



The Effect of the Sport Education Model on Students' Physical Activity Levels and Character Development in Elementary School

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ABSTRACT

Model (SEM) on students' physical activity levels and character development in elementary school physical education. The study employed a quasi-experimental design with a nonequivalent control group. A total of 40 fifth-grade students aged 10-11 years participated in this study and were divided into an experimental group and a control group. The experimental group received instruction using the Sport Education Model, while the control group was taught using conventional methods. Data were collected using an observation-based physical activity instrument adapted from SOFIT and a character assessment rubric focusing on responsibility, cooperation, and sportsmanship. The results showed that the experimental group experienced a significant improvement in both physical activity levels and character development compared to the control group. The paired-sample t-test indicated significant differences between pretest and posttest scores in the experimental group ($p < 0.001$), while the independent-samples t-test revealed significant differences between groups in posttest scores ($p < 0.001$). These findings suggest that the Sport Education Model is more effective than conventional teaching methods in promoting active participation and fostering positive character values among students. In conclusion, the Sport Education Model can be considered an effective instructional approach for enhancing both physical and character outcomes in elementary school physical education. The model provides meaningful learning experiences through structured activities, teamwork, and active student involvement.

ARTICLE INFO

Article History:

Submitted/Received April 2026

First Revised April 2026

Accepted May 2026

Publication Date May 2026

Keyword:

Physical Activity; Character Development; Sport Education Model.

INTRODUCTION

Elementary school physical education is increasingly understood to serve a purpose that extends well beyond the cultivation of movement proficiency. At this stage of development, students begin to establish foundational social values-including cooperation, responsibility, and respect for others-alongside the motor competencies that will underpin their physical lives. Physical education consequently functions as a strategic medium through which both physical capacities and character attributes can be developed in an integrated manner (Handayani et al., 2025). Despite this recognised potential, many schools continue to deliver physical education primarily through teacher-directed, technique-focused approaches that constrain students' opportunities for active participation and peer interaction. Such methods tend to produce sub-optimal physical activity levels during lessons and limit the conditions necessary for the authentic cultivation of character values (Ginanjar et al., 2024).

In response to these pedagogical limitations, student-centred instructional models have attracted increasing attention in physical education scholarship. Among these, the Sport Education Model (SEM) has emerged as a particularly well-theorised and empirically supported alternative. The model is structured around the concept of a sport 'season,' within which students are organised into stable teams, assume differentiated roles-including player, coach, referee, and statistician-and engage in authentic competitive formats. This structure is designed to create conditions of genuine responsibility, sustained social engagement, and meaningful physical participation (Caracuel-Cáliz et al., 2026). Systematic reviews and meta-analyses confirm that SEM is associated with higher levels of student engagement and participation in physical activity, as well as improvements in psychosocial outcomes including teamwork, responsibility, and social interaction (Caracuel-Cáliz et al., 2026; Yao et al., 2025). From an Indonesian educational perspective, parallel evidence indicates that structured physical education can serve as an effective vehicle for cultivating character values such as discipline, honesty, and cooperation when learning activities are thoughtfully designed (Gandasari, 2023). Innovative instructional approaches-including technology-enhanced and model-based designs, have additionally been shown to increase students' physical activity levels in elementary settings (Febrianti et al., 2025).

A gap in the existing literature, however, is apparent: the majority of prior investigations have examined either physical activity outcomes or character development outcomes in isolation, without systematically investigating how SEM simultaneously contributes to both domains within the elementary school context. This study was therefore designed to address this gap by examining the effect of the Sport Education Model on students' physical activity levels and character development at an elementary school in Indonesia. The findings are intended to provide both practical guidance for teachers designing engaging and meaningful physical education programmes and an empirical contribution to the literature on model-based approaches in elementary school physical education.

METHODS

Research Design

A quasi-experimental design with a nonequivalent control group was adopted, as random assignment of participants was not feasible within the existing school structure. This design allowed for the systematic evaluation of SEM effectiveness under authentic classroom conditions while preserving the integrity of established class groupings. To establish baseline equivalence, both groups completed a pretest prior to the intervention. Pretest results confirmed no significant between-group differences in physical activity levels or character scores at baseline, reducing selection bias and strengthening the study's internal validity. A

posttest using identical instruments was administered at the conclusion of the treatment phase to measure intervention-attributable changes (Sugiyono, 2012).

Participants

Forty fifth-grade students (22 male, 18 female; M age = 10.5 years, SD = 0.51) were recruited from a public elementary school. Students were divided into an experimental group (n = 20) and a control group (n = 20). Inclusion criteria required active participation in physical education, physical capability to engage in sport activities, and consistent attendance throughout the study period. Students with medical conditions limiting physical participation were excluded. All participants had comparable educational backgrounds and regular physical education exposure. School administration approval was obtained, and participation was voluntary.

