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The Effectiveness of the Sport Education Model on Volleyball Learning Outcomes of Eighth-Grade Students

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Abstract

Study purpose. This study was conducted to determine whether the Sport Education Model can improve volleyball learning outcomes among eighth-grade students. In many physical education classes, instruction still relies heavily on teacher-centered approaches, which often limit students' active involvement. As a result, students may have fewer opportunities to develop both their skills and motivation.

Materials and methods. This study used a quasi-experimental design with a pretest–posttest control group setup. A total of 64 students from SMP Negeri 32 Padang participated in the research, with 32 students assigned to the experimental group and the remaining 32 placed in the control group. The study followed three main stages: pretest, treatment, and posttest. At the beginning, both groups were given a pretest to measure their initial abilities in cognitive, psychomotor, and affective domains. The experimental group then received instruction through the Sport Education Model, which emphasizes teamwork, student roles, and game-based activities. The control group received traditional instruction that mainly relied on explanations and repetitive practice. After the treatment period, both groups were given a posttest. The collected data were then analyzed using descriptive statistics and an independent samples t-test.

Results. The findings revealed that the experimental group showed greater progress compared to the control group. Improvements were seen in understanding, skill performance, and participation. Statistical testing confirmed that the difference between the two groups was significant.

Conclusion. The Sport Education Model proved effective in enhancing volleyball learning outcomes. Approaches that encourage active participation and teamwork appear to provide better learning experiences and outcomes for students.

Keywords: Sport Education Model, Volleyball Learning Outcomes, Physical Education, Student Engagement

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Introduction

Physical Education, Sports, and Health (PJOK) plays a strategic role in achieving national education goals by promoting physical fitness, character development, social skills, and lifelong healthy lifestyles (Muyassar & Hambali, 2025). At the junior high school level, PJOK is particularly important as students undergo significant physical and psychological development. Therefore, learning should not only emphasize motor skills but also foster values such as discipline, responsibility, cooperation, and sportsmanship (Aprelyani, 2025; Destriani, et al., 2019). International studies further confirm that well-designed physical education contributes to students' socio-emotional development, particularly when implemented through participatory and student-centered approaches (Sindiani et al., 2025). In addition, innovative learning approaches have been shown to significantly improve student engagement and learning effectiveness (Nasrullah, 2025).

Volleyball is one of the core components of PJOK and is widely implemented in Indonesian schools (Samsudin, S., Setiawan, I., Dwi, 2023). As a team sport, volleyball requires not only technical mastery—such as serving, passing, spiking, and blocking—but also tactical understanding and effective communication among players (Ozdal, 2025; Umar, et al., 2023). However, learning practices in schools are still largely dominated by teacher-centered approaches, which limit student participation and reduce opportunities for meaningful practice. This condition often leads to low motivation and suboptimal mastery of fundamental volleyball skills (Astuti, 2023). Evidence also shows that game-based approaches, such as Teaching Games for Understanding (TGfU), can significantly improve volleyball skills and learning motivation compared to conventional methods (Resifa, 2025).

Instructional models are therefore a key factor in determining the success of physical education learning, particularly those that promote active engagement and student responsibility (Chu, T. L. Alan, & Zhang, 2018; Yao G., et al., 2025). One pedagogical approach aligned with these principles is the Sport Education model, which emphasizes authentic sport experiences by assigning students various roles such as players, referees, and team organizers (Romar, J. E., Sarén, J., & Hastie, 2016). Through this structure, students are encouraged to engage cognitively, socially, emotionally, and physically in an integrated manner.

Previous research has demonstrated that the Sport Education model is effective in improving motivation, engagement, and sport literacy (Tendinha et al., 2021). Furthermore, innovative and game-based approaches have been shown to enhance technical skills, tactical understanding, and teamwork more effectively than conventional methods (Apriani et al., 2025; Ginanjar et al., 2024; Kitamura, K. et al., 2020). The integration of reflective practices, peer assessment, and digital learning has also been found to strengthen cognitive, psychomotor, and affective outcomes. In addition, student-centered learning environments that promote collaboration and shared responsibility can improve intrinsic motivation and social competence (Ahn & Lim, 2025; Atsani, 2020).

However, despite the growing body of research, several gaps remain. Most existing studies have been conducted in developed countries, limiting their applicability to the Indonesian educational context. Moreover, studies specifically examining the implementation of the Sport Education model in volleyball learning at the junior high school level are still limited. Thus, there is a lack of empirical evidence regarding how this model influences cognitive, psychomotor, and affective learning outcomes simultaneously in this context.

This study addresses this gap by investigating the implementation of the Sport Education model in volleyball learning among eighth-grade students at SMP Negeri 32 Padang. The novelty of this study lies in its comprehensive analysis of three domains of learning outcomes—cognitive, psychomotor, and affective—within a specific context of volleyball learning using the Sport Education model in Indonesian junior high schools.

