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# The Influence of Game Series and Fundamental Motor Skills (FMS) Learning Strategies on Volleyball Technique Skills of Elementary School Students 006 Madung

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## Abstract

This study investigates the impact of game-based learning strategies versus conventional approaches on developing elementary school students' basic volleyball skills. Using an experimental design, two groups received different treatments: game-based learning and conventional methods. The sample consisted of 60 fifth-grade students, assessed for fundamental motor skills using the TGMD-2 subtest and basic volleyball techniques using the AHHPERD instrument designed for ages 10-18. Data analysis using descriptive statistics and a 2x2 ANOVA yielded the following findings: (1) Game-based learning strategies were more effective than conventional approaches in improving basic volleyball technique skills ( $p = 0.030$ ), (2) Students with high fundamental motor skills (FMS) showed significantly better basic volleyball technique skills compared to those with low FMS ( $p = 0.039$ ), (3) There was a significant interaction between learning strategies and students' FMS ( $p = 0.013$ ), indicating varying effectiveness based on FMS levels, (4) Game-based learning strategies were more effective in enhancing basic volleyball technique skills in students with high FMS compared to conventional methods ( $p = 0.003$ ), (5) Conventional learning strategies were more effective than game-based approaches in improving basic volleyball skills in students with low FMS ( $p = 0.011$ ).

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## INTRODUCTION

Volleyball is a fundamental sport that promotes physical fitness, coordination, and teamwork, making it an essential component of elementary school physical education (adha Septiana et al., 2022). However, many elementary school students struggle with mastering basic volleyball techniques due to various physiological, psychological, and environmental factors. Developing these skills is crucial, as they form the foundation for motor competence and sports participation. Traditional teaching methods often emphasize repetitive drills and structured instruction, which may not always engage young learners effectively (Yahya & Arham, 2021). In contrast, game-based learning strategies offer an interactive and enjoyable approach, fostering student motivation and improving skill acquisition through active participation. Understanding which approach is more effective can help educators enhance their teaching strategies and optimize student learning outcomes in physical education (Pamungkas & Wibowo, 2020).

This study explores the effectiveness of game-based learning strategies compared to conventional methods in developing basic volleyball skills among elementary school students (Al-Majid et al., 2024). Additionally, it examines the role of fundamental motor skills (FMS) in skill acquisition and whether different teaching strategies yield varying results based on students' FMS levels. By employing an experimental design with two groups receiving different instructional approaches, this research provides insights into the most effective methods for improving volleyball techniques in young learners. The findings aim to inform educators about the best practices for teaching volleyball, ensuring that students with different motor skill levels receive appropriate and effective instruction (Sulistiadinata, 2020).

Recent studies on physical education and sports pedagogy highlight the effectiveness of game-based learning in enhancing motor skill development and engagement among young learners. Research has shown that traditional drill-based instruction, while structured, may not be as effective in sustaining student motivation or improving skill acquisition compared to interactive, game-oriented methods (Mustaghfirin et al., 2021). Game-based learning strategies have been found to promote cognitive engagement, decision-making, and skill adaptability, making them a preferred approach in modern physical education. Furthermore, studies on fundamental motor skills (FMS) indicate a strong correlation between motor competence and sports performance, suggesting that students with higher FMS levels tend to acquire technical skills more efficiently. However, limited research has examined the interaction between learning strategies and FMS in volleyball skill development (Taneo et al., 2022; Yulianti et al., 2024). This study contributes to the existing body of knowledge by investigating the comparative effectiveness of game-based learning versus conventional methods while also exploring the moderating role of FMS, thereby providing a more comprehensive understanding of skill acquisition in elementary school students.

The novelty of this study lies in its exploration of the interaction between learning strategies and fundamental motor skills (FMS) in developing basic volleyball techniques among elementary school students. While previous research has examined the benefits of game-based learning and the impact of FMS on sports performance separately, few studies have analyzed how these two factors interact to influence skill acquisition (Alkindi et al., 2021; Taslim, 2020). This study provides new insights by determining whether game-based learning is universally effective or if its impact varies depending on students' motor skill levels. Additionally, the research offers empirical evidence on the differential effectiveness of game-based and conventional learning strategies for students with

high and low FMS, contributing to a more targeted and individualized approach to physical education.

