



Empowering Problem-Solving Abilities and Self-Esteem in Students: Implementing the Teams Games Tournament (TGT) Model in Class VIII of MTS Daar Al-Ilmi

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Abstract

This study aims to analyse the effect of the Teams Games Tournament (TGT) type cooperative learning model on students' problem-solving ability and self-confidence. This research is quantitative research using quasi-experimental methods. The research design used is a nonequivalent control group design. The research design used is nonequivalent control group design. The stages of this study were 1) conducting pretests, 2) providing learning treatment, 3) conducting posttests and questionnaires, and 4) concluding. This research was carried out in class VIII C and class VIII D MTs Daar Al-Ilmi Academic Year 2023/2024. The instruments used in this study are tests and questionnaires. This test instrument is in the form of a posttest that measures students' mathematical problem-solving abilities. This questionnaire is in the form of a statement to determine students' mathematical confidence. The results showed that the mathematical problem-solving ability and mathematical self-confidence of students who received the Teams Games Tournament (TGT) type learning model treatment had an average score of 84.27, Better than the mathematical problem-solving ability of students who obtained conventional learning model treatment with an average score of 80.28. it can be implied that the Teams Games Tournament (TGT) model influences students' problem-solving abilities, and students' self-confidence is proven.

Keywords: Teams Games Tournament; Problem-solving ability; Self-confidence.

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Islamiyah, et. al. (2024). Empowering Problem-Solving Abilities and Self-Esteem in Students: Implementing the Teams Games Tournament (TGT) Model in Class VIII of MTS Daar Al-Ilmi. *International Journal of Applied Learning and Research in Algebra* (Algebra), 01(01), 1-9, doi. <https://doi.org/10.56855/algebra.v1i1.1157>

1. Introduction

Education is a conscious and planned effort to create a learning atmosphere and learning process where students actively develop their potential in the fields of religion, spiritual strength, self-discipline, personality, intelligence, noble character, and skills needed by themselves, society, nation, and state, according to Law Number 20 of 2003 concerning the National Education System.(Efendi & Suastra, 2023; Riandi, 2016). Mathematics is used to answer problems in mathematics. This involves understanding problems, creating ideas, improving models, and offering appropriate solutions. The ability to solve problems is essential for children. Experts agree that the subjects and topics of study taught can help teach problem-solving techniques. Problem is a word we often hear. However, something becomes a problem depending on how a person approaches the problem according to his ability.

Purba et al. (2021) is a mathematician who thinks that problem-solving is an attempt to find a way out of a difficulty to achieve a goal that cannot be achieved immediately. George Polya also provides four problem-solving methods: understanding the problem, planning a solution, solving the problem and checking again. Sumartini (2016) stated that mathematical problem-solving skills are significant for every student because (1) problem-solving is the goal of teaching mathematics in general, (2) problem-solving related to methods, procedures, and strategies is the primary and main process in the mathematics curriculum, and (3) problem solving is the initial ability in learning mathematics.

According to Muslimah et al. (2023) Problem-solving is an effort to find a way to achieve the previously obtained goals in a new situation. Mathematical problem-solving is a complex cognitive activity, as overcoming a problem encountered and solving it requires several strategies. (Harahap & Surya, 2017; Susilo et al., 2023). According to Mawardah and Anisa (2015), problem-solving is a thought directed directly to finding a solution or solution to a specific problem. Each student's mathematical problem-solving ability is different.

In addition to the cognitive aspect, namely problem-solving ability, it is also necessary to improve the affective aspect, namely Self-confidence. According to Aisyah et al. (2019), self-confidence means being confident in one's abilities and judgement in performing tasks and choosing approaches that are considered influential enough. Self-confidence is the primary capital of a human being in fulfilling their own various needs. A person needs freedom of thought and feeling, so someone with freedom of thought and feeling will grow into someone with self-confidence (Kania et al., 2022; Andayani & Amir, 2019). Self-confidence will determine how much potential or ability a person uses and how good and effective the action is until, finally, it will determine the results obtained (Mawaddah et al., 2020).

