Implementation of the STAD Type Cooperative Learning Model in Physical Education Learning Through Mini Volleyball Games

Nukhrawi Nawir iD A-E

Universitas Negeri Makassar, Kota Makassar, Sulawesi Selatan, Indonesia

nukhrawi.nawir@unm.ac.id

Authors' contribution:
A. Conception and design of the study; **B.** Acquisition of data;
C. Analysis and interpretation of data; **D.** Manuscript preparation; **E.** Obtaining funding

ABSTRACT

This study aims to analyze the effectiveness of the STAD type of Cooperative Learning model in Physical Education learning on mini volleyball material at SMP Negeri 17 Makassar. The study used a quasi-experimental design with a one-group pretest–posttest model involving 20 students as a sample. The research instruments included a mini volleyball basic technique skills test, an active participation observation sheet, and a learning motivation questionnaire. Data were analyzed using descriptive statistics and a paired sample t-test. The results showed a significant increase in three main variables. First, basic technique skills experienced an average increase from 52.6 to 71.7 after the implementation of the STAD model. Second, student active participation increased by 31%, indicating that cooperative learning encourages positive engagement and interaction between group members. Third, student learning motivation increased by 30.1%, indicating that group rewards, cooperation, and a pleasant learning atmosphere can increase students' intrinsic motivation to participate in learning. Statistical tests showed that all of these increases were significant ($p < 0.05$). These findings confirm that the STAD model is effective in physical education (PJOK) learning, particularly in games that require cooperation, such as mini volleyball. The study recommends broader implementation of this model in schools and the use of more robust experimental designs in future research.

Keywords : Cooperative Learning; STAD; Physical Education; Mini Volleyball; Learning Motivation.

INTRODUCTION

Physical Education, Sports, and Health (PJOK) is an integral part of the school curriculum, playing a strategic role in developing the physical, cognitive, affective, and social aspects of students. In the context of modern education, PJOK is no longer understood solely as physical activity, but as a holistic educational tool that emphasizes character development, critical thinking skills, social skills, and a healthy lifestyle (Putra & Nur, 2018). The currently evolving Independent Curriculum emphasizes the importance of active, collaborative, and student-centered learning, so learning methods and models must be adapted to support the development of these competencies (Sari & Kurniawan, 2022).

In the PJOK learning process, teachers are required to create a conducive, enjoyable learning environment that is appropriate to the developmental needs of junior high school

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students. This is emphasized by the Minister of Education and Culture Regulation, which mandates that PJOK learning must integrate aspects of movement, social behavior, and sportsmanship through games and sports activities (Hardiansyah et al., 2021). Volleyball is an ideal sport for developing students' motor skills, coordination, and social interaction. This game is easily modified to suit the developmental level of students, making it relevant for junior high school. One widely used modification is mini volleyball, which allows students to actively participate through simpler basic techniques and higher-intensity play (Rahayu & Maksum, 2020). Cooperative Learning is a highly recommended learning approach in modern education because it fosters positive interactions between students, fosters group responsibility, and fosters shared goals. Of the various Cooperative Learning models, Student Teams Achievement Division (STAD) is considered the easiest to implement and the most effective in increasing student motivation, participation, and achievement (Slavin, 2019).

The STAD model emphasizes learning through: teacher presentation of material, teamwork in heterogeneous groups, individual quizzes, individual progress scores, and group awards. Research shows that STAD can improve motivation, discipline, and fundamental movement skills in physical education (PJOK) learning, especially when combined with sports games (Fauzi & Saputra, 2021). In the context of mini volleyball, teamwork is crucial, allowing the STAD model to maximize the potential for student interaction and collaboration (Rahmatullah & Dewi, 2020).

Initial observations and various previous studies indicate that volleyball learning in junior high schools often faces several obstacles, including: (1) Low active student participation; Many students still exhibit passive behavior during learning, are not fully engaged in game activities, and lack confidence in performing basic volleyball techniques (Pratama & Hidayat, 2019), (2) Learning remains teacher-centered; One-way lecture and demonstration methods are the dominant approach, resulting in limited opportunities for students to collaborate and learn independently in groups (Yuliana et al., 2021), (3) Minimal integration of innovative learning models; Teachers tend to use traditional models, resulting in unstructured student group activities. Mini volleyball requires strong coordination, communication, and cooperation (Fauzan & Yudiana, 2020), and (4) Challenges in basic technical skills; Junior high school students often experience difficulties with serving, passing, and coordination among team members. Modifications to the court and ball size in mini volleyball have not been optimally utilized to address these challenges (Setiawan & Hidayati, 2018). The above issues highlight the need for a learning model that can increase participation, motivation, communication, and collaboration, while also providing opportunities for students to practice basic techniques in a focused manner.

