Didactic strategies in Physical Education: a comparative study of instructional approaches to improve student engagement and motor learning

Estrategias didácticas en Educación Física: un estudio comparativo de enfoques instruccionales para mejorar la participación estudiantil y el aprendizaje motor

Authors

[1] Titi Setiyoningsih
[2] Arif Setiawan
[3] Diyono
[4] Gigit Mujianto

[1] Universitas Sebelas Maret, (Indonesia)
[2, 5] Universitas Muhammadiyah Malang, (Indonesia)
[3] Sekolah Tinggi Ilmu Kesehatan Nasional (Indonesia)

Corresponding author:
arifsetiawan@umm.ac.id

Received: 05-02-26
Accepted: 26-02-26

How to cite in APA

Setiyoningsih, T., Setiawan, A., Diyono, D., & Mujianto, G. (2026). Didactic strategies in Physical Education: a comparative study of instructional approaches to improve student engagement and motor learning. *Retos, 80*, 1300-1311.
https://doi.org/10.47197/retos.v78.118583

Abstract

Introduction and Objective: Physical education in secondary schools often faces low student engagement and limited contextual motor learning due to the dominance of technique-oriented instruction. This study aimed to compare the effectiveness of a game-based didactic strategy and a traditional technique-based approach in improving student engagement and motor learning outcomes.
Methodology: A quasi-experimental pre-test–post-test non-equivalent control group design was employed. The participants consisted of 56 Grade 10 students, divided into an experimental group (n = 29) and a control group (n = 27). The experimental group received game-based instruction, while the control group followed a traditional technique-oriented approach during a soccer unit. Student engagement was measured using a multidimensional questionnaire, and motor learning was assessed using the Game Performance Assessment Instrument (GPAI). Data were analyzed using paired-sample and independent-sample t-tests.
Results: Both groups showed significant improvements; however, the experimental group demonstrated significantly higher gains in student engagement, decision-making, skill execution, and support play ($p < .05$).
Conclusion: Game-based didactic strategies are more effective than traditional technique-oriented approaches in enhancing student engagement and contextual motor learning in physical education.

Keywords

Didactic strategies; Physical Education; instructional approaches; motor learning.

Resumen

Introducción y Objetivo: La educación física en la educación secundaria suele presentar baja participación estudiantil y un aprendizaje motor contextual limitado debido al predominio de la instrucción centrada en la técnica. Este estudio tuvo como objetivo comparar la efectividad de una estrategia didáctica basada en juegos y un enfoque tradicional basado en la técnica para mejorar la participación estudiantil y los resultados del aprendizaje motor.
Metodología: Se empleó un diseño cuasiexperimental pre-post con grupo de control no equivalente. Los participantes fueron 56 estudiantes de 10.º grado, divididos en un grupo experimental (n = 29) y un grupo de control (n = 27). El grupo experimental recibió instrucción basada en juegos, mientras que el grupo de control siguió un enfoque tradicional centrado en la técnica durante una unidad de fútbol. La participación estudiantil se midió mediante un cuestionario multidimensional y el aprendizaje motor se evaluó mediante el Instrumento de Evaluación del Rendimiento en el Juego (GPAI). Los datos se analizaron mediante pruebas t de muestras pareadas e independientes.
Resultados: Ambos grupos mostraron mejoras significativas; sin embargo, el grupo experimental demostró ganancias significativamente mayores en participación estudiantil, toma de decisiones, ejecución de habilidades y juego de apoyo ($p < 0,05$).
Conclusión: Las estrategias didácticas basadas en juegos son más efectivas que los enfoques tradicionales orientados a la técnica para mejorar la participación de los estudiantes y el aprendizaje motor contextual en la educación física.

Palabras clave

Estrategias didácticas; Educación Física; enfoques instruccionales; aprendizaje motor.

Introduction

In practice, physical education in secondary schools continues to face fundamental problems related to instructional quality and student engagement, despite the curriculum being designed to develop students' holistic competencies (Casey & Kirk, 2020). In many school contexts, physical education instruction remains dominated by traditional approaches that emphasize isolated technique drills, repetitive movement, and one-way teacher-to-student instruction (Raiola, 2017). This condition often results in low levels of active student participation, limited emotional engagement, and a minimal sense of meaning in the physical activities undertaken in learning (Beni et al., 2017). Furthermore, students tend to view physical education solely as physical activity, failing to recognize the pedagogical, cognitive, and social values that should be inherent to it (Calmeiro et al., 2025). Field evidence also indicates that low student engagement directly impairs motor learning development, particularly in decision-making, tactical understanding, and performance in real-world situations (Harvey & Jarrett, 2014). The imbalance between technical mastery and game understanding makes it difficult for students to transfer learned skills to real game contexts (Renshaw et al., 2010). Thus, this reality indicates a systemic problem in physical education instruction that is not only technical but also didactic and pedagogical, requiring a more in-depth scientific study of learning strategies that can simultaneously increase student engagement and the quality of motor learning.

