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The effect of cooperative learning models and student learning interest on mathematics learning outcomes of high school students

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Abstract
The condition of teachers who do not know the individual circumstances of students, students have an interest in learning or not in Mathematics subjects can result in low student learning outcomes in Mathematics subjects. This study aims to determine the differences in student learning outcomes in Mathematics taught by cooperative learning models of the type of TPS and conventional methods viewed from the high and low student interest in learning. This type of research included in experimental research. The population of the research is the XI grade of SMA Negeri I Airmadidi, North Minahasa Regency. A sample of 72 people will be randomly drawn from the population. Data analysis using ANAVA treatment by level test. The results are expected: (1) there is a difference in Mathematics learning outcomes between cooperative learning models of TPS types and conventional learning models, (2) there is an interaction between learning models and student interest in learning, (3) there are differences in Mathematics learning outcomes between students taught using the model TPS type cooperative learning with high learning interest and students taught using conventional learning models with high learning interest (4) there is a difference in Mathematics learning outcomes between students taught using the TPS type cooperative learning model with low learning interest and students taught using conventional learning models with low learning interest.

Keywords: effect of learning models, interest in learning and learning outcomes of mathematics

Introduction

In learning activities, many problems often arise. One of the main problems in learning is the learning conditions that are still conventional or the learning process that is still done with lectures, namely the learning process that is still dominated by the teacher and does not provide access for students to develop independence through discovery and thought processes.

In this learning, the class atmosphere tends to be teacher-centered so students become passive. Even so, the teacher prefers to apply the model, because it does not require tools and practice materials, it is sufficient to explain the concepts in the textbook or other references. In this case, students are not taught learning strategies that can understand how to learn, think and motivate themselves.

This learning model causes the involvement of all students in learning activities is very small because learning activities are dominated by students who have high abilities while those who have a low ability only to watch (passive). This has caused the majority of students, especially those with low abilities to become lazy to think, resulting in feelings of boredom and boredom in attending Mathematics. As a result of these student attitudes, the learning outcomes are also unsatisfactory, in the sense of not meeting the deadline set by the school. This problem is often found in teaching and learning activities in the classroom, therefore it is necessary to implement a learning strategy that can help students to understand teaching material and its application in everyday life.

The class atmosphere needs to be built so that students get the opportunity to interact with each other. This can be implemented by choosing one of the right learning models because the selection of the right learning model is one of the efforts in optimizing student learning outcomes. One learning model that allows students to interact with each other is the cooperative learning model. The cooperative learning model can motivate students and take responsibility for one another. Cooperative learning models help students learn from basic skills to complex problem-solving.

Cooperative Learning Models have several types. One type of cooperative learning model that can build student confidence and encourage their participation in the classroom is the TPS (Think Pair Share) cooperative learning model. In the Think-Pair-Share (TPS) type of cooperative learning model, it teaches students to discuss or learn in groups, while the teacher acts as a facilitator for students so that student learning activities can be observed by the teacher. Through this learning, students are expected to gain meaningful knowledge and can improve student learning outcomes in mathematics.

When the teaching and learning process at school is often found students whose learning outcomes are low due to a lack of student interest in learning about these subjects, especially specifically in mathematics. The condition of teachers who do not know the individual student's situation, students have an interest in learning or not in mathematics resulting in low student learning outcomes in mathematics.

Great interest in its influence on learning, because if the learning material learned does not match the interests of students, students will not learn as well as possible, because there is no attraction for him. Lesson material that interests students, younger studied and stored, because interest increases learning activities.

Based on the background of the problem outlined above, the problem in this study is defined as follows:

1. Learning conditions that are still conventional or still

use the lecture method.
2. Some factors influence student learning processes, such as low student learning interest.
3. Learning activities are dominated by students who have high ability while those who have the low ability only watch or are passive.
4. Lack of student interest in learning towards Mathematics.
5. The condition of the teacher who does not know the individual circumstances of students, students have an interest in learning or not in Mathematics subjects result in low student learning outcomes in Mathematics subjects

Since the problems above require quite extensive research, it is necessary to limit the problems in question. This study limited to the effect of the TPS (Think-Pair-Share) type of cooperative learning model and students 'interest in learning towards high school students' Mathematics learning outcomes.

