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Effectiveness of TGFU Model in Improving Playing Skills and Motivation to Learn Volleyball in Senior High School

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Abstract

Studi purpose. This study aims to evaluate the effectiveness of the Teaching Games for Understanding (TGFU) model in enhancing students' playing skills and learning motivation in volleyball learning at the senior high school level. The TGFU approach emphasizes tactical understanding before technical mastery to create a contextual and engaging learning environment.

Materials and methods. Using a quantitative quasi-experimental design, 60 students were divided into two groups: experimental (TGFU) and control (conventional method). Both groups were taught by the same teacher over a six-week period, with two 90-minute sessions per week. Instruments included a volleyball skill test based on the Game Performance Assessment Instrument (GPAI) and a learning motivation questionnaire aligned with Self-Determination Theory. Data analysis employed Shapiro-Wilk, Levene's Test, paired sample t-tests, and independent sample t-tests (Welch's where applicable) at a significance level of $\alpha = 0.05$.

Results. Both groups demonstrated significant improvements in playing skills and motivation ($p < 0.05$). However, the experimental group outperformed the control group in posttest results (Skills: $t = 33.399$, Motivation: $t = 12.204$, both $p = 0.000$). The TGFU group showed higher consistency, median scores, and tighter score distribution, suggesting greater effectiveness in enhancing student engagement and performance.

Conclusions. The TGFU model significantly improves students' volleyball playing skills and learning motivation. By prioritizing tactical understanding, the model fosters a holistic learning environment integrating psychomotor, cognitive, and affective domains. This approach is highly recommended for physical education curricula to meet 21st-century student needs.

Keywords: Teaching Games For Understanding, Playing Skills, Learning Motivation, Volleyball, Physical Education.

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Introduction

Physical education, sports, and health (PJOK) learning at the high school level plays an important role in shaping students' motor, cognitive, and affective skills in an integrated manner (Syafruddin et al., 2022). One of the core subjects in PJOK is volleyball, which aims not only to develop technical skills such as serving, passing, and spiking but also to enhance tactical thinking, teamwork, and students' motivation to engage in sports activities (Gil-arias et al., 2021; Itu et al., 2025). However, the implementation of volleyball education in schools still faces several challenges, particularly related to students' low playing skills in a competitive context and their lack of motivation during the learning process (Arafah et al., 2025).

One of the main causes of this problem is the learning approach that is still predominantly oriented towards mechanical basic technique training and separated from the actual game context (Fransiska et al., 2020). This conventional learning model tends to be instructional and does not provide enough space for students to develop strategic understanding and emotional engagement with the material (Philip, 2021). As a result, students not only struggle to apply techniques in real-game situations but also lose interest and motivation to actively engage in the learning process (Naro et al., 2023). Therefore, an alternative approach is needed that can integrate psychomotor, cognitive, and affective aspects in a balanced and meaningful way (Rohmah et al., 2022).

The Teaching Games for Understanding (TGFU) model is a pedagogical approach that places games at the center of learning, emphasizing tactical understanding before technical mastery (Hismullutfi et al., 2025). Through the application of this model, students are encouraged to understand the concepts and strategies of the game first, so that the learning process becomes more contextual, reflective, and participatory. In the context of volleyball learning in high school, the application of TGFU is expected to create a more meaningful and enjoyable learning experience, as students not only memorize techniques but also develop critical thinking skills, make decisions in the game, and work together as a team (Stephanou & Karamountzos, 2020). Furthermore, this model is believed to have a positive impact on students' overall performance and foster a more positive attitude toward sports activities, including increased intrinsic motivation to participate in learning (Tendinha et al., 2021). Therefore, this study focuses on evaluating the effectiveness of the TGFU model in simultaneously improving students' playing skills and learning motivation, as an effort to strengthen the quality of adaptive and student-centered physical education pedagogy (Sari, 2024).

