The Effect of the TGT Model Assisted by 'Play With Dyno' Snakes and Ladders Media on First-Grade Students' Mathematics Learning Outcomes

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Abstract

This study aims to determine the effect of the cooperative learning model of the Teams Games Tournament (TGT) type assisted by the snakes and ladders media "Play With Dyno" on the mathematics learning outcomes of grade I students at SDN Barurambat Kota 1 Pamekasan. The background of this study is the low student learning outcomes due to conventional learning methods that are less interesting and the lack of interactive media. The method used is quantitative with a quasi-experimental design of Nonequivalent Control Group Design. The sample consisted of two classes, namely class IA as the experimental group and class IB as the control group. The instrument used was a multiple-choice test. The results showed a significant increase in student learning outcomes after the TGT model assisted by the snakes and ladders media was applied. This approach has been proven to be able to increase student involvement, facilitate understanding of number concepts, and create a fun and meaningful learning atmosphere. The conclusion of this study is that the TGT model with the snakes and ladders media "Play With Dyno" is effective in improving the mathematics learning outcomes of grade I students and is worthy of being used as an alternative learning strategy in elementary schools.

Keywords : Teams Games Tournament, Snakes and Ladders, Learning outcomes.

1.   Introduction

Mathematics learning in elementary schools plays a pivotal role in developing students' logical reasoning, analytical thinking, and conceptual understanding by connecting abstract concepts to real-life contexts through concrete experiences. However, challenges arise from students' perception of math as difficult due to weak foundational skills, teachers' limited use of engaging methods, and the inherent abstract nature of mathematical concepts. Research (Fitriya et al., 2022; Febrianti et al., 2024; Fauzi et al., 2020; Wiryana & Alim, 2023) emphasizes that effective math education requires contextual, play-based approaches tailored to students' developmental stages to bridge the concrete-abstract gap, boost engagement, and solidify basic concepts. By integrating interactive, relevant strategies such as linking lessons to daily experiences teachers can transform math into a meaningful, accessible subject that fosters critical thinking and problem-solving skills.

The learning model known as Teams Games Tournament (TGT) is one of the various cooperative learning strategies. The TGT learning model is an adaptation of various cooperative learning techniques. According to (Nopiani et al., 2021) "The TGT model is a form of cooperative learning that is easy to implement, involves all students equally without distinguishing status, allows students to function as peer tutors, and includes aspects of play and feedback." Given these aspects, students are organized into different study groups. After collaborating in the group, representatives with the same abilities will compete at the tournament table.

The TGT learning model can be integrated with learning media. The selection of media must be done carefully, considering the suitability of the subject matter and student characteristics. One of the main characteristics of elementary school students is that they like to play. For children, playing is a need that cannot be separated from their lives. Therefore, the integration of game elements in learning, such as those found in the TGT model, is a very relevant and effective approach to increasing student engagement and motivation to learn. It

is imperative for teachers, especially in mathematics-related disciplines, to explore more creative, diverse, engaging, and fun approaches to presenting educational content. One effective technique to implement is the game-based learning approach, which is known to improve students' cognitive, emotional, and motor skills. (Rosarian & Dirgantoro, 2020) stated that psychology specialists believe that learning through play is an ideal strategy to develop children's social skills because it fosters a relaxed and fun educational environment. In addition, this approach is also an active way to nurture children's psychological growth, allowing them to explore and act freely, while also helping in the formation of positive interpersonal relationships. In line with this, (Syaikhu et al., 2022) emphasized the need for innovative methods in education to foster a more enjoyable learning experience. In this regard, the TGT (Teams Games Tournaments) learning framework presents options that can help students hone their logical, analytical, systematic, creative, and critical thinking skills, along with improving their teamwork skills. This model also enables students to acquire social competencies, such as engaging in discussions, articulating opinions with justification, responding to and assessing others' points of view, and making appropriate decisions.