Several previous studies have demonstrated the effectiveness of the STAD model in Physical Education (PJOK) learning, but there are several research gaps that have not been widely explored, particularly in the context of mini volleyball in junior high schools: (1) Research on STAD and mini volleyball is still limited, particularly in the context of public schools in the Makassar area (Sujarwo et al., 2021), (2) Most research focuses on cognitive aspects, even though PJOK requires the simultaneous development of psychomotor, affective, and social aspects (Nugroho & Widiyanto, 2020), (3) There has been little research integrating STAD with modified mini volleyball games, even though modified game activities are very effective in stimulating cooperation and participation (Rahayu & Maksum, 2020), (4) There is limited research examining the impact of STAD on participation and motivation, as well as basic technical skills, within a single learning model (Fauzi & Saputra, 2021), and

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(5) There has been no specific research at SMP Negeri 17 Makassar, so empirical data on the model's effectiveness in that context is still limited. This gap presents an opportunity and urgency to conduct research based on the implementation of the STAD model in mini volleyball learning.

This research offers novelty in the following aspects: (1) Integration of the STAD Model with Mini Volleyball; Unlike previous research that only applied STAD in individual basic technique learning, this study integrates the STAD model with mini volleyball activities that require direct interaction between students, (2) Focus on Psychomotor and Affective Domain Development; The study not only measured basic technical skills but also captured active participation, motivation, cooperation, and team communication affective domains that are crucial in Physical Education (Kusumawardhana & Rahman, 2022), (3) Unresearched Local Context; The study focused on SMP Negeri 17 Makassar, which has distinct characteristics, learning culture, and learning facilities compared to other schools. This provides a scientific contribution to the development of a regional context-based learning model, (4) Heterogeneous Group-Based Intervention Approach; The STAD model was implemented with heterogeneous groupings based on basic volleyball technical skills, allowing this study to provide a comprehensive overview of the effectiveness of group work, and (5) Comprehensive Evaluation of Participation and Learning Achievement; This study combined quantitative evaluation (mini-volleyball skills tests) and participant observation, resulting in a more comprehensive picture of the impact of the learning model.

Based on the explanation above, this research is crucial because it can address various key issues in Physical Education (PJOK) learning, particularly in mini-volleyball. This study aims to analyze and test the effectiveness of the STAD Cooperative Learning model implementation in improving: student active participation, learning motivation, and basic mini-volleyball technical skills, in the context of PJOK learning at SMP Negeri 17 Makassar.

The implementation of STAD is believed to increase positive interactions between students, provide equal learning opportunities, and facilitate collaborative learning. In mini-volleyball, teamwork, communication, and motor coordination are key factors, so the implementation of STAD is predicted to produce significant improvements in these aspects.

This research is expected to make a significant contribution to the development of learning models in PJOK, complement existing literature, enrich collaborative-based learning practices, and serve as a reference for PJOK teachers implementing the STAD model in sports activities.

Thus, this research not only provides theoretical contributions, but also offers practical solutions in improving the quality of PJOK learning that is more innovative, effective, and relevant to the developmental needs of students.

METHODS
Research Type and Design

This study used a quantitative approach with a quasi-experimental design. This experimental design was chosen because it was conducted in pre-formed classes without randomization, yet still allowed researchers to systematically administer treatments and measure their impact (Sugiyono, 2019). Quasi-experiments are widely used in physical education research because they consider classroom conditions that do not allow for full manipulation as in pure experiments (Hardiansyah et al., 2021).

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The design model used was a One-Group Pretest–Posttest Design, a research design involving one sample group who are given a pretest, then given a treatment in the form of the STAD Cooperative Learning model in mini volleyball lessons, and then a posttest is administered to assess the changes that occur (Rahayu & Maksum, 2020). This design is effective for evaluating the impact of learning interventions on basic technical skills, participation, and student motivation in the context of Physical Education (PJOK) (Yuliana et al., 2021).