Based on these considerations, this study aims to analyze the effectiveness of the Sport Education model in improving students' volleyball learning outcomes. It is hypothesized that students taught using the Sport Education model will achieve significantly better learning outcomes than those taught using conventional teaching methods.

Materials and methods

Study participants

This study involved 64 eighth-grade students from SMP Negeri 32 Padang in the 2025/2026 academic year. The participants came from two intact classes, each consisting of 32 students, which were designated as the experimental group and the control group.

A purposive sampling approach was used to ensure that the two groups were comparable at the outset. The classes were selected based on several considerations: both were taught by the same physical education teacher, had similar schedules and access to learning facilities, and showed relatively equivalent initial ability in volleyball based on pretest results. In addition, none of the students had previously experienced learning through the Sport Education model. These conditions were taken into account to reduce potential bias and to allow a clearer interpretation of the effects of the intervention.

The intervention was carried out over six meetings. This duration reflects the typical time allocation for a volleyball unit in junior high school physical education. Although relatively short, prior research indicates that structured, student-centered interventions implemented over a limited number of sessions can still produce meaningful improvements in students' motor performance, motivation, and engagement (Yao G., 2025). In this study, each session was carefully organized to include progressive skill practice, basic tactical understanding, and modified game situations in line with the principles of the Sport Education model. All students participated voluntarily after receiving an explanation of the study's purpose. Approval to conduct the research was obtained from the school, and all data were handled confidentially.

Study organization

This study employed a quasi-experimental design using a pretest–posttest control group format (Fraenkel et al., 2019). The purpose of this design was to examine the effectiveness of the Sport Education Model in improving students' volleyball learning outcomes compared to conventional teaching methods, as recommended in recent physical education research emphasizing experimental approaches to evaluate instructional models (Hidayat et al., 2024; Nasrullah, 2025).

The research was conducted during regular Physical Education (PJOK) classes over six meetings, with each session lasting approximately 90 minutes. Prior to the intervention, both groups completed a pretest to assess their initial cognitive understanding and basic volleyball skills.

The intervention was then implemented using different instructional approaches for each group. In the experimental group, students were organized into teams and assigned specific roles such as players, referees, coaches, and scorekeepers. Learning activities emphasized cooperative practice, tactical discussions, and structured competitions. These activities were designed to promote active participation, teamwork, and shared responsibility, which are considered essential elements of effective physical education learning (Resifa, 2025).

In contrast, the control group received conventional instruction that focused on teacher explanations, demonstrations, and repetitive practice drills. Although similar skills were taught, the learning process placed less emphasis on student roles and team-based activities. The detailed sequence of learning activities carried out in both groups is presented in Table 1.

Table 1. Volleyball Learning Scenario

Stage	Experimental Group (Sport Education Model)	Control Group (Conventional Method)
Opening	Prayer, warm-up, explanation of learning objectives, and team formation	Prayer, warm-up, and explanation of learning objectives
Core Activities	Team-based practice of volleyball techniques (serving, passing, and spiking); assignment of roles (players, referees, scorekeepers); tactical discussions; small-group games; team competitions	Teacher demonstration of volleyball techniques; individual and group practice; repetitive drills (serving, passing, and spiking); simple gameplay
Closing	Reflection on learning experiences, discussion of teamwork, teacher feedback, and cool-down	Teacher feedback on students' performance and cool-down

Throughout the learning process, observations were conducted to monitor students' engagement, cooperation, and participation. These observations also contributed to the assessment of affective learning outcomes.

At the end of the intervention, both groups completed a posttest using the same instruments as in the pretest. The results were then compared to evaluate the effectiveness of the Sport Education Model.

Students' learning outcomes were measured across three domains. Cognitive achievement was assessed using a 25-item multiple-choice test covering volleyball rules, techniques, and strategies. The instrument demonstrated good internal consistency, with a Cronbach's alpha coefficient of 0.82. Psychomotor performance was evaluated using a structured rubric focusing on serving, passing, and spiking, with assessment criteria including preparation, execution, and follow-through on a four-point scale. The affective domain was measured using an observation checklist assessing cooperation, sportsmanship, responsibility, and participation, also rated on a four-point scale.

Content validity was reviewed by two Physical Education experts and one educational assessment specialist. Inter-rater reliability was calculated using percentage agreement, resulting in a coefficient of 0.85, indicating a high level of agreement.

Statistical analysis

Data analysis was conducted using both descriptive and inferential statistical techniques with the assistance of SPSS version 22. Descriptive statistics were used to summarize the data, including mean scores, standard deviations, and percentage improvements in students' cognitive and psychomotor learning outcomes.