Numerous studies in the physical education literature have highlighted the importance of learner-centered didactic approaches as an alternative to traditional learning models. Pedagogical models such as Teaching Games for Understanding (TGfU), Sport Education, and Cooperative Learning have been reported to improve student participation, motivation, and tactical understanding in physical education learning (Estevan et al., 2021; Harvey & Jarrett, 2014). However, most previous studies have examined these didactic strategies in isolation and have not compared their effectiveness across two key learning variables: student engagement and motor learning (Casey & Kirk, 2020). Furthermore, many studies have focused more on cognitive or affective learning outcomes, while motor learning is often reduced to mere technical mastery (Renshaw et al., 2010). The literature also shows that modern motor learning theories emphasize the importance of context, decision-making, and environmental interaction in the movement learning process. However, their implementation in physical education instruction remains limited (Renshaw et al., 2010). Consequently, there is a gap between the theoretical frameworks developed in sports science and the learning practices that occur in schools (Tohănean et al., 2025).

Numerous studies in the physical education literature highlight the value of learner-centered didactic approaches as alternatives to traditional technique-oriented instruction. Models such as Teaching Games for Understanding (TGfU), Sport Education, and Cooperative Learning have been associated with improvements in student motivation, participation, and tactical awareness (Estevan et al., 2021; Harvey & Jarrett, 2014). However, existing research typically examines these pedagogical models in isolation. It often focuses on single outcome domains, such as motivation or tactical cognition, rather than analyzing student engagement and contextual motor performance simultaneously (Casey & Kirk, 2020). In addition, although contemporary motor learning theories emphasise decision-making, environmental interaction, and contextualized skill acquisition (Renshaw et al., 2010), empirical comparisons between game-based didactic instruction and traditional technique-based approaches within the same secondary school setting remain limited (Longakit et al., 2024). Consequently, there is insufficient comparative evidence clarifying whether and to what extent game-based didactic strategies produce different effects on both student engagement and contextual motor learning in authentic school-based physical education contexts (Tohănean et al., 2025).

Although pedagogical models such as Teaching Games for Understanding and other model-based approaches have been widely discussed in physical education literature, empirical comparisons between game-based didactic strategies and technique-oriented instruction remain limited in secondary school contexts. In particular, few studies have simultaneously examined student engagement and contextual motor performance using structured performance instruments. This study addresses that gap by comparing two instructional approaches within the same curricular unit (soccer) and by measuring outcomes through multidimensional student engagement indicators and game performance variables (decision-making, skill execution, and support play). Rather than assuming the superiority of a specific peda-

gogical model, this research empirically tests whether a game-based didactic strategy produces significantly different outcomes from traditional instruction in an authentic school setting (Adams et al., 2025).

Accordingly, the research question guiding this study is: Are there significant differences in student engagement and motor learning outcomes between students taught using a game-based didactic strategy and those taught using a traditional technique-oriented approach?

Method

Research Design and Approach

This study employed a quantitative quasi-experimental design using a pre-test–post-test non-equivalent control group structure. The design was selected because intact classes were used within the school setting, making random assignment of participants impractical (Creswell & Creswell, 2018). The research was conducted during a soccer unit in secondary school physical education and compared two instructional approaches. The experimental group received a game-based didactic instructional approach, while the control group was taught using a traditional technique-oriented approach. Both groups completed identical pre-test and post-test assessments to measure changes in student engagement and game performance indicators. This design enabled the examination of differences in learning outcomes attributable to the instructional strategies implemented while maintaining ecological validity within the authentic school context.

Subject and Context of the Research

The participants were Grade 10 students enrolled in physical education at Muhammadiyah 3 Batu Senior High School during the 2024/2025 academic year. Initially, 61 students from two intact classes participated in the study. After excluding students with incomplete pre-test or post-test data, the final sample consisted of 56 students: 29 in the experimental group and 27 in the control group. Group classification followed the school's existing classroom structure, consistent with the quasi-experimental design employing non-equivalent groups. No random assignment was conducted. One intact class was designated as the experimental group and received a game-based didactic instructional approach.

In contrast, the other class served as the control group and received a traditional technique-oriented approach. Inclusion criteria required students to be officially enrolled in physical education, regularly attending classes, and medically fit to participate in physical activity. Exclusion criteria included absence during either pre-test or post-test measurements or failure to complete the full instructional intervention. The learning intervention focused on a soccer unit, selected because it requires integrated motor skills, tactical awareness, teamwork, and real-time decision-making, making it appropriate for assessing contextual motor performance within a didactic instructional framework (Harvey et al., 2020). Ethical approval for the study was obtained from the Institutional Research Ethics Committee of Muhammadiyah 3 Batu Senior High School under approval number 157/SMAM.3/III.A/4a/XII/2025. Written permission was also granted by the school administration prior to data collection.