Previous studies in the field of physical education, particularly in volleyball learning, have generally focused on a mechanistic approach to basic techniques that emphasizes psychomotor aspects alone (Gil-arias et al., 2021). These studies have largely highlighted improvements in technical skills such as serving, passing, or spiking, but have not comprehensively considered the role of cognitive and affective dimensions in the process of learning sports games. Important aspects such as understanding game tactics, decision-making, and student motivation are often overlooked, even though these three elements significantly contribute to the effectiveness and meaningfulness of learning (Tom et al., 2020). This imbalance in focus indicates a gap in the literature that limits efforts to develop a holistic learning approach oriented toward the students' overall needs. Therefore, a learning model is needed that not only enhances technical playing skills but also strengthens strategic thinking abilities and fosters intrinsic motivation in students, making the learning process more contextual, enjoyable, and sustainable (Yunianti, 2020).

In the context of high school volleyball learning, persistent challenges remain, particularly students' low playing skills in real-game situations and their lack of motivation to actively participate in learning activities. These problems are often linked to teaching approaches that focus heavily on isolated technical drills, which limit students' opportunities

to apply skills in meaningful, competitive contexts. As a response, this study offers an innovative learning approach through the Teaching Games for Understanding (TGFU) model, which fundamentally reconstructs the traditional sequence in teaching sports games. Unlike conventional models that prioritize mastering techniques before students understand the context of the game, TGFU places tactical understanding as the starting point of the learning process. Through modified game scenarios, students are encouraged to directly engage in simple game situations that require decision-making, cooperation, and strategic analysis, before being guided to refine the technical skills relevant to the game's requirements. This approach not only promotes higher cognitive engagement but also strengthens learning motivation through meaningful and contextual experiences. Thus, this research makes a significant contribution to the field of physical education pedagogy by offering a learning model that aligns with 21st-century learning principles: collaborative, reflective, and student-centered.

Materials and methods

Study participants

The study involved 60 high school students, divided equally into two groups of 30: the experimental group and the control group. The participants were selected purposively, ensuring that both groups had comparable baseline characteristics such as similar levels of volleyball skills, prior game-based learning experiences, and teacher and institutional readiness. This purposive selection was made to minimize variability that could arise from differences in students' prior competencies and learning environments, thereby ensuring that any differences in post-intervention outcomes could be more confidently attributed to the applied instructional model rather than extraneous factors. The allocation of participants into control and experimental groups was also designed to maintain equivalence in demographic factors such as age, gender composition, and prior exposure to volleyball, supporting the validity of comparisons between the two groups.

Study organization

This research employed a quantitative approach using a quasi-experimental design to assess the effectiveness of the Teaching Games for Understanding (TGFU) model. The overall research design is shown in Figure 1. Both the experimental and control groups were taught by the same teacher and received identical teaching materials to control for instructional variables. The experimental group received instruction using the TGFU model, while the control group followed a conventional model focused on isolated technical drills.The intervention lasted for six weeks, conducted twice per week, with each session lasting 90 minutes. Instruction for the TGFU group followed the model's core principles beginning with modified game scenarios to stimulate tactical decision-making and strategic reflection, followed by refinement of specific technical skills within context.

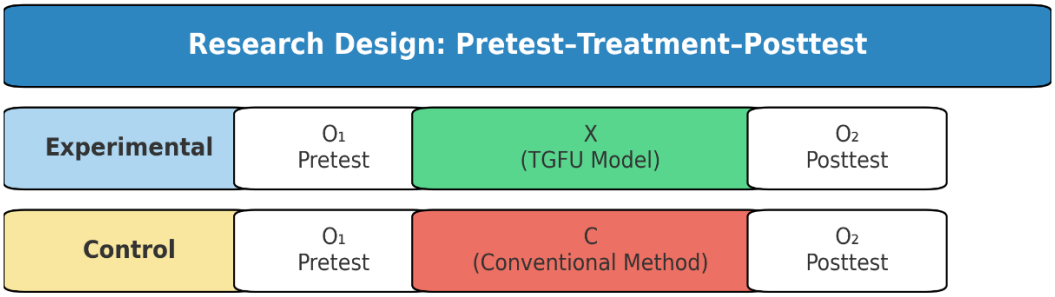

Figure 1. Research Design: Pretest-Treatment-Posttest

Statistical analysis

Two types of instruments were used: (1) a volleyball skill test based on Game Performance Assessment Instrument (GPAI) indicators including decision-making, skill execution, positioning, and team support and (2) a learning motivation questionnaire aligned with Self-Determination Theory, comprising intrinsic motivation, extrinsic motivation, perceived competence, interest, and emotional engagement, rated on a 1–5 Likert scale.

