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The Effectiveness of the STAD Type Cooperative Learning Model in Improving Volleyball Passing Skills

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Abstract

Studi purpose. The purpose of this study is to evaluate how well the Student Achievement Team Division (STAD) cooperative learning model improves volleyball passing skills among students at Medan 16 Public High School. This study aims to evaluate how well the Student Achievement Team Division (STAD) cooperative learning model improves volleyball passing skills among students at Medan 16 Public High School. In volleyball, passing the ball is a fundamental technique that forms the basis of many offensive strategies and many offensive and defensive tactics.

Materials and methods. This study used a pretest-posttest design with a control group and quasi-experimental methodology. The research sample consisted of 60 eleventh-grade students, divided into two groups: a control group (n = 30) that received traditional teaching and an experimental group (n = 30) that received the STAD model treatment. A validated volleyball passing skills test with a reliability score of 0.89 was used as the research instrument. Paired t-tests and independent sample t-tests were used to analyze the data, with a significance level of α=0.05.

Results. The average pre-test score of the experimental group increased from 65.23 to 82.47 in the post-test ($p<0.001$), while the average score of the control group increased from 64.87 to 72.13 ($p<0.05$). With a Cohen's d effect size of 1.82 (large category), the difference test showed a significant difference between the two groups ($p<0.001$).

Conclusions. By offering peer feedback, group rewards, and collaborative learning opportunities, the STAD model has been proven successful in improving volleyball passing skills. According to the study's conclusions, physical education teachers can use the STAD model as a more effective substitute for teaching basic volleyball techniques.

Keywords: Physical education, motor skills, volleyball passing, cooperative learning, and STAD
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Introduction

Physical education is an essential component of the national education system that aims to develop the values of morality, physical fitness, motor skills, critical thinking skills, and emotional stability through physical activities (Iryanti et al., 2024). As one of the sports taught in schools, volleyball has high educational value in terms of developing students' motor, cognitive, and affective skills (Sciences et al., 2025). However, observations at SMA Negeri 16 Medan show that student achievement is still relatively low, with an average achievement of only 62% of the established competency standards.

Passing is a key technique in volleyball that forms the basis of all game strategies, whether used to build attacks or defenses (Gunawan & Kurniawati, 2024). Good ball control allows the team to control the tempo of the attack, develop attacking strategies, and make attacks more effective (Lima et al., 2019). These skills result in complex neuromuscular coordination, precise timing, and a clear understanding of position and movement (Tanis et al., 2026). Therefore, teaching passing techniques requires systematic and structured learning to ensure optimal technique.

Conventional teaching methods that are teacher-centered and focus more on demonstrating techniques are less effective in improving students' ability to pass a volleyball (Connor et al., 2020). This approach limits students' opportunities to think critically and solve tactical problems in the game, thereby reducing interest and neglecting the social aspects of the learning process. As a result, students often use techniques mechanically without understanding how to apply them in emergency situations.

As a learning approach that emphasizes teamwork, positive feedback, and individual initiative, cooperative learning has proven effective in teaching Japanese (B. Dyson et al., 2020). One type of cooperative learning that is often researched and applied in education is Student Teams Achievement Division (STAD), developed by Robert E. Slavin. This model encourages learning in diverse small groups, cooperation between students, and individual initiative in achieving academic goals (Nurodin et al., 2024). Many recent studies show that the application of the STAD model is effective in improving student learning outcomes, motivation, and social skills compared to traditional classroom teaching. The STAD model combines teacher guidance, heterogeneous teamwork, individual creativity, and a scoring-based assessment system that encourages intrinsic and extrinsic motivation in students.

As an educational paradigm that emphasizes teamwork, positive feedback, and individual initiative, cooperative learning has proven effective in teaching vocational skills. One of the most widely researched and applied forms of cooperative learning is Student Teams Achievement Division (STAD), which is run by (Idah Rahmawati, Ati Sadiah, 2024). The STAD model combines teacher guidance, heterogeneous teamwork, individual creativity, and a scoring system based on improvement that encourages intrinsic and extrinsic motivation in students.

According to research, the STAD model effectively improves learning outcomes in various educational contexts, including in soccer teaching (Rohyami, Y., & Huda, 2019). However, specific research on the effectiveness of STAD in relation to volleyball passing techniques in Indonesia, particularly in North Sumatra, is still inadequate. In fact, social characteristics, infrastructure, and learning conditions in each region can affect the effectiveness of implementing this learning model (Fish, 2021).

Based on the aforementioned research gap, this study aims to analyze the effectiveness of the STAD Model in the context of teaching volleyball passing techniques at SMA Negeri 16 Medan. This school was chosen because of its status as a national school in the region with adequate sports facilities, yet it still hinders students' ability to reach their maximum potential.

This study is being conducted at SMA Negeri 16 Medan, which is located on Jalan Pembangunan in Medan Deli District, Medan City. This school has approximately 1,245 students with 36 learning groups. The available sports facilities include a standard 18 x 9 m outdoor volleyball court, 20 volleyballs, a standard net, and a sports equipment storage room. Physical education is taught in three classes (3 x 45 minutes) per semester using volleyball materials. This is taught in the even semester of grade XI.

The profile of 11th grade students highlights diversity in terms of motor skills, volleyball playing, and learning motivation. Based on preliminary results, 68% of students stated that they had never taken volleyball lessons outside of school, 24% had participated in volleyball extracurricular activities, and only 8% were actively participating in volleyball clubs. This situation poses a challenge in the learning process due to the wide range of students' initial abilities, from those who sometimes have difficulty understanding basic techniques to those who already have good playing experience.