In elementary schools, the development of basic volleyball skills is often hindered by students' varying levels of fundamental motor skills (FMS) and the teaching strategies employed. While traditional learning approaches focus on structured drills, they may not fully engage students or accommodate different skill levels (Girsang & Hendrawan, 2022). Game-based learning strategies, which integrate movement and play, have been proposed as a more effective alternative for improving motor skills and technical proficiency (Asnaldi, 2020; Fanani, 2020). However, the extent to which these strategies benefit students with different FMS levels remains unclear. This study specifically examines how game-based and conventional learning strategies impact volleyball skill acquisition in students with high and low FMS, providing a deeper understanding of how instructional methods can be optimized to enhance physical education outcomes.

## **METHODS**

This study employed an experimental research design to compare the effectiveness of game-based learning strategies and conventional learning approaches in developing basic volleyball skills among elementary school students. The research involved two experimental groups, each receiving a distinct instructional approach. A total of 60 fifth-grade students from SD Negeri 006 Tanjungpinang City were selected as participants using a purposive sampling technique. The independent variables in this study were the learning strategies (game-based and conventional), while the dependent variable was the students' basic volleyball technique skills. Additionally, fundamental motor skills (FMS) were considered as a moderating variable to analyze their influence on skill acquisition.

The assessment of FMS was conducted using the Test of Gross Motor Development-2 (TGMD-2) subtest, which evaluates locomotor and object control skills. Basic volleyball technique skills, including passing, serving, and setting, were measured using the AHHPERD test instrument designed for students aged 10-18 years. The intervention was carried out over several weeks, during which both groups participated in structured learning sessions tailored to their assigned instructional method. The game-based learning group engaged in volleyball-related games that emphasized active play and decision-making, while the conventional learning group followed a structured, drill-based approach with teacher-led instructions and repetitive skill practice.

Data analysis was performed using SPSS 26 software, with descriptive statistics used to summarize the collected data. A 2x2 factorial ANOVA was conducted to examine the main effects of learning strategies and FMS, as well as their interaction effect on volleyball skill development. The significance level was set at  $p < 0.05$  to determine statistical differences between the groups. Ethical considerations were observed by obtaining informed consent from participants and ensuring that all students received equal opportunities for skill development. This systematic methodology provides a comprehensive framework for understanding the impact of instructional strategies on elementary students' volleyball skills.

## **RESULT AND DISCUSSION**

The homogeneity test has the purpose of finding out whether the distribution of the two groups is homogeneous or not, if the two groups of data distribution have the same variance, then

the group is said to be homogeneous and vice versa. The data tested is said to be homogeneous based on its significance value.

- 1) The significance value ( $p > 0.05$ ) indicates that the data group comes from a population that has the same variance (homogeneous).
- 2) The significance value ( $p < 0.05$ ) indicates that each data group comes from a population with different variances (not homogeneous).

Based on the research, the researcher obtained a Levene's Test of Equality of Error Variances,  $b$  score of  $0.799 > 0.05$ . This proves that the data used in this study are homogeneously distributed.

#### a. Normality Test

The normality test is used to determine whether or not the collection of data is normal. The normality test can be seen using 2 techniques, namely for data with normal categories, parametric statistical analysis techniques can be used, while for data with abnormal categories, non-parametric statistical techniques can be used. Normality test using SPSS software version 26.

- 1) If the sig value  $> 0.05$  then the data comes from a normal distribution.
- 2) If the sig value  $< 0.05$  then the data comes from an abnormal distribution.

The following is a summary of the results of the normality test of the research data.

**Table 1. Summary of normality testing of research data**

No	Variable	<i>p value</i>	Sig	Information
1.	Game network learning strategies	0.819	0.05	Normal
2.	Conventional learning strategies	0.187	0.05	Normal

Based on the table above, we can see that the  $p$  value for the game series learning strategy (0.819) and the conventional learning strategy (0.189) both have a value greater than the sig of 0.05. So it can be concluded that the samples used in this study are normally distributed and this research can be continued to test the hypothesis.