Data analysis began with normality testing using the Shapiro-Wilk test and variance homogeneity testing using Levene's test. Pretest and posttest comparisons within groups were assessed using the paired sample t-test, while comparisons between experimental and control groups used the independent sample t-test. When homogeneity assumptions were not met, Welch's t-test was applied. All statistical decisions were based on a significance threshold of $\alpha = 0.05$.

Results

Table 1. Normality Test

Group	Variable	Statistic	Sig. (p-value)
Experiment	Skills_Pre	0.94	0.093
Experiment	Skills_Post	0.954	0.215
Control	Skills_Pre	0.938	0.082
Kontrol	Skills_Post	0.932	0.054
Experiment	Motivation_Pre	0.975	0.687
Experiment	Motivation_Post	0.984	0.913
Control	Motivation_Pre	0.963	0.365
Control	Motivation_Post	0.949	0.156

The normality test table above shows the results of the Shapiro-Wilk test for the skill and motivation variables in the pretest and posttest in both groups (experimental and control). All p-values (Sig.) are above 0.05, indicating that the data distribution for each variable follows a normal distribution. This means that the normality assumption is met, so the use of parametric tests such as the paired sample t-test and independent sample t-test in subsequent analyses can be conducted validly and reliably.

Table 2. Variance Homogenity Test

Variable	Statistic	Sig. (p-value)
Skills Post	4.381	0.041
Motivation_Post	0.806	0.373

The table of variance homogeneity test above presents the results of Levene's Test for skill and motivation variables in the posttest between the experimental and control groups. The test results indicate that the skill variable has a p-value of 0.041, meaning it does not meet the assumption of homogeneity of variances ($p < 0.05$). Therefore, the comparison of skill levels between groups should use the t-test version assuming unequal variances (Welch's t-test). Conversely, the motivation variable has a p-value of 0.373 ($p > 0.05$), indicating that the variances between groups are homogeneous.

Table 3. Paired t-test

Group	Variable	t	df	Sig. (p-value)
Experiment	Skills	-74.195	30	0.0
Control	Skills	-12.493	30	0.0
Experiment	Motivation	-22.575	30	0.0
Control	Motivation	-7.493	30	0.0

The paired t-test table above shows the results of the analysis of the differences between the pretest and posttest scores in each group for the variables of skill and motivation. All test results show very small p-values (Sig.) ($p < 0.05$), indicating that there are statistically significant differences between before and after the treatment in each group. This means that both the experimental and control groups experienced improvements in ability and motivation after the learning process or intervention was implemented.

Table 4. Independent sample t-test

Variable	t	df	Sig.(p-value)
Skills Post	33.399	60	0.0
Motivation_Post	12.204	60	0.0

The independent t-test table above presents the results of the comparison of posttest scores between the experimental and control groups for the variables of skill and motivation. Both variables show a p-value (Sig.) of 0.000, indicating a highly significant difference between the two groups after the treatment was administered. The high t-value indicates that the experimental group has significantly higher posttest scores compared to the control group, both in terms of skill and motivation.

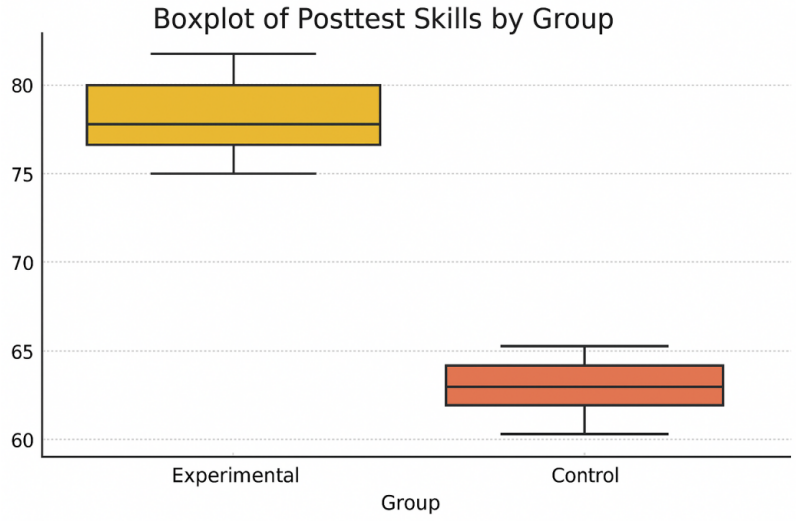

Figure 2. Posttest Skill Boxplot

The posttest skill boxplot shows the distribution of scores between the experimental and control groups. The experimental group had higher and more stable scores, with a larger median