Effective elementary mathematics learning requires media that aligns with both curriculum objectives and students' playful nature, making game-based tools like "Play With Dyno" Snakes and Ladders combined with the TGT model particularly valuable. Research (Wati, 2021; Dynawantika et al., 2023) demonstrates this approach's effectiveness in transforming abstract concepts into engaging experiences that bridge concrete and abstract thinking, while being collaborative, visual, and cost-effective. At SDN Barurambat Kota 1 Pamekasan, where 80% of first-graders scored below minimum standards in addition/subtraction due to passive textbook methods, this strategy successfully addressed critical challenges by boosting participation, reducing anxiety, and improving outcomes - meeting teachers' urgent needs for concrete, motivational tools that revitalize foundational math education through psychologically

stimulating, measurable improvements. The application of learning aids in the format of a snakes and ladders game is a creative approach to improving the learning outcomes of first grade students, especially in understanding the concepts of addition and subtraction, as stated by (Myrna, 2022).

The use of learning media at SDN Barurambat Kota 1 Pamekasan remains limited, primarily relying on textbooks and stationery with little variation, leading teachers to depend on lecture methods and board examples resulting in student boredom and low motivation. Key challenges include limited access to modern (physical/digital) media, a lack of facilities like computers or projectors, and insufficient teacher training in interactive media development. Heavy workloads, time constraints, and tight school budgets further hinder the creation of engaging learning tools. Consequently, monotonous and irrelevant teaching materials reduce student interest and focus during lessons.

The need to understand media innovation and use appropriate and interesting learning models is undeniable, especially since elementary school children often show limited attention spans and require more interesting teaching techniques. To overcome this challenge, researchers must find creative solutions, one of which is the adoption of the Teams Games Tournament (TGT) learning model in addition to being combined with interactive learning media, such as the "Play With Dyno" snake and ladder game. This approach can not only foster a fun learning environment but also help students understand mathematical principles more simply and entertainingly. Furthermore, providing professional development for teachers on learning tools, learning tools are essential to improving teacher quality. When teachers have the right skills, they can fully optimize interactive media, leading to a more effective and enjoyable teacher experience for students. As stated by (Myrna, 2022) it highlights that advances in learning media significantly affect the performance of student learning outcomes, especially in increasing student engagement and understanding of mathematical concepts.

The research that supports this research is a research conducted by (Ariza et al., 2024) entitled Improving Student Learning Achievement in Mathematics Through the Use of the Teams Games Tournament (TGT) Learning Approach with the Support of Snakes and Ladders Media for Grade Five at SD Negeri 18 Pendopo. The purpose of this study was to improve student learning outcomes through the application of the Teams Games Tournament (TGT) model that combines snakes and ladders as a teaching aid. According to the findings of this analysis, in cycle I, the average score for teacher involvement was 45, which was included in the sufficient category. However, after improvements were made in cycle II, the score for teacher involvement increased to 56, now categorized as good. Student participation also increased, with an initial average score of 44 in cycle I, which increased to 54.5 in cycle II, which was categorized as good. Student learning achievement in cycle I was reflected in the average class score of 61.53 with a percentage of completion of 46.15%, which was considered sufficient. On the other hand, in cycle II the average class value increased to 75.38 with a passing percentage of 76.91%, which is considered good. This shows that the implementation of the TGT model equipped with snakes and ladders media has a positive effect on student learning outcomes.

2. Method

This study uses a quantitative approach. Quantitative research according to (Ali et al., 2022) is a type of research that produces findings through measurement procedures and statistical analysis. This study focuses on certain symptoms that can be measured as variables. In a quantitative approach, the relationship between variables is analyzed using statistical tests and is based on objective theories. This approach allows researchers to test hypotheses systematically and accurately based on empirical data. This study aims to determine whether or not there is an effect of using the TGT learning model assisted by snakes and ladders media on student learning outcomes.

In this study, using the quasi-experimental method used involving two groups, namely the experimental group and the control group. The study used the Nonequivalent Control Group Design. In this design, the two groups (experimental and control) were not selected randomly (non-random). However, this design is similar to the Pretest-Posttest Control Group Design, where both groups are given a pretest and posttest. The design notation can be described as follows.

