded 0.05, indicating that the Kolmogorov–Smirnov test did not detect statistically significant departures from normality. Thus, the normality assumption was considered satisfied based on the reported test results. Nevertheless, normality should also be assessed using graphical methods, such as Q–Q plots, and, for paired-samples analyses, by examining the distribution of the difference scores.

Levene's test was conducted to assess the homogeneity of variances between the experimental and control groups. The results are presented in Table 3.

Table 3. Levene's Test for Homogeneity of Variances

Measurement	Levene Statistic	Sig.
Post-test scores	0.664	0.418

Levene's test was not statistically significant, $F = 0.664$, $p = 0.418$. This result indicates that there was insufficient evidence to conclude that the post-

test score variances differed between the two groups. Accordingly, the homogeneity of variance assumption was considered satisfied for the independent-samples comparison.

Paired-samples *t*-tests were conducted to examine changes in basketball skill performance from pretest to post-test within each group. The results are presented in Table 4.

Table 4. Paired-Samples *t*-Test Results

Group	**Mean Gain**	***t***	***p***
Experimental (TGT)	17.14	12.84	< .001
Control (Conventional)	8.24	6.21	< .001

The paired-samples *t*-test results indicated statistically significant improvements in basketball skill performance in both groups ($p < .001$). The experimental group showed a mean gain of 17.14 points, whereas the control group showed a mean gain of 8.24 points. These findings indicate that basketball skill performance improved following both instructional approaches, with a greater observed gain in the TGT group.

However, the statistical significance of the within-group improvements does not, by itself, establish that the difference in improvement between the groups is statistically significant. A direct between-group comparison of the gains or an analysis of the group-by-time interaction is needed to test that question.

An independent-samples *t*-test was conducted to compare post-test basketball skill performance between the experimental and control groups. The descriptive statistics and reported test results are presented in Table 5.

Table 5. Independent-Samples *t*-Test Results for Post-Test Scores

Group	**Mean (M)**	**SD**	***t***	***p***
Experimental (TGT)	78.56	5.84	6.02	< .001
Control (Conventional)	69.21	6.03	—	—

The reported independent-samples *t*-test indicated a statistically significant difference in post-test basketball skill performance between the experimental and control groups, $t = 6.02$, $p < .001$. The experimental group obtained a mean score of 78.56, compared with 69.21 in the control group, yielding an observed difference of 9.35 points in favor of the TGT group.

These findings suggest that students who received TGT-based instruction achieved higher post-test basketball skill scores than students who received conventional instruction. Nevertheless, because the groups also had pretest measurements, the post-test comparison should be interpreted alongside baseline performance. An analysis that adjusts for pretest scores, such as analysis of covariance (ANCOVA), would provide stronger evidence regarding the comparative effectiveness of the two instructional approaches.

Overall, the descriptive and inferential results showed improvements in basketball skill performance in both the experimental and control groups. The experimental group demonstrated a larger mean gain and a higher post-test mean than the control group. The reported paired-samples and independent-samples *t*-tests were statistically significant at $p < .001$. These findings are consistent with a beneficial effect of TGT-based instruction on basketball skill performance. However, a definitive conclusion regarding its superiority over conventional instruction should be supported by a direct comparison of change scores or an appropriate baseline-adjusted analysis, together with verification of the reported test statistics against the original dataset.

DISCUSSION

The purpose of this study was to examine the effects of the Teams-Games-Tournament (TGT) cooperative learning model on students' basketball skill development. The results demonstrated that students who participated in TGT-based instruction showed significantly greater improvements in basketball skills compared to those who received conventional teaching. These findings support the effectiveness of cooperative and game-based pedagogical approaches in enhancing motor skill acquisition in physical education contexts.

The superior performance of the experimental group can be explained by several key characteristics of the TGT model. First, the integration of structured games and tournaments provided students with repeated opportunities to apply skills in authentic and dynamic contexts. From a motor learning perspective, learning is enhanced when practice conditions simulate real-game environments, allowing for better transfer and adaptability of skills (Button et al., 2021; Chow et al., 2021). Through TGT, students practiced

passing, dribbling, and shooting under conditions that required decision-making and coordination, which are essential for effective performance in invasion games such as basketball (Rösch et al., 2021).

