

The Effect of Teaching Games for Understanding (TGfU) Learning Model on Improving Students' Social and Cognitive Skills in Physical Education at SMK Merdeka Bandung

Farell Ferdian Pramudita^{1A-E*}, Asep Sumpena^{2A-D}, Tri Martini^{3A-D}

^{1,3}Physical Education, Health, and Recreation, Faculty of Sports and Health Education, Indonesia University of Education, Indonesia

ABSTRACT

This study aims to analyze the effect of the Teaching Games for Understanding (TGfU) learning model on improving students' social and cognitive skills in physical education. This study uses a quasi-experimental design with control and experimental groups that were given pre-tests and post-tests. The research sample consisted of 50 students in grade XI at SMK Merdeka Bandung who were randomly selected from existing classes. The experimental group received treatment using the TGfU model, while the control group followed conventional learning. The instruments used to measure social skills were the Social Skills Inventory (SSI), and to measure cognitive skills, the Game Performance Assessment Instrument (GPAI) test was used. The results of data analysis using an independent t-test showed that there were significant differences between the experimental group and the control group on both variables, namely social skills with a significance value of 0.040 and cognitive skills with a significance value of 0.000. These findings indicate that the application of the TGfU model can significantly improve students' social and cognitive skills, so that it can be implemented as an effective approach in physical education learning. Random assignment was carried out within predetermined class boundaries; however, this quasi-experimental design still provides a valid picture of the influence of the TGfU model.

Keywords: Teaching Games for Understanding; social skill; cognitive skill; physical education; experiment

Corresponding author:

*Farell Ferdian Pramudita, Universitas Pendidikan Indonesia, Jl. Dr. Setiabudi No.229, Isola, Kec. Sukasari, Kota Bandung, Jawa Barat 40154. Email: farellferdian12@upi.edu

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INTRODUCTION

Physical education is an educational process that aims to develop the growth and development of students in physical, intellectual, motor skills, and attitude aspects, which is carried out through physical activities or body movements. This aims to make students healthy, intelligent, skilled in movement, and have noble character, so that they can have a positive impact on their quality of life in the future (Mustafa, 2022). Physical education basically has three main objectives in three domains, namely attitude, knowledge, and skills, which can be achieved through movement learning and physical activities that adopt sports movements (Masgumelar & Mustafa, 2021). The development of the times, marked



by technological advances and changes in lifestyle, demands innovation in the learning process, including in physical education subjects.

Social skills also play an important role in students' cognitive growth because the two are interrelated and support each other (Jones et al., 2019). Students who can communicate, collaborate, and show empathy well will find it easier to engage in the learning process, especially when discussing or studying together. Positive social interactions encourage students to express their opinions, ask questions, and accept advice, thereby improving their critical thinking and problem-solving skills. In addition, social skills support students in managing their feelings, respecting differences, and resolving conflicts, which in turn strengthens their logical and rational thinking abilities. Therefore, mastery of social skills not only supports academic achievement but also builds students' character so that they are ready to face challenges in their daily lives and in the future, where a balance between cognitive and social intelligence is essential.

One learning approach that has emerged as an innovative alternative is Teaching Games for Understanding (TGfU). This approach emphasizes tactical and strategic understanding in games, so that students not only master motor skills, but also learn to make decisions, work together in teams, and understand the values of sportsmanship (Morales-Belando et al., 2018). This method allows students to learn through games, making the learning process more interesting and enjoyable. In addition, TGfU encourages students to think critically and make decisions while playing, which supports the development of social and cognitive skills (Ashar & Maharani, 2025). TGfU integrates cognitive and social learning through game activities that are modified according to the needs and ability levels of students.

More innovative learning methods, such as Teaching Games for Understanding (TGFU), can provide a more meaningful and relevant learning experience for students. TGFU emphasizes the importance of understanding game concepts and strategies, rather than simply focusing on mastering physical techniques (Barba-Martín et al., 2020). TGFU is considered a learning model that is relevant to today's educational needs, as it integrates skills, understanding, and attitudes into a single innovative learning process.

Social and cognitive skills are two important aspects of individual development. Social skills refer to a person's ability to interact and communicate effectively with others, while cognitive skills involve thinking, understanding, and problem-solving processes. Social and cognitive skills are also valuable assets that help us succeed in all aspects of life. By developing these skills early on, we can build better relationships, achieve career goals, and live happier and healthier lives (Mercur et al., 2020).

