

**The Effect of Teaching Games for Understanding (TGfU) on Volleyball Learning Outcomes in Physical Education**Muhammad Rifki Febriyanto^{1*}, Hermawan Pamot Raharjo²¹²Physical Education, Health, and Recreation, Faculty of Sports Science, Universitas Negeri Semarang, Semarang, Indonesia**Keywords**

Learning Outcomes;
Physical Education;
Tgfu; Teaching
Games; Volleyball
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Abstract

Volleyball learning in Physical Education at school often faces the problem of low student learning outcomes. The purpose of this study is to evaluate the efficacy of applying the Teaching Games for Understanding (TGfU) learning model in stages—from low to high—with TGfU directly, as well as to ascertain and assess the impact of TGfU on enhancing volleyball learning outcomes. This study employs a pretest-posttest control group design, a quasi-experimental method, and a quantitative methodology. The research sample consisted of two classes selected using a purposive sampling technique, namely experimental class A (32 students) who received TGfU learning with gradual increases and experimental class B (26 students) who received TGfU learning with direct increases. Data were collected through observation and game performance tests using the Games Performance Assessment Instrument (GPAI). With the use of SPSS 25 for Windows, data were examined using normality tests, homogeneity tests, paired sample t-tests, and independent sample t-tests. The findings demonstrated that learning outcomes improved in both classes. Experimental class A saw an average improvement in learning outcomes of 20.75 points, according to the paired sample t-test. In a similar vein, learning results for experimental class B increased on average by 17.62 points. The independent sample t-test revealed a significant difference between the two groups with a significance value of 0.000 ($p < 0.05$). Therefore, compared to TGfU with direct high-intensity increases, the implementation of the TGfU model with incremental increments, from low to high, is more beneficial in increasing volleyball learning results.

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INTRODUCTION

Education is a planned effort to encourage students to actively learn and hone their abilities. This aims to develop students into individuals who are faithful, disciplined, intelligent, have noble character, and are skilled for the benefit of themselves and society (A. Hidayat & Mahendra, 2024). In order to develop quality human beings, education incorporates emotive, cognitive, and psychomotor components in addition to cognitive ones (Oh, 2022). Every individual has the right to receive a proper education to improve their quality of life, as education plays a vital role in various aspects of life. In order to prevent pupils from being bored during the learning process, education undoubtedly needs an interesting learning method (S. Hidayat, 2021).

Through organized physical activities, physical education aims to improve students' motor skills, social attitudes, and physical fitness. It is a crucial part of the educational system. Particularly in terms of improving social skills, social conduct, self-confidence, and academic and cognitive development, physical education has a great deal of potential to make a distinctive and substantial contribution to the development of the educational system (Arizona, 2025). Physical Education is a comprehensive form of education aimed at developing motor skills, improving physical fitness, fostering critical thinking, and promoting healthy lifestyles in students (Dewi et al., 2021). Physical education learning aims to develop and balance various aspects of student education, namely the affective, cognitive, and psychomotor aspects (Raharjo et al., 2023). In addition to emphasizing technical proficiency, physical education seeks to promote lifetime learning and exercise habits as well as a favorable attitude toward physical activity (Pane et al., 2025). In schools, physical education instruction is crucial because it allows students to participate directly in a variety of learning activities.

Volleyball is a team sport often taught in physical education classes in schools. Two teams of six players each compete in volleyball on a court divided by a net. The goal of the game is to hit or send the ball over the net such that it lands in the opponent's court while simultaneously preventing it from falling in one's own court by utilizing basic abilities and teamwork (Yuan, 2024). Volleyball in the framework of physical education strives to enhance not just technical skills but also physical capabilities, teamwork, and game-related decision-making abilities (Resifa et al., 2025). Group play allows students to learn communication, cooperation, and understanding game strategies. Therefore, volleyball learning needs to be well-designed so that students are not only able to perform technical movements correctly but also understand their application in real games. Learning that emphasizes the relationship between technique and tactics is expected to increase student engagement and optimal learning outcomes (Mellor & Brunsdon, 2025).