The traditional volleyball teaching method at this school is as follows: (1) 10 minutes of instruction, (2) 15 minutes of demonstration by the teacher, (3) 45 minutes of technique practice, (4) 15 minutes of game modification, and (5) 5 minutes of waiting. Learning evaluation is conducted using a skills test at the end of the unit. Although structured, this approach does not provide opportunities for students to learn collaboratively and develop their social and cognitive skills in the context of the game.

The objectives of this study are to: (1) analyze the increase in passing grades of students who participated in classes using the STAD cooperative learning model; (2) analyze the increase in passing grades of students who participated in classes using the STAD cooperative learning model; (3) analyze the difference in effectiveness between the STAD cooperative learning model and the conventional learning model in relation to the increase in student passing grades; and (4) analyze the difference in effectiveness between the STAD cooperative learning model and the conventional learning model in relation to the increase in student passing grades.

Several recent studies have examined the effectiveness of cooperative learning in the classroom (A. G. Ben Dyson, 2016) In a meta-analysis of 38 studies, it was found that Cooperative Learning had a significant effect (d=0.68) on psychomotor, cognitive, and affective learning outcomes in Japanese education (Yang et al., 2021) Cooperative learning has been proven to increase students' intrinsic motivation by 34% and active learning by 52% compared to conventional learning.

Specific to the STAD model, (Ivero, 2025) A comprehensive assessment of 24 studies showed that STAD consistently improved motor performance by 28% compared to the control group. (Garc et al., 2020) In a study of 156 high school students in Spain, it was found that STAD improved tactical performance in the game by 41% and technical performance by 36% after 16 training sessions.

Although in different contexts, several studies have been conducted in Indonesia. (Fitriani et al., 2024) This shows that STAD effectively improves junior high school students' ball dribbling skills, with an increase of 31.2% in the experimental group and 12.4% in the control group. (Setiawan, 2004) It is said that STAD improves learning outcomes by 29.7% compared to the repeated practice method (Dony & Wisman, 2024). Demonstrating the effectiveness of STAD in teaching basketball chest passes with a 34.5% improvement in the experimental group.

Despite the positive findings of these studies, most of them were conducted in fields other than volleyball or in different educational settings. Research on STAD in high school volleyball education, particularly in Indonesia, is still quite limited. This gap forms the basis for this study's empirical contribution to the literature on volleyball education through cooperative learning.

Based on theoretical and empirical research, the following hypotheses are proposed for this study: H1: There is a significant increase in the ball passing ability of students who participate in learning using this model. Type of Cooperative Learning: STAD H2: There is a significant increase in the ball passing ability of students who participate in traditional classroom learning; H3: There is a significant difference in volleyball passing ability between students who participate in the STAD learning model and students who participate in conventional methods, where the STAD group shows higher growth.

Materials and methods

Study participants

This study employs a quasi-experimental methodology using a pretest-posttest control group design (Chali et al., 2022). This design was chosen because it is difficult to assign participants randomly in a manner that is sensitive to the research topic, which is to identify pre-existing groups (cohesive groups).

The study population consisted of all 11th grade students at SMA Negeri 16 Medan in the 2025–2026 academic year, with a total of 324 students spread across 9 classes. The sampling technique used was cluster random sampling, in which each class was selected as a sample unit. From the nine available classes, the research objective was to randomly select two classes. The research results were obtained from class XI-IPA 3 (30 students) as the experimental group and class XI-IPA 5 (30 students) as the control group. Thus, the total sample size for this study was 60 students.

The requirements for samples are as follows: (1) students must be actively enrolled in grade XI at SMA Negeri 16 Medan; (2) at least 80% of all students must be present; (3) there must be no medical conditions that interfere with physical activity; and (4) students must be available to participate in the study by providing informed consent. The exclusion criteria are students who participate in intensive external volleyball training during the research session. The requirements for the sample are as follows: (1) students must be actively enrolled in grade XI at SMA Negeri 16 Medan; (2) at least 80% of all students must be present; (3) there must be no medical conditions that interfere with physical activity; and (4) students must be available to participate in the study by providing informed consent. The exclusion criteria were students who participated in intensive external volleyball training during the research session.

The sample size for the experiment consisted of 18 male students and 12 female students aged between 16.4 and 0.5 years. The control group consisted of 13 female students and 17 male students aged between 16.5 and 0.4 years. Based on the homogeneity test, there were no significant differences between the two groups in terms of age (p=0.342), height (p=0.567), and early motor skills based on the AAHPERD test results (p=0.421).

Study organization

This research tool uses the Volleyball Test from the American Alliance for Health, Physical Education, Recreation, and Dance (AAHPERD), which has been widely used as a tool for assessing volleyball techniques and has good validity and reliability in physical education. (Destriana., et al. 2022). Students' ability to perform overhead passes (set) and underhand passes (dig) accurately and consistently. Test components include: (1) Underhand Pass Against Wall: Students stand 3 meters from a wall with a target height of 2 meters, and they practice underhand passes as often as possible for 30 seconds. (2) Overhand Passing Against the Wall: The score is calculated based on the number of passes that hit the target. Similar to underhand

passing, but using overhand passing techniques. (3) Passing Accuracy: Students perform 10 underhand passes and 10 overhand passes to a target, which is a circle with a diameter of 1 meter located two meters away on the field. Game: Scores are determined based on accuracy: on target (3 points), touching the target line (2 points), and off target (0 points). Passing performance assessment during mini-games The 3-on-3 mini-game uses the Game Performance Assessment Instrument (GPAI) as an authentic evaluation tool in the game to assess student performance in terms of skills, decisions, and efficiency. Using the Game Performance Assessment Instrument (GPAI) as an authentic evaluation tool in the game to assess student performance in terms of skills, decisions, and efficiency (Pasca Tri Kaloka, Soni Nopembri, 2023) with a focus on decision making, skill execution, and support.