The Teaching Games for Understanding (TGFU) learning model can make a significant contribution to the development of students' social and cognitive aspects because it places them in game situations that require cooperation, communication, and team interaction, thereby fostering mutual respect, empathy, and sportsmanship, while also teaching them how to accept differences in abilities and game results. At the same time, TGFU also trains students' cognitive abilities through critical thinking, situation analysis, and quick decision-making, for example, in determining when to pass, shoot, or defend, as well as through reflective discussions after the game that help students evaluate the strategies used (Rinaldo et al., 2021). Thus, TGFU not only serves as a means of mastering motor skills, but also as an innovative learning approach that can develop social skills as well as cognitive abilities relevant to today's learning needs.

Previous studies have shown that the application of the TGfU model can have a positive impact on increasing learning motivation, understanding of game tactics, and students' social and cognitive skills (Harvey et al., 2020). However, there are still limited studies that specifically examine the simultaneous effect of TGfU on students' social and cognitive skills at the vocational high school (SMK) level. Therefore, this study aims to empirically examine the effect of the TGfU learning model on students' social and cognitive skills in physical education, particularly at SMK Merdeka Bandung.

METHOD

The type of research

The type of research used in this study was quantitative research using the experimental method. Experimental research is a type of quantitative research that aims to identify cause-and-effect relationships between variables by controlling and changing certain variables (Em Sereyrath, 2024). Research participants were selected using simple random sampling from the population of 11th grade students at SMK Merdeka Bandung.

Time and Location

This study was conducted from October to November 2025 at SMK Merdeka Bandung, located in the center of Bandung, West Java. This location was chosen because SMK Merdeka has adequate physical education facilities and a student population that is representative for this study. In addition, this school is known for its high commitment to developing students' skills in various aspects, including cognitive and social skills through innovative approaches to learning. The research was conducted in a school environment that supports the implementation of the TGfU learning model, with the aim of measuring the effect of this model on improving student skills.

Objectives or Goals

The main objective of this study is to empirically analyze the effect of the Teaching Games for Understanding (TGfU) learning model on improving students' social and cognitive skills in physical education. The population of this study consisted of 11th grade students at SMK Merdeka Bandung. The 11th grade was chosen because it is a transition between the 10th and 12th grades, where students tend to be more stable in their social and cognitive development.

The sampling technique used was probability with simple random sampling, which assumes a homogeneous population. Therefore, as the researcher will study 11th grade students, it is impossible to take samples from all students. The sampling technique used probability sampling with simple random sampling, which is random sampling from the population because the population is considered homogeneous. The main purpose of randomization is to reduce bias and ensure that the differences between groups are not influenced by other factors that may exist outside the treatment applied. However, randomization does not necessarily ensure that all groups are 100% homogeneous. Even though it is random, there is still a possibility of small differences in characteristics between groups, especially if the sample used is not too large. However, with randomization, these differences in characteristics are expected to be distributed evenly among the groups. The selection of this population was based on the relevance of the students as research subjects who were directly related to the study objective, which was to evaluate or develop the influence of the Teaching Games for Understanding (TGfU) learning model on students'

social and cognitive skills. If the number of subjects is less than 100, it is recommended to take all of them so that the research becomes a population study, but if the number is greater, approximately 10-15% or 20-25% or more can be taken (Arikunto, 2006). Therefore, the sample size was determined to be 15% of the population. The total number is $15/100 \times 325 = 50$ students.

Research procedure

The research procedure consists of three main stages: planning, data collection, and data analysis. The planning stage includes developing a conceptual model, designing questionnaires, and conducting trials to ensure the validity and reliability of the instruments. The data collection stage is carried out by distributing online questionnaires through platforms such as Google Forms.

It was conducted over 8 sessions, each lasting approximately 60 minutes. Each session included a warm-up phase, small-sided games, discussion/reflection, and a closing phase. This structure refers to the TGfU framework, which includes 6 learning steps: game form, game appreciation, tactical awareness, decision making, skill execution, and performance. Through this approach, students are invited to learn through playing experiences while reflecting on the social actions and tactical decisions they make.

The selection of 8 sessions was determined by the minimum standard for the learning cycle in physical education experimental research, which usually lasts 6-10 sessions so that the impact of the treatment can be measured significantly. Eight to ten sessions are sufficient to observe improvements in learning outcomes without causing boredom or high dropout rates (La Greca, 2005). With this time frame, it is hoped that students will have adequate opportunity to experience, adapt, and demonstrate progress in both social and cognitive aspects.