Table 1. Research Tabel

Group	Pre-test	Treatment	Post-test
Experiment	O_1	X	O_2
Control	O_3	-	O_4

Information:
O1 = Pretest value (before treatment)
X = Implementation of the cooperative model of the scramble game type
O2 = Posttest value (after treatment)
O3= Pretest score (before being given the material)
O4= Posttest score (after being given the material)

3.   Result and Discussion

This study was conducted with the main objective to examine how much influence the implementation of the Teams Games Tournament (TGT) cooperative learning model combined with the use of educational media in the form of the snakes and ladders game "Play With Dyno" has on the mathematics learning outcomes of grade I students at SDN Barurambat Kota 1 Pamekasan. The Teams Games Tournament (TGT) learning model is a cooperative learning model that in its implementation involves the activities of all students to obtain the desired concept. The TGT model has a positive influence on students through learning activities that can accommodate the diversity of students' learning methods in absorbing information so that all students are actively involved in the learning process (Marlina et al., 2024).

This study uses a quasi-experimental approach, which is a type of experimental research that does not fully use randomization in determining subjects. The design used is Nonequivalent Control Group Design, which consists

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of two groups of students, namely the experimental group and the control group. The experimental group is a group that follows learning using the TGT model with the support of the "Play With Dyno" snake and ladder media. Meanwhile, the control group continues to receive learning with conventional methods commonly used by teachers in daily learning activities, without the application of innovative learning models or media.

The total sample in this study was 56 students. This number was divided into two classes, namely 28 students as members of the experimental group and 28 students as members of the control group. To obtain the data needed in the study, the researcher used an instrument in the form of multiple-choice test questions. This test was given in two stages, namely before the implementation of learning (pretest) and after learning was completed (posttest). The purpose of giving this pretest and posttest was to determine the increase in student learning outcomes after treatment, and to measure the extent to which the TGT model with game media was able to improve students' understanding of the mathematics material being taught.

Before being used in the study, the question instrument was first validated by expert lecturers and teachers to ensure the appropriateness of the content and its suitability with the learning objectives. After receiving validation, on Wednesday, April 16, 2025, a trial of the instrument was conducted in class II C SDN Barurambat Kota 1 Pamekasan involving 27 students. The results of this trial were then analyzed using a construct validity test with the help of the SPSS 22.0 application to ensure that each question item was valid in measuring learning outcomes. Construct validity refers to the extent to which the measurement score reflects the latent construct to be measured. An instrument is said to be valid if the instrument is able to accurately measure the variables being studied. According to (Ayuningtyas et al., 2025) where construct validity shows the extent to which an instrument reflects the ability of the theoretical construct to be measured. Validity testing emphasizes the suitability of the measuring instrument to the concept being measured so that the instrument truly measures the relevant

thing. In this study, validity testing was carried out on test questions used as measuring instruments to determine student learning outcomes. From the results of the validity test analysis of the test instrument, 10 out of 15 questions showed an adequate level of validity and were suitable for use. This means that only questions that passed the validity criteria were used in the analysis of learning outcomes, to ensure that the data obtained truly reflected the students' actual abilities.

In addition to the validity test, researchers also conducted a reliability test using Cronbach's Alpha. According to (Nilda, 2021) reliability is an index that shows the extent to which a measuring instrument can be trusted or relied on. So that the reliability test can be used to determine the consistency of the measuring instrument, whether the measuring instrument remains consistent if the measurement is repeated. A measuring instrument is said to be reliable if it produces the same results even though measurements are taken many times. The results obtained were the Cronbach's Alpha coefficient on the test questions of 0.75. According to (Sugiharto et al., 2024) stated that the Cronbach alpha statistical test is that a variable is declared reliable if its value is> 0.6. Therefore, it can be concluded that the variable is said to be reliable or consistent in measuring. Therefore, it can be concluded that the test questions that are said to be valid are reliable, and both questions are in the strong reliability category.

