

The Effectiveness of Team Games Tournament Type Cooperative Learning Model on Students' Mathematical Conceptual Understanding

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Abstract

This research is motivated by the fact that teaching in schools is more oriented to teacher activity in the learning process which causes students to get bored in following the learning process. The purpose of this study was to determine the influence of the Team Games Tournament (TGT) learning model on students' mathematical conceptual understanding in class XI at SMK Bani Saleh. The population in this study amounted to 61 students with a sample of class XI.B as a control class and class XI. As an experimental class. This sampling technique uses Cluster Random Sampling. The instrument used in data collection is an essay test that contains indicators of mathematical conceptual understanding with the subject matter of 5 essay questions. This research is a quasi-experimental research using posttest only. Based on the results of hypothesis testing, the value of $t_{count}=2.78 > 1.689=t_{table}$, it can be concluded that the TGT type cooperative learning model is better than the conventional learning model towards students' mathematical conceptual understanding in class XI at one of the Vocational high schools in Bekasi.

Keywords: Cooperative, Team games tournament, Mathematical conceptual understanding.

1 INTRODUCTION

Mathematics is a subject that is considered important in every school. Mathematics also has an important role in the development of science and technology and can develop human thinking. According to Wahyudi and Kriswandani (2013) mathematics is a science that studies abstract concepts that are arranged using symbols and is an exact, careful, and emotion-free language.

In mathematics learning, the ability to understand concepts is the initial ability used in solving a mathematical problem. The understanding of concepts according to Barboianu (2021) is a relatively perfect and meaningful idea/idea, an understanding of an object through human perception (after perceiving the subject/object). Sastrika, Sadia, and Muderawan (2013) concept understanding is the actual ability achieved by students after experiencing a learning process about concepts, principles, and procedures within a certain period. Indicators of concept understanding include interpreting, example, classifying, summarizing, surmising, comparing, and explaining.

Based on the opinions of these experts, it can be concluded that understanding concepts is the actual ability achieved by students after experiencing a teaching and learning process regarding concepts in the form of mastery of learning material so that students can express concepts again in a form that is easier to understand. However, the mathematical ability of students in Indonesia is still low, this can be seen based on data from the results of UN SMK scores in Bekasi City in 2019 with an average mathematics score of 34.38. One of the schools that received UN scores below the average was SMK Bani Saleh with an average UN mathematics score of 46.96. This shows that there is still a low mathematical ability among students in the school. Based on the observations of researchers with mathematics

teachers of at one of the Vocational high schools in Bekasi, it shows that students' mathematical conceptual understanding ability is low.

The low understanding of mathematical concepts can be seen when researchers gave an initial test with 7 indicators of concept understanding to students of SMK Bani Saleh obtained results with an average score of 33 out of 20 students. Many factors cause students' mathematical conceptual understanding to be relatively low, one of which is the way teachers deliver material to students. In general, the learning provided by teachers is still conventional learning or only teacher-centered, teachers play more roles than students. As a result, students feel afraid to ask things that feel less clear or poorly understood from the material described.

According to Ulfa and Saifuddin (2018), the learning model is a form of learning illustrated from beginning to end which is presented typically by the teacher. In other words, the learning model is a container or wrapper of the application of a learning approach, method, and technique.

The use of the right learning model is one of the determinants of success in learning activities carried out by teachers. Thus, teachers can choose the appropriate types of learning models to achieve the expected learning objectives. One solution that teachers can do in solving these problems is to vary learning in class. One of the right learning models for the above problems is the TGT type cooperative learning model. According to Li and Lam (2013) cooperative learning is a learning method that involves several small groups of students working together and learning together by helping each other interactively to achieve the formulated learning objectives.

The TGT learning model is a learning model that contains academic tournaments in the form of games the application of this learning model can increase student motivation in following the mathematics learning process and cause competitiveness in students to become the best group. Slavin (1980) revealed that TGT type cooperative learning is an academic tournament using quizzes and individual progress scores, where students compete as representatives of their teams with other team members whose previous academic performance is equivalent to theirs. Based on the researcher's fieldwork practice experience, students are more motivated when the learning process involves more students.

In the application of this TGT type cooperative learning model is a tournament-shaped game. For the teaching and learning process to be more interesting, students need media. According to Hamalik learning media are tools, methods, and techniques used to streamline communication and interaction between teachers and students in the learning process. The learning media used in this study is a Question Card or question card.

