

The impact of the team games tournament cooperative learning model on students' motivation and mathematics achievement in elementary schools

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Abstract

This research investigates the positive influence of the Team Games Tournament (TGT) learning model on elementary school students' motivation and mathematics performance. Using a quantitative quasi-experimental design with a One Group Pre-test Post-test format, the study involved twenty-five students from class VB at Elementary School 006 Melayu Besar. Various data collection instruments were utilized, including observation sheets, motivation questionnaires, and evaluation tests for learning outcomes. Statistical analyses such as the Wilcoxon test, Paired Sample t-test, and MANOVA were conducted. Results revealed a significant Asymp.Sig (2-tailed) value below 0.001 in the Wilcoxon test, indicating that TGT significantly enhances learning motivation. The Paired Sample t-test also reported a p-value of <0.001, demonstrating a notable improvement in pre-test and post-test scores, affirming the effectiveness of the TGT model. Additionally, MANOVA analysis confirmed that the TGT model positively influences both motivation and mathematics learning outcomes simultaneously, highlighting its beneficial impact on elementary school students' academic achievements.

Keywords: Motivation; mathematics learning outcomes; mathematics learning; TGT; elementary school

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INTRODUCTION

According to [Armin and Astuti \(2021\)](#), education is a well-designed activity to support student growth so that they can improve their knowledge, character, self-control, personality, and skills, thereby providing positive benefits for society and themselves. At the elementary school level, there are various subjects that are part of the curriculum, and one of the most fundamental is mathematics. Through mathematics learning, students are encouraged to think logically and critically, sharpen their numerical skills, and apply these concepts in real-life contexts.

In general, the structure of the mathematics curriculum at the elementary school level covers three main elements, namely introduction to basic concepts, deepening understanding of concepts, and skills training ([Susilowati et al., 2021](#)). Therefore, attention to mathematics learning should not be underestimated, especially by educators. This is because mathematics is the foundation for academic understanding in the next level of education. However, most students continue to believe that this subject is difficult to master. According to [Armin and Astuti](#)

(2021), the role of teachers is vital in choosing learning methods that can increase student participation and interest, as well as in creating a pleasant learning atmosphere.

The main issue discussed in this study is the low motivation and achievement of elementary school students in mathematics. Weak learning motivation is often triggered by monotonous teaching methods that do not encourage active student participation. Characteristics of low motivation include passive questioning, giving up easily when faced with difficulties, and a tendency not to do homework. This phenomenon of lack of participation is often encountered in the teaching and learning process.

In many classes, teacher-centered learning methods allow students to only receive information without giving them sufficient opportunity to learn independently and discover what they know for themselves. Dependence on the teacher results in low student confidence to actively participate in discussions or other learning activities. Therefore, a more interactive and participatory approach should be pursued to produce a more meaningful and effective learning experience.

Learning is considered successful when students demonstrate enthusiasm, motivation, and concentration throughout the learning process. Interest and drive to learn play an important role in determining an individual's learning outcomes, because when students feel motivated, they tend to be more active in pursuing their academic goals. According to [Wahyuni and Jailani \(2017\)](#), learning achievement is a consequence of effective interaction between teaching methods and the teacher's role in providing positive encouragement. Therefore, educators are expected to have the skills to design and implement various approaches, strategies, and teaching techniques that not only align with students' characteristics but also stimulate their enthusiasm, particularly in mathematics learning ([Armin & Astuti, 2021](#)).

One of the challenges encountered in the field is the low learning performance of students in daily mathematics tests on Least Common Multiple (LCM) and Greatest Common Factor (GCF). The average score achieved by students was only 48.40, with the lowest score being 20 and the highest 90. Students' difficulties in understanding these concepts are often associated with the use of traditional teaching methods, such as lectures and monotonous drill exercises. Such approaches are generally ineffective in fully engaging students' attention, which in turn leads to low learning motivation and unsatisfactory learning outcomes.

As a solution to this problem, the cooperative learning approach can be used as a promising alternative. This approach emphasizes the importance of cooperation among students and the creation of a positive and competitive learning environment ([Hidayati et al., 2024](#)). The Team Games Tournament (TGT) model is one form of cooperative learning that is highly effective in improving students' motivation and academic achievement ([Yuliawati, 2021](#)). This approach, which combines elements of games and competition within group collaboration, has the potential to create a more engaging and interactive learning atmosphere, provided that the learning process can encourage students to participate actively.