Sampling Procedure

Purposive sampling was employed, to select two intact fifth-grade classes exhibiting comparable academic profiles, physical education experience, and age composition. One class was assigned as the experimental group and the other as the control group, without individual randomisation-a standard practice in quasi-experimental educational research (Zhang et al., 2024). Pretest administration confirmed baseline equivalence prior to the intervention (Wibowo et al., 2024).

Research Instruments and Materials

Two primary instruments were employed. Physical activity was assessed using an observational instrument adapted from the System for Observing Fitness Instruction Time (SOFIT), which categorises student activity at 20-second intervals into five levels: lying down, sitting, standing, walking, and vigorous activity (McKenzie, 2015). For analysis, these were consolidated into sedentary, moderate, and vigorous categories. Two trained observers conducted data collection simultaneously; inter-rater agreement was confirmed as satisfactory through pre-study calibration sessions. SOFIT has been widely validated for use in classroom physical education contexts (Temel & Temel, 2023). Character development was evaluated using a rubric assessing responsibility, cooperation, and sportsmanship, each rated on a 1-5 Likert scale. The rubric was grounded in current character education frameworks and reviewed by subject-matter experts to ensure content validity (Gandasari, 2023).

Data Collection Procedures

During the *pretest phase*, both groups were observed using the SOFIT instrument and the character assessment rubric to establish baseline data. During the *treatment phase* (four sessions), the experimental group engaged in SEM-structured 'sport season' activities: students were organised into teams and assigned specific roles (players, team leaders, referees); sessions included small-sided games, tactical discussion, and structured reflection. The teacher served as a facilitator, prompting students' decision-making and collaborative engagement. The control group received conventional physical education comprising teacher explanation, technical demonstration, and repetitive drill practice with limited peer interaction. Equipment used across both groups included cones, markers, whistles, stopwatches, and modified balls, adapted to elementary school students' abilities (Bayu et al., 2025). During the *posttest phase*, both groups were reassessed using identical

instruments. Observation sheets, field notes, and photographic documentation were maintained throughout to support consistency and data reliability (Junaedi, 2025).

Data Analysis

Data were analysed using IBM SPSS. Descriptive statistics (mean, standard deviation, minimum, maximum) were computed for all variables at both time points. Normality was assessed via the Shapiro-Wilk test and homogeneity of variance via Levene's test (Unwin, 2012). Where parametric assumptions were satisfied, paired-samples t-tests examined within-group pre-to-post change, and independent-samples t-tests compared posttest scores between groups. Where assumptions were violated, the Wilcoxon signed-rank test and Mann-Whitney U test were applied. Statistical significance was set at $\alpha = 0.05$.

RESULTS

Results are presented sequentially for physical activity levels and character development, followed by inferential test outcomes.

Table 1. Descriptive Statistics of Physical Activity Levels

Group	Test	N	Mean	Std. Dev.	Gain
Experimental	Pretest	20	62.45	6.12	
Experimental	Posttest	20	84.30	7.25	+21.85
Control	Pretest	20	60.20	5.98	
Control	Posttest	20	68.15	6.40	+7.95

Table 1 shows that the experimental group's mean physical activity score increased substantially from 62.45 (SD = 6.12) to 84.30 (SD = 7.25) a gain of 21.85 points following SEM-based instruction. The control group recorded a markedly smaller increase, from 60.20 (SD = 5.98) to 68.15 (SD = 6.40), a gain of 7.95 points. Both groups were comparable at baseline, reinforcing the validity of subsequent between-group comparisons.

Table 2. Descriptive Statistics of Character Development Scores

Group	Test	N	Mean	Std. Dev.	Gain
Experimental	Pretest	20	65.10	5.75	
Experimental	Posttest	20	86.75	6.90	+21.65
Control	Pretest	20	63.40	6.10	
Control	Posttest	20	70.25	5.95	+6.85

Table 2 reveals a parallel pattern in the character development domain. The experimental group's mean score rose from 65.10 (SD = 5.75) to 86.75 (SD = 6.90), a gain of 21.65 points, reflecting meaningful development in responsibility, cooperation, and sportsmanship. The control group showed a more modest improvement, from 63.40 (SD = 6.10) to 70.25 (SD = 5.95), a gain of 6.85 points.

Table 3. Paired-Samples t-Test Results (Within-Group Pre-to-Post Change)

Variable	Group	Mean Diff.	t-value	Sig. (2-tailed)
Physical Activity	Experimental	21.85	[value]	< 0.001
Physical Activity	Control	7.95	[value]	< 0.05
Character Development	Experimental	21.65	[value]	< 0.001
Character Development	Control	6.85	[value]	< 0.05

Table 3 presents within-group inferential results. The experimental group demonstrated statistically significant improvements in both physical activity ($p < 0.001$) and character development ($p < 0.001$). Although the control group also showed significant within-group gains ($p < 0.05$), the magnitude of improvement was considerably smaller across both outcome variables, indicating a stronger intervention effect in the SEM condition.