The validity of the instrument was assessed using expert judgment by three volleyball players, with the results showing a CVR (Content Validity Ratio) of 0.89. Assessed using expert judgment by three volleyball players, with the results showing a CVR (Content Validity Ratio) of 0.89. The total score ranged from 0 to 100, with the following categories: excellent (81–100), good (61–80), fair (41–60), poor (21–40), and very poor (0–20). Reliability was assessed by retesting using a 1-month interval for 1 month for students outside the research sample, resulting in a reliability coefficient of 0.89 (high category). The interval for 30 students outside the research sample resulted in a reliability coefficient of 0.89 (high category). The total score ranged from 0 to 100, with the following categories: excellent (81–100), good (61–80), fair (41–60), poor (21–40), and very poor (0–20).

The research was conducted through the following stages: Preparation Stage (Week 1): consisted of obtaining research permits, coordinating with school officials, socializing the research to students, obtaining consent, and conducting a pretest for both groups.

Implementation Phase (Weeks 2–7): This experiment provides instructions using the STAD paradigm, which consists of five phases: This experiment provides instructions using the STAD paradigm, which consists of five phases: (1) Teacher presentation on passing techniques (15 minutes), (2) heterogeneous workshop in which five to six students complete passing exercises using worksheets (60 minutes), (2) presentation on passing techniques (15 minutes), (2) heterogeneous workshop in which five to six students complete passing exercises using worksheets (60 minutes), (3) Individual Quiz to assess skill mastery (20 minutes), (4) Improvement Score based on a comparison of quiz scores with baseline scores, and (5) Group Award for the team with the highest accumulated improvement score. (4) Improvement Score based on a comparison of quiz scores with baseline scores, and (5) Group Award for the team with the highest accumulated improvement score.

The control group received conventional instruction with the following pattern: (1) general and specific warm-up (15 minutes), (2) passing technique enforcement by the teacher (15 minutes). (3) Individual and group passing practice (60 minutes). (4) Game modification (30 minutes), and (5) Waiting and evaluation (15 minutes).

Evaluation Stage (Week 8): Posttest administered using the same instrument as the pretest for both groups. Preliminary test for both groups. This test was conducted by three examiners who had been trained to assess data objectivity with inter-rater reliability of 0.91. Three examiners who had been trained to assess data objectivity with inter-rater reliability of 0.91.

Statistical analysis

(3) Documentation: includes photo and video documentation during the learning process as well as lesson plans, student work notes, and quiz results; (4) Interviews: Semi-structured interviews were conducted with 10 students from the experimental group (based on high, medium, and low classifications) to collect quantitative data on learning outcomes using the STAD model. This study was conducted by involving 10 students from the experimental group

(based on high, medium, and low classifications) to collect quantitative data on learning outcomes using the STAD model. The researchers collected all data with the help of two trained researchers. Triangulation methods and triangulation sources were used to assess the validity and reliability of the data. Triangulation sources were used to assess the validity and reliability of the data.

The collected data were analyzed using descriptive and inferential statistics with SPSS version 26. Descriptive and inferential statistics were performed using SPSS version 26. The data analysis steps included: (1) Descriptive Statistics: Calculating the mean, median, mode, standard deviation, minimum, and maximum for the pretest and posttest scores of both groups; (2) Prerequisite Test Analysis: The steps included: (1) Descriptive Statistics: Calculating the mean, median, mode, standard deviation, minimum, and maximum for the pretest and posttest scores of both groups; (2) Prerequisite Test Analysis: a) Because the sample size was less than 50 per group, the Normality Test used the Shapiro-Wilk test. b) The Levene test is used to assess the level of variation between groups; to assess the level of variation between groups; (3) Hypothesis Testing: a) The paired sample t-test is used to examine the difference in pretest-posttest scores in all groups (H1 and H2). b) Independent samples t-test to compare posttest scores and improvement scores between the experimental group and the control group (H3); c) If the assumption of normality is not violated, the non-parametric Mann-Whitney U test is used; (4) Effect Size: Cohen's d is used to classify effect sizes into three categories: small (0.2), medium (0.5), and large (0.8); to compare posttest scores and improvement scores between the experimental group control group (H3); c) If the assumption of normality is not violated, (4) Effect Size: Cohen's d is used to classify effect sizes into three categories: small (0.2), moderate (0.5), and large (0.8); (5) Qualitative Data Analysis: Analysis: Interview data analysis uses thematic analysis to identify themes that emerge related to student learning experiences. Analysis to identify themes that emerge related to student learning experiences. The level of significance used is $\alpha = 0.05$ (5%). No hypothesis is rejected if p is less than 0.05.