Following reliability testing, the researcher assessed question difficulty levels (with 8 medium and 2 easy items) and discriminatory power (7 good and 3 sufficient items) to select 10 validated pretest/posttest questions (Setiyawan & Wijayanti, 2020). The study was conducted over three 35-minute sessions in experimental and control classes (IA and IB), with four Trunojoyo University observers monitoring model/media implementation and student responses. Pretests were administered on May 9, 2025, while the control class received conventional instruction until posttesting on May 14, 2025.

The application of the TGT model with the "Play With Dyno" snakes and ladders media provides a more enjoyable and challenging learning experience for

students. The game and competition aspects in the snakes and ladders media can significantly increase students' learning motivation. This is in line with the opinion of (Fauziyah & Anugraheni, 2020) that the TGT type cooperative learning model has the aim of motivating students to support and help each other in mastering the skills taught by the teacher which ultimately leads to a score for each team member. So that students try to master the material well, then in this way it will have an impact on students' critical thinking. In addition, the aspects of group work and collaboration that occur during the game strengthen the understanding of mathematical concepts in depth. Group discussions held after the game session help students construct knowledge together, improve conceptual understanding and problem-solving skills, this is also supported by the findings of (Myrna, 2022) who emphasizes the importance of group discussions in building an in-depth understanding of mathematical concepts.

The use of snakes and ladders game media also supports active learning, where students not only receive information passively, but also interact directly with learning materials through playing activities. This activeness is an important factor in improving learning outcomes, especially for lower grade students who tend to get bored easily with traditional learning methods. In line with the opinion of (Kresnandya, 2020) stated that learning media greatly helps students in understanding basic mathematical concepts such as numbers and number operations. The results of observations during learning showed a lively classroom atmosphere and high student enthusiasm, supporting the opinion of (Hamidah & Gumilang, 2023)) who stated that innovative learning media can trigger student involvement emotionally and cognitively.

In the snakes and ladders game, each student takes turns throwing the dice and moving the pawns according to the number obtained. After stopping at a certain box, students are required to answer math questions related to the material that has been taught. Correct answers will give points to their group. The teacher acts as a facilitator who oversees the course of the game, provides assistance if needed, and leads group discussions after the game session to

strengthen the understanding of mathematical concepts collaboratively. This learning process is designed so that students actively interact, work together in groups, and feel challenged so that the learning atmosphere becomes fun and supports the achievement of optimal learning outcomes.

In the process of collecting pretest and posttest data that has been carried out, the researcher conducted a normality prerequisite test using the Shapiro-Wilk test technique from this test, the significance value of the experimental class pretest data was 0.11> 0.05 and the control class showed a value of 0.12> 0.05, while the significance value of the experimental class posttest data showed 0.12> 0.05 and the control class showed a value of 0.07> 0.05, this indicates that the values of the pretest and posttest of the experimental class and the control class show normal data.

Table 2. Result of the Normality Test

Tests of Normality							
Kelas		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Pretest	1	.165	28	.050	.939	28	.106
	2	.151	28	.102	.943	28	.131
Posttest	1	.162	28	.057	.929	28	.058
	2	.176	28	.026	.943	28	.130
a. Lilliefors Significance Correction							

After conducting the prerequisite test, the researcher conducted a homogeneity test using the Levene's Test for Equality of Variances technique. The results obtained significant pretest data of 0.728 and posttest of 0.640. Therefore, it can be concluded that the pretest and posttest data are homogeneous, this is because the pretest data shows 0.73> 0.05, while the posttest data shows 0.64> 0.05.