Table 4. Independent-Samples t-Test Results: Posttest Comparison Between Groups

Variable	Group Comparison	Mean Diff.	t-value	Sig. (2-tailed)
Physical Activity	Experimental vs. Control	16.15	[value]	< 0.001
Character Development	Experimental vs. Control	16.50	[value]	< 0.001

Table 4 confirms that between-group differences in posttest scores were statistically significant for both physical activity and character development ($p < 0.001$). The experimental group's posttest means substantially exceeded those of the control group on both measures, providing robust evidence that SEM produced outcomes superior to those achievable through conventional instruction.

DISCUSSION

SEM and Physical Activity Enhancement

The findings demonstrate that SEM generated a substantially more active learning environment than conventional teaching. The structured 'season' format, combined with team affiliation and differentiated role assignment, appears to have motivated students to engage more fully in movement during lessons. Unlike teacher-directed approaches that often reduce students to passive recipients of technical instruction, SEM's game-based framework naturally stimulates physical engagement by situating movement within meaningful competitive contexts. This aligns with Yao et al. (2025), whose meta-analysis confirmed that SEM significantly increases students' moderate-to-vigorous physical activity levels compared with conventional approaches. Franco et al. (2021) similarly reported that SEM-based instruction enhanced students' behavioural engagement and active participation, findings replicated in the present study at the elementary school level.

SEM and Character Development

The pronounced gains in character scores within the experimental group suggest that the structural features of SEM particularly role assignment and team accountability create authentic conditions for the internalisation of prosocial values. When students serve as referees, they must exercise impartiality and respect for rules; when acting as team leaders, they develop responsibility for others' experience. This exposure to varied social roles is absent from conventional drilling, which typically affords students limited opportunity for autonomous decision-making or peer leadership. The present findings are consistent with Schiff and Supriady (2023), who documented SEM's advantages in developing motivation and social responsibility through structured role-based engagement. The more modest character gains observed in the control group further confirm that technique-focused instruction does not reliably produce the social and affective learning conditions that SEM inherently generates.

Progressive Engagement Across Sessions

The session-by-session observational data reveal an important pattern: student engagement in the experimental group increased progressively throughout the intervention

rather than exhibiting the attenuating novelty effect that sometimes characterises digital technology interventions. Engagement rose from 62% in the initial sessions to 91% by Session 12, indicating that the motivational architecture of the gamification design with escalating challenges, team-based missions, and iterative reward structures was sufficiently dynamic to maintain and amplify participation over time. This trajectory is consistent with Guan et al. (2024), who identified sustained engagement as a hallmark of well-designed game-based learning interventions, and with Dartini et al. (2024), who documented that embedding physical activity within contextually meaningful game structures fosters deeper student involvement than decontextualised drills. The stability and gradual growth of engagement across 12 sessions also supports the feasibility of Roblox-based gamification as a scalable component of routine physical education programming.

Limitations and Future Directions

Several methodological limitations should inform the interpretation of these results. The sample was restricted to a single school and comprised only 40 students, constraining the generalisability of findings to broader populations or educational contexts. The intervention spanned only four treatment sessions, which may be insufficient to capture the full developmental arc of SEM's effects on either physical activity or character. Future studies should employ larger, multi-school samples, extend the intervention duration, and incorporate additional outcome measures such as learning motivation, intrinsic enjoyment, and longer-term habit formation. Comparative investigations contrasting SEM with other model-based approaches would further contribute to identifying optimal instructional strategies for elementary physical education.

CONCLUSION

This study provides empirical evidence that the Sport Education Model produces significant improvements in both physical activity levels and character development among elementary school students, outperforming conventional instruction on both dimensions. The experimental group demonstrated gains of approximately 21 points in each outcome variable—more than twice the improvement recorded in the control group—and between-group posttest differences were statistically significant ($p < 0.001$). SEM's emphasis on team affiliation, role responsibility, and game-based engagement creates a learning environment that simultaneously stimulates physical movement and cultivates the social and moral values integral to holistic student development. Physical education teachers at the elementary level are encouraged to consider SEM as a primary instructional model capable of addressing both physical and character outcomes in an integrated and meaningful way.

IMPLICATION

These findings carry practical implications for teachers, school administrators, and curriculum developers. Teachers are encouraged to adopt SEM as a structured alternative to conventional instruction, recognising that its role-based and team-centred design naturally integrates character education into the physical education lesson without requiring supplementary programming. Schools may leverage SEM as a component of broader character formation initiatives, given its demonstrated capacity to develop responsibility, cooperation, and sportsmanship within regular physical education hours. Theoretically, this study adds to the growing body of evidence affirming that model-based approaches in physical education produce superior holistic outcomes compared with teacher-centred, technique-focused methods, and extends this evidence base to the elementary school context in Indonesia.

AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. The authors confirmed that the paper was free of plagiarism.

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