To reduce potential biases such as the Hawthorne effect and testing effect, several steps were taken. The Hawthorne effect, which occurs when participants change their behavior because they know they are being observed, can be minimized by increasing the confidentiality of observations and using control groups. Meanwhile, the testing effect, which occurs when score increases are caused by familiarity with the test, can be overcome by administering a pre-test that is not analyzed or by using different instruments for the pre-test and post-test.

Instrument

The instrument used to measure social skills is the Social Skills Inventory (SSI) developed by Riggio (1992). This instrument has high validity and reliability, with Cronbach's Alpha values between 0.74 and 0.88. Meanwhile, for cognitive skills, the Game Performance Assessment Instrument (GPAI) is used, which has been proven to be valid and reliable with a Cronbach's Alpha value of more than 0.70.

Data collection technique

The data collection technique used in this study was quantitative research using an experimental method. This study was conducted using a pre-test and post-test control group design, dividing 25 students into two groups: the experimental group, which received physical education using the TGfU learning model, and the control group, which received physical education using the conventional learning model commonly used in schools. Before and after the implementation of the learning model, both groups will be

given pre-tests and post-tests to measure their social and cognitive skills. The differences between the two groups will be analyzed statistically to determine whether the TGfU learning model has a significant effect on students' social and cognitive skills.

Data analysis technique

The data analysis used by researchers in this case is SPSS. By using SPSS, researchers can find out data regarding the significance of differences in the success of students' physical education learning before and after the application of the method. The data obtained from the pre-test and post-test were analyzed using SPSS with a t-test to see the significant differences between the experimental and control groups. In addition, descriptive analysis was performed to determine the distribution of data, such as the mean, standard deviation, and variance.

Before performing the t-test, several important assumptions needed to be examined to ensure the validity of the analysis. The first assumption is normality, which was tested using the Shapiro-Wilk test to ensure that the data distribution was normal. The second assumption was homogeneity of variance, which was tested using the Levene test to ensure that the variance between the experimental and control groups was similar. Only after these assumptions were met could the t-test be performed to test for significant differences between the groups.

Descriptive statistics for the variables studied (such as cognitive and social scores) are reported separately for the experimental and control groups. This is done to provide a clearer picture of the data distribution, mean values, standard deviations, and variances for each group before and after the treatment.

Fidelity of TGfU implementation

To maintain the fidelity of the Teaching Games for Understanding (TGfU) learning model, several important steps need to be taken. One of them is to provide instructor training so that teachers have a good understanding of the principles and stages of TGfU. In addition, the use of a compliance checklist is also important to ensure that each stage of learning is carried out in accordance with the established guidelines, so that the implementation of this method remains consistent and valid.

RESULTS AND DISCUSSION

Findings

Based on the results of normality testing using the Shapiro–Wilk test (Table 1), all data, both in the pre-test and post-test stages, showed a significance value (Sig.) greater than 0.05, indicating that the data were normally distributed. This applied to both the experimental and control groups for the cognitive and social variables, both in the pre-test and post-test.

Table 1. Test Normality

Measurement Time	Group	Variable	Statistik Shapiro–Wilk	df	Sig. (p)	Description
Pre-Test	Experiment	Cognitive	0.934	25	0.110	Normal
		Social	0.986	25	0.977	Normal
	Control	Cognitive	0.954	25	0.314	Normal
		Social	0.972	25	0.707	Normal

Post-Test	Experiment	Cognitive	0.928	25	0.080	Normal
		Social	0.982	25	0.919	Normal
	Control	Cognitive	0.935	25	0.116	Normal
		Social	0.970	25	0.651	Normal