Results

Descriptive statistical analysis shows the characteristics of the research data as follows:

Table 1. Descriptive Statistics of Volleyball Passing Skill Scores

Group	Tes	N	Mean	SD	Min	Max	Median
Experiment	Pretest	30	65.23	8.42	48.00	79.00	66.00
	Posttests	30	82.47	6.18	68.00	93.00	83.50
	Gain	30	17.24	5.73	10.00	24.00	17.00
Control	Pretest	30	64.87	8.91	45.00	81.00	65.00
	Posttest	30	72.13	7.34	56.00	86.00	72.00
	Gain	30	7.26	4.12	2.00	16.00	7.00

Table 1 data show that both groups had comparable pre-test scores (experimental: 65.23 ± 8.42; control: 64.87 ± 8.91), indicating initial group homogeneity. The pre-test scores were comparable (experimental: 65.23 ± 8.42; control: 64.87) 8.91), indicating initial group homogeneity. After testing, the experimental group increased by 82.47 ± 6.18 82.47, while the control group increased by 72.13 ± 7.34 percent. ± 6.18, while the control group increased by 72.13 ± 7.34 percent. The experimental group score (17.24 ± 5.73) increased 2.4 times compared to the control group (7.26 ± 4.12).

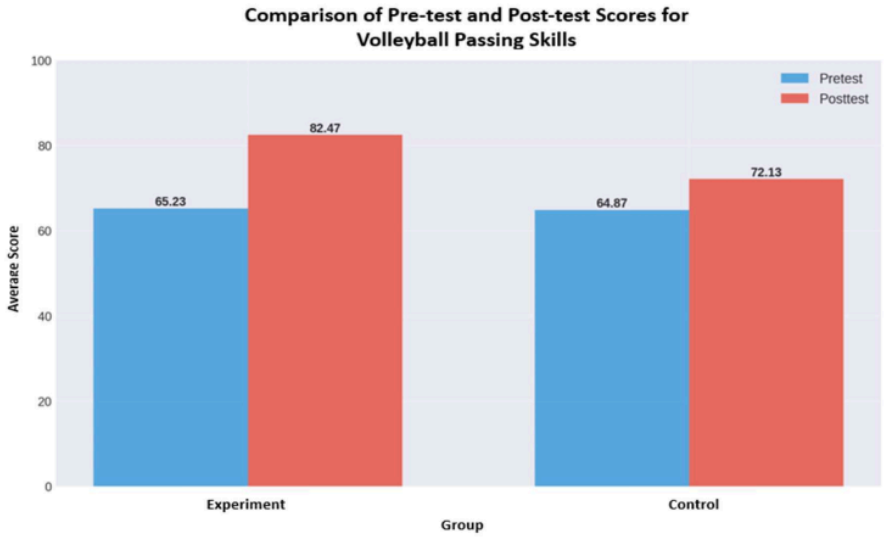

Figure 1. Comparison of Pretest and Posttest Scores

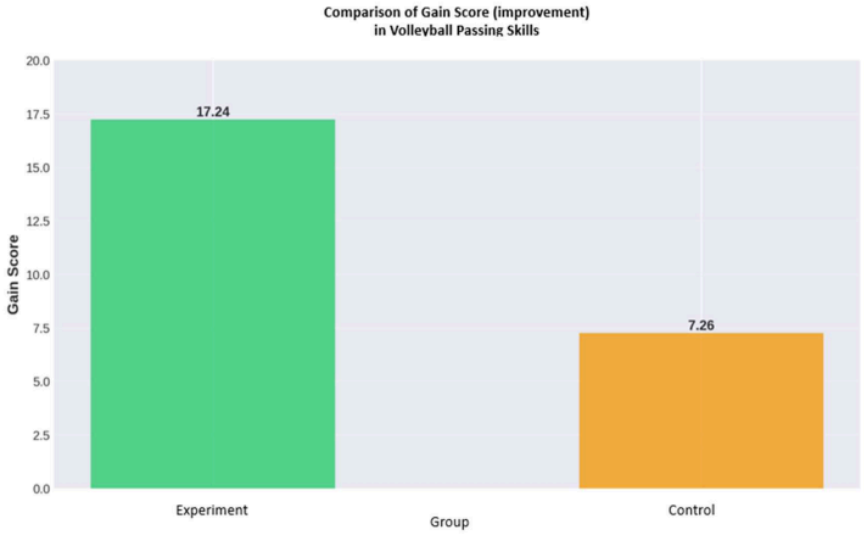

Figure 2. Comparison of Gain Scores between Groups

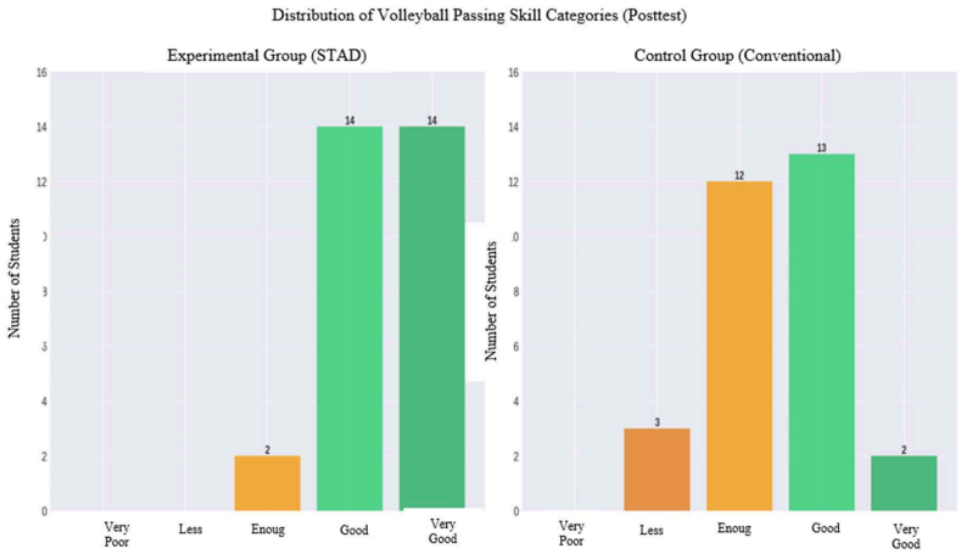

Figure 3. Distribution of Posttest Skill Categories

Prerequisite Test Analysis

Before formulating hypotheses, the following steps should be taken: The Shapiro-Wilk test revealed that the distribution of pretest and posttest scores was normal ($p > 0.05$; experimental pretest $p = 0.214$; control pretest $p = 0.189$; experimental posttest $p=0.156$; control posttest $p=0.198$). The pretest and posttest scores are normally distributed with $p > 0.05$ (experimental pretest $p=0.214$; control pretest $p=0.189$; posttest $p=0.156$; posttest $p=0.198$). Using Levene's homogeneity test, the variables for both groups were found to be homogeneous with $F(1,58) = 1.342$, $p = 0.251$ for pretest data and $F(1,58) = 1.876$, $p = 0.176$ for posttest data. Both groups were homogeneous with $F(1,58) = 1.342$, $p = 0.251$ for pre-test data and $F(1,58) = 1.876$, $p = 0.176$ for post-test data. Assuming normality and homogeneity, the analysis was conducted using parametric statistics.

Hypothesis Test Results

Table 2. Results of the Paired Sample t-test

Group	Mean Difference	t	df	p-value	Cohen's d
Experiment	17.24	16.453	29	< 0.001	3.02
Control	7.26	9.654	29	< 0.001	1.77

The results of the paired sample t-test show that: from1: There was a significant increase in volleyball serves in the experimental group ($t = 16.453$, $df = 29$, $p < 0.001$) with a large effect size (Cohen's $d = 3.02$). The paired sample t-test shows that: Hypothesis 1: There is a significant increase in volleyball passing in the experimental group ($t = 16.453$, $df = 29$, $p < 0.001$) with a large effect size (Cohen's $d = 3.02$). This indicates that the STAD model is very effective in improving students' volleyball passing skills.

Hypothesis 2: There was a significant improvement in volleyball passing skills in the control group ($t=9.654$, $df=29$, $p<0.001$) with a large effect size (Cohen's $d=1.77$). Although conventional learning was also effective, the effect size was lower than that of the STAD model.

Table 3. Independent Sample t-test Results