A new learning model is needed to overcome the problems related to students' problem-solving ability and self-confidence. Thus, the Teams Games Tournament (TGT) cooperative learning model suits students. According to Fauziyah & Anugraheni (2020), the Teams Games Tournament (TGT) learning model is a learning model by creating learning teams consisting of four to six people, formed heterogeneously to master the material well, then playing tournaments or matches between teams to get additional points which will be used as their team score. According to Uli and Pardede (2019), the TGT-type cooperative

learning model is a group learning model that uses games and tournaments to get an assessment score. Meanwhile, Rusman (2014) defines TGT as one type of cooperative learning that places students in learning groups of 5 to 6 students who have different abilities, genders, ethnicities or races. The steps of the Teams Games Tournament (TGT) type cooperative learning model, according to Shoimin (2014), are a) Class presentation, b) Learning in groups, c) Playing (Game), d) Match (Tournament), and e) Group awards.

Based on a preliminary study conducted by Nurhayati et al. (2022) using the TGT-type cooperative learning model, the test results showed that the average mathematical and logical thinking ability of students before applying the Teams Games Tournament (TGT) type cooperative learning model was 58 (sufficient category) and after applying realistic mathematics learning was 85.85 (outstanding category). This article discusses the effect of the Teams Games Tournament (TGT) learning model on students' problem-solving ability and self-confidence.

2. Methods

This research uses quantitative quasi-experimentation. The research methodology used was nonequivalent control group design, in which a highly regulated experimental group and control group were used to conduct the study and ensure that all variables had the same or nearly identical features. The experimental group was given special treatment, but the control group was given standard treatment. This is the difference between the two groups.

The steps taken in this study are as follows: 1) administering a pretest; 2) offering therapy using the Teams Games Tournament (TGT) learning model; 3) administering a posttest of problem-solving ability and questionnaire to students expressing self-confidence; and 4) formulating findings. The research design is shown in Table 1.

Table 1 - Nonequivalent control group design

Groups	Test	Treatment
Experiment	T	X
Control	T	O

Description:

T: Student problem-solving ability test.

X: Learning using Teams Games Tournament (TGT) type cooperative learning model.

O: Learning with conventional learning.

This research was conducted in class VIII C and class VIII D MTs Daar Al-Ilmi, with a population of all class VIII students in the odd semester of the 2023/2024 academic year. The research sample was 59 students, with classes VIII-C and VIII-D being the experimental classes. The independent variable in this research is the TGT learning model. The dependent variable is students' mathematical problem-solving ability.

The instrument used is a summative test instrument of cartesian coordinate material, which becomes a pretest and posttest containing as many as 5 essay questions. This study's test data analysis techniques are descriptive statistical analysis (min, max, mean, standard deviation), normality test, homogeneity test, and hypothesis test using Paired sample t-test and independent sample t-test. The questionnaire analysis technique in this research is descriptive statistical analysis (min, max, mean, standard deviation) and Likert scale results.

3. Results and Discussion

3.1. Results

Quantitative data is generated from pretests and posttests conducted in classes VIII-C and VIII-D. The pretest tests students' mathematical problem-solving ability before learning that applies the Teams Games Tournament (TGT) type cooperative learning model for the experimental class. The control class is given before learning, which applies conventional learning. The posttest is a test of students' mathematical problem-solving ability given after learning that applies the TGT type cooperative learning model for the experimental class. At the same time, the control class is given after learning, which applies conventional learning. The pretest and Posttest consisted of descriptive questions with 5 items on cartesian coordinate material. The test serves to see the extent of improving students' mathematical problem-solving skills before and after implementing learning. The following presents the results of the descriptive analysis of the posttest in Table 2.

Table 2 - Descriptive analysis of pretest and posttest

Information	N	Min	Max	Mean	Std. Deviation
Pretest Exp	30	28	62	42.33	9.953
Posttest Exp	30	68	98	84.27	6.596
Pretest Cont	29	26	56	37.72	8.464
Posttest Cont	29	64	94	80.28	7.382
Valid N	29				

Table 2. shows that the average value of the pretest for the experimental class is 42.33, with the highest value of 62 and the lowest value of 28, and the average value of the posttest is 84.27, with a 98 and the lowest value of 68. In the control class, the average value of the pretest is 37.72, with a highest value of 56 and a lowest value of 26, and the average value of the posttest is 80.28, with a highest value of 94 and a low value of 64.

Thus, before and after being given different treatments between the experimental and control classes, the results can be seen that the experimental class given the treatment using the TGT type cooperative learning model on cartesian coordinates material obtained a better average value of the students' mathematical problem-solving ability test than the control class using the conventional learning model. Furthermore, the Kolmogorov-Smirnov Normality test was conducted to determine whether the data was normally distributed. The results of the normality test are shown in Table 3.