Based on the identification and limitations of the problem, the formulation of the problem in this study was formulated as follows:

1. Are there differences in mathematics learning outcomes between students who are taught with the cooperative learning model TPS type and conventional learning models?
2. Is there an effect of interaction between learning models and student interest in learning outcomes in Mathematics?
3. Are there differences in Mathematics learning outcomes between students who are taught with TPS type cooperative learning models with high learning interest and students who are taught with conventional learning models with high learning interest?
4. Is there a difference in Mathematics learning outcomes between students who are taught with TPS type cooperative learning models with low learning interest and students who are taught with conventional learning models with low learning interest?

Psychological understanding (Slameto 2010: 2), learning is a process of change that is a change in behavior as a result of interactions with the environment in meeting their needs. These changes will be evident in all aspects of behavior.

According to Slameto (2010: 2), the notion of learning can be defined as follows: "Learning is a process carried out by a person to obtain a new change in behavior as a whole, as a result of his own experience in interaction with his environment."

According to Ernest R. Hilgard, learning is a process of doing something intentionally, which then causes a change, which is different from the changes caused by others (Haryanto, 2010).

From some of the above understanding, it can be concluded that learning is a mental or psychological activity that results in changes in knowledge and behavior as a result of interaction with the environment in meeting their needs.

Learning outcomes are the ultimate goal of implementing learning activities in schools. Learning outcomes can be improved through conscious efforts made systematically leading to positive changes which are then called the learning process. The end of the learning process is the acquisition of a student learning outcome. Student learning outcomes in class are collected in a set of classroom learning outcomes. All learning outcomes are the result of an interaction of learning and teaching. From the teacher's point of view, the act of teaching ends with a process of evaluating learning outcomes, while from the student's side, the learning outcome is the end of the fragment and the peak of the learning process (Dimyati and Mudjiono, 2009: 3).

According to Sudjana (2001), "Learning outcomes are abilities students have after they have received their learning experience. The results of learning events can appear in various types of changes or proof of someone's behavior ".

Furthermore, Warsito (in the Ministry of National Education, 2006: 125) argues that the results of learning activities are marked by changes in behavior toward a relatively permanent positive in the people who learn. In connection with that opinion, Wahidmurni, *et al*. (2010: 18) explains that someone can be said to have succeeded in learning if he can show a change in him. These changes include aspects of thinking ability, skills, or attitude towards an object.

Furthermore, according to Hamalik (2006: 155), it illustrates that the learning outcomes obtained can be measured through the progress obtained by students after studying in earnest. Learning outcomes appear changes in behavior in students who can be observed and measured through changes in attitudes and skills. These changes can be interpreted as an increase and development that is better than before.

Based on the explanation above, the understanding of learning outcomes can be concluded as a positive behavior change and the ability of students from an interaction of learning and teaching actions in the form of changes in thinking ability, attitude, and skills towards an object. These changes can be interpreted as an increase and development that is better than before.

Suprijono (2010: 54) argues that the cooperative learning model is a broader concept covering all types of group work including forms that are led by the teacher or directed by the teacher ".

According to Slavin (Isjoni, 2011: 15) "In cooperative learning methods, students work together in four members teams to master material initially presented by the teacher". This means that cooperative learning or cooperative learning is a learning model in which the system of learning and working small groups of 4-6 people collaboratively so that it can stimulate students more passionate in learning.

Cooperative learning is a group of teaching strategies that involve students working collaboratively to achieve shared goals (Eggen and Kauchak, 1996: 279). Cooperative learning is structured to increase student participation, facilitate students with experience leadership attitudes and make decisions in groups, as well as provide opportunities for students to interact and learn together with students of different backgrounds. So in cooperative learning students play a dual role, namely as students or as teachers. By working collaboratively to achieve a common goal, students will develop skills in dealing with fellow human beings who will be very beneficial for life outside of school (Trianto, 2007).

From some understanding, according to the experts, it can be concluded that cooperative learning is a way of learning in the form of small groups that cooperate and are directed by the teacher to achieve the expected learning goals.

According to Djamarah (1996), conventional learning

methods are traditional learning methods or also called lecture methods, because this method has always been used as an oral communication tool between teachers and students in the learning and learning process. In learning history, the conventional method is marked by lectures accompanied by explanations, as well as the distribution of tasks and exercises (Ghufron Dimyati 2012, 21 October).