The use of this design provides an overview of the impact of the STAD model implementation on improving basic mini-volleyball technical skills, particularly serving, passing, and motor coordination, which are relevant to junior high school learning activities (Fauzi & Saputra, 2021).

Research Population and Sample

The population of this study was all eighth-grade students of SMP Negeri 17 Makassar in the 2024/2025 academic year, who were taking Physical Education (PJOK) classes during the current semester. The population characteristics included students aged 13–14 years with varying levels of basic mini-volleyball technique skills.

The study sample consisted of 20 students, selected using a purposive sampling technique based on several criteria: students actively participating in the PJOK class, attending the mini-volleyball learning sessions, willing to participate in the entire research process, and having no injuries that hindered physical activity. Purposive sampling is widely used in experimental physical education research to ensure the sample has characteristics relevant to the treatment being administered (Pratama & Hidayat, 2019).

The selection of the 20 participants was based on considerations of the effectiveness of the intervention in group learning situations and the classroom management skills of the PJOK teachers during the implementation of the STAD model (Sujarwo et al., 2021).

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Research Instruments

The research instruments were designed to measure students' basic mini-volleyball technical skills, active participation, and learning motivation. Each instrument uses academically accountable standards.

1. Mini-Volleyball Basic Technical Skills Test Instrument

   The basic technical test instruments include:

   a. The Underhand Serve Test measures accuracy of the target to a specific area.

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b. The Underhand Pass Test uses a throw from the teacher to measure accuracy and control.

c. The Ball Control Test measures the ability to maintain the ball in a simple game.

This instrument adheres to measurement standards in school sports research that emphasize high reliability and validity for assessing basic technical skills (Rahayu & Maksum, 2020).

2. Active Participation Observation Sheet

Students' active participation was observed using an observation sheet that included the following indicators: involvement in activities, interaction with group members, initiative in the game, and compliance with teacher instructions. Observation instruments such as these are commonly used in cooperative learning research in physical education (Yudiana & Fauzan, 2020).

3. Learning Motivation Questionnaire

Learning motivation was measured using a 1–5 Likert-scale questionnaire that adapted indicators from learning motivation theory in physical education, including: interest in the material, enthusiasm during learning, self-confidence, and achievement orientation (Kurniawan & Sari, 2020). This questionnaire instrument meets the principles of content and construct validity according to educational research standards.

Data Collection Techniques

Data collection was conducted through three main stages: pretest, treatment, and posttest.

1. Pretest

Before the treatment was administered, the entire sample underwent a pretest to measure initial basic technique abilities, participation level, and learning motivation. The pretest data was used to determine the baseline before implementing the STAD model.

2. Treatment Implementation (STAD Model Implementation)

The treatment was conducted over six PE learning sessions. Each meeting includes:

a. Presentation of material by the teacher on basic mini volleyball techniques.

b. Formation of heterogeneous groups of 4–5 students.

c. Group learning activities, where students discuss and practice basic techniques.

d. Individual quizzes to assess each student's progress.

e. Group awards based on improvement scores.

This implementation procedure refers to the STAD learning model guidelines, which have been shown to be effective in improving collaboration and learning outcomes in sports (Slavin, 2019).

3. Posttest

After the treatment was completed, a posttest was conducted using the same instrument as the pretest to determine changes or improvements in the research variables.

Data Analysis Techniques

Data were analyzed quantitatively using the following steps:

1. Statistical Prerequisite Test

a. Normality Test; Using the Kolmogorov–Smirnov test to ensure that the pretest and posttest data were normally distributed before conducting parametric tests (Ghozali, 2020).

b. Homogeneity Test; Using the Levene's test to determine the equality of variance between data groups. Homogeneity is necessary for valid comparative analysis (Sugiyono, 2019).

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2. Inferential Statistical Tests
   a. Paired Sample t-Test (t-Test); Used to test for significant differences between pretest and posttest scores on the same sample. This test was chosen because the research design involved one group with two measurements. The t-test is very commonly used in physical education research evaluating the effectiveness of learning models (Hardiansyah et al., 2021).
   b. Effect Size Calculation; To determine the magnitude of the effect (small, medium, or large) of the STAD model implementation on the dependent variable. Interpretation is performed using Cohen's d (Fauzi & Saputra, 2021).
3. Descriptive Analysis
   In addition to inferential analysis, descriptive analysis is used to describe the mean value, standard deviation, minimum-maximum value, and score distribution for each research variable. This descriptive approach helps provide a comprehensive picture of the initial conditions and changes after treatment (Nugroho & Widiyanto, 2020).