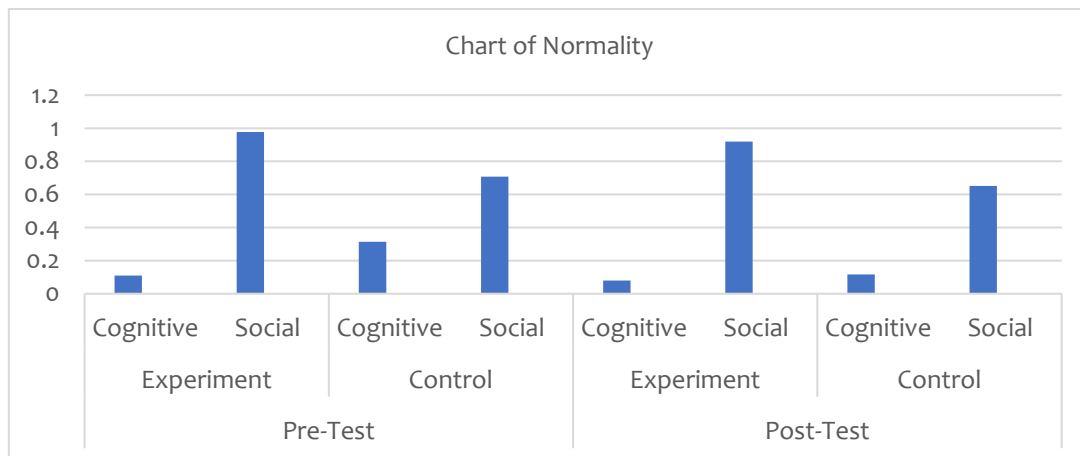


Figure 1. Chart of Normality

All p-values (Sig.) are greater than 0.05, which means that the data in the pre-test and post-test stages, both for the experimental and control groups, meet the assumption of normality. This condition allows us to continue the analysis using parametric tests, such as the t-test or ANOVA, in accordance with the research design. The results of the Levene's test for homogeneity of variance show that the variance between the experimental and control groups is not significantly different, both at the pre-test and post-test stages. This test aims to ensure that the variance between groups is homogeneous before continuing with parametric analysis.

Table 2. Test Homogeneity

Measurement Time	Variable	Levene Statistic	df1	df2	Sig. (p)
Pre-Test	Cognitive	0.120	1	48	0.731
	Social	3.345	1	48	0.074
Post-Test	Cognitive	0.269	1	48	0.598
	Social	3.631	1	48	0.064

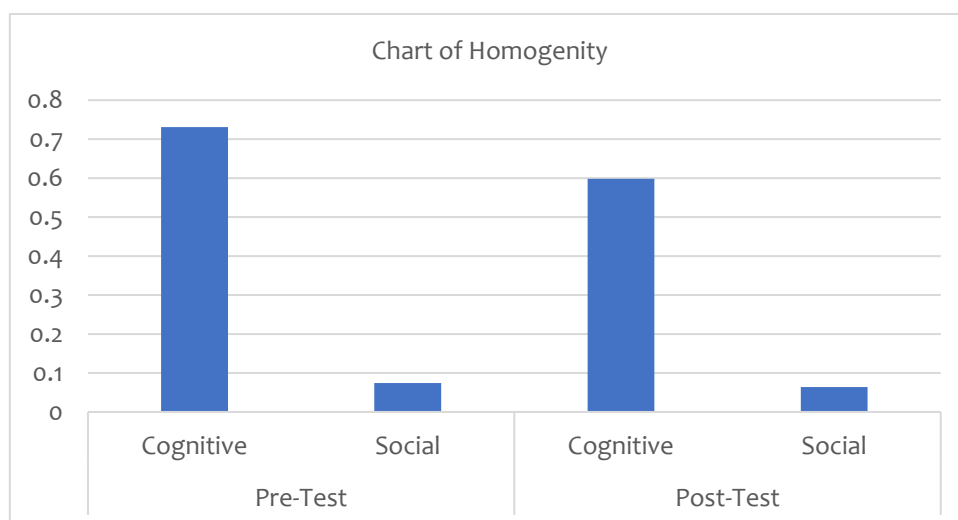


Figure 2. Chart of Homogeneity

The significance value (Sig.) for all variables, both in the pre-test and post-test, is greater than 0.05, indicating that there is no significant difference in variance between the experimental group and the control group. This means that the variance between groups is homogeneous, allowing us to continue the analysis with parametric tests, such as the independent t-test or ANOVA. Based on the results of the independent t-test, it is known that both cognitive and social variables show significant differences between the experimental group and the control group, as can be seen in Table 3.

Table 3. T-Test Independent

Variable	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Description
Cognitive	0.000	11.440	2.120	Significant
Social	0.040	8.000	3.796	Significant

This is indicated by a significance value (Sig. (2-tailed)) of less than 0.05 for both variables, so the null hypothesis (H_0) is rejected and the alternative hypothesis (H_1) is accepted. Thus, it can be concluded that the treatment given to the experimental group had a significant effect on improving results in both aspects. For the cognitive variable, the Sig. (2-tailed) value of 0.000 indicates a very significant difference between the two groups. The Mean Difference value of 11.440 with a Std. Error Difference of 2.120 indicates that the average cognitive score of the experimental group is significantly higher than that of the control group. This finding indicates that the intervention or treatment applied was able to have a positive impact on improving the cognitive abilities of the participants.