According to Ujang Sukandi (2003), defining that the conventional approach is characterized by the teacher teaching more about concepts - not competencies, the goal is that students know something not being able to do something, and when the learning process students listen more (Ghufron Dimyati 2012, October 21).

Based on the explanation above, conventional learning can be interpreted as learning characterized by lectures, the learning process is dominated by the teacher, and communication is more one-way from teacher to student.

In general, the characteristics of conventional learning are:

1. Students are passive recipients of information, where students receive knowledge from the teacher and knowledge is assumed as a body of information and skills possessed by standards.
2. Study individually.
3. Learning is very abstract and theoretical.
4. Behavior is built on habits.
5. Truth is absolute and knowledge is final.
6. The teacher is the determinant of the learning process.
7. Good behavior based on extrinsic motivation.
8. Interaction between students is lacking.
9. Teachers often act to pay attention to group processes that occur in learning groups (Ghufron Dimyati, 2012).

Think pair share (TPS) or sharing pair thinking is a type of cooperative learning that is designed to influence student interaction patterns. This think-pair-share (TPS) strategy developed from cooperative learning research and waiting time. First developed by Frang Lyman and colleagues at the University of Maryland, think-pair-share is an effective way to vary the atmosphere of class discussion patterns assuming that all recitation or discussion requires arrangements to control the class as a whole, and the procedures used in think pair share can give students more time to think, to respond and help each other. Students are expected to consider more of what has been explained and experienced. Think-pair-share is used to compare questions and answers between groups as a whole. The steps (phase) of the TPS type of cooperative learning model are as follows:

a. Step 1: Thinking

The teacher asks a question or problem that is related to the lesson and asks students to use a few minutes to think for themselves answers or problems.

b. Step 2: Pair (Pairing)

Next, the teacher asks students to pair up and discuss what they have gained. Normally the teacher gives no more than 4 or 5 minutes to pair up.

c. Step 3: Sharing

In the final step, the teacher asks the pairs to share with the whole class they have talked about. This is effective for going around the room from couple to couple and continuing until around some couples have the opportunity to report (Trianto, 2007).

The advantages of the TPS learning model according to Ibrahim, *et al* (2000: 6) are:

1. Increase the time spent on assignments. The use of the TPS learning method requires students to use their time to do the tasks or problems given by the teacher at the beginning of the meeting so that students are expected to be able to understand the material well before the teacher presents it at the next meeting.
2. Improve attendance. Assignments given by the teacher at each meeting, in addition, to actively involving students in the learning process are also intended so that students can always try to be present at every meeting. Because for students who are absent once, these students do not do the work and this will affect their learning outcomes.
3. Dropout rates are reduced. TPS learning model is expected to motivate students in learning so that student learning outcomes can be better than learning with conventional models.
4. Apathy is reduced. Before learning begins, students tend to feel lazy because the learning process in class only listens to what the teacher says and answers everything asked by the teacher. By actively involving students in the teaching and learning process, TPS learning methods will be more interesting and not monotonous than conventional methods.
5. Greater acceptance of individuals. In the conventional learning model, students who are active in the class are only certain students who are diligent and quick to accept the material delivered by the teacher while other students are only the listeners of the material delivered by the teacher. With TPS learning this can be minimized because all students will be involved with the problems given by the teacher.
6. Deeper learning outcomes. The parameters in the teaching and learning process are the learning outcomes achieved by students. With TPS learning the development of student learning outcomes can be identified gradually. So that at the end of learning the results obtained by students can be more optimal.
7. Increase kindness, sensitivity, and tolerance. The collaboration system applied in the TPS learning model requires students to be able to work together in teams, so students are required to be able to learn to empathize, accept other people's opinions or admit sportsmanship if their opinions are not accepted.

While the weakness of the TPS model according to Ibrahim (2000: 8) is new learning, the possibility that can arise is a number of students confused, some lose confidence and interfere with each other between students.

Hilgard (Slameto, 2010) gives the formulation of interests is as follows: "Interest is the persisting tendency to pay attention to and enjoy some activity or content". Interest is a constant tendency to pay attention and remember some activities. Activities that are of interest to a person are to be considered constantly accompanied by pleasure.

According to Hardjana (Loekmono, 1994), interest is a high tendency toward something that arises because of a need, which is felt or not felt or the desire of a particular thing. Interest can be interpreted as a tendency to be interested or motivated to pay attention to someone something goods or activities in certain fields.