RESULTS AND DISCUSSION
Result
This study aims to determine the effectiveness of implementing the STAD Cooperative Learning model in Physical Education (PE) mini-volleyball instruction at SMP Negeri 17 Makassar. The results are presented based on three main components: (1) basic mini-volleyball technical skills, (2) active student participation, and (3) student learning motivation, as measured by pretest and posttest.
Description of Research Data
Basic Mini-Volleyball Technical Skills
Basic technical skill variables include underhand serve, underhand pass, and ball control. Descriptive data can be seen in Table 1.

Table 1.
Descriptive Statistics of Basic Mini-Volleyball Technical Skills (N = 20)

Variables	Tes	Mean	SD	Min	Max
Underhand Serve	Pre	52.3	7.8	40	68
	Post	71.6	6.4	60	85
Underhand Pass	Pre	54.7	8.2	41	70
	Post	74.1	7.1	60	88
Ball Control	Pre	50.9	6.9	39	65
	Post	69.4	6.0	58	82
Basic Technique Average	**Pre**	**52.6**	**7.6**	**40**	**68**
	Post	**71.7**	**6.5**	**59**	**85**

Active Student Participation
Participation indicators include student engagement, cooperation, attention to instructions, and initiative.

Table 2.
Descriptive Statistics of Active Participation

Variable	Mean Pre	Mean Post	Improvement (%)
Active Participation	63.5	83.2	31.0%

Student Learning Motivation

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Learning motivation includes interest, enthusiasm, self-confidence, and achievement orientation.

Table 3.
Descriptive Statistics of Learning Motivation

Variable	Mean Pre	Mean Post	Improvement (%)
Motivation to learn	65.1	84.7	30.1%

Inferential Statistical Test Results

To determine significant differences between the pretest and posttest, a paired sample t-test was used.

Table 4.
Paired Sample t-Test Results

Variables	t-count	Sig. (p)	Description
Basic Technical Skills	14.22	0.000	Significant (p < 0.05)
Active Participation	11.76	0.000	Significant (p < 0.05)
Learning Motivation	12.33	0.000	Significant (p < 0.05)

t-Test Interpretation
1. All variables showed $p < 0.05$, indicating a significant difference between the pretest and posttest scores.
2. Thus, the implementation of the STAD model significantly improved basic mini-volleyball technical skills, active participation, and learning motivation.

The results of the study showed a significant improvement in basic mini volleyball technical skills after implementing the STAD Cooperative Learning model. The average basic technique score increased from 52.6 (pretest) to 71.7 (posttest), representing a 19.1 point increase, or 36.3%, compared to the previous model. This improvement indicates that heterogeneous group-based learning using the STAD model can improve students' motor skills in a more structured manner.

Statistical analysis also confirmed the significant improvement ($t = 14.22$; $p = 0.000$). This finding is consistent with previous research that the STAD model can improve basic sports technical skills through interaction and feedback between group members (Fauzi & Saputra, 2021; Rahayu & Maksum, 2020).

Students' active participation also significantly increased from 63.5 to 83.2, representing a 31% increase. This indicates that cooperative learning provides greater space for students to engage, help each other, and participate in each game activity. During the treatment, students demonstrated greater initiative, communication, and group responsibility.

Student learning motivation increased from 65.1 to 84.7 (a 30.1% increase). This increase was largely due to the STAD model encouraging positive competition between groups through a reward system, resulting in more enthusiastic students striving for their best performance.

In general, pre-post data showed that implementing the STAD model in mini volleyball learning: improved basic technical competency, strengthened cooperation and active participation, and built stronger learning motivation.

The results of this study indicate that a group-based learning approach like STAD is effective in Physical Education (PJOK) learning because it aligns with the characteristics of game activities that require teamwork and communication.

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Discussion

This study evaluated the effectiveness of implementing the STAD (Student Teams Achievement Division) cooperative learning model in physical education, specifically mini-volleyball, in classes at SMP Negeri 17 Makassar. The results showed that the STAD model significantly improved basic mini-volleyball technical skills, student active participation, and learning motivation. This finding is consistent with previous research trends showing that cooperative learning, and specifically STAD, can boost students' physical learning outcomes, motor skills, and affective aspects (Yang, 2021; Fernández-Espínola et al., 2020).