Inferential analysis involved two main tests. A paired samples t-test was used to examine differences between pretest and posttest scores within each group, in order to determine whether significant improvement occurred after the intervention. An independent samples t-test was conducted to compare posttest scores between the experimental and control groups to evaluate the effectiveness of the instructional approaches.

Before conducting hypothesis testing, the assumptions for parametric analysis were verified. Normality was tested using the Shapiro-Wilk test, while homogeneity of variance was assessed using Levene's test.

The level of significance was set at $\alpha = 0.05$. A p-value of less than 0.05 was considered statistically significant. In addition, effect size was calculated using Cohen's d to determine the magnitude of the treatment effect.

Results

The results of this study are presented based on the analysis of pretest and posttest scores from both the experimental and control groups. The data were analyzed using descriptive statistics, assumption testing, paired samples t-tests, independent samples t-tests, effect size (Cohen's d), confidence interval, and N-Gain analysis.

Descriptive Statistics

Following the instructional intervention, both groups showed an increase in mean scores. The experimental group's mean score increased from 65.21 (pretest) to 82.34 (posttest), resulting in a gain of 17.13 points. The control group's mean score increased from 64.87 to 73.15, with a gain of 8.28 points in [Table 2](#).

Table 2. Descriptive Statistics of Volleyball Learning Outcomes

Research Group	Pretest	Posttest	Gain
Experimental	65.21	82.34	17.13
Control	64.87	73.15	8.28

Assumption Testing

Prior to inferential analysis, tests of normality and homogeneity were conducted. The Shapiro–Wilk test indicated that all data were normally distributed ($p > 0.05$). Levene's test indicated that the variances between groups were homogeneous ($p > 0.05$).

Paired Samples t-Test

A paired samples t-test was conducted to examine differences between pretest and posttest scores within each group in [Table 3](#).

Table 3. Paired Samples t-Test Results

Group	t	Sig (2-tailed)
Experimental (pretest–posttest)	-14.632	0.000
Control (pretest–posttest)	-8.417	0.000

Independent Samples t-Test

An independent samples t-test was conducted to compare posttest scores between the experimental and control groups [Table 4](#).

Table 4. Independent Samples t-Test Results (Posttest Scores)

Group Comparison	t	Sig (2-tailed)
Experimental vs Control	3.876	0.000

Effect Size (Cohen's d)

The effect size analysis yielded a Cohen's d value of 0.90.

Confidence Interval

The mean difference between the experimental and control groups was 9.19, with a 95% confidence interval ranging from 4.50 to 13.88.

N-Gain Analysis

Table 5. N-Gain Analysis of Volleyball Learning Outcomes

Group	N-Gain Score	Category
Experimental	0.49	Moderate
Control	0.23	Low

Graphical Representation

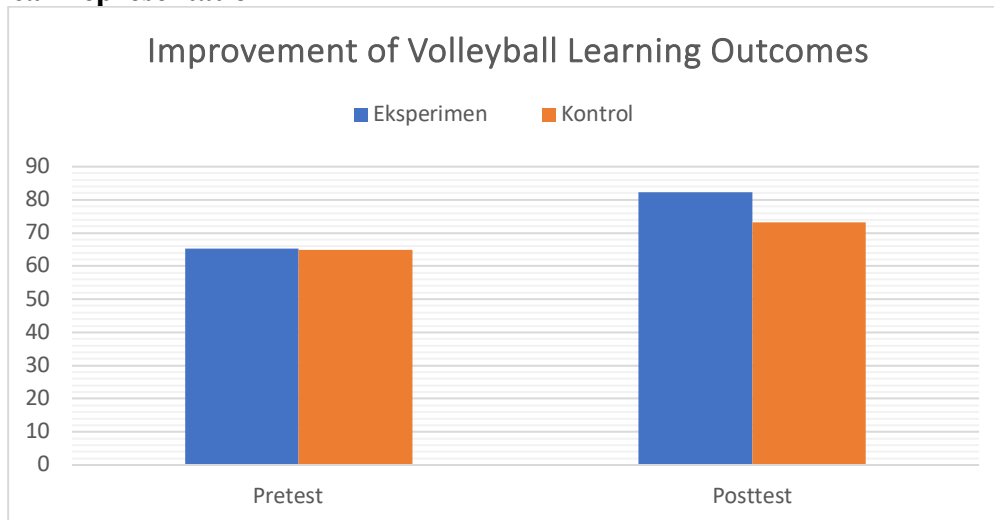


Figure 1. Improvement of Volleyball Learning Outcomes

The figure 1 presents the change in mean scores from pretest to posttest in both groups. The experimental group increased from 65.21 to 82.34, while the control group increased from 64.87 to 73.15. The difference in gain scores between the two groups is also presented in the figure.