### 1. Test Hypothesis

#### a. The difference in the influence of learning strategies of game series and conventional learning strategies on basic technical skills of playing volleyball in students of SD Negeri 006 Tanjung Pinang City

The statistical analysis conducted showed that there was a significant difference ( $p = 0.030$ ) between the group of students who were given the treatment of a series of game learning strategies and the group that used conventional learning strategies in improving basic volleyball technique skills. The  $p$ -value obtained 0.030 is less than the significance level of  $\alpha = 0.05$  indicates that the results found did not occur by chance, but were caused by the treatment given. Thus, the research hypothesis that the learning strategy of the series of games is more effective in developing basic volleyball technique skills in students of SD Negeri 006 Tanjung Pinang City can be accepted. These findings provide empirical evidence that a learning approach based on a series of games has greater potential in improving the mastery of basic volleyball techniques in students compared to conventional learning methods that are generally applied.

#### b. Differences in basic technical skills of playing volleyball for students who have high and low FMS at SD Negeri 006 Tanjungpinang City

Statistical analysis conducted in this study revealed a significant difference ( $p=0.038$ ) in the basic technical skills of volleyball between students of 006 State Elementary School Tanjung

Pinang City who have high and low levels of motor fundamentals. The p-value obtained is well below the significance level ( $\alpha = 0.05$ ) indicating that the observed difference is not a mere coincidence, but can be attributed to the difference in the fundamental level of students' motor skills. Thus, the research hypothesis that proposes a positive relationship between fundamental motor skills and mastery of basic volleyball techniques in elementary school children is acceptable. These findings provide empirical support for the assumption that strong motor fundamentals are an important prerequisite in the development of basic technical skills in volleyball in children, so they need special attention in the learning and training process.

**c. The interaction between learning strategies and FMS on the basic technical skills of playing volleyball for students at SD Negeri 006 Tanjungpinang City**

The statistical analysis conducted in this study succeeded in identifying the influence of a significant interaction between learning strategy variables and motor fundamentals on the improvement of basic volleyball technique skills in students of State Elementary School 006 Tanjung Pinang City. The results of the statistical test showed a p value of  $0.013 < 0.05$ , which indicates that the influence did not occur by chance. These findings provide empirical evidence that the two variables have a close relationship and influence each other in the volleyball learning process. The results of this study are in line with the hypothesis proposed earlier, which states that the combination of effective learning strategies and strong mastery of motor fundamentals will have a positive impact on the development of students' basic volleyball technique skills. It can be concluded that to achieve optimal improvement of basic engineering skills, a learning approach is needed that does not only focus on one aspect, but integrates various learning components that complement each other.

**d. The effect of a series of game learning strategies with conventional learning strategies on students who have a high FMS on the basic technical skills of playing volleyball for students at SD Negeri 006 Tanjungpinang City**

The results of this study significantly prove the superiority of the learning strategy of the series of games in improving the basic technical skills of volleyball compared to the conventional learning approach. Statistical analysis conducted using an independent t-test of the study data showed a significant difference between the two treatment groups. The p-value obtained is  $0.003 < 0.05$ , indicating that the difference found did not occur by chance. These findings support the proposed research hypothesis, which is that the learning strategy of the series of games will be more effective in improving the basic technique skills of volleyball in students with good basic motor skills. The results of this study make an important contribution in the field of physical education, especially in learning volleyball. The application of a series of game learning strategies in groups of students with high basic motor skills is proven to provide optimal stimulation for the development of students' basic technical skills.

**e. The effect of a series of game learning strategies with conventional learning strategies on the basic technical skills of playing volleyball for students who have low FMS at SD Negeri 006 Tanjungpinang City**

The data analysis of this study revealed that there was a significant difference in the effectiveness of learning strategies for a series of games and conventional in students with low basic motor fundamentals in improving basic volleyball technique skills. A p value of  $0.011 < 0.05$  indicates that this result is statistically significant. Thus, an alternative hypothesis that states that the

two strategies have different influences is acceptable. These findings have important implications for learning practices, especially for educators who work with students who have limitations in basic motor skills. The conventional learning approach, with a more organized structure and focus on individual practice, seems to be more effective in helping this group of students master the basic techniques of volleyball.