Basic Technical and Psychomotor Skills

The increase in the average basic technical score (serving, passing, ball control) from 52.6 to 71.7 indicates that the STAD intervention successfully improved students' motor and basic technical skills. This aligns with research findings in the context of sports/soccer and other sports, where STAD supports the development of motor skills and group coordination (Maemona, 2025; Ramadhani, 2022).

Systematic studies of physical education have shown that cooperative learning can improve the effectiveness of motor learning more effectively than traditional methods. In mini-volleyball instruction—which requires coordination, communication, and team collaboration the STAD model provides opportunities for students to mentor each other, practice together, provide feedback, and learn from their peers. Repeated practice in heterogeneous groups allows students of varying abilities to support each other, allowing them to refine basic techniques while building confidence and motor skills. Furthermore, research on the long jump using STAD also showed significant improvements in psychomotor scores after the intervention, demonstrating that STAD can be effectively implemented in various sports and school physical activities (Alamsyah, 2025).

Thus, the research results support the argument that STAD is not only effective for theoretical or academic material, but is also highly suitable for developing physical and psychomotor skills in physical education.

Active Participation and Social Interaction

The increase in active student participation from a mean of 63.5 (pre) to 83.2 (post) indicates that STAD successfully created a more participatory and collaborative learning environment. The cooperative model provides space for every student to contribute including previously passive students—through heterogeneous group structures, discussions, collaborative practice, and individual quizzes, allowing each student to feel a sense of group responsibility.

Previous research has reported that one of the main advantages of cooperative learning in Physical Education is increased social interaction, cooperation, and communication among students. The STAD model allows students to support each other, pay attention to each other's successes, and work toward common goals (group skills, group scores, awards), which fosters a sense of togetherness and solidarity. Furthermore, in the context of character education and cooperation, the implementation of STAD has also been shown to improve students' cooperative attitudes and solidarity in subjects other than physical education for example, in civics/character learning (Effendi, 2024). This shows that STAD not only strengthens physical and cognitive aspects, but also social and character aspects of students, which are relevant in holistic physical education.

Thus, the results of active participation support the claim that STAD facilitates social cooperative learning students learn not only individually but also collaboratively, working

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together, helping each other, and taking responsibility for the group. This is particularly important in team sports like mini volleyball.

Learning Motivation and Affective Dimension

This study shows that learning motivation increased significantly (mean from 65.1 to 84.7). This finding aligns with a meta-analysis of cooperative learning interventions in physical education, which found that cooperative learning generally increases students' intrinsic motivation.

Intrinsic motivation plays a crucial role in long-term learning success, active participation, and the willingness to continue practicing. The STAD model with heterogeneous grouping, group responsibility, and group rewards can meet students' psychological needs (competence, social relationships, and autonomy) as described in self-motivation theory. The results of another quasi-experimental study in physical education also show that STAD is more effective than conventional methods in increasing students' learning motivation (Suhendra, 201x).

Therefore, this study confirms that STAD is effective in activating students' affective aspects motivation, enthusiasm, and participation—not just cognitive or psychomotor aspects.

Consistency with the Literature and Variability of Findings

While numerous studies support the effectiveness of cooperative learning/STAD in Physical Education (PJOK), the literature also shows that not all interventions consistently produce positive results some studies report results that are not significantly different from traditional methods (Yang, 2021; meta-analysis shows considerable heterogeneity).

For example, a meta-analysis showed that although the majority of studies found positive effects, there was variation based on the type of sport, intervention duration, grouping method, and contextual factors such as student age, school culture, and student baseline competencies. This means that the implementation of STAD must be tailored to student characteristics, sport content, and learning conditions to achieve maximum results.

In this study, success may have been supported by several factors: (1) strategically structured heterogeneous groups allowing students of varying abilities to support each other, (2) adequate intervention duration (6 sessions) to allow for repetition and internalization of techniques and cooperation, and (3) comprehensive measurement of variables (psychomotor, affective, participation) that reflect the holistic characteristics of PJOK.

Theoretical Implications

The results of this study strengthen the theoretical basis that cooperative learning specifically the STAD model can be used as an effective framework in physical education to simultaneously develop psychomotor, social, and affective aspects. The findings support the argument that sports learning should ideally utilize not only traditional instructional approaches, but also collaborative approaches that emphasize interaction, group responsibility, and intrinsic motivation (Dyson et al., 2022; Gazali, 2022).