Variabel	Eksperimen (Mean ± SD)	Kontrol (Mean ± SD)	t	df	p-value	Cohen's d
Posttest Score	82.47 ± 6.18	72.13 ± 7.34	5.894	58	< 0.001	1.52
Gain Score	17.24 ± 5.73	7.26 ± 4.12	7.624	58	< 0.001	1.82

Hypothesis 3: There is a significant difference in post-test scores ($t=5.894$, $p<0.001$) and post-test gain scores ($t=7.624$, $p<0.001$) between the experimental group and the control group. ($t=5.894$, $p<0.001$) and gain scores ($t=7.624$) between the experimental group and the control group. Cohen's effect size of 1.82 indicates a large effect size, which indicates that the STAD model is far more effective than traditional learning in improving volleyball passing skills. This shows that the STAD model is far more effective than traditional learning in improving volleyball passing skills.

Discussion

The results of this study indicate that the STAD cooperative learning model is highly effective in improving graduation rates among students at SMA Negeri 16 Medan. This study shows that the STAD cooperative learning model is highly effective in improving graduation rates among students at SMA Negeri 16 Medan. This concept is consistent with recent studies that identify the importance of cooperative learning in education (B. Dyson et al., 2020). The effectiveness of the STAD model in this study can be demonstrated using the following pedagogical methods: from the STAD model in this study can be demonstrated using the following pedagogical methods:

To begin with, cooperative learning in heterogeneous groups facilitates peer tutoring, where students with higher abilities help students with lower abilities. Heterogeneous groups facilitate peer tutoring, where students with higher abilities help students with lower abilities. (Slavin, Robert E. Zubaedi, 2015). Survey results from students show that 87% of them want help in the form of more detailed explanations and feedback from their peers. Surveys of students show that 87% of them want help in the form of more detailed explanations and feedback from their peers. This is consistent with Vygotsky's Zone of Proximal Development (ZPD), which states that learning occurs best when students are guided by people who are more competent in their ZPD (Jeanne Ellis Ormrod, Eric M. Anderman, 2024). In this context, students who have successfully mastered the technique can provide demonstrations, verbal instructions, and remote learning to students who are struggling. Those who have successfully mastered the technique can provide demonstrations, verbal instructions, and remote corrections to students who are struggling.

Intense and rapid feedback in small groups enhances the process of correcting movements. In learning situations where teachers must provide timely feedback to 30 students, with the STAD model, each student receives feedback not only from the teacher but also from 4-5 peers. (Timothy D. Lee, 2025) Emphasizing the need for frequent and rapid feedback in motor skill learning, especially during the initial acquisition stage. Frequent and rapid feedback in motor skill learning, especially during the initial acquisition stage. The results of the observation showed that in the experimental group, each student received 12-15 pieces of feedback per learning session, while in the control group, they only received 3-4 pieces of feedback.