Table 3. Result of the Homogeneity Test

Test of Homogeneity of Variance					
		Levene Statistic	df1	df2	Sig.
Pretest	Based on Mean	.002	1	54	.961
	Based on Median	.000	1	54	1.000
	Based on Median and with adjusted df	.000	1	54.000	1.000
	Based on trimmed mean	.005	1	54	.946
Posttest	Based on Mean	.790	1	54	.378
	Based on Median	.884	1	54	.351

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Based on Median and with adjusted df	**.884**	**1**	**53.557**	**.351**
Based on trimmed mean	**.684**	**1**	**54**	**.412**

The researcher conducted data analysis using two types of statistical tests, namely paired sample t-test and independent sample t-test. The peered sample t-test was used to see the differences in learning outcomes before and after treatment in each group, while the Independent Sample t-test was used to compare learning outcomes between the experimental and control groups, both before and after treatment. The results of the paired t-test showed that in the experimental class there was an increase in the average mean differences of 30.00 points, while in the control class the increase in mean differences was 8.14 points. The significance value (sig. 2-tailed) in both groups was 0.00, which means less than 0.05. This shows that the increase in learning outcomes was statistically significant in both groups. However, the increase in the experimental group was much higher than the control group. This shows that the use of the Team Games Tournament (TGT) type cooperative learning model with the "Play With Dyno" snake and ladder media is more effective in improving student learning outcomes than conventional methods.

Table 4. Result of the Paired Samples T-Test

		Paired Samples Test							
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	PostEksp - PretestEks	30.00000	15.39601	2.90957	24.03005	35.96995	10.311	27	.000
Pair 2	PostKontrol - PretesKontrol	9.286	12.451	2.353	4.458	14.114	3.946	27	.001

The researcher then continued the analysis using the independent sample t-test to determine whether there was a significant difference between the experimental group and the control group. The results of the analysis on the pretest data showed a significance value of 1.00, which is greater than 0.05. This indicates that the initial abilities of students in both groups are relatively the same and there is no significant difference before the treatment is given.

However, the analysis results on the posttest showed a significance value of 0.00, which is smaller than 0.05. This means that there is a significant difference between the learning outcomes of students in the experimental class and the control class after the treatment was given. The mean difference of 21.85 points shows that students in the experimental group obtained much higher learning outcomes compared to students in the control group.

Table 5. Result of the Independent Samples T-Test

Independent Samples Test		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Pretest	Equal variances assumed	.002	.961	.206	54	.838	.714	3.475	-6.252	7.681
	Equal variances not assumed			.206	53.999	.838	.714	3.475	-6.252	7.681
Posttest	Equal variances assumed	.790	.378	5.934	54	.000	21.429	3.611	14.189	28.668
	Equal variances not assumed			5.934	52.415	.000	21.429	3.611	14.184	28.673

The results of the t-test show that there is a significant difference between the learning outcomes of students in the experimental class and the control class after being given treatment. This difference is supported by data visualization in the form of a histogram that illustrates the distribution of pretest and posttest scores in the two classes that have been explained in the picture. The distribution of student learning outcomes in the experimental class and the control class is also presented in the form of a histogram. This presentation aims to illustrate the distribution of posttest scores and strengthen the finding that there is a significant difference between the two classes after being given treatment.
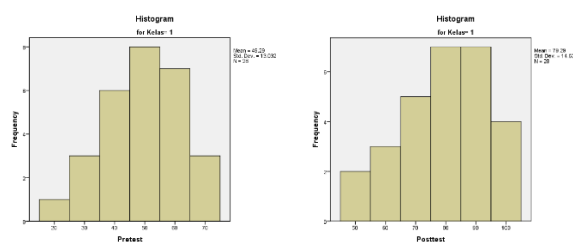

Figure 1. Histogram of Pretest dan Posttest Scores of the Experimental Class

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In the experimental class, the posttest histogram showed a much higher increase with an average value of 79.29, compared to the pretest which was only 49.29. This strengthens the results of the statistical test that the Scramble game type cooperative learning model assisted by Canva media has a significant effect on improving student learning outcomes.
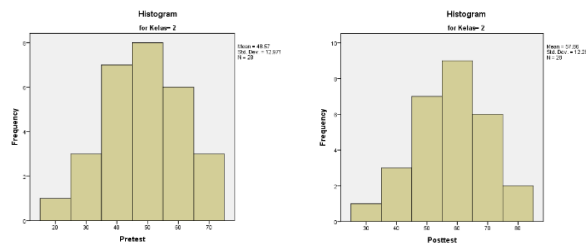

Figure 2. Histogram of Pretest and Posttest Scores of the Control Class

Meanwhile, the histogram data of the pretest values in the control class showed an average of 48.57 with a distribution that tended to be normal but still low, while the posttest showed that the value increased to 57.86.