Furthermore, this study provides empirical evidence in the context of mini-volleyball at the junior high school level a relatively under-researched context thus enriching the literature on the application of STAD in school sports and providing a theoretical basis for further research in other sports and different age groups.

Practical Implications

For physical education teachers in schools, these results indicate that the STAD model is highly suitable for application in sports learning, particularly team games such as mini-

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volleyball. With STAD, teachers can improve student participation, improve basic skills, and increase learning motivation especially for students who may be less active or self-confident.

Implementing STAD requires careful planning: selecting heterogeneous groups, adequate meeting duration, structured observation and evaluation, and a fair group reward system. Because not all contexts guarantee the same results, teachers and schools are advised to adapt to student characteristics and available resources before fully implementing STAD.

These findings are also relevant for education policymakers designing physical education curricula they demonstrate that cooperative learning is a viable strategy for achieving holistic educational goals: motor skills, social skills, motivation, and character.

Research Limitations

Although the results are very encouraging, this study has limitations that need to be considered:

1. The sample size was only 20 students although adequate for a small study, the results are less generalizable to the broader population.
2. The intervention duration was relatively short (6 sessions), and it is unknown whether the effects are sustained long-term (skill retention, motivation).
3. There was no control group a one-group pretest-posttest designso it is impossible to compare whether improvements were truly due to STAD or external factors (e.g., natural motivation, repeated learning effects, classroom environment).
4. Participation and motivation were measured using subjective instruments (observations, questionnaires), which could be influenced by bias (students' desire to perform at their best after treatment).

Recommendations for Further Research

Based on the results and limitations, some recommendations for further research are:

1. Use an experimental design with a control group for example, a quasi-experiment with a control and an experimental group to compare STAD with conventional methods. This will increase internal validity and generalizability.
2. Extend the duration of the intervention and measure retention for example, a follow-up several months after the posttest to see if improvements are sustained.
3. Expand the sample size and grade/grade diversity to assess the effectiveness of STAD across different grade levels (middle school, high school), different sports, and schools with different characteristics.
4. Add more in-depth measures of social and psychological aspects such as teamwork, empathy, self-confidence, integrity, and sportsmanship to assess the overall impact of STAD.
5. Combine STAD with other game methods/modifications for example, modified mini-volleyball games, varied drills, or a hybrid approach (cooperative + individual) to maximize student diversity.

Overall, this study demonstrates that implementing the STAD model in mini-volleyball instruction at SMP Negeri 17 Makassar has great potential to improve students' fundamental technical skills, active participation, and motivation. This supports the literature suggesting that cooperative learning is suitable for physical education, particularly in developing psychomotor and affective aspects (Fernández-Espínola et al., 2020; Yang, 2021; Maemona, 2025).

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However, despite the positive results, these findings must be understood within the context of the limitations of the research design. Generalizations should be made with caution, and broader implementation should be followed by more comprehensive research.

Thus, the STAD model offers a promising alternative for physical education teachers and schools in developing physical education that emphasizes not only technique and physical skills, but also collaboration, motivation, and student character critical aspects in developing physically, socially, and emotionally competent students.

CONCLUSION

This study concludes that the application of the STAD Cooperative Learning model in the learning of Physical Education (PE) on mini volleyball at SMP Negeri 17 Makassar has a significant impact on improving students' basic technical skills, active participation, and learning motivation. The increase in the average basic technical scores from pretest to posttest indicates that heterogeneous group work, structured discussions, and opportunities for mutual feedback in the STAD model can strengthen motor skills and coordination in mini volleyball. In addition, the significantly increased active participation indicates that the STAD model creates a more collaborative learning environment, encouraging optimal student involvement through group responsibilities and fun game activities. Increased learning motivation also indicates that group rewards, positive interactions, and peer support can build students' internal drive to participate and demonstrate their best performance in learning. Thus, STAD is proven effective in achieving the learning objectives of PE which include psychomotor, affective, and social aspects. However, this study still has limitations, especially the absence of a control group and a limited sample size. Therefore, further research is recommended to use a more robust experimental design and involve a larger sample to strengthen the generalizability of the results. Overall, the STAD model can be an innovative alternative for PJOK teachers in improving the quality of sports learning in schools.

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