Emphasizing the importance of frequent and timely feedback in motor skill development, especially during the early acquisition period. Learning motor skills requires frequent and rapid feedback, especially during the early acquisition period. The results of the observations showed that in the experimental group, each student received 12-15 pieces of feedback per learning session, while in the control group, they only received 3-4 pieces of feedback. The results of the observations showed that in the experimental group, each student received 12-15 pieces of feedback per learning session, while in the control group, they only received 3-4 pieces of feedback (Richard M. Ryan, 2020).

Fourth, the reward system is based on score improvements that encourage a healthy goal orientation. Encouraging a healthy goal orientation. Regardless of their starting point, every student has the same opportunity to contribute to the team's success through improved performance. Has the same opportunity to contribute to the team's success through improved performance. This contrasts with traditional competitive benchmarks, which have a significant impact on highly skilled employees and reduce the motivation of low-skilled employees. In this study, low-ability students (25th percentile) in the experimental group increased their average by 24.3 points, which was much higher than the low-ability students in the control group, who only increased by 9.7 points.

Fifth, the STAD learning structure, which is clear and well-organized, facilitates optimal active learning time. Analysis of task completion time shows that students in the experimental group were actively involved in value-added activities for 67% of the total learning time, while students in the control group were only involved for 48%. Students in the experimental group were actively involved in interactive activities for 67% of the total learning time, while students in the control group were only involved for 48%. The waiting time in the experimental group was lower (12% compared to 28%) because the exercises were carried out in small groups of 5-6 people, unlike the control group, which often practiced in pairs or waited for their turn with one ball for 8-10 people.

Although the control group control produced a significant improvement, the magnitude of the improvement was greater. This resulted in a significant improvement, the magnitude of which was greater. This can be explained by the fact that conventional learning provides sufficient time to practice and repeat techniques, which is a basic principle of motor learning (David I. Anderson, Richard A. Magill, Anthony M. Mayo, 2019). However, traditional approaches that focus more on individualism do not optimize the social aspects of learning and do not take into account individual differences in learning abilities. Approaches that focus more on individualism do not optimize the social aspects of learning and do not take into account individual differences in learning abilities (Bessa et al., 2021).

The distribution of post-test performance categories provides interesting insights. In the experimental group, 93% of students achieved a good or very good category, with a moderate success rate. In contrast, only 50% of the control group met these criteria. met the criteria for good or very good, with the majority (43%) falling into the adequate category. good or very good, with the majority (43%) falling into the adequate category. This shows that the STAD model not only improves group performance, but also reduces the spread or unevenness of skills

among employees. This not only improves group performance, but also reduces the spread or unevenness of skills among employees. The smaller standard deviation of the post-test group (6.18 versus 7.34) affects the interpretation. The deviation of the post-test group (6.18 versus 7.34) affects the interpretation.

Performance component analysis shows that improvements occurred in all areas: back-to-back passes (+28.4%), back-to-back passes (+31.2%), pass accuracy (+42.7%), and performance during the match (+38.9%). Performance components show that improvements have been made in all areas: passing accuracy (+28.4%), passing accuracy (+31.2%), passing accuracy (+42.7%), and performance during the game (+38.9%). The improvement in accuracy and performance shows that the STAD model not only improves the technical aspects of passing, but also the tactical and contextual aspects. This shows that the STAD model not only improves the technical aspects of passing, but also the tactical and contextual aspects. An ecological approach to motor learning emphasizes learning in relevant and real contexts (Chris Button, Ludovic Seifert, Jia Yi Chow, Duarte Araujo, 2021).

From a pedagogical perspective, applying the STAD paradigm at a glance in volleyball games provides several practical implications. To begin with, the effective formation of heterogeneous groups requires teachers to consider not only motor skills but also gender, privacy, and social dynamics. The formation of groups requires teachers to consider not only motor skills but also gender, privacy, and social dynamics. According to this study, the most effective groups are those that have: (a) at least 1-2 highly talented peers, (b) gender balance to prevent segregation, and (c) a combination of positive interactions. According to this study, the most effective groups are those that have: (a) at least 1-2 highly talented peers, (b) gender balance to prevent segregation, and (c) a combination of positive interactions. Second, group task worksheets should be clear, progressive, and challenging but still doable. Task research shows that worksheets with 4-5 different and increasingly complex operant exercise variations are the most effective in increasing student engagement.

These findings are also consistent with the concept of Communities of Practice. (Etienne Wenger-Trayner, E., 2020) STAD groups can be viewed as small communities within a larger community engaged in collaborative efforts (improving graduation rates), shared repertoires (joint training and strategies), and reciprocal involvement (intensive interaction among members). who participate in collaborative efforts (improving graduation rates), shared repertoires (joint practice and strategies), and reciprocal engagement (intensive interaction among members). Legitimate peripheral involvement occurs when novice students gradually increase their participation and adopt practices from more experienced students.

Limitations in the research must be acknowledged in order to contextualize the topic. To contextualize the topic, first, the research study was conducted in an ideal environment with a student-teacher ratio of 30:1 and adequate facilities. The effectiveness of STAD in schools with higher teacher-student ratios or inadequate facilities needs to be further investigated. The phenomenon of STAD (Student Attachment Disorder) in schools with higher teacher-student ratios or inadequate facilities needs to be further investigated. Second, during the 8-month intervention (16 periods), the long-term effects were investigated. Further studies are needed to determine retention and transfer of learning. Third, this study focused on psychological outcomes (graduation performance) with an emphasis on cognitive and affective aspects. Future research could use a more comprehensive mixed-methods strategy to investigate various domains of learning.