For the social variable, a Sig. (2-tailed) value of 0.040 was obtained, which is also below the threshold of 0.05. The Mean Difference value of 8.000 with a Std. Error Difference of 3.796 indicates a significant difference in the average between the experimental and control groups in terms of social aspects. This confirms that the treatment given not only affects cognitive aspects but is also able to significantly improve participants' social abilities. Overall, the results of this analysis show that the treatment given to the experimental group is effective in improving both aspects studied, cognitive and social. Thus, the intervention carried out can be said to have a positive and significant effect on improving participants' overall learning outcomes.

Discussion

Based on the results of this study, it appears that the use of the Teaching Games for Understanding (TGFU) approach has a positive effect on improving students' cognitive abilities. This is evidenced by the results of an independent t-test, which shows a significant difference between the experimental group and the control group in terms of cognitive variables, with a significance value of 0.000 (less than 0.05). The Mean Difference value of 11.440 shows that the experimental group given the TGFU treatment had higher cognitive scores than the control group. This finding supports the theory that TGFU can improve cognitive skills, particularly in the context of understanding game concepts, strategies, and decision-making in sports games.

To maintain the fidelity of the Teaching Games for Understanding (TGfU) learning model, several important steps need to be taken. One of them is to provide instructor training so that teachers have a good understanding of the principles and stages of TGfU. In addition, the use of a compliance checklist is also important to ensure that each stage of

learning is carried out in accordance with the established guidelines so that the implementation of this method remains consistent and valid.

The TGFU approach aims to develop students' understanding of the game through active involvement in decision-making, strategy, and reflection on the games they play (Ortiz et al., 2023). This allows students to understand tactics and strategies in the context of the game, which contributes to improving their cognitive abilities. Furthermore, TGFU supports the development of critical thinking and strategic decision-making in games, which is consistent with the improvement in cognitive abilities observed in this study (Nopembri et al., 2022).

There is a view that not all TGFU-based interventions result in significant cognitive improvement. For example, the success of TGFU in improving cognitive skills is highly dependent on the context and the readiness of students to actively participate in learning (Gaspar et al., 2021). If students do not have a sufficient understanding of the game or strategy, the impact on cognitive improvement may be limited. This opinion reminds us that although TGFU shows effectiveness in improving cognitive skills, readiness and context factors greatly influence the results obtained.

This study shows that the application of the Teaching Games for Understanding (TGFU) approach significantly improves students' cognitive skills, with clear differences between the experimental and control groups. These findings are in line with previous studies that support the effectiveness of TGFU in improving understanding of game tactics and strategies. However, several studies also show that the results of cognitive improvement can be influenced by the readiness of students and the sustainability of this method's application. Overall, although TGFU has been proven effective, contextual and sustainability factors need to be considered to ensure optimal results.

Several studies also indicate that the effects of TGFU on cognitive improvement can be temporary and depend on the intensity and duration of its application. Although TGFU can improve understanding of game tactics and strategies in the short term, long-term results will be more optimal if accompanied by continuous learning and repetition in more complex contexts (Robles et al., 2020). Thus, although this study shows significant improvement in cognitive aspects through the application of TGFU, it should be noted that this success does not always apply to every individual or situation. Factors such as students' initial level of understanding and the sustainability of the method's application need to be taken into account to ensure continued success.

In addition to improvements in cognitive aspects, the findings of this study also show that the application of TGFU has a significant effect on improving students' social skills. This is reflected in the significance value of 0.040 for the social variable, which indicates that the experimental group given the TGFU treatment showed higher improvements in social skills than the control group. The Mean Difference value of 8.000 indicates that the TGFU treatment successfully improved the social skills of students, such as the ability to work in teams, communicate, and collaborate in game situations.

This study shows that the application of TGFU improves students' social skills, especially in collaboration, communication, and leadership. The greatest improvement was seen in students' ability to work together in teams, communicate effectively, and lead discussions. These results provide practical guidance for educators to focus on developing these social skills through game activities, which can improve social dynamics and collaboration in learning.

TGFU focuses not only on physical skill development but also on social aspects, emphasizing the importance of group cooperation and communication between players (Jaya, 2019). In the TGFU approach, students are presented with situations that require them to interact socially in the context of the game, which encourages the improvement of social skills such as effective communication and leadership (Sa'bani & Santoso, 2024).

To improve the social skills of students with lower initial abilities, strategies that can be applied include a guidance-based approach and the provision of gradual collaborative tasks. A guidance-based approach can help students understand the importance of communication and cooperation, while gradual collaborative tasks allow them to practice social skills in a simpler context before moving on to more complex situations. Positive feedback and reflection are also important for building students' confidence in social interactions.