and narrower data spread than the control group. This indicates the effectiveness of the treatment in improving participants' skills.

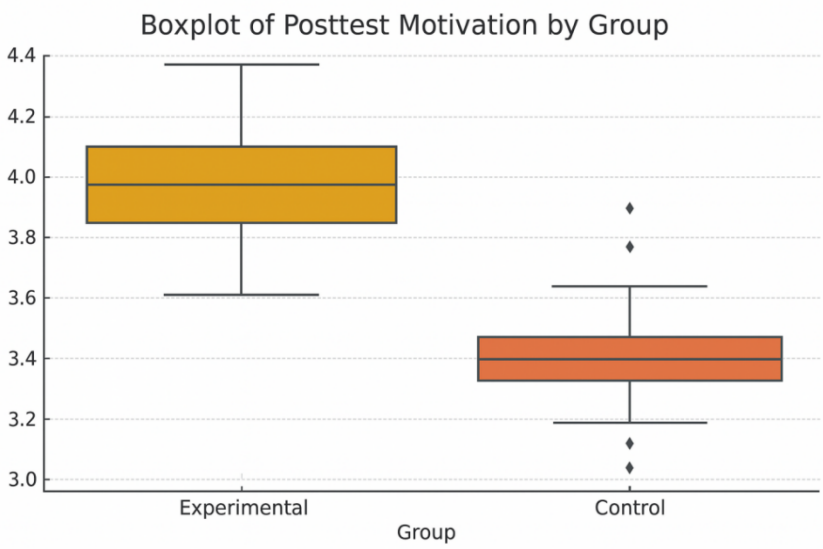

Figure 3. Posttest Motivation Boxplot

The posttest motivation boxplot shows that the experimental group consistently had higher motivation scores after the treatment, with data concentrated above a score of 4. In contrast, the control group showed a smaller increase. This reinforces the statistical finding that the intervention had a significant impact on motivation.

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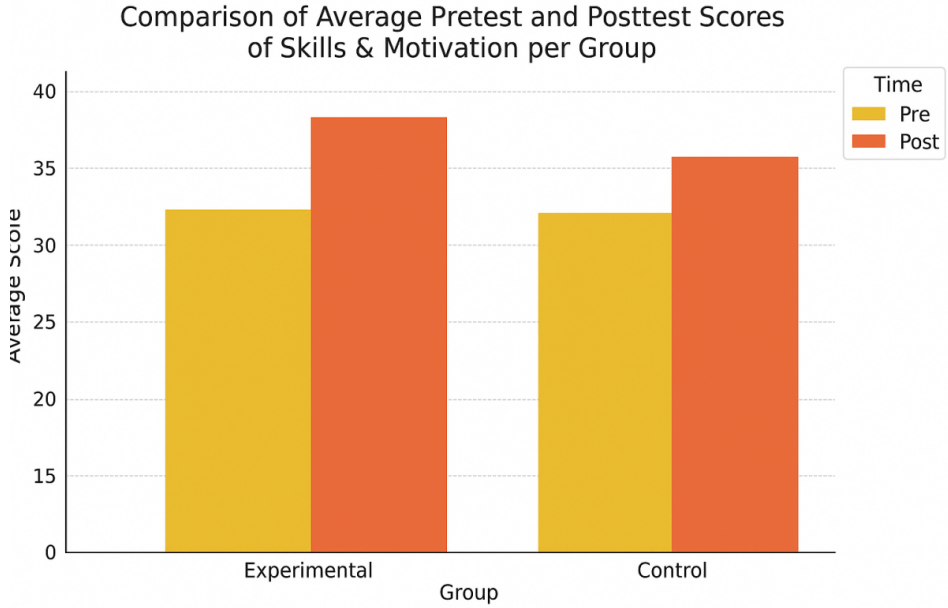

Figure 4. Combined Average Pretest and Posttest Diagram

This combined bar chart presents the average pretest and posttest scores for skills and motivation in a single view. It is clear that the experimental group experienced a significant increase in both variables compared to the control group. The colors of the bars distinguish between the pre- and post-conditions, emphasizing that the learning intervention was more effective in improving student learning outcomes in terms of both skills and motivation.