Learning Intervention Procedures

The research procedure began with the administration of pre-test measures to assess students' engagement and contextual motor performance prior to the instructional intervention. Following baseline assessment, each group participated in physical education lessons according to their assigned instructional approach. The experimental group received a game-based didactic instructional approach structured around small-sided games and task constraint manipulation (e.g., space, number of players, scoring rules). It guided tactical questioning to promote decision-making during gameplay (Harvey et al., 2020). In this approach, questioning strategies were used as instructional tools to direct students' attention to tactical principles such as spatial awareness, timing, and support play. These questioning elements were not analyzed qualitatively; they were part of the pedagogical design. The control group received a traditional technique-oriented instructional approach emphasizing technical demonstrations, isolated skill drills, repetitive practice, and direct teacher-led instruction (Metzler, 2017). The intervention was con-

ducted over eight weeks, with two sessions per week (90 minutes per session), within the regular physical education curriculum. Upon completion of the instructional period, post-test measures identical to the pre-test instruments were administered to assess changes in student engagement and motor performance. The use of equivalent pre- and post-test measures, combined with the non-equivalent control group design, allowed for comparison of changes attributable to differences in instructional approach while maintaining internal validity within an authentic school context.

Data Collection Instruments and Techniques

Data collection employed two primary instruments: a student engagement questionnaire and the Game Performance Assessment Instrument (GPAI). Student engagement was measured using a validated engagement questionnaire encompassing behavioral, emotional, and cognitive dimensions. In the present study, engagement scores were recorded as composite scores for each participant at both pre-test and post-test. The dataset contained aggregated engagement scores rather than item-level responses. The instrument has been previously validated in physical education research contexts and has demonstrated acceptable psychometric properties in prior studies. Contextual motor learning was assessed using the Game Performance Assessment Instrument (GPAI) applied during soccer gameplay. The GPAI evaluates performance in three components: (1) decision-making, (2) skill execution, and (3) support play. In this study, each component was scored using structured observational criteria, and final performance scores were recorded as composite values for each student at pre-test and post-test. All measurements were conducted under identical procedures at both testing points to ensure comparability. The use of composite scores enabled statistical comparisons of changes in engagement and motor performance following the instructional intervention.

Data Analysis Techniques and Ethical Considerations

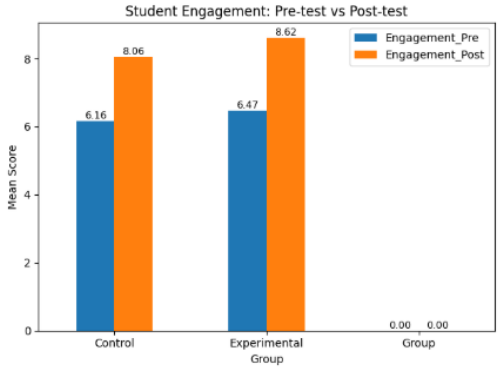
Data were analyzed using both descriptive and inferential statistics. Descriptive statistics (mean and standard deviation) were calculated to summarize pre-test and post-test scores for student engagement and motor performance variables (decision-making, skill execution, and support play). To examine within-group changes from pre-test to post-test, paired-sample t-tests were conducted separately for the experimental and control groups. To compare differences between groups following the intervention, independent-sample t-tests were performed on post-test scores. Prior to inferential testing, assumptions of normality and homogeneity of variance were examined. Statistical significance was set at $p < .05$. In addition to significance testing, effect sizes were calculated using Cohen's d to determine the magnitude of differences, interpreted as small (0.20), medium (0.50), and large (0.80), following Lakens (2013). All statistical analyses were conducted using IBM SPSS Statistics. From an ethical perspective, the study was conducted in accordance with principles of confidentiality, voluntary participation, and responsible data management. The Institutional Research Ethics Committee granted ethical approval under approval number 157/SMAM. 3/III.A/4a/XII/2025, and permission was obtained from the school administration prior to data collection.

Results

Student Engagement

This study begins with an analysis of student engagement as a key indicator of the success of soccer learning in schools. Student engagement reflects the level of physical, cognitive, and emotional involvement of students during the learning process, making it a key variable in assessing the effectiveness of a learning approach. By comparing pre-test and post-test results between the control and experimental groups, this study seeks to determine the extent to which the implemented soccer learning program increases student engagement. The data visualization in Figure 1 quantitatively illustrates changes in student engagement and provides a basis for analyzing differences in achievement between the two groups. Therefore, this section presents the results, focusing on the trend toward increasing student engagement and its implications for the quality of ongoing learning.