Although the results of this study show a significant improvement in social skills, there are views that criticize TGFU for not always being effective in optimally developing social skills. Although TGFU provides opportunities for students to interact in a game context, it does not always create situations that facilitate the maximum development of social skills (Gil-Arias et al., 2021). If learning is not well organized or students are not given the opportunity to reflect on their social experiences, the impact on social skills may be limited.

Another criticism that has emerged is that TGFU tends to be more effective in improving the social skills of students who already have a good foundation of social skills. Students with lower social skills may have difficulty collaborating in groups, even if they are involved in TGFU-based learning (Hank & Huber, 2024). This shows that although this approach has the potential to improve social skills, its effectiveness is highly dependent on the initial characteristics of the students. The influence of TGFU on students' social skills can be affected by external factors, such as school culture or the teaching style applied by teachers. Therefore, although TGFU provides opportunities for social skill improvement, external factors such as social support from the students' environment also influence the results achieved (Gaspar et al., 2021).

We also recommend that physical education teachers consider implementing the TGFU model in their curriculum. For example, in basketball lessons, teachers can introduce game elements such as team decision-making, with a focus on strategy and collaboration. Students can be given assignments to design game tactics that involve communication and cooperation, followed by reflection sessions to discuss their decision-making processes. In this way, in addition to technical skills, students can also develop social and cognitive skills that are very useful in everyday life.

This study also has limitations that need to be considered. First, the quasi-experimental design used did not include randomization, which allowed for bias in group selection. Therefore, the differences between the experimental and control groups may have been influenced by other uncontrolled factors. Second, the relatively small sample size ($n = 50$) limited the ability to perform subgroup analyses and affected the statistical power of this study.

This study opens up opportunities for further exploration of the effectiveness of the TGFU model in improving students' social and cognitive skills in various types of schools. Future research is recommended to be conducted in several schools with larger and more diverse samples, as well as with a research design that involves randomization to reduce

potential bias. In addition, long-term follow-up studies are needed to evaluate the sustainability of the TGFU model's effects on students' social and cognitive skills.

Higher scores on the Social Skills Inventory (SSI) indicate better social skills, meaning that individuals are more effective at interacting, understanding emotions, and communicating. Meanwhile, higher scores on the Game Performance Assessment Instrument (GPAI) reflect better cognitive skills in the context of games, such as the ability to make appropriate tactical decisions and apply skills effectively.

This research can be expanded by examining moderating factors that influence the effectiveness of TGFU. Students' initial skill levels may affect the results, as students with a better basic understanding may show more significant improvement. In addition, student motivation also plays an important role; more motivated students are likely to be more active in the learning process, which can accelerate the development of cognitive and social skills. Teachers' experience in implementing TGFU may also moderate the results, as teachers who are more experienced in this method tend to be more effective in managing learning and supporting student development. Further research could explore the influence of these factors to gain a more comprehensive understanding of the conditions that support the success of TGFU.

CONCLUSION

Based on the results of research conducted at SMK Merdeka Bandung, it can be concluded that the application of the Teaching Games for Understanding (TGFU) learning model has a significant positive effect on improving students' social and cognitive skills in physical education. Statistical analysis shows a significant difference between the experimental group that participated in TGFU learning and the control group that participated in conventional learning, both in terms of social and cognitive skills. In terms of social skills, the experimental group showed a significant improvement with a significance value of 0.040, while in terms of cognitive skills, the experimental group showed a greater improvement with a significance value of 0.000.

These findings support the theory that TGFU, which emphasizes tactical understanding and decision-making in the context of games, can help students develop their cognitive abilities and improve their social skills through group interaction and cooperation. Thus, the TGFU model has been proven effective in integrating the development of motor, cognitive, and social skills simultaneously, making it an innovative alternative in physical education learning.

It should be noted that the effectiveness of the TGFU model can be influenced by external factors such as student readiness and consistent application over the long term. Therefore, further research is recommended to explore other factors that may influence learning outcomes and the application of TGFU in a broader context. Overall, the TGFU model can be implemented as an effective learning approach to improve the quality of physical education at the secondary school level, especially in developing students' social and cognitive skills. TGFU is an effective and innovative learning model because it simultaneously improves motor, cognitive, and social skills in physical education learning at the secondary school level.

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CONFLICT OF INTEREST

All authors declare no conflict of interest.

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