TGT cooperative learning enables students to work together in small groups consisting of four to six members, each with different ethnic, gender, and ability characteristics. The implementation process of this model includes several stages, starting from the presentation of objectives and material by the teacher, followed by group discussions, the implementation of intergroup tournaments, and the awarding of recognition to teams with the best performance ([Armin & Astuti, 2021](#)).

The Team Games Tournament (TGT) model has been proven to create an enjoyable learning atmosphere, because the game elements allow students to collaborate, communicate, and solve problems with others. It can also increase their desire to continue learning ([Alawiyah et al., 2023](#)). Moreover, the implementation of TGT encourages students to value the opinions of their group members more highly, which leads to the development of tolerance, empathy, and the strengthening of moral and ethical values in the learning process ([Hasan & Aziz, 2023](#)).

The success of implementing the TGT model in enhancing learning motivation has also been confirmed by several studies. [Handayani and Nurlizawati \(2022\)](#) found that students who

took part in learning activities using the TGT approach experienced a significant increase in motivation. [Julyanti et al. \(2021\)](#) also reported a positive relationship between high learning motivation and better learning outcomes.

[Cahyaningsih \(2017\)](#), through her research, it also indicated that the TGT method can influence the psychomotor and cognitive abilities of elementary school students in mathematics learning. This finding is reinforced by [Sahmar \(2023\)](#), who found that TGT contributes to increased motivation, activeness, and overall student learning outcomes.

Based on these findings, this study aims to examine more specifically: (1) the extent to which the Team Games Tournament (TGT) model affects students' motivation in learning mathematics; (2) its effect on mathematics learning achievement; and (3) its simultaneous effect on both aspects.

It is expected that this study will make a valuable contribution to the development of mathematics learning at the elementary school level. In addition, it is expected to serve as a practical guide for teachers and educators in designing learning methods that are more interactive, communicative, and aligned with students' current needs.

METHODS

This study employed a quantitative approach with a quasi-experimental one group pre-test post-test design. A single intact class of fifth grade students served in a dual role, functioning as its own control group before the implementation of the Team Games Tournament (TGT) model and as the experimental group after receiving the TGT treatment. This design was selected because it allowed the researchers to examine changes in students' motivation and mathematics achievement over time in an authentic classroom context while accommodating practical constraints related to school scheduling and class assignment. The overall structure of the design is summarized in Table 1, which presents the one group pre-test post-test arrangement.

Table 1. One Group Pre-test and Post-test Design

Pre-test 01	Treatment X	Post-test 02
Source: Sugiyono (as cited in Nurhidayat, 2023)		
Description	:	
01	:	Pre-test (initial measurement before the TGT model is implemented)
X	:	Treatment (implementation of the TGT model)
02	:	Post-test (final measurement after the TGT model is implemented)

The study was conducted at Elementary School 006 Melayu Besar in Indonesia. The target population consisted of fifth grade students at this elementary school, and the accessible population comprised all students enrolled in class VB during the semester of data collection. Using a convenience sampling technique, one intact class was selected in collaboration with the school administration. A total of 25 students from class VB participated in the study. All students who were officially enrolled in class VB and present during the data collection sessions were included in the sample. There were no additional exclusion criteria. The sample size corresponded to the full membership of the class, which reflects the typical class size in the school context and is common in classroom-based intervention studies at the elementary school level.

Three instruments were used: an observation sheet, a motivation questionnaire, and a mathematics achievement test administered as pre-test and post-test. Data analysis was conducted using quantitative methods. Pre-test scores reflected students' initial conditions before receiving treatment, while post-test scores showed students' achievements after participating in TGT-based learning. Data on learning motivation was analyzed using the Wilcoxon test because the questionnaire results showed abnormal and non-homogeneous data distribution. Conversely, to evaluate learning outcome improvement, since the pre-test and post-test scores had a normal distribution and met the assumption of homogeneity, the Paired

Sample t-Test was used. In addition, analysis was performed using the MANOVA test to assess the impact of the TGT model on motivation and mathematics learning achievement.

This study not only aims to measure the effectiveness of TGT learning from a cognitive perspective but also seeks to determine the extent to which this approach is able to build students' internal motivation in learning mathematics. Thus, the results of this study are expected to provide a comprehensive picture of the potential of the TGT learning model in improving the quality of education at the elementary school level.