Figure 1. Comparison of Student Engagement in the Control and Experimental Groups Based on Pre-test and Post-test Results



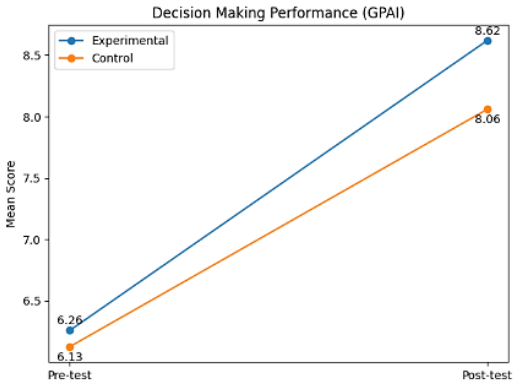
Based on the visualization in Figure 1, the data indicate an increase in student engagement in both groups following the soccer learning program. In the control group, the increase in student engagement is evident from the comparison of the average pre-test and post-test scores. Before the program, the average student engagement score in the control group was 6.16, indicating a moderate level of student engagement. After the program, the post-test score increased to 8.06. This improvement indicates that the soccer learning program implemented positively impacted student engagement, even without any special treatment or significant method innovation. These results indicate that engagement scores increased during the soccer instructional unit in both groups.

Meanwhile, the experimental group showed a greater increase in student engagement than the control group. The average pre-test score in the experimental group was 6.47, comparable to that of the control group at the beginning of the study. However, following the implementation of the soccer learning program with targeted interventions, the average post-test score increased significantly to 8.62. This improvement indicates that the learning strategies implemented in the experimental group were more effective at encouraging active student engagement. Students were not only physically engaged but also demonstrated higher cognitive and emotional engagement during the learning process. Thus, the difference in score improvement between the two groups confirms that the learning intervention in the experimental group significantly improved overall student engagement.

Decision-Making Performance

Decision-making ability is a crucial cognitive aspect of soccer, as it determines the accuracy of students' responses to various dynamic game situations. In the context of physical education, this ability is not only about technical mastery but also about tactical understanding, the ability to read the game, and the capacity to select the most effective solution within a limited time. Therefore, analyzing changes in students' decision-making performance is crucial in evaluating the effectiveness of the applied learning approach. The visualization in Figure 2 compares pre-test and post-test results between the control and experimental groups, providing a clear picture of the development of students' decision-making abilities during the soccer learning process.

Figure 2. Comparison of Students' Decision-Making Performance in the Control and Experimental Groups Based on Pre-test and Post-test Results



The visualization in Figure 2 shows changes in students' decision-making performance in soccer games across both study groups. In the control group, the average decision-making ability score increased from 6.13 at pre-test to 8.06 at post-test. This improvement indicates that the soccer learning process provided helped students understand game situations and choose more appropriate actions during the activity. Even without special treatment, students in the control group still demonstrated progress in decision-making, likely attributable to repeated play, interactions with teammates, and a basic understanding of the game's rules and strategies. This confirms that sports-based learning can gradually improve students' tactical thinking skills.

However, the experimental group demonstrated greater and more stable improvements in decision-making performance than the control group. The average score in the experimental group increased from 6.26 in the pre-test to 8.62 in the post-test. The line pattern in the graph shows a more consistent and progressive improvement, reflecting the development of students' tactical understanding and ability to analyze game situations more effectively. Students in the experimental group appeared to be better able to make appropriate decisions, such as choosing the right time to pass, moving without the ball, or maintaining position. Thus, these results indicate that the learning treatment applied to the experimental group significantly improved students' decision-making during soccer games and strengthened the link between playing experience and cognitive skill development in physical education.

Skill Execution

Skill execution is a fundamental component of soccer learning, reflecting students' ability to apply basic techniques effectively during gameplay. This skill encompasses motor coordination, technical accuracy, and the ability to adapt actions to dynamic game situations. In physical education, skill execution is influenced not only by individual technical training but also by students' opportunities to practice these skills in meaningful game situations. Therefore, analyzing changes in skill execution ability is crucial to assessing the extent to which the learning approach supports students' mastery of soccer techniques. The data visualization in Figure 3 illustrates the development of students' technical skills by comparing pre-test and post-test results in the control and experimental groups.

Figure 3. Comparison of Student Execution Skills in the Control and Experimental Groups Based on Pre-test and Post-test Results

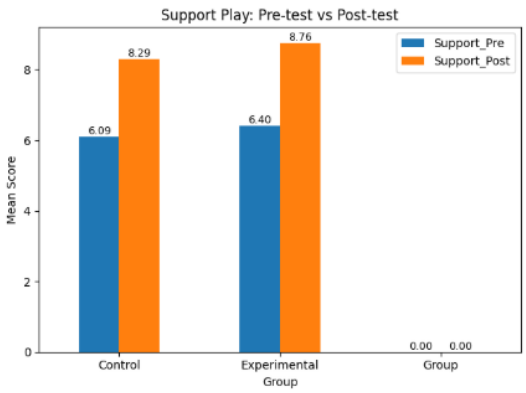
The visualization results in Figure 3 show that skill execution skills improved in both groups after the learning process. In the control group, the average skill execution score increased from 6.24 in the pre-test to 7.98 in the post-test. The control group demonstrated an increase in skill execution scores from pre-test to post-test. Although the control group's learning emphasized a more conventional approach, students still had the opportunity to practice and repeatedly apply technical skills. This regular practice process enabled students to improve motor coordination, technical accuracy, and confidence in executing skills during the game.