Table 3 - Normality test results of pretest and posttest

Classes	Kolmogorov-Smirnov Sig.
Pretest Exp	0.053
Posttest Exp	0.651
Pretest Cont	0.090
Posttest Cont	0.834

Table 3 shows that the significant values for the pretests of the experimental and control classes are 0.053 and 0.90, respectively, where the values of Sig. >0.05. Similarly, the significant value for the posttest of the experimental and control classes is 0.651 and 0.834,

respectively, where the Sig value is. >0.05 . This shows that the research data is usually distributed. The next step is to test Levene's homogeneity to determine whether the data is homogeneously distributed. The results of the homogeneity test are shown in Table 4.

Table 4 - Results of pretest and posttest homogeneity test

Classes	Sig. Based on Mean	Information
Exp and Cont	1.053	Homogeneous

Table 4 shows that the significance value (Sig.) based on the mean is $1.053 > 0.05$. Because the significant value of pretest and posttest data of experimental and control classes > 0.05 , it can be concluded that the variance of pretest and posttest data in experimental and control classes is homogeneous.

Next, with the t-paired sample test. The purpose of the t-paired sample test is to see the pretest data whether there is a difference in students' mathematical creative thinking ability before being given treatment in learning in the experimental class using the TGT type cooperative learning model and the control class using conventional learning. The results of the t-paired sample test are shown in Table 5.

Table 5 - Results of paired sample test pretest

Classes	Sig. (2-tailed)	Information
Exp and Cont	0.076	H0 accepted

Based on Table 5 above, a sig value (2-tailed) of $0.079 > 0.05$ means that H0 is accepted and H1 is rejected. Because H0 is accepted and H1 is rejected, it can be concluded that there is no significant difference in pretest results in experimental and control classes in students' problem-solving skills.

Next, the independent sample test. The independent sample test aims to see whether the post-test data show a difference in students' mathematical creative thinking ability after being treated in experimental classes that use the TGT-type cooperative learning model and control classes that use conventional learning. The results of the independent sample test are shown in Table 6.

Table 6 - Independent sample test results posttest

Classes	Sig. (2-tailed)	Information
Exp and Cont	0.033	H0 rejected

Based on Table 6, the above-obtained sig value is shown. (2-tailed) of $0.033 < 0.05$ so that H0 is rejected and H1 is accepted. Because H0 is rejected and H1 is accepted, it can be concluded that there is a significant difference in post-test results in the experimental and control classes in students' problem-solving ability.

Quantitative data is generated from questionnaire statements carried out in the experimental class. The questionnaire is a statement that collects data in the form of circumstances, experiences, knowledge, attitudes and opinions about a matter in the form of a statement. Questionnaires were given to students to determine their self-confidence during the learning process using the TGT type cooperative learning model. The questionnaire statement consists of 20 short statements about students' mathematical self-confidence. The following presents the results of the descriptive analysis of the questionnaire in Table 7.

Table 7 - Descriptive results of self-confidence

Information	N	Min	Max	Mean	Std. Deviation
Exp	30	55	79	73.47	5.111
Valid N (listwise)	30				

According to Table 7. The self-confidence questionnaire completed by 31 participants in the experimental class had an average score of 5,111, with a maximum of 79 and a minimum of 55. Table 8 shows the percentage of each self-confidence indicator tested with up to 30 participants in the experimental class.

Table 8 - Percentage results of self-confidence indicators

Number	Self-efficacy indicator	Max	Percentage (%)	Criteria
1.	Confidence in Your Ability	440	92	Very Strong
2.	Act independently in making decisions	458	95	Very Strong
3.	Valuing Yourself and Your Effort	443	92	Very Strong
4.	Excited when expressing opinions in discussions	329	91	Very Strong
5.	Dare to Face Challenges	534	89	Very Strong
Average Percentage			92	Very Strong

According to the percentage results of Table 8, each of the three confidence indicators has a decisive qualifying factor. The highest indicator score for Acting Independently in Making Decisions is 95%. However, the lowest score for the Dare to Face Challenges indicator is 89%.

Based on the data management results, it is concluded that there are differences in students' mathematical problem-solving abilities after learning in experimental and control classes. In the control class using the conventional learning model, there was a difference in problem-solving ability after learning. Likewise, the experimental class that used the TGT-type cooperative learning model experienced differences in students' mathematical problem-solving abilities after learning.