Conclusions

Based on the results of the research and discussion, it can be concluded that the STAD type Cooperative Learning model is very effective in improving the volleyball passing skills of students at SMA Negeri 16 Medan. This resulted in a statistically significant increase of 17.24

points from 65.23 to 82.47, with a large effect size (Cohen's d = 3.02). by 17.24 points from 65.23 to 82.47, with a large effect size (Cohen's d = 3.02). Conventional education improved student performance by 7.26 points, from 64.87 to 72.13, with a significant effect size (Cohen's d = 1.77), but still lower than STAD. 7.26 points, from 64.87 to 72.13, with a significant effect size (Cohen's d = 1.77), but still lower than STAD. There was a significant difference in effectiveness between the two models ($p<0.001$), with STAD being 2.4 times more effective based on improvement scores (Cohen's d =1.82) and achieving a more even distribution of skills, with 93% of students reaching the good or very good category compared to 50% in the control group. There was a significant difference between the two models ($p < 0.001$), with STAD proving to be 2.4 times more effective based on improvement scores (Cohen's d = 1.82) and achieving a more even distribution of skills, with 93% of students reaching the good or very good category compared to 50% in the control group.

Diverse group tutoring, intensive feedback, positive interdependence, an improvement-based learning system, increased active learning time, and meaningful social learning all contribute to the development of STAD. Implicitly, physical education teachers are advised to implement STAD by paying attention to group formation, progressive tasks, the role of facilitators, and motivational assessment. Further research is recommended using longitudinal and factorial methods, mixed cooperative learning models, factorial models, and comparative models from Cooperatives, as well as focusing on various sports techniques and classroom actions to determine best practices in implementing STAD in various school contexts. Learning, as well as focusing on various sports techniques and classroom actions to determine best practices in implementing STAD in various school contexts.

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Conflict of interest

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References

Ben Dyson, & *Casey, A. (2016). Cooperative learning in physical education and physical activity: A practical introduction. Routledge.* https://doi.org/10.4324/9781315739496

Bessa, C., Hastie, P., Ramos, A., & Mesquita, I. (2021). *What Actually Differs between Traditional Teaching and Sport Education in Students ' Learning Outcomes ? A Critical Systematic Review. March*, 110–125. https://doi.org/https://doi.org/10.52082/jssm.2021.110

Chali, M. T., Eshete, S. K., & Debela, K. L. (2022). *Learning How Research Design Methods Work : A Review of Creswell ' s Research Design : Qualitative , Quantitative and Mixed Methods Approaches*. *27*(12), 2956–2960. https://doi.org/10.46743/2160-3715/2022.5901

Chris Button, Ludovic Seifert, Jia Yi Chow, Duarte Araujo, K. D. (2021). *Dynamics of Skill Acquisition*. https://doi.org/https://doi.org/10.5040/9781718214125

Connor, S. O., Mccaffrey, N., Whyte, E. F., Fop, M., & Murphy, B. (2020). Journal of Science and Medicine in Sport Can the Y balance test identify those at risk of contact or non-contact lower extremity injury in adolescent and collegiate Gaelic games ? *Journal of Science and Medicine in Sport*, *23*, 943–948. https://doi.org/https://doi.org/10.1016/j.jsams.2020.04.017

David I. Anderson, Richard A. Magill, Anthony M. Mayo, K. A. S. (2019). *Enhancing motor skill acquisition with augmented feedback*. https://www.taylorfrancis.com/chapters/edit/10.4324/9781351189750-1/enhancing-motor-skill-acquisition-augmented-feedback-david-anderson-richard-magill-anthony-mayo-kylie-steel

Destriana, D., Destriani, D., Victorian, A. R., & Makorohim, M. F. (2022). Need Analysis for The Development Passing Test for Volleyball Games. *Jurnal Halaman Olahraga Nusantara (HON)*, *5*(1), 68-79. https://doi.org/https://doi.org/10.31851/hon.v5i1.6469

Dony, G. W., & Wisman, Y. (2024). Pengaruh Model Pembelajaran Kooperatif Tipe Student Teams Achievement Division (STAD) Terhadap Hasil Belajar Teknik Dasar Passing Bola Basket. *Jurnal Ilmiah Kanderang Tingang*, *15*(1), 20–28. https://doi.org/https://doi.org/10.37304/jikt.v15i1.301

Dyson, B., Howley, D., & Shen, Y. (2020). ‘ Being a team , working together , and being kind ’: Primary students ’ perspectives of cooperative learning ’ s contribution to their social and emotional learning. *Physical Education and Sport Pedagogy*, *0*(0), 1–18. https://doi.org/10.1080/17408989.2020.1779683

Etienne Wenger-Trayner, E., & B. W. (2020). *Learning to make a difference: Value creation in social learning spaces*. https://doi.org/https://doi.org/10.1017/9781108677431

Fish, F. E. (2021). The role of the tail or lack thereof in the evolution of tetrapod aquatic propulsion. In *Integrative and Comparative Biology* (Vol. 61, Issue 2, pp. 398–413). https://doi.org/10.1093/icb/icab021