Based on observations conducted by researchers at Al-Hikmah Islamic Vocational School, Mayong, Jepara Regency, during the volleyball learning process, it was apparent that students showed little enthusiasm in participating in learning activities. According to the Physical Education teacher, students still lacked a grasp of basic volleyball techniques, such as passing, serving, and how to play volleyball. This was evident during the learning activities, where students still experienced difficulties in passing and serving correctly. In the techniques of overhand and underhand passing, as well as the service technique, the ball that was hit often did not reach a teammate and the students' hand positions were also still incorrect. In addition, students also did not understand how to play and the rotation system in volleyball. This situation was brought on by a number of things, such as students' poor comprehension of the volleyball game, a lack of time for studying, and teachers' often repetitive teaching methods. Learning methods that were less varied and interesting also made students feel bored and tired during the volleyball learning process. Proven by the results of the needs form given to 25 students of class X MP 3 and analysis of class X MP 2 which amounted to 30 students when observations were conducted, data obtained as many as 38 out of 55 students (69.1%) stated that the volleyball learning that had been carried out tended to be monotonous. In addition, 41 students (74.5%) admitted to being less actively involved in the learning process, especially during game activities. This condition caused some students to feel less interested, passive in learning, and had difficulty applying underhand and overhand passing skills during

play. Because of this, student learning outcomes have not produced the best outcomes (Pratama et al., 2023).

Based on these problems, researchers plan to improve Physical Education learning by implementing Teaching Games for Understanding (TGfU) learning. The reason for using Teaching Games for Understanding (TGfU) learning is because it is a learning model that applies real game situations, so it has the potential to improve student learning outcomes. According to (Threatt et al., 2022), in keeping with the goals of physical education and education in general, using the TGfU approach in the classroom can help students reach their full potential. According to (Putra, 2025), the Teaching Games for Understanding (TGfU) learning paradigm significantly improves student learning outcomes and increases teacher and student engagement in the study of deceptive passing strategies. Meanwhile, (Meliandi, 2023) claimed that students' volleyball underhand passing abilities improved by 44% when the Teaching Games for Understanding (TGfU) learning paradigm was used. From (Turmuzi & Purnamaningsih, 2021) shows how volleyball players' overhand passing skills can be enhanced by the Teaching Games for Understanding (TGfU) learning system.

The Teaching Games for Understanding (TGfU) learning model is a model in physical education that aims to help students understand a sport through game situations. This model focuses not only on mastering techniques, so the learning process is more dynamic and tailored to the developmental stage of students (Rahma, 2025). TGfU learning paradigm concentrates on how students learn in a customized game environment, including tactical awareness, game comprehension, skill execution, and decision-making.. With learning characteristics that emphasize game activities, it is hoped that it can increase student enthusiasm so they do not feel bored during the learning process. This is in line with the opinion of (Threatt et al., 2022) who emphasize the importance of using evidence-based learning models, particularly hybrid models such as the Sport Education Tactical Games Model (SETGM), which integrates elements of tactics, games, and active student involvement. Game-based learning that can be modified according to student abilities is considered effective in increasing student motivation, game understanding, and enjoyment in physical education.

This research is highly urgent considering the low learning outcomes of students in Physical Education, particularly in volleyball, which remains a common problem in many high schools, particularly at SMK Islam Al-Hikmah Mayong. One factor suspected of influencing these low learning outcomes is the use of learning models that lack variety and are not fully able to accommodate students' learning needs and characteristics. The Teaching Games for Understanding learning model presents an innovative approach that emphasizes active student involvement in solving real-life problems, thereby improving conceptual understanding and critical thinking skills. The unique application of the TGfU model in the context of learning volleyball in physical education, which has up until now been more frequently used in cognitive disciplines, is what makes this study novel. This novelty is provided by the researchers in the form of a gradual application of TgfU, from low to moderate to high, and also the direct application of TgfU with high levels. Therefore, it is anticipated that this research will aid in the creation of more successful physical education teaching methods that meet the needs of 21st-century learning (Haryani et al., 2022).

The purpose of this study is to determine and analyze the extent to which the application of the Teaching Games for Understanding (TGfU) learning model with gradual increases, namely from low to medium to heavy and direct heavy increases can have an impact on improving learning outcomes in the subject of Physical Education, Sports, and Health volleyball material for students. This study also aims to compare the effectiveness between students who participate in gradual TGfU learning in experimental class A and students who participate in direct heavy TGfU learning in experimental class B. Therefore, it is anticipated that the study's findings will help educators, educational institutions, and other relevant stakeholders choose effective teaching methods to enhance secondary school students' learning outcomes and process quality.