RESULTS AND DISCUSSION

Results

Motivation data comprised both pre-test and post-test scores. The pre-test data represented the initial condition of students' motivation before the TGT learning model was implemented, whereas the post-test data reflected their motivation after the implementation of the TGT learning model. The descriptive quantitative results for motivation are presented in Table 2.

Table 2. Descriptive statistics for pre-test and post-test motivation

		Motivation Pre-test	Motivation Post-test
N	Valid	25	25
	Missing	0	0
Mean		33.36	37.52
Std. Deviation		4.698	3.097
Minimum		26	31
Maximum		40	40

Source: Processed primary data, 2025

The level of students' learning motivation before the Team Games Tournament (TGT) learning model was implemented is shown in Table 2. The minimum score was 26 and the maximum score was 40, with a mean score of 33.36. After the TGT learning model was applied, an increase in motivation indicators was observed, as indicated by an increase in the minimum score to 31 while the maximum score remained 40, and the mean motivation score increased to 37.52.

Before testing the hypotheses, the distribution of the data was examined. To ensure that the motivation data before and after the treatment met the requirements for parametric statistics, tests of normality and homogeneity were conducted. Table 3 presents the results of the normality test, and Table 4 contains information on data homogeneity. These steps were carried out to provide a solid basis before testing the hypotheses regarding the effect of the TGT learning model on students' learning motivation.

Table 3. Normality test for motivation pre-test and post-test

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Motivation Pre-test	0.143	25	0.198	0.911	25	0.032
Motivation Post-test	0.244	25	<0.001	0.776	25	<0.001

Source: Processed primary data, 2025

Table 3 shows that before the TGT learning model was implemented, the students' motivation data had a Shapiro-Wilk significance value of 0.032. It can be concluded that the motivation data were not normally distributed because the significance value was below 0.05. After the TGT learning model was applied, the students' motivation data had a significant value of < 0.001, indicating the same condition, namely that the post-test motivation data were also not normally distributed.

Table 4. Homogeneity Test for Motivation Pre-test and Post-test

		Levene Statistic	df1	df2	Sig.
Motivation Pre-test Post-test	Based on Mean	8.752	1	48	0.005
	Based on Median	6.174	1	48	0.017
	Based on Median and with adjusted df	6.174	1	47.989	0.017
	Based on trimmed mean	9.069	1	48	0.004

Source: Processed primary data, 2025

The homogeneity test yielded a significance value of 0.005, which is equal to or lower than the critical threshold of 0.005. Thus, it can be concluded that the motivation data before and after the TGT treatment did not satisfy the assumption of homogeneity of variance. The Wilcoxon test was therefore conducted to determine whether there was a significant difference between students' mean motivation scores before and after the implementation of the Team Games Tournament (TGT) learning model. This test was used because the students' motivation data before and after TGT showed a distribution that was not normal and not homogeneous. Table 5 presents the results of the Wilcoxon test.

Table 5. Wilcoxon test for motivation pre-test and post-test

Motivation Pre-test – Motivation Post-test	
Z	-3.929 ^b
Asymp. Sig. (2-tailed)	<0.001

Source: Processed primary data, 2025

Because of the Asymp. Sig. (2-tailed) value is below 0.001, the null hypothesis (H₀) is rejected, and the alternative hypothesis (H_a) is accepted. This indicates that the value is lower than the significance level of 0.005. In other words, there is a significant difference between students' motivation scores before and after the implementation of the Team Games Tournament (TGT) learning model, with motivation increasing after the treatment. Therefore, it can be concluded that the TGT model increases students' motivation to learn mathematics.

In addition, the pre-test and post-test results presented in Table 6 show that the mathematics learning outcomes of fifth grade students improved after the TGT model was implemented.

Table 6. Descriptive statistics for pre-test and post-test learning outcomes

Pre-test Learning Outcomes		Post-test Learning Outcomes	
N	Valid Missing	25 1	25 1
Mean	56.00	67.60	
Std. Deviation	25.820	23.324	
Minimum	20	20	
Maximum	100	100	

Source: Processed primary data, 2025

From Table 6, it can be seen that the lowest pre-test score was 20, whereas the highest score was 100, with a mean of 56.00. By contrast, the post-test scores show the same minimum value of 20 and the same maximum value of 100, but with an increased mean of 67.60.

Before testing the hypotheses on students' learning outcomes, the pre-test and post-test scores were examined for normality and homogeneity. The results of the normality test are presented in Table 7, and the results of the homogeneity test are presented in Table 8.