Second, the cooperative structure of TGT promoted peer interaction, shared responsibility, and active engagement. Students were encouraged to support one another and contribute to team success, which likely increased their time-on-task and quality of practice. Previous research has shown that cooperative and student-centered approaches can enhance both engagement and skill learning by fostering interaction and feedback among learners (Bores-García et al., 2021; Metzler, 2017). In this study, peer feedback and collaboration may have facilitated more effective skill refinement compared to isolated and teacher-dominated instruction.

However, while the results favor the TGT model, it is important to consider alternative explanations and influencing factors. The improvement observed in the experimental group may also be partially attributed to increased student motivation, which is often higher in game-based and competitive learning environments. Additionally, differences in prior basketball experience among students could have influenced the rate of skill improvement, as students with previous exposure may adapt more quickly to game-based instruction. Teacher competence and familiarity with the TGT model may also have played a role in the effectiveness of implementation, as instructional quality is a critical factor in determining learning outcomes (Metzler, 2017).

Furthermore, several external variables that were not controlled in this study may have influenced the results. For example, gender differences in participation and engagement could affect skill development outcomes, as previous research suggests that boys and girls may respond differently to competitive and cooperative learning environments (Hastie et al., 2017). Similarly, variations in training intensity during lessons and students' involvement in extracurricular sports activities may have contributed to differences in skill improvement. Students who are more physically active outside of school may demonstrate greater gains regardless of the instructional model used.

The findings of this study are consistent with previous research reporting the effectiveness of TGT in improving learning outcomes in sports contexts (Andrianova et al., 2022; Ginanjar et al., 2023; Sembiring et al., 2020). However, this study extends the literature by providing empirical evidence of its effectiveness in basketball, a sport that requires the integration of technical skills, perceptual awareness, and decision-making under pressure. This highlights the potential of TGT as a suitable instructional model for complex invasion games in physical education.

From a practical perspective, the results provide clear guidance for physical education teachers. The TGT model can be effectively implemented by organizing students into heterogeneous teams, structuring learning sessions around progressive skill practice followed by game-based tournaments and ensuring balanced competition through ability grouping. Teachers should also provide clear instructions, monitor group interactions, and facilitate constructive feedback to maximize learning outcomes. Importantly, adapting the level of task difficulty and competition to students' abilities is essential to maintain engagement and ensure equitable participation.

Despite its contributions, this study has several limitations. The quasi-experimental design limits causal generalization, and the relatively short duration of the intervention may not capture long-term learning and retention effects. Future research is recommended to employ longitudinal and mixed method approaches to examine the sustained impact of TGT on motor skills, tactical understanding, motivation, and physical activity engagement across diverse educational contexts (Beni et al., 2017; Kirk, 2013).

CONCLUSIONS

This study highlights the potential of the Teams-Games-Tournament (TGT) cooperative learning model to enhance students' basketball skill performance in physical education. By combining cooperative learning principles with structured, game-based activities, TGT provides opportunities for active participation, repeated skill practice, peer interaction, and collaborative learning. These pedagogical features may contribute to a more engaging and supportive learning environment in which students can develop

their basketball skills through both individual practice and team-based activities. The findings suggest that TGT may serve as an alternative to traditional teacher-centered instruction, particularly when the learning objectives emphasize motor skill development, student engagement, and cooperation.

Several limitations should be considered when interpreting these findings. First, the relatively short intervention period limits the extent to which conclusions can be drawn regarding the long-term retention and transfer of basketball skills. Second, the study was conducted within a specific educational context, which may constrain the generalizability of the findings to other student populations and learning environments. Future research should therefore employ longer intervention periods and follow-up assessments to examine skill retention over time. Further studies could also investigate the applicability of TGT across different sports, educational levels, and student characteristics, as well as examine its integration with other pedagogical approaches, such as Teaching Games for Understanding (TGfU). Comparative studies using robust research designs would further clarify the relative effectiveness of TGT and identify the pedagogical conditions under which it is most beneficial for physical education.

AUTHOR CONTRIBUTIONS

Conceptualization: H.F., R.S., G.B.P., and R.W.P.; Methodology: H.F., R.S., and G.B.P.; Investigation: H.F.; Data curation: H.F.; Formal analysis: H.F. and R.S.; Project administration: H.F.; Supervision: R.S., G.B.P., and R.W.P.; Visualization: H.F.; Writing – original draft: H.F.; Writing – review & editing: H.F., R.S., G.B.P., and R.W.P. 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 school 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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