METHODS

This study employed a pretest–posttest control group design and a quantitative, quasi-experimental methodology (Sugiyono, 2019). The Teaching Games for Understanding (TGfU) paradigm will be used to teach volleyball to the first group, experimental class A, progressively progressing from low to moderate to high. The Teaching Games for Understanding (TGfU) paradigm will be used to teach volleyball to the second group, experimental class B, with a high degree of direct intensity.

The population of this study was all 380 students from 13 classes of class X of SMK Islam Al-Hikmah Mayong. Sampling was conducted using a non-probability sampling technique selected by purposive sampling. Purposive sampling was used because the sample determination was based on certain considerations that were in accordance with the research objectives. Class selection was carried out through recommendations from physical education teachers who knew the conditions and characteristics of students, so that the selected classes were considered representative of the population and had suitability with the research needs, and two classes were selected, namely X MP 2 with 32 students and X MP 3 with 26 students. Then, class X MP 2 was determined as the first group, namely experimental class A and X MP 3 as the second group, namely experimental class B, based on recommendations from physical education teachers.

This research was conducted at Al-Hikmah Islamic Vocational School, Mayong, Jepara Regency, Central Java Province, during the 2025/2026 academic year. The number of effective meetings in this study was two, with each meeting lasting two lesson hours (2 x 45 minutes), including a posttest. This research was conducted from February 3–10, 2026. Although this study was conducted over a relatively short period of time, namely two meetings (2 x 45 minutes per meeting), the intervention provided was systematically and intensively designed. Each meeting included the complete TGfU learning stages, from game format, tactical awareness, decision-making, skill execution, and performance. With a structured learning design centered on game activities, students gained meaningful learning experiences in an efficient timeframe. This enabled gradual improvement in learning outcomes, despite the limited duration.

The variables in this study consist of one independent variable and one dependent variable. The independent variable in this study is the Teaching Games for Understanding (TGfU) learning model with learning variations, while the dependent variable studied is student learning outcomes.

The data collection techniques used in this study were adapted to the research objectives and the characteristics of the variables studied, namely volleyball learning outcomes, which include affective, psychomotor, and cognitive aspects. The data collection techniques used included observation, question and answer sessions, game performance tests, and documentation.

The instruments used were attitude observation sheets, knowledge questionnaires, and GPAI (Games Performance Assessment Instrument) sheets (Oslin et al., 1998) stated, “The Games Performance Assessment Instrument (GPAI) was developed to measure game performance behaviors that demonstrate tactical understanding, as well as the player’s ability to solve tactical problems by selecting and applying appropriate skills”. This tool is meant to help teachers monitor and document their students’ gaming performances. The assessment of students’ playing performances in this study focuses on three areas: support, skill execution, and decision making.

Instruments that have a good level of validity and reliability are the main requirements for obtaining accurate and reliable research results (Sugiyono, 2019). Based on the results of the validity test on 32 respondents, the *r* table value was obtained at 0.349. All items in the cognitive, affective, and psychomotor aspects (GPAI) had a calculated *r* value > *r* table, with a value range between 0.745 and 0.952. and the reliability test showed a Cronbach Alpha value for the cognitive aspect of 0.967, the affective aspect of 0.952, and the psychomotor aspect (GPAI) of 0.837, all alpha values were above the minimum limit of 0.60. Thus, the research instrument was declared valid and reliable so that it was suitable for use in the research data collection process.

The data studied in this study were quantitative. Following the collection of data from both the first and final diagnostic tests, the SPSS 25 for Windows program was used to process and analyze the data. The steps involved in data analysis are as follows:

1. Determining the average value of the initial and final diagnostic tests;
2. Performing analysis prerequisite tests, such as homogeneity and normality tests;
3. Performing statistical tests using the Paired Sample t-Test and Independent Sample t-Test.

RESULTS AND DISCUSSION

Based on the observation results, Two types of research data were collected based on the observation results: pretest data and posttest data. Using the Teaching Games for Understanding (TGfU) paradigm, Group A, the experimental class A, received volleyball instruction at low, medium, and high levels. The Teaching Games for Understanding (TGfU) paradigm was used to teach volleyball to Group B, the experimental class B, with direct increases in high levels.