Meanwhile, the experimental group demonstrated a greater improvement in skill execution than the control group. The average score in the experimental group increased significantly from 6.40 in the pre-test to 8.69 in the post-test. These findings demonstrate that the game-based didactic approach not only focuses on tactical aspects and decision-making but also effectively improves students' mastery of technical skills. Through contextual game-based scenarios, students can apply technical skills directly in real-world settings, making the learning process more meaningful. Therefore, these data confirm that a game-based learning approach does not hinder the development of soccer technical skills and may even yield more optimal skill execution in the experimental group.

Support Play

Support play skills are a crucial aspect of soccer, linked to teamwork and collective tactical understanding. Support play reflects a student's ability to move without the ball, find appropriate space, and provide effective support to teammates in various game situations. In physical education, these skills develop through interactions among players and through ongoing playing experience, rather than solely through individual technique training. Therefore, analyzing changes in support-play skills is relevant to assessing the effectiveness of the soccer learning approach employed. The visualization in Figure 4 illustrates the development of students' support-play skills by comparing pre-test and post-test results across the control and experimental groups, providing a comprehensive picture of improvements in teamwork and support throughout the learning process.

Figure 4. Comparison of Students' Support Play Abilities in the Control and Experimental Groups Based on Pre-test and Post-test Results



Changes in students' support-play skills are shown in Figure 4, which demonstrates improvements in both study groups following the soccer learning program. In the control group, the average support play skill score increased from 6.09 in the pre-test to 8.29 in the post-test. The control group demonstrated an increase in support play scores from pre-test (M = 6.09, SD = 1.42) to post-test (M = 8.29, SD = 1.94). The paired-sample t-test indicated that this increase was statistically significant, $t(26) = -2.19$, $p = .038$.

Meanwhile, the experimental group demonstrated a greater and more pronounced improvement in support-play skills than the control group. The average score in the experimental group increased from 6.40 in the pre-test to 8.76 in the post-test. Compared with other variables, support play was among the aspects that showed the greatest improvement in the experimental group. These findings reflect students' development in moving without the ball, effectively finding space, and providing appropriate support to teammates during the game. The implemented game-based learning approach enables students to gain a deeper understanding of collective roles within a team. Therefore, these results confirm that learning

that emphasizes the context of real-life games can significantly improve the quality of cooperation and support between players.

Discussion

The findings of this study substantively indicate that the application of didactic strategies in physical education yields a different quality of learning compared with traditional instructional approaches, particularly with respect to student engagement and motor learning. Although both groups experienced improvements, the game-based didactic strategy showed a more consistent pattern in encouraging behavioral, emotional, and cognitive student engagement, as well as in strengthening contextual motor learning processes (Ding & Zhai, 2023). Observational data revealed that students in the experimental group were more actively involved in discussions, demonstrated initiative in decision-making, and were better able to adapt their movements to changing game situations (Ezeddine et al., 2025). The quantitative findings indicate that the experimental group achieved significantly higher post-test scores in student engagement and contextual motor performance compared to the control group. These differences suggest that the game-based didactic approach may provide learning conditions that foster greater active involvement and improved performance during gameplay. This synthesis indicates that the effectiveness of didactic strategies is reflected not only in learning outcomes but also in the quality of the learning process in physical education classes. Thus, the findings of this study confirm that didactic strategies play an important role in fostering more participatory and understanding-oriented physical education instruction, consistent with the goals of modern physical education, which emphasize meaningful learning and physical literacy (Casey & MacPhail, 2018).

The present findings indicate that the experimental group achieved significantly higher post-test scores in student engagement and contextual motor performance compared with the control group. In particular, improvements were observed in decision-making and support play, suggesting that the game-based didactic approach was associated with enhanced performance in tactical game situations. These results are consistent with prior research indicating that game-based approaches, such as Teaching Games for Understanding (TGfU), can enhance tactical awareness and motivation in physical education settings (Adams et al., 2025; Harvey & Jarrett, 2014). However, unlike previous studies that often examined motivational or cognitive outcomes in isolation, the present study simultaneously analyzed student engagement and contextual motor performance within a single quasi-experimental framework. The statistically significant differences observed between groups suggest that engagement and motor performance may develop in parallel under game-based instructional conditions, supporting integrative perspectives in physical education research (Casey & Kirk, 2020). Furthermore, these findings also strengthen the arguments of nonlinear pedagogy theory, which emphasizes the importance of context and decision-making in movement learning (Renshaw et al., 2010). Compared with research that still focuses on isolated technique mastery, this study's results indicate that didactic-based learning enables better skill transfer to real-life game situations. Thus, the strength of this research lies in its ability to bridge pedagogical theory and secondary school learning practice, while providing relevant empirical evidence for the development of physical education didactics (Metzler, 2017).