In the control class, the pretest score had an average of 48.57 with a distribution that tended to be normal but still relatively low. After the treatment, the posttest score increased to 57.86. Meanwhile, in the experimental class, there was a much higher increase, from a pretest average of 49.29 to a posttest average of 79.29. This histogram visualization strengthens the results of the statistical analysis that the TGT type cooperative learning model assisted by the "Play With Dyno" snake and ladder media has a significant effect on improving student learning outcomes. The significant increase in posttest scores in the experimental group not only shows the success of the intervention, but also illustrates how the game elements in the TGT model can stimulate students' intrinsic motivation in understanding basic mathematical concepts.

Based on the results of the hypothesis test, it is determined:

- H0 (null hypothesis): There is no significant influence from the use of the Team Game Tournament (TGT) type cooperative model assisted by the Snakes and Ladders Play With Dyno media on the learning outcomes of class I students at SDN Barurambat Kota 1 Pamekasan.

- H_a (alternative hypothesis): There is a significant influence of the use of the Team Games Tournament type cooperative model assisted by the Play With Dyno snake and ladder media on the learning outcomes of class I students at SDN Barurambat Kota 1 Pamekasan.

Since the posttest significance value is 0.00 < 0.05, then H_o is rejected and H_a is accepted. This means that the use of the Team Games Tournament type cooperative learning model supported by the "Play With Dyno" snake and ladder media has been statistically proven to have a significant effect on improving student learning outcomes.

This study uses a cooperative learning model of the Team Games Tournament (TGT) type assisted by snakes and ladders media, the same as that used in several previous studies. (Kurniawan & Setyawan, 2024) who studied grade II students at SDN Ngadirejo 4 Kartasura found that the TGT model with snakes and ladders media can significantly improve mathematics learning outcomes. Likewise, (Sitohang Adriani Herlita, 2023) and (Ariza et al., 2024) reported an increase in the scores and activities of grade V students after implementing the TGT model with snakes and ladders media.

In addition, research by (Islami et al., 2025) showed an increase in students' arithmetic abilities with the same model, and (Nopiani et al., 2021) proved that the use of snakes and ladders game media in TGT learning was more effective than conventional methods in grade IV students. The main difference between this study and previous studies is the focus on grade I students with number material at SDN Barurambat Kota 1 Pamekasan. Although the objects and class levels are different, the results of this study are in line with previous findings that the TGT model assisted by snakes and ladders media is effective in improving mathematics learning outcomes and student engagement.

The results of this study extend previous studies by proving that the TGT model assisted by snakes and ladders media is also effective when applied to first grade elementary school students, especially in understanding number material. Based on the results of data analysis and discussion that have been presented, it

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can be concluded that the application of the Team Games Tournament (TGT) cooperative learning model assisted by the snakes and ladders game media "Play With Dyno" significantly improves the mathematics learning outcomes of first grade students at SDN Barurambat Kota 1 Pamekasan. This success shows the importance of innovation in learning models and media in creating effective and enjoyable learning, especially for students in the early grades of elementary school.

4.   Conclusion

Based on the results and data analysis that have been done, it can be concluded that the cooperative learning model of the teams games tournament type has an effect on the learning outcomes of class I students of SDN Barurambat Kota 1 Pamekasan, in the subject of mathematics on addition and subtraction, this is based on the results of the hypothesis test that has been done where the value of the hypothesis test of the pretest posttest data of students is significant $0.00 < 0.05$. Thus H0 is rejected and Ha is accepted, it can be interpreted that there is a significant influence between the use of the cooperative type of Teams Games Tournament (TGT) assisted by the snake and ladder media Play With Dyno on the learning outcomes of class I students of SDN Barurambat Kota 1 Pamekasan.

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