The statistical results of the research data for groups A and B are described in **Table 1**.

Table 1. Descriptive statistics

Descriptive Statistics					
	N	Min.	Max.	Mean	Std. Deviation
Pretest Eks. A	32	59	73	65,78	3,757
Posttest Eks. A	32	80	93	86,53	3,759
Pretest Eks.B	26	58	72	63,69	3,707
Posttest Eks. B	26	75	89	81,31	4,259
Valid N	26				

Based on the results of descriptive statistical analysis in **Table 1**, both classes experienced an increase in learning outcomes after learning. In experimental class A, which consisted of 32 students, the pretest had an average of 65.78 with a min of 59 and a max of 73 and a std. deviation of 3.757. After being given learning treatment, the posttest increased with an average of 86.53, a min of 80, a max of 93, and a std. deviation of 3.759. In experimental class B, which consisted of 26 students, the pretest had an average of 63.69 with a min of 58 and a max of 72 and a std. deviation of 3.707. After being given treatment, the posttest increased with an average of 81.31, a min score of 75, a max of 89, and a std. deviation of 4.259.

Next, a normality Test was conducted testing using Kolmogorov-Smirnov with the help of the SPSS 25 application for Windows at a significance level of 0.05. The results of the normality test are shown in **Table 2**.

Table 2. Normality Test

One-Sample Kolmogorov-Smirnov Test				
	Pretest Eks. A	Posttest Eks. A	Pretest Eks. B	Posttest Eks. B
Asymp.Sig. (2-tailed)	,200c,d	,065c	,200c,d	,089c
Remarks Learning Outcomes	Normal	Normal	Normal	Normal

The test conditions show that the data is normally distributed if the significance value (p) > 0.05 and not normally distributed if the significance value (p) < 0.05 , according to the findings of the normality test in **Table 2**. According to the test results, every significant value in this study's data is higher than 0.05. Thus, it may be said that both experimental class A and experimental class B data have a normal distribution.

Next, a homogeneity test of variance between groups was performed using Levene's Test of Equality of Error Variance using SPSS 25 for Windows at a significance level of 0.05. The results of this homogeneity test are presented in **Table 3**.

Table 3. Homogeneity Test

Test of Homogeneity of Variance					
		Levene Statistic	df1	df2	Sig.
Learning Outcomes	Based on Mean	,434	3	112	,729

According to the homogeneity test findings in **Table 3**, the test conditions state that the data variance is deemed homogenous if the significance value (p) > 0.05 and non-homogeneous if the significance value (p) < 0.05 . The Levene test results indicate a significance value of 0.729, which is higher than 0.05 ($0.729 > 0.05$). Consequently, it can be said that the learning outcome data variance in the group under study is homogeneous..

Next, SPSS 25 for Windows was used to evaluate the hypothesis using t-tests, namely the Paired Sample T-evaluate and the Independent Sample T-Test. The following testing criteria were applied: If the test findings indicate a significance value of less than α ($\text{sig} < 0.05$), the study hypothesis is accepted. On the other hand, the study hypothesis is rejected if the significance value is higher than α ($\text{sig} > 0.05$). **Tables 4** and **5** below show the outcomes of the hypothesis testing.

Table 4. Paired Sample Statistics

Paired Sample Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pretest Eks. A	65,78	32	3,757	,664
	Posttest Eks. A	86,53	32	3,759	,664
Pair 2	Pretest Eks. B	63,69	26	3,707	,727
	Posttest Eks. B	81,31	26	4,259	,835

This test was utilized to ascertain if TGfU had an impact on learning outcomes based on the findings of the hypothesis test using Paired Sample Statistics in **Table 4**. Experimental Class A saw an average increase in learning outcomes of 20.75 points. Meanwhile, experimental Class B also saw an average increase in learning outcomes of 17.62 points. This indicates that both experimental classes experienced improved learning outcomes after being given the learning treatment. This, descriptively, the learning model applied to experimental Class A had a greater impact on improving volleyball learning outcomes than the learning model applied to experimental Class B.