The results of this study indicate that the research objective of analyzing and comparing the effectiveness of didactic strategies in physical education has yielded tangible benefits for understanding the learning process. The experimental group demonstrated significantly higher post-test scores in engagement and decision-making compared with the control group. These quantitative findings suggest that the game-based instructional approach facilitated deeper cognitive involvement during gameplay. This aligns with the concept of student engagement, which emphasizes cognitive involvement as a key component of quality learning (Lynott & Bittner, 2019). In terms of motor learning, observations showed that students were more adaptive in game situations, indicating the development of decision-making skills and tactical understanding. Reflection confirms that the benefits of didactic strategies are not only short-term, in the form of improved scores, but also extend to students' interpretation of physical activity as a learning process (Manurung et al., 2025). Thus, this study demonstrates that didactic strategies can shift the paradigm of physical education learning from mere physical exercise to learning oriented toward understanding and reflection (Oktavianus et al., 2025). Reflection is important because it con-

firms that the research objectives were not only achieved methodologically but also pedagogically relevant, particularly in creating more meaningful learning experiences for secondary school students (Beni et al., 2017).

The implications of this study are broad, with relevance for physical education practice, curriculum development, and teacher training. The findings suggest that game-based didactic strategies can be an effective alternative for improving the quality of physical education instruction in secondary schools. For teachers, these findings indicate a need to shift instructional approaches from teacher-centered to student-centered learning, emphasizing exploration, discussion, and reflection. From a curriculum perspective, these implications support the integration of pedagogical models that emphasize active engagement and contextual learning into physical education learning standards (Tohănean et al., 2025). Furthermore, these findings provide policymakers with an empirical basis for reviewing physical education instructional practices that remain predominantly technical and drill-based. Another implication is the need for ongoing teacher training in implementing didactic strategies appropriate to the characteristics of secondary school students (Quintana Otero et al., 2025). Thus, the results of this study not only answer the research questions but also provide concrete directions for developing physical education to be more relevant, effective, and meaningful for students (Casey & Kirk, 2020; Casey & MacPhail, 2018).

Research findings demonstrating differences in effectiveness between didactic strategies and traditional approaches can be understood through a framework grounded in learning theory and empirical findings. Game-based didactic strategies enable students to learn in contexts that mimic real-life situations, making the movement learning process more meaningful and adaptive (Renshaw et al., 2010). Observational data indicate that students engage more frequently in decision-making and problem-solving, which directly strengthens cognitive engagement and motor learning. In contrast, traditional approaches tend to limit students' exploration by focusing on isolated repetitions of techniques (Metzler, 2017). The experimental group demonstrated significantly higher engagement scores compared with the control group at post-test. These findings suggest that the game-based instructional approach was associated with greater behavioral, emotional, and cognitive involvement during the learning process (Fraenkel et al., 2019). Thus, these research findings arise not solely from differences in methods but from differences in underlying learning philosophies. Didactic strategies position students as active subjects of learning, while traditional approaches tend to position students as recipients of instruction. This analysis confirms that the effectiveness of the didactic strategy in this study stems from its suitability with modern motor learning principles and the developmental needs of secondary school students (Gallahue et al., 2019).

Based on the study's results and analysis, several strategic actions are needed to improve the quality of physical education instruction in secondary schools. First, physical education teachers should be encouraged to adopt game-based instructional strategies more systematically in their lesson planning and implementation. Second, educational institutions and policymakers need to provide training and mentoring programs for teachers to enable them to implement didactic approaches effectively and sustainably (Cano-Moya et al., 2023). Third, physical education teachers should consider incorporating greater opportunities for contextualized and game-based learning within their instructional planning, rather than relying predominantly on isolated technical drills. The findings of this study highlight the importance of didactic design at the classroom level in shaping student engagement and contextual motor performance (Parrales-Moyon et al., 2025).

Furthermore, further research is needed to explore the application of didactic strategies across different sport contexts and educational levels, and to integrate mixed-methods approaches to examine students' learning experiences in greater depth (Casey & Kirk, 2020; Moreno et al., 2021). These actions are crucial to ensure that research findings extend beyond academic learning and have a tangible impact on physical education practice. Thus, this research provides an initial foothold for transforming physical education instruction toward a more participatory, reflective, and meaningful, learning-oriented approach.