Table 7. Normality test for pre-test and post-test learning outcomes

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
Pre-test Learning Outcomes	0.112	25	0.200 [*]	0.935	25	0.111
Post-test Learning Outcomes	0.183	25	0.031	0.922	25	0.058

Source: Processed primary data, 2025

Based on the information presented in Table 7, the significance value for the pre-test was 0.111. The pre-test data met the normality assumption because this value was greater than 0.05. In addition, for the post-test data collected after the implementation of the TGT learning model, the significance value was 0.058, which also exceeded the 0.05 threshold. Therefore, the distribution of the post-test data was likewise considered normal.

Table 8. Homogeneity test for pre-test and post-test learning outcomes

		Levene Statistic	df1	df2	Sig.
Result	Based on Mean	0.454	1	48	0.503
	Based on Median	0.452	1	48	0.504
	Based on Median and with adjusted df	0.452	1	47.621	0.504
	Based on trimmed mean	0.498	1	48	0.484

Source: Processed primary data, 2025

The data presented in Table 8 show that the significance value for the homogeneity test is 0.503, indicating that the pre-test and post-test learning outcome data are homogeneous. A t test was used to identify whether there was a significant difference between learning outcome scores before and after the treatment. The results of this test are shown in Table 9.

Table 9. Paired samples test for pre-test and post-test learning outcomes

		Paired Differences					Significance			
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		T	df	One- Sided p	Two-Sided p
					Lower	Upper				
Pair 1	Pre-test	-11.600	11.431	2.286	-16.318	-6.882	-5.074	24	<0.001	<0.001
	Post-test									

Source: Processed primary data, 2025

Because the Sig. (2-tailed) value is less than 0.001, the null hypothesis (H₀) is rejected, and the alternative hypothesis (H_a) is accepted. The SPSS output presented in Table 9 shows a significant difference between students' mathematics learning outcomes before and after the implementation of the TGT learning model. This indicates that the use of the Team Games Tournament (TGT) learning model influences improving the mathematics learning outcomes of fifth grade students.

In addition, the effect of the TGT learning model on elementary school students' motivation and mathematics learning outcomes was evaluated using a MANOVA test.

Table 10. Manova test

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Intercept	Pillai's Trace	0.990	2236.894 ^b	2.000	47.000	<0.001	0.990
	Wilks' Lambda	0.010	2236.894 ^b	2.000	47.000	<0.001	0.990
	Hotelling's Trace	95.187	2236.894 ^b	2.000	47.000	<0.001	0.990
	Roy's Largest Root	95.187	2236.894 ^b	2.000	47.000	<0.001	0.990
	Pillai's Trace	0.227	6.904 ^b	2.000	47.000	0.002	0.227
Learning Model	Wilks' Lambda	0.773	6.904 ^b	2.000	47.000	0.002	0.227
	Hotelling's Trace	0.294	6.904 ^b	2.000	47.000	0.002	0.227
	Roy's Largest Root	0.294	6.904 ^b	2.000	47.000	0.002	0.227

Source: Processed primary data, 2025

According to the SPSS output in Table 10, the significance value (Sig.) is below 0.001, so the null hypothesis (H₀) must be rejected, and the alternative hypothesis (H_a) is accepted. This finding indicates that the use of the Team Games Tournament (TGT) learning model has a significant effect on elementary school students' motivation and mathematics learning outcomes.

Discussion

The effect of TGT on mathematics learning motivation

This study shows that students' desire to learn mathematics increased after the implementation of the Team Games Tournament (TGT) learning model. The Wilcoxon test results show an Asymp. Sig (2-tailed) value below 0.001, which is much lower than the significance threshold of 0.05. Thus, the null hypothesis (H₀) is rejected, and the alternative hypothesis (H_a) is accepted, which means that there is a significant change in learning motivation before and after the application of TGT. Quantitatively, the average motivation score increased from 33.36 before treatment to 37.52 after treatment. This increase indicates that TGT is effective in creating a more enjoyable learning atmosphere, stimulating active participation, and strengthening students' affective aspects. Through tournament activities and group awards, students not only receive material passively but also actively engage in cooperation, discussion, and healthy competition that can build self-confidence.