Table 5. Independent Samples t-Test

Independent Samples t-Test							
		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
Learning Outcomes	Equal variances assumed	,063	,441	4,958	56	,000	5,224
	Equal variances not assumed			4,894	50,380	,000	5,224

Based on **Table 5** hypothesis test results. Using the SPSS 25 for Windows program, an independent samples t-test yielded a significance value (Sig. 2-tailed) of 0.000. Prior to examining the t-test findings, take note of the Levene's Test for Equality of Variances results, which indicate a significance value of 0.441. The t-test results are in the Equal variances assumed row because

the significance value is more than 0.05 ($0.441 > 0.05$), indicating that the variance of the two groups is homogeneous.

The computed t-value is 4.958 with a significance value (Sig. 2-tailed) of 0.000 based on the t-test results in the row. Since the significance value is less than 0.05 ($0.000 < 0.05$), H_0 is rejected and H_1 is accepted. This demonstrates that when it comes to learning volleyball games, the learning outcomes of experimental classes A and B differ significantly. Therefore, it can be said that the learning model used in experimental class A improves volleyball game learning outcomes more successfully than the learning model used in experimental class B.

The study's findings demonstrate that using the Teaching Games for Understanding (TGfU) learning approach improves students' learning outcomes when it comes to volleyball game content (Barba-Martín et al., 2020). The Teaching Games for Understanding (TGfU) learning model is a physical education model that aims to help students understand a sport through game situations. This model focuses not only on mastering techniques, making the learning process more dynamic and tailored to the student's developmental stage (Rahma, 2025). The Teaching Games for Understanding (TGfU) learning model is a game-based learning approach that emphasizes tactical understanding and decision-making skills in game situations, enabling students to gain a deeper understanding of game concepts (Batez & Petrušić, 2021). This approach allows students to learn through modified game activities, allowing for the simultaneous development of technical skills and tactical understanding (Pill, 2020).

Based on the research results, both experimental classes experienced improved learning outcomes after being given learning treatments using the TGfU model. This is in line with research stating that volleyball learning using the TGfU approach can improve playing skills and student engagement in the physical education learning process (Apriani et al., 2025).

The higher learning outcomes in experimental class A compared to experimental class B indicate that gradual learning, from low, medium, to high difficulty levels, is more effective in helping students understand volleyball game concepts. This gradual learning allows students to systematically adjust their motor skills and tactical understanding, making the learning process more effective (González-valero et al., 2024). Conversely, in experimental class B, which was immediately given a high level of difficulty, learning outcomes still increased, but not as significantly as in experimental class A. This may be due to the level of complexity of the game being introduced from the start, requiring students more time to understand game strategies and master the necessary basic techniques (Sumhendartin et al., 2023).

The learning outcomes of experimental class A and experimental class B differed significantly, according to statistical tests using the Independent Sample t-test. This finding suggests that game-based learning models like TGfU can significantly improve students' volleyball playing abilities and comprehension of game strategies (Sobari et al., 2025). In addition to improving technical skills, the TGfU learning model has also been shown to increase learning motivation and active involvement of students in physical education learning. This is due to the fact that students actively participate in game-related tasks that call for collaboration, judgment, and problem-solving (Sumhendartin et al., 2023). Therefore, compared to the straight application of TGfU, the application of the TGfU learning model with a gradual rise in difficulty is more effective in enhancing volleyball learning results. These results suggest that step-by-step game-based learning can enhance students' technical proficiency, tactical thinking abilities, and comprehension of game principles in volleyball (Dwi et al., 2025).

CONCLUSION

From the research findings and data analysis that using the Teaching Games for Understanding (TGfU) learning approach improves students' volleyball learning outcomes. Both experimental groups showed an increase in learning outcomes after being given learning treatment, which was indicated by an increase in the average value from the initial diagnostic to the final results. Hypothesis testing through a paired sample t-test was carried out in experimental class A which applied the TGfU model with a gradual increase from low, medium, to severe, there was an average increase in learning outcomes of 20.75 points. Meanwhile, in experimental class B there was also an average increase in learning outcomes of 17.62 points. This demonstrates that after receiving learning treatment, both experimental classes saw an

improvement in learning outcomes. The Independent Sample t-test findings indicated a significant difference between the learning outcomes of the two classes, with a significance value of 0.000 ($p < 0.05$). When it comes to enhancing volleyball learning results, the Teaching Games for Understanding approach with a gradual increase works better than the Teaching Games for Understanding model with a direct increase in severity.

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