## Discussion

The findings of this study indicate that game-based learning strategies are significantly more effective than conventional approaches in improving basic volleyball technique skills among elementary school students (Ginting & Helmi, 2021). This aligns with previous research highlighting the benefits of active, engaging, and interactive learning environments in sports education. Game-based learning promotes decision-making, adaptability, and motivation, making skill acquisition more natural and enjoyable for young learners. In contrast, conventional methods, which rely heavily on repetitive drills and direct instruction, may not fully engage students, potentially limiting their skill development. The results suggest that incorporating game elements into physical education can enhance learning outcomes and foster greater enthusiasm for sports participation (Laksana et al., 2021; Mautama et al., 2022).

The study found that students with high fundamental motor skills (FMS) demonstrated significantly better volleyball technique skills compared to those with low FMS. This supports the idea that motor competence plays a crucial role in skill acquisition, as students with well-developed motor skills are better able to control their movements and execute volleyball techniques effectively (Kadrianto et al., 2023; Sutisna, 2021). The findings reinforce the importance of early motor skill development, as children with strong FMS are more likely to excel in sports and physical activities. Schools should, therefore, integrate comprehensive motor skill development programs into their curriculum to ensure that students acquire the foundational skills necessary for sports participation (Pranata, 2023; Shiddiq & Rahayu, 2022; Sistiasih, 2021).

A key contribution of this study is the identification of a significant interaction between learning strategies and FMS levels. The results indicate that the effectiveness of game-based and conventional learning strategies varies depending on students' motor skill proficiency (Nopandri & Wathoni, 2024; Wulandari, 2020). Specifically, game-based learning was more effective for students with high FMS, while conventional methods were more beneficial for students with low FMS. This suggests that while interactive and engaging learning strategies enhance skill development for those with strong motor foundations, structured and repetitive practice may be necessary for students with lower motor proficiency (Alfarezi et al., 2021; Priyadi, 2021). Educators should consider differentiating instructional methods based on students' motor skill levels to optimize learning outcomes.

The findings highlight the need for a more individualized approach to physical education. Instead of using a one-size-fits-all method, teachers should assess students' motor skill levels and apply the most suitable learning strategies accordingly (Datau & Amri, 2023; Rukmana et al., 2021). For students with high FMS, game-based learning can enhance skill acquisition by providing dynamic and situational learning experiences. Meanwhile, students with lower FMS may benefit from structured and guided practice to build foundational motor competence before engaging in more complex activities. By implementing tailored teaching strategies, educators can maximize

students' learning potential and improve overall sports participation rates in elementary schools (Indrawathi et al., 2022; Karisman, 2020).

## CONCLUSIONS

This study concludes that game-based learning strategies are more effective than conventional approaches in enhancing basic volleyball technique skills among elementary school students. Additionally, students with high fundamental motor skills (FMS) demonstrate superior volleyball skills compared to those with low FMS. The findings also reveal a significant interaction between learning strategies and FMS, indicating that game-based learning is particularly beneficial for students with high FMS, while conventional methods are more effective for students with low FMS. These results highlight the importance of tailoring instructional strategies based on students' motor skill levels to optimize skill development. Integrating game-based learning into physical education programs can enhance engagement, motivation, and skill acquisition, while structured practice may be necessary for students with lower motor competence. Therefore, educators should adopt a differentiated approach to teaching volleyball and other sports to ensure inclusive and effective learning for all students.

## CONFLICTS OF INTEREST STATEMENT

Regarding this study, the author declares that there is no conflict of interest.

## AUTHOR CONTRIBUTIONS

Study concept and design: Afeldi Yelmon Zirman. Acquisition of data: Syahril Bakhtiar. Analysis and interpretation of data: Afeldi Yelmon Zirman. Drafting the manuscript: Wilda Welis. Critical revision of the manuscript for important intellectual content: Alnedral. Statistical analysis: Alnedral.

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