Several research results revealed that TGT can affect students' mathematical conceptual understanding as research conducted by Arifin, Fadhilah, and Widiyanto (2020) at MI Pembangunan UIN Jakarta stated that the TGT learning model has a significant effect on students' mathematical conceptual understanding. Research by Ulfia and Irwandani (2019) at Madrasah Tsanawiyah Miftahul Ulum class VIII in the even semester of 2016 stated that the TGT learning model had a positive effect on mathematical conceptual understanding.

In this case, researchers tried to use a TGT type cooperative learning model to determine its effect on students' mathematical conceptual understanding. The formulation of the problem in this study is "Is the TGT type cooperative learning model better than the conventional learning model for students' mathematical conceptual understanding?". The purpose of this study was to determine the effectiveness of the TGT type cooperative learning model on students' mathematical conceptual understanding ability.

2 RESEARCH METHODS

This research uses a quantitative approach with quasi-experimental methods carried out at SMK Bani Saleh Bekasi city. The Posttest Only Control Group Design design in Payadnya and Jayantika (2018) can be seen as follows.

Table 1. Posttest Only Control Group Design

Class	Treatment	Posttest
Experiment	X	T ₂
Control	-	T ₂

Information:

X = treatment using the TGT model

T₂ = final test (posttest)

The population in this study is all grade XI students of SMK Bani Saleh for the 2022/2023 school year totaling 61 students. Sampling in this study was taken using Cluster Random Sampling. The sampling process in this study is by researchers randomizing the population based on groups, the population in this study amounts to 3 classes, and from 3 classes 2 classes will be selected which will later be sampled, the sampling process up to 2 classes is by using whisks. To collect data in this study, test techniques were used referring to indicators of mathematical conceptual understanding on probability material. The form of the test given was in the form of 5 essay questions about probability.

3 RESULT AND DISCUSSION

3.1 Result

The results of this study are in the form of posttest data results that contain indicators of students' mathematical conceptual understanding as an impact of the application of the TGT type cooperative learning model in experimental classes and conventional learning in control classes.

The scores of students who used the Team Games Tournament (TGT) type cooperative learning model obtained mean = 73.78; median= 76,58; mode= 82; variance= 270,58; standard deviation= 16,44; highest value= 100; lowest value= 38. The experimental class comprehension data can be presented in the form of a histogram as shown in Figure 1.

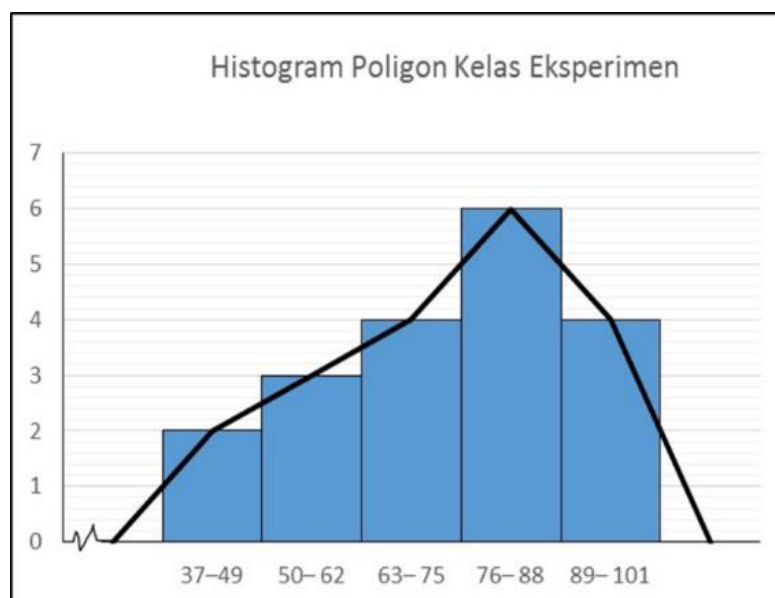


Figure 1. Histogram of mathematical conceptual understanding of Experimental Students

The scores of students who used conventional learning models obtained mean= 57.3; median= 57.5; mode= 57.5; variance= 257.14; standard deviation= 16.03; highest value= 90; lowest value= 23. Control class comprehension data can be presented in the form of a histogram as shown in Figure 2.