Summary of Findings

Overall, the results consistently show that students who participated in the Sport Education Model experienced greater improvements in both cognitive understanding and psychomotor performance compared to those who received conventional instruction. The combination of structured learning activities, team involvement, and active participation appears to play a key role in enhancing students’ overall learning outcomes.

Discussion

The findings of this study indicate that the Sport Education Model (SEM) is more effective than conventional teaching approaches in improving students’ volleyball learning outcomes. The improvement was observed in both students’ understanding of game concepts and their ability to perform fundamental volleyball skills. These results suggest that learning environments that actively involve students in the learning process can facilitate more comprehensive learning outcomes.

These findings are consistent with previous studies reporting the positive effects of SEM on student engagement, motivation, and skill development in physical education contexts (Hastie et al., 2011; Perlman, 2012; Zhang et al., 2024). SEM emphasizes authentic and structured sport experiences, allowing students to participate in meaningful learning situations rather than repetitive drills. Similarly, recent studies in the Indonesian context have shown that student-centered and game-based learning approaches can significantly enhance engagement and skill mastery (Nasrullah, 2025; Resifa, 2025).

From a theoretical perspective, these findings support Siedentop's concept of Sport Education, which highlights the importance of authentic sport experiences in promoting meaningful learning (Siedentop et al., 2020). In this study, students were involved not only in technical practice but also in team organization, role-taking, and decision-making processes. Such structured involvement may have contributed to a deeper understanding of the game and improved performance outcomes. This is further supported by findings that role-based and game-centered learning environments enhance student participation and understanding (Hidayat et al., 2024).

In addition, Social Learning Theory provides a relevant explanation for the observed outcomes. Through observation, interaction, and feedback, students were able to develop both cognitive and psychomotor competencies (Han et al., 2022; Hu et al., 2022). The collaborative nature of SEM enables students to learn from peers while actively refining their skills, which may explain the higher improvement observed in the experimental group.

However, it is important to note that not all studies report consistently strong effects of SEM. Some research suggests that the effectiveness of student-centered models may vary depending on factors such as implementation quality, duration of intervention, and teacher expertise (Hastie & Casey, 2014; Wallhead & O'Sullivan, 2005). In contexts where time is limited or teachers are less familiar with the model, the impact of SEM may not be as pronounced. This indicates that the success of SEM is influenced not only by the model itself but also by how it is implemented in practice.

Several limitations of this study should also be considered. First, the duration of the intervention was relatively short (six meetings), which may limit the extent to which long-term learning outcomes can be observed. Second, the study was conducted in a single school with a limited sample size, which may affect the generalizability of the findings. Third, although efforts were made to ensure group equivalence, the use of intact classes may introduce potential bias related to classroom dynamics or prior experiences. In addition, the same teacher was involved in both groups, which may have influenced the consistency of instruction and introduced teacher-related bias. External factors such as student motivation, peer interaction, and classroom environment may also have contributed to the observed outcomes.

Despite these limitations, the findings offer several important implications. Practically, the results suggest that physical education teachers should consider implementing student-centered models such as SEM to enhance student engagement and learning outcomes. The use of role-based learning and authentic game situations can help create a more interactive and meaningful learning environment. From a theoretical perspective, this study supports the integration of constructivist and social learning approaches in physical education, emphasizing that learning is more effective when students actively participate and collaborate.

Furthermore, this study contributes to the limited body of research on SEM implementation in the Indonesian junior high school context, particularly in volleyball learning. It also provides empirical evidence that SEM can simultaneously support cognitive and psychomotor development within a relatively short instructional period.

Future research is recommended to explore the long-term effects of SEM, include larger and more diverse samples, and examine additional variables such as motivation, teamwork, and affective outcomes. Investigating the role of teacher expertise and implementation fidelity may also provide deeper insights into the effectiveness of the model.

Conclusions

The findings of this study confirm that the Sport Education Model is more effective than conventional teaching methods in improving students' volleyball learning outcomes. Students who participated in the model showed greater progress in both cognitive understanding and

psychomotor performance, indicating that active and structured learning environments can lead to better learning results.

The use of team-based learning, role distribution, and structured competition appears to create a more authentic and engaging learning experience. Through this approach, students not only improved their technical skills but also developed a better understanding of game strategies and rules.

These results suggest that integrating skill development with meaningful learning activities can enhance overall learning outcomes in physical education. This study also provides empirical support for the use of the Sport Education Model, particularly in volleyball learning at the junior high school level.

Based on these findings, the Sport Education Model can be considered a practical and effective instructional approach for Physical Education teachers. Future research is encouraged to examine its long-term impact and to explore its application in different sports and educational contexts.

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Conflict of interest

The authors say that there is no conflict of interest when it comes to publishing this article.

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