These findings are in line with the results of research by [Silvia Nasir & Amaliyah, \(2024\)](#), who found that combining the TGT learning model with crossword puzzles significantly increased students' desire to learn. In an atmosphere focused on competitive games, students feel more challenged and engaged, especially when the activities require group cooperation and

competition between teams. Similarly, [Armin and Astuti \(2021\)](#) reported that TGT is effective in increasing students' desire to learn, reinforcing the idea that game-based cooperative approaches can be a relevant alternative in mathematics learning in elementary schools. In addition, packaging learning in a competitive game format helps reduce the boredom that often arises when students learn mathematics, which is often considered a difficult subject. TGT also plays a role in reducing psychological barriers such as fear of asking or answering questions in class, which is often the cause of low learning motivation ([Tandirogang et al., 2025](#)). Thus, the measurable increase in motivation is in line with the theoretical explanation of the importance of a safe, enjoyable, and collaborative learning environment.

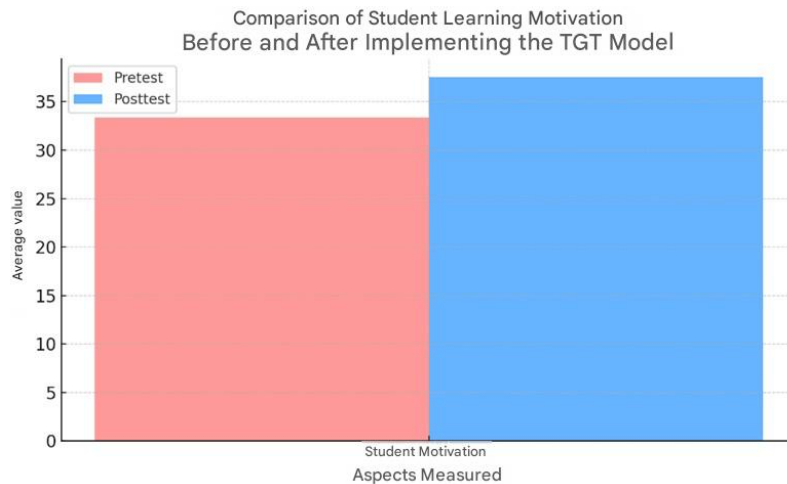


Figure 1. Graph comparing student learning motivation before and after the implementation of the TGT model

Figure 1 visually shows an increase in average learning motivation from 33.36 to 37.52 after TGT was implemented. In the initial stage, motivation was still in the moderate to low category, while after the treatment, the average motivation approached the maximum value of the scale used. This pattern is consistent with the Wilcoxon test findings and reinforces the interpretation that the elements of play, competition, and collaboration in TGT can increase students' emotional involvement and interest in mathematics lessons.

The effect of TGT on mathematics learning outcomes

Statistical analysis using the Paired Sample t-Test shows that the TGT learning model has a significant impact on the mathematics learning outcomes of fifth-grade students. The significance value (Sig. 2-tailed) is less than 0.001, indicating that there is a very significant difference between the pre-test and post-test scores. In other words, TGT successfully improved students' mathematics abilities after the treatment was applied. Quantitatively, the average learning outcome increased by 11.6 points, from 56.00 on the pre-test to 67.60 after learning with TGT. This increase indicates that students have a better understanding of the concepts of GCD and LCM after engaging in a series of TGT-based learning activities. Because the data met the assumptions of normality and homogeneity, the use of the t-test can be considered valid and reinforces the validity of these findings.

These findings are supported by a study by [Silvia Nasir and Amaliyah \(2024\)](#), which reported that students who participated in learning using the TGT model and crossword puzzles obtained an average post-test score of 86, much higher than the control group with a score of 64.83. The effect size of 1.47 in their study indicates a very strong influence of the TGT model on mathematics learning outcomes. These results are in line with the view that TGT can help students understand mathematical concepts that are considered difficult, as it provides opportunities for repeated practice, discussion, and cooperative problem solving.

The TGT model also creates a dynamic learning environment by combining collaboration and healthy competition. Students actively exchange knowledge in small groups and compete in

a tournament format that encourages enthusiasm for learning. [Arini and Sukriono \(2024\)](#) state that this approach not only boosts motivation but also strengthens memory of concepts and critical thinking and mathematical problem-solving skills. [Usman et al. \(2024\)](#), as well as [Amelia and Rizalie \(2023\)](#), emphasize that TGT can increase motivation in the affective domain, as well as learning outcomes in the cognitive and psychomotor domains. These findings are consistent with current research results, which show that TGT has the potential to be an alternative solution to overcome low mathematics achievement at the elementary school level.