Discussion

The results of this study indicate that the application of the Teaching Games for Understanding (TGFU) model has a significant impact on improving students' playing skills and learning motivation in volleyball instruction at the high school level (Alifia et al., 2024). These findings support the argument that a learning approach centered on tactical understanding and real-game contexts is more effective than conventional approaches that emphasize the separate mastery of basic techniques (Wang et al., 2023). The significant improvement in playing skills among the experimental group reflects the success of the TGFU approach in developing students' tactical understanding (Wijaya & Ahmad, 2019). Students are not only encouraged to understand game strategies but also actively involved in decision-making, teamwork, and evaluation of game actions. This fosters a reflective and strategic mindset that is crucial for the functional mastery of game skills (González-valero et al., 2024).

In addition, a significant increase in learning motivation indicates that the TGFU model is capable of fostering emotional engagement and interest in learning activities among students (Helyanan et al., 2025). Student engagement in meaningful game situations creates enjoyable and challenging learning experiences, which in turn strengthen intrinsic motivation to learn (Palupi et al., 2024). This aligns with the principles of Self-Determination Theory, where experiences of autonomy, competence, and social connectedness serve as the primary drivers of learning motivation (Annisa et al., 2022).

The difference in results between the experimental and control groups also indicates that the learning model factor has a dominant influence on learning success. Although both groups were taught by the same teacher and used identical materials, the significantly different learning outcomes confirm that the pedagogical approach used plays a crucial role in directing learning outcomes (Soe et al., 2025).

These results reinforce previous research findings (Gil-arias et al., 2021; Septiyanto et al., 2023) emphasizing the superiority of the TGFU model in sports game learning. Theoretically, the success of this model is inseparable from its ability to simultaneously integrate psychomotor, cognitive, and affective dimensions, making it highly relevant to 21st-century learning needs focused on developing critical, collaborative, and reflective thinking skills (Sotto, 2021).

However, this study has several limitations that need to be considered. The study was conducted in only one school with a limited sample size, so the scope of generalization of the results is still limited to a specific context. In addition, the six-week intervention period is considered relatively short to evaluate the long-term impact of implementing the TGFU model, especially in terms of character building and sustainable changes in learning attitudes. The quality of implementation by teachers was also not a primary focus of this study, even though the success of TGFU is greatly influenced by teachers' ability to manage tactical discussions, design game scenarios, and facilitate student reflection. This study also did not examine broader affective dimensions such as sportsmanship, empathy, and student self-confidence, which are important elements in comprehensive physical education learning.

Based on these limitations, several suggestions can be made for further research. Further studies are recommended to involve more schools from various backgrounds in order to increase the external validity and generalizability of the results. Research with a longer intervention duration will provide a more comprehensive picture of the impact of TGFU on student development in the medium to long term. Additionally, it is important for future researchers to evaluate the quality of model implementation by teachers, either through classroom observations or in-depth interviews, to gain a more comprehensive understanding of the relationship between teaching quality and learning outcomes. Research should also explore other psychosocial aspects such as communication skills, leadership, and attitudes toward

teamwork. A mixed-methods approach could also be considered to integrate quantitative and qualitative dimensions of students' learning experiences more deeply.

Conclusions

The implementation of the Teaching Games for Understanding (TGFU) model has been proven effective in enhancing students' playing skills and learning motivation in high school volleyball education. By prioritizing tactical understanding before technical mastery, the TGFU model fosters a contextual, engaging, and reflective learning environment. It successfully integrates psychomotor, cognitive, and affective domains, making it a highly relevant and impactful pedagogical approach in the context of 21st-century physical education. This model is recommended as an alternative strategy for improving both the quality and experience of learning in physical education programs.

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