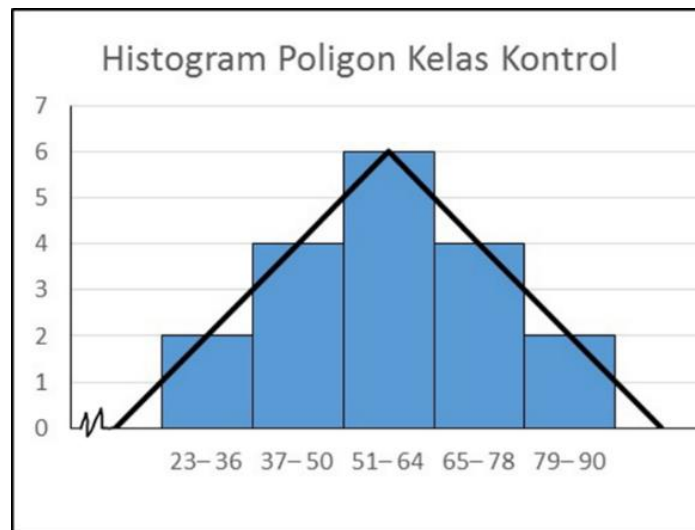


Figure 2. Histogram mathematical conceptual understanding of Control Students

Before hypothesis testing is carried out, prerequisite testing is first carried out on the data obtained, analysis prerequisite testing consists of a normality test and homogeneity test.

3.1.1 Normality Test

The normality test is performed to assess the distribution of data in a group or variable with normal distribution or not. The calculation results of the normality test can be seen in Table 2.

Table 2. Normality Test Results

Class	N	α	L_{count}	L_{table}	Conclusion
Experiment	19	0.05	0.09	0.195	Normal
Control	18	0.05	0.185	0.2	Normal

Based on Table 2, data derived from experimental and control classes, obtained the results of $L_{count}=0.09 < 0.195=L_{table}$ for the experimental class, and $L_{count}=0.185 < 0.2=L_{table}$ for the control classes, then it can be concluded that the data came from a population that normally distributed.

3.1.2 Homogeneity Test

Homogeneity testing was carried out using the F -test against the data of the mathematical conceptual understanding ability of the experimental class and the control class. This test is done to ensure that the data comes from populations that have the same variance or homogeneous. The results of the homogeneity is presented in Table 3.

Table 3. Homogeneity Test Results

Class	Varian	dk	F_{count}	F_{table}	Conclusion
Experiment	270.58	18	1.05	2.25	Homogeneous
Control	257.14	17			

Based on Table 3, $F_{\text{count}}=1.05$, and $F_{\text{table}}=2.25$. Because of $F_{\text{count}}=1.05 < 2.25 = F_{\text{table}}$, then it can be concluded that the data comes from populations that have the same or homogeneous variances.

3.1.3 Test the hypothesis

After it is known that the data poses the mathematical conceptual understanding ability of the experimental class and control class are normally distributed and homogeneous, hypothesis testing is carried out. Hypothesis testing using the t -test can be seen in Table 4.

Table 4. Hypothesis Test Results

Class	X	N	S^2	S_{gab}	t_{count}	t_{table}
Experiment	73.78	19	270.58	17.98	2.78	1.689
Control	57.3	18	257.14			

Based on Table 4, it shows that $t_{\text{count}}=2.78$, while t_{table} for the t -test on significance is $t_{\text{table}}=1.689$. The results show that $t_{\text{count}} > t_{\text{table}}$, which means the TGT learning model is better than conventional learning models for mathematical conceptual understanding on probability material.

3.2 Discussion

Based on the results of data analysis, the students' mathematical conceptual understanding ability in probability material shows a difference in the mathematical conceptual understanding ability between students who use the TGT type cooperative learning model and students who use conventional learning models. The mathematical conceptual understanding ability of students taught with the TGT type cooperative learning model obtained the mathematical conceptual understanding ability higher than students taught with conventional learning models. The results showed that TGT is better than conventional learning in students' ability to understand mathematical concepts.

Based on the analysis test and hypothesis test that has been carried out, it shows that the statistical hypothesis proposed in this study is acceptable, namely the TGT type cooperative learning model is better than the conventional learning model on the mathematical conceptual understanding ability on probability material. The average score of students' mathematical conceptual understanding using the TGT model was 73.78 and the average score of mathematical conceptual understanding using conventional models was 57.3 This shows that the TGT learning model is better than the conventional learning model for students' mathematical conceptual understanding.

4 CONCLUSION

Based on the results of the study, shows that the statistical hypothesis proposed in this study is acceptable, namely the TGT type cooperative learning model is better than the conventional learning model on the students' mathematical conceptual understanding ability on probability material in one of the Vocational high schools in Bekasi.

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