3.2. Discussions

As seen in Table 8, the Teams Games Tournament (TGT) cooperative learning paradigm impacted the students' self-assurance and ability to devise solutions to specific problems. The findings indicate that three leading indicators of students' self-confidence—namely, "Acting Independently in Making Decisions," "Dare to Face Challenges," and another one that was not named—have a substantial influence on the degrees of confidence that students possess. With a perfect score of 95%, "Acting Independently in Making Decisions" stood out among the other questions, indicating that students genuinely believe they can make their own decisions while they are in school. Because of this self-assurance on the part of the students, it is clear that the TGT model successfully motivates them to be active participants in their education. This is accomplished by giving them the authority to decide on their assignments without needing heavy supervision from the teacher or tutor. On the other hand, the "Dare to Face Challenges" indicates a relative gap compared to the others, even though it still demonstrates

a high degree of confidence (89 per cent). Students may have a high level of self-assurance regarding their decision-making ability. However, this lower score indicates they may still feel unease or hesitate when confronted with complex or novel tasks (Usmayati & Gürbüz, 2024). Because this revelation is of such critical importance, it highlights the necessity of enhancing the TGT model's emphasis on resilience and the ability to confront issues head-on. This component should be helped by incorporating more planned chances for students to engage in more challenging activities within a supportive environment (Ratnawulan et. al, 2020) . This would strengthen the students' confidence in dealing with complex challenges.

When the experimental and control groups are compared, it sheds light on the effectiveness of the TGT model in enhancing the ability to solve mathematical problems efficiently. Following the learning sessions in the control class, which involved implementing a conventional learning technique, it was seen that the students' problem-solving abilities had improved. The experimental group that utilised the TGT model, on the other hand, saw these advantages to a significantly greater degree. This proves that students have a more comprehensive understanding of mathematical concepts and a stronger foundation in problem-solving abilities due to the collaborative nature of TGT, in which they work together to find answers to problems (Fernando & Wijaya, 2022).

The ability of the TGT model to include students in learning activities that are both relevant and interesting is a possible explanation for these results. By presenting problems in the context of competitions and games, the TGT methodology transforms learning mathematics into an exciting and enjoyable activity. The most important thing is that youngsters can change the problem-solving process from a terrifying concept into an exciting adventure through participation of this kind (Angraini et al., 2024). Through peer learning, an essential component of the TGT program, students can enhance their problem-solving abilities by cooperating. Because the TGT model emphasises problem-solving through research and analysis of real-life events, students can make the connection between theoretical mathematical concepts and their applications in the actual world. The student's capacity for critical thinking is enhanced, and their creative potential is fostered as they study a variety of approaches to addressing difficulties (Kania et al., 2023). Students' self-confidence increases when they get expertise in managing complex activities without constant support from other sources. This is because they must seek out relevant knowledge and use various resources (Noviyanti et al., 2024).

The enhanced level of intrinsic drive is yet another significant outcome that may be attributed to the TGT model itself. When students participate in activities and competitions designed to reinforce what they have learnt, they are more likely to take an active interest in the course content and maintain their motivation to study (Arifin & Bonyah, 2024). Intrinsic motivation is essential for students' academic achievement throughout their careers since it motivates students to continue learning even when not in the classroom (Harini et al., 2023). Using the TGT cooperative learning model can provide exciting and meaningful experiences to students in dealing with existing problems by investigating and analysing as daily problem-solving (Ismail & Imawan, 2023; Shafira et al., 2023). So that students can indirectly develop critical thinking skills, creativity and other mathematical abilities. Learners must train their self-confidence using the TGT cooperative learning model. They will look for the necessary data to foster motivation in learning. Learners will also use other relevant sources more often when solving mathematical problems.

4. Conclusions

Based on the research results and problems formulated, the research makes the following conclusions: The mathematical problem-solving ability of students using the Teams Games Tournament (TGT) cooperative learning model is better than that of students using conventional learning. The mathematical self-confidence of students using the TGT cooperative learning model shows robust criteria.

Based on the research obtained, the researcher provides several suggestions that can be considered: Teachers can make the TGT learning model one of the learning models that can improve students' mathematical problem-solving skills on cartesian coordinate material and self-confidence. For schools, this research can be a reference for improving the quality of learning at school. It can suggest subject teachers, either mathematics or other subject lessons, use the TGT learning model as an alternative learning model for further researchers who want to research the TGT learning model, mathematical problem-solving ability, and self-confidence can examine indicators of each variable and other subject matter.

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