Fitriani, T., Martini, T., Hidayat, T., & Firmansyah, H. (2024). Pengaruh Model Pembelajaran Cooperative dalam Meningkatkan Hasil Belajar Guling Depan dan Guling Belakang. *Pubmedia Jurnal Pendidikan Olahraga*, *4*, 1–11. https://doi.org/https://doi.org/10.47134/jpo.v2i1.572

Garc, L., Ab, Á., Diloy-peña, S., Gil-arias, A., & Sevil-serrano, J. (2020). *Can a Hybrid Sport Education / Teaching Games for Understanding Volleyball Unit Be More E ff ective in Less Motivated Students ? An Examination into a Set of Motivation-Related Variables*. *12*, 1–16. https://doi.org/https://doi.org/10.3390/su12156170

Gunawan, I., & Kurniawati, A. (2024). Application of Plastic Ball Modification through Teams Games Tournament Learning Model to Improve Volleyball Lower Passing in Class V MI Ath-Thohariyah. *Jurnal Ilmu Olahraga, Kesehatan Dan Pendidikan Jasmani Indonesia*, *2*(2), 2–6. https://doi.org/https://doi.org/10.58723/inasport.v2i2.192

Idah Rahmawati, Ati Sadiah, A. S. (2024). No Title. *Jurnal Pendidikan Ekonomi (JURKAMI)*, *9*. https://doi.org/10.31932/jpe.v9i3.3696

Iryanti, D., Juditya, S., Zakaria, D. A., & Hambali, S. (2024). Phyiscal education games model to improve physical literacy skills of children. *Jurnal Ilmu Olahraga Dan Kesehatan*, *13*(2), 213–226. https://doi.org/https://doi.org/10.36706/altius.v13i2.72

Ivero, B. I. M. A. (2025). Aprendizaje Cooperativo en Educación Física . Explorando las dificultades y oportunidades para una correcta implementación desde una mirada docente

Cooperative Learning in Physical Education . Exploring the Challenges and Opportunities for Proper Implemen. *Ágora Para La Educación Física y El Deporte*, 51–76. https://doi.org/https://doi.org/10.24197/v4tb4n42

Jeanne Ellis Ormrod, Eric M. Anderman, L. H. A. (2024). *Educational Psychology*. https://www.pearson.com/en-us/subject-catalog/p/educational-psychology-developing-learners/P200000009802/9780137871384

Lima, R., Silva, A. F., & Clemente, F. M. (2019). Temporal effects of final action on the performance of the Portuguese men ' s volleyball teams. *Biomedical Human Kinetics*, *11*, 121–130. https://doi.org/10.2478/bhk-2019-0017

Nurodin, D., Asmawi, M., Nurfitri, W., & Humaid, H. (2024). Optimizing Volleyball Bottom Passing Skills : Unveiling the Impact of the STAD Learning Model on Learning Outcomes. *KnE Social Sciences*, *2024*, 180–189. https://doi.org/10.18502/kss.v9i31.17568

Pasca Tri Kaloka, Soni Nopembri, Y. Y. (2023). Nonlinear learning pedagogy: Does it have an impact on physical education in elementary schools? Pedagogía del aprendizaje no lineal: ¿tiene impacto en la educación física en las escuelas primarias? Pasca Tri Kaloka, Soni Nopembri, Yudanto. *Retos*, *48*, 1078–1085. https://doi.org/10.47197/retos.v48.97760

Richard M. Ryan, & E. L. D. (2020). Intrinsic and extrinsic motivation from a self-determination theory perspective: Definitions, theory, practices, and future directions. *Contemporary Educational Psychology*, *61*, 101860. https://doi.org/10.1016/j.cedpsych.2020.101860

Rohyami, Y., & Huda, T. (2019). (2019). Pengaruh Cooperative Learning dan Flipped Classroom-Cooperative Learning Matakuliah Kimia Analisis II terhadap Motivasi Belajar Mahasiswa. *Refleksi Pembelajaran Inovatif*, *1*(2), 147–160. https://doi.org/https://doi.org/10.20885/rpi.vol1.iss2.art5

Sciences, S., Sciences, S., Clemente-su, V. J., Sciences, S., & Costa, L. (2025). Differences in the psychophysiological response between normal weight and overweight young recreational athletes in strength training. *Journal of Human Sport and Exercise*, *21*, 10. https://doi.org/https://doi.org/10.55860/d6921037

Setiawan, O. C. (2004). *Krisis Identitas dan Legitimasi dalam Pendidikan Jasmani*. *1*(1), 1–7.

Slavin, Robert E. Zubaedi, N. (2015). *Cooperative Learning : teori, riset, dan praktik*. https://e-library.nalanda.ac.id/index.php?p=show_detail&id=698

Tanis, D., Calalo, J. A., Cashaback, J. G. A., & Ã, I. L. K. (2026). *Control of Movement Accuracy and effort costs together lead to temporal asynchrony of multiple motor commands*. *November 2022*, 1–6. https://doi.org/10.1152/jn.00435.2022

Timothy D. Lee, R. A. S. (2025). *Motor Learning and Performance*. https://www.human-kinetics.co.uk/9781718221093/motor-learning-and-performance/?utm_source=chatgpt.com

Yang, C., Chen, R., Chen, X., & Lu, K. (2021). The Efficiency of Cooperative Learning in Physical Education on the Learning of Action Skills and Learning Motivation. *Frontiers in Psychology*, *12*(October), 17. https://doi.org/10.3389/fpsyg.2021.717528

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