Conclusions

The most significant finding of this study is that the effectiveness of didactic strategies in physical education is determined not solely by the magnitude of improvement in learning outcomes, but also by changes in the quality of the learning process experienced by students. The results reveal that game-based didactic strategies can create more comprehensive student engagement and more meaningful motor learning, even when quantitative differences between groups are not always apparent. This fact is significant because it challenges the long-held assumption that improvements in technique or dominant physical performance must always demonstrate successful physical education learning. Instead, this study shows that changes in the way students participate, think, and make decisions in learning are equally important, if not more fundamental, indicators of success. These findings are supported by statistically significant improvements in engagement and contextual motor performance observed in the experimental group compared with the control group. The quantitative results indicate that the game-based didactic approach was associated with higher levels of student involvement and improved performance in game-related decision-making, support play, and adaptation to complex game situations. In other words, the results of this study confirm that didactic strategies can shift the orientation of physical education learning from mere physical activity to reflective and meaningful learning experiences. This conclusion offers a new perspective: the quality of physical education can be measured not only by what students achieve but also by how they experience and interpret the learning process.

The added value of this research lies in its simultaneous contribution to the development of physical education science, both theoretically and practically. Theoretically, this research strengthens the position of didactic strategies as relevant to modern motor learning theory and the concept of student engagement, by demonstrating that student engagement and motor learning are interrelated and inseparable dimensions. This research provides a more comprehensive understanding that effective movement learning depends not only on technique repetition but also on context, decision-making, and student cognitive engagement. Practically, this research provides a strong empirical basis for physical education teachers to review learning practices that have tended to be technical and teacher-centred. The results of this study indicate that the use of didactic strategies can foster a more lively, participatory learning environment that is aligned with the developmental needs of secondary school students. Furthermore, this research serves as a reference for policymakers and curriculum developers in formulating physical education curricular directions that are more student-centered. Thus, the added value of this research lies not only in its empirical findings but also in its ability to bridge theory, practice, and policy to develop a more meaningful and sustainable physical education.

While this study makes a significant contribution, its findings also offer a constructive basis for reflection on further research. This study was conducted in a secondary school setting, focusing on a single sport, thereby enabling the findings to reflect the dynamics of learning within that specific context. Therefore, future research could broaden its scope by incorporating multiple levels of education, different sports, and more diverse social and cultural contexts within schools. Furthermore, this study employed a quantitative approach complemented by qualitative data, thereby enabling future research to develop a more in-depth mixed-methods design to longitudinally explore students' learning experiences. Another opportunity is to explore the role of teachers as key actors in implementing didactic strategies, including the pedagogical and reflective competencies necessary for their consistent application. Therefore, the limitations of this study should not be viewed as shortcomings, but rather as a starting point for broadening and deepening the study of physical education didactics. These recommendations are expected to encourage further research that will further enrich understanding of how physical education can be developed as a learning vehicle that is not only physically active but also pedagogically meaningful and sustainable.

Acknowledgements

The researchers would like to express their gratitude to the Institute of Research and Community Service (LPPM) of Sebelas Maret University (UNS) Surakarta, the Institute of Research and Community Service (LPPM) of Muhammadiyah University of Malang (UMM), the Institute of Research and Community Service (LPPM) of Surakarta National Health Sciences College for all forms of invaluable support during

this research process. Gratitude is also expressed to Sebelas Maret University, Muhammadiyah University of Malang & Surakarta National Health Sciences College for the various opportunities given to the authors to develop academic and professional skills, as well as support the process of continuous self-development.

References

Adams, A., Goad, T., Jenkins, A., & Belcher, D. (2025). Powering up online physical education: Unleashing the potential of video. *Strategies, 38*(2), 13–20. https://doi.org/10.1080/08924562.2024.2444205

Beni, S., Fletcher, T., & Ní Chróinín, D. (2017). Meaningful experiences in physical education and youth sport: A review of the literature. *Quest, 69*(3), 291–312. https://doi.org/10.1080/00336297.2016.1224192

Calmeiro, L., Paupério, T., McCabe, J., & Teques, P. (2025). Students' perceptions of teaching styles use and motivation to participate in PE: A multigroup analysis of the mediating role of basic psychological needs. *European Physical Education Review*, *31*(4), 713–730. https://doi.org/10.1177/1356336X241309756

Cano-Moya, J. L., Isaza-Gómez, G. D., & Valencia-Guzmán, J. D. (2023). El juego como estrategia didáctica para la construcción de habilidades sociales en los niños de la comuna 20 de la ciudad de Cali (The game as a didactic strategy for the construction of social skills in the children of the 20 communes of the city of Cali). *Retos*, *48*, 261–270. https://doi.org/10.47197/retos.v48.96989

Casey, A., & Kirk, D. (2020). *Models-based Practice in Physical Education* (1st ed.). Routledge. https://doi.org/10.4324/9780429319259

Casey, A., & MacPhail, A. (2018). Adopting a models-based approach to teaching physical education. *Physical Education and Sport Pedagogy*, *23*(3), 294–310. https://doi.org/10.1080/17408989.2018.1429588

Ding, B., & Zhai, Q. (2023). An Experimental Study on the Effect of Blended Teaching Method on Learning Basketball Skills and Learning Motivation for College Students. In G. Kuan, Y.-K. Chang, T., Morris, T., Eng Wah, R. M., Musa, & A. P. P. Abdul Majeed (Eds.), *Advancing Sports and Exercise via Innovation* (pp. 127–136). Springer Nature Singapore. https://doi.org/10.1007/978-981-19-8159-3_12