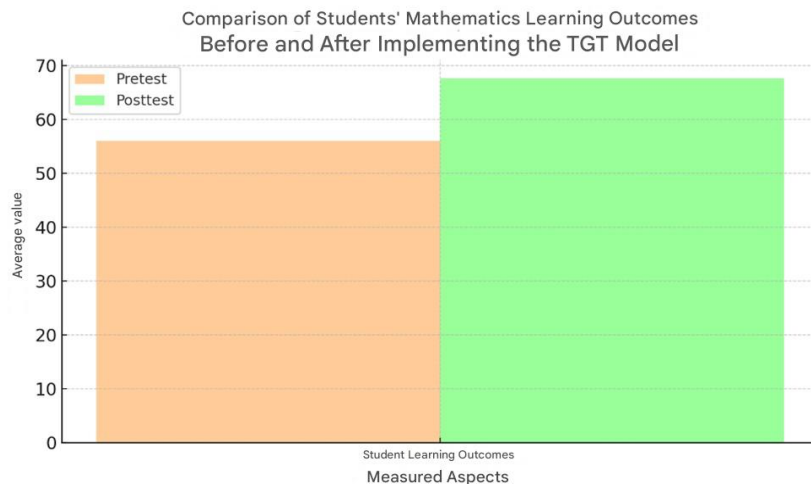


Figure 2. Graph comparing students' mathematics learning outcomes before and after the implementation of the TGT model

Figure 2 illustrates an increase in the average learning achievement of students from 56.00 on the pre-test to 67.60 on the post-test. Before the treatment, the average score showed that students' understanding of mathematical concepts was still low. After participating in learning with the TGT model, the average score increased significantly, reflecting an improvement in students' ability to master the material. This can be attributed to the nature of TGT, which emphasizes interactivity, cooperation, and healthy competition, thereby reducing boredom and increasing active participation during the learning process.

The simultaneous effect of TGT on motivation and learning outcomes

This study not only assessed the effect of TGT on motivation and learning outcomes separately but also examined its impact on both variables simultaneously. MANOVA analysis showed that the TGT model treatment significantly affected motivation and mathematics learning outcomes simultaneously. This is indicated by a significance value of 0.002 from several multivariate tests, such as Pillai's Trace, Wilks' Lambda, Hotelling's Trace, and Roy's Largest Root, all of which are below the significance threshold of 0.05.

These findings indicate that increased learning motivation and improved academic outcomes go hand in hand in the context of TGT implementation. In other words, when students feel more motivated through a pleasant, cooperative, and positively competitive learning atmosphere, this is reflected in their improved cognitive achievements. This supports the view that effective pedagogical interventions need to pay attention to both affective and cognitive aspects simultaneously, not just one.

[Silvia Nasir and Amaliyah \(2024\)](#) state that the TGT model plays a role in improving learning outcomes while motivating students, especially when combined with game media such as crossword puzzles. The use of such media not only increases enthusiasm for learning but also helps students understand concepts more comprehensively. [Putra et al. \(2024\)](#) add that approaches based on social interaction, collaboration, and healthy competition are highly effective when applied in the context of primary education. The findings of this study reinforce

the idea that TGT is a holistic and comprehensive approach to developing students' learning potential, both affectively and cognitively.

CONCLUSION

This study aims to examine the effect of the Team Games Tournament (TGT) learning model on the motivation and learning outcomes of fifth-grade elementary school students in mathematics, both separately and simultaneously. The results of the analysis show that TGT learning has a positive and significant effect on student learning motivation, contributing to an increase in their interest and involvement in mathematics learning. In addition, TGT was also proven to have a positive and significant effect on mathematics learning outcomes, as reflected in the improvement in students' academic achievement after the treatment. Simultaneously, TGT had a positive and significant effect on motivation and learning outcomes, so it can be concluded that this model not only strengthens the affective aspect but also supports the improvement of students' cognitive abilities in mathematics in fifth grade elementary school.

These findings confirm that the TGT learning model is not only effective in improving one aspect of learning separately but also strengthens the relationship between motivation and learning outcomes. Theoretically, this study strengthens empirical evidence regarding the effectiveness of game-based cooperative learning in the context of mathematics learning in elementary school, particularly in the material on the Least Common Multiple (LCM) and Greatest Common Factor (GCF). Practically, the TGT model can be a strategic alternative for teachers to improve the quality of learning, as it is able to create a more enjoyable, interactive, and positively competitive learning atmosphere. The implementation of TGT makes students more enthusiastic about learning, actively involved in tournaments, and have ample opportunity to interact and exchange ideas in solving mathematical problems.

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