Estevan, I., Bardid, F., Utesch, T., Menescardi, C., Barnett, L. M., & Castillo, I. (2021). Examining early adolescents' motivation for physical education: Associations with actual and perceived motor competence. *Physical Education and Sport Pedagogy*, *26*(4), 359–374. https://doi.org/10.1080/17408989.2020.1806995

Ezeddine, G., Souissi, N., Abaidia, R., Masmoudi, L., Trabelsi, K., Ammar, A., Jahrami, H., Husain, W., Tannoubi, A., Kurnaz, M., Altınkök, M., & Mrayah, M. (2025). Game-based physical education: A pathway to increased student motivation and greater learning outcomes. *Frontiers in Education*, *10*(12), 1531651. https://doi.org/10.3389/feduc.2025.1531651

Fraenkel, J. R., Wallen, N. E., & Hyun, H. H. (2019). *How to design and evaluate education research (10th ed.)*. McGraw-Hill.

Gallahue, D. L., Ozmun, J. C., & Goodway, J. D. (2019). *Understanding motor development (8th ed.)*. McGraw-Hill.

Harvey, S., & Jarrett, K. (2014). A review of the game-centred approaches to teaching and coaching literature since 2006. *Physical Education and Sport Pedagogy*, *19*(3), 278–300. https://doi.org/10.1080/17408989.2012.754005

Longakit, J., Lobo, J., Tagare, R. Jr., Aliser, J., Colobio-Englatiera, B., Panganiban, T., Aquino, J. M., Rodriguez, D., Gazali, N., & Kurnaz, M. (2024). Investigating the effect of a 12-week game skill-based activity in physical education to enhance movement competence of students: A randomized trial. *Pedagogy of Physical Culture and Sports*, *28*(6), 525–533. https://doi.org/10.15561/26649837.2024.0607

Lynott, F. J., & Bittner, G. L. (2019). Moving Toward Developing Inquiry Skills: Inquiry-Based Learning in Physical Education. *Strategies*, *32*(2), 32–38. https://doi.org/10.1080/08924562.2018.1560135

Manurung, I. K. B., Damanik, S., Supriadi, A., Harahap, M. I., & Manihuruk, F. (2025). Integrating TikTok fitness videos and interactive dodgeball relay activities to improve physical fitness and motor skill development in elementary school students. *2025 16th International Conference on E-Education, E-Business, E-Management and E-Learning (IC4e)*, 546–550. https://doi.org/10.1109/IC4e65071.2025.11075502

Metzler, M. (2017). *Instructional models for physical education (3rd ed.)*. Routledge.

Moreno, D. R., Murias, T. F., & Barbajero, J. E. (2021). La formación de árbitros y asistentes de fútbol desde el enfoque flipped learning (Training soccer referees and assistant referees from the flipped learning approach). *Retos*, *39*, 794–804. https://doi.org/10.47197/retos.v0i39.78222

Oktavianus, I., Gustian, U., & Triansyah, A. (2025). Unveiling Current and Future Trends in the Implementation of Teaching Games for Understanding in Primary School: A Bibliometric Analysis. *Physical Education Theory and Methodology*, *25*(1), 191–201. https://doi.org/10.17309/tmfv.2025.1.23

Parrales-Moyon, G., Mantuano Ortega, E., & Mendoza Carrera, J. (2025). Modelo de formación docente con innovación pedagogía para la promoción de la salud y el bienestar social en el contexto educativo ecuatoriano. *Retos*, *73*, 1342–1355. https://doi.org/10.47197/retos.v73.117896

Raiola, G. (2017). Motor learning and teaching method. *Journal of Physical Education and Sport*, *17*(s05), 2239–2243. https://doi.org/10.7752/jpes.2017.s5236

Renshaw, I., Chow, J. Y., Davids, K., & Hammond, J. (2010). A constraints-led perspective to understanding skill acquisition and game play: A basis for integration of motor learning theory and physical education praxis? *Physical Education & Sport Pedagogy*, *15*(2), 117–137. https://doi.org/10.1080/17408980902791586

Tohănean, D. I., Vulpe, A. M., Mijaica, R., & Alexe, D. I. (2025). Embedding Digital Technologies (AI and ICT) into Physical Education: A Systematic Review of Innovations, Pedagogical Impact, and Challenges. *Applied Sciences*, *15*(17), 9826. https://doi.org/10.3390/app15179826

Authors' and translators' details:

Titi Setiyoningsih	setiyoningsih.2812@staff.uns.ac.id	Author
Arif Setiawan	arifsetiawan@umm.ac.id	Author
Diyono	physio.diyono@stikesnas.ac.id	Author
Gigit Mujianto	gigitm@umm.ac.id	Translator