Interest is a feeling of preferability and a sense of attachment to a thing or activity, without anyone asking. Interest is the acceptance of a relationship between oneself

and something outside of oneself. The stronger or closer the relationship, the greater the interest (Slameto, 2010).

Interest can be expressed through a statement that shows that students prefer one thing to another, it can also be manifested through participation in an activity. Students who have an interest in a particular subject tend to pay greater attention to the subject (Slameto, 2010).

So, interest is a feeling of preferability and a sense of attachment to a thing or activity, without anyone asking that arises because of a need or desire that is accompanied by a sense of pleasure in that matter.

Developing an interest in something is helping students see how the relationship between the material they are expected to learn with themselves as individuals. This process means showing students how certain knowledge or skills affect themselves, serve their goals, satisfy their needs. If students realize that learning is a tool to achieve some of the goals they consider important, and if students see that the results of their learning experience will bring progress to themselves, they will most likely be interested in learning them (Slameto, 2010).

Based on the results of psychological research shows that the lack of interest in learning can lead to a lack of interest in a particular field, can even give birth to an attitude of rejection of the teacher (Slameto, 1995). If a student has an interest in a particular lesson the student will pay more attention to the lesson and be diligent in doing the assignment, but conversely, if the student is not interested, then the task given is usually lazy students to do it. If students do not pay attention to the subjects taught, it is difficult to expect these students to learn well. This certainly affects learning outcomes (Kartono, 1995).

Big interest influence on learning activities. Students who are interested in Mathematics will study Mathematics seriously as diligently studying, feel happy to follow the presentation of Mathematics lessons, and can even find difficulties in learning to solve practice questions of the attraction gained by studying Mathematics. Students will easily memorize lessons that interest them.

Interest as a psychological aspect is influenced by a number of factors, both internal (internal) and external (external). Viewed from within students, interest is influenced by ideals, satisfaction, needs, talents, and habits. Meanwhile, when viewed from external factors interest is not permanent but can change according to environmental conditions. The external factors can be in the form of completeness of facilities and infrastructure, association with parents and people's perception of an object and socio-cultural background (Slameto, 2010).

Research Hypothesis

1. Mathematics learning outcomes of students taught with the TPS type of cooperative learning model are higher than mathematics learning outcomes of students taught with conventional learning models.
2. There is an interaction effect between the learning model and students' interest in learning towards student mathematics learning outcomes.
3. Mathematics learning outcomes of students who are taught with the TPS type of cooperative learning model with high learning interest is higher than mathematics learning outcomes of students taught with conventional learning models with high learning interest.
4. Mathematics learning outcomes of students taught with TPS type cooperative learning models with low learning interest are lower than mathematics learning outcomes of students taught with conventional learning models with low learning interest.

The aim of this research is

1. To find out the difference between Mathematics learning outcomes of students who are taught with TPS cooperative learning models and conventional learning models.
2. To determine the effect of interactions between learning models and student interest in learning towards Mathematics learning outcomes.
3. To find out the difference between Mathematics learning outcomes between students taught with TPS type cooperative learning models with high learning interest and students taught with conventional learning models with high learning interest.
4. To find out the differences in learning outcomes in Mathematics between students taught with TPS type cooperative learning models with low learning interest and students taught with conventional learning models with low learning interest.

Research Method

3.1 Research Methods, Variables, and Design

3.1.1. Research methods

The research method used in this study is an experimental research method with a 2x2 treatment by level design.

3.1.2. Research variable

The variables in this study are:

The independent variable A is a classroom learning model consisting of two types of cooperative learning model TPS and conventional learning.

1. The independent variable B is student learning interest which consists of two levels or levels, namely high learning interest and low learning interest.
2. The dependent variable Y is student learning outcomes in Mathematics.

Research design

Table 2: Treatment design by level 2x2

B	A	
	A_1 (experimental class)	**A_2 (control class)**
B_1	A_1B_1	A_2B_1
B_2	A_1B_2	A_2B_2

Information:

A: Learning model used in class

B: Interest in student learning

A_1: TPS (think pair share) cooperative learning model, experimental class

A_2: Conventional learning model, the control class

B_1: High learning interest

B_2: Low learning interest

3.1 Population and Sample

1. Study Population

According to Sugiyono (2010), the population is a generalization area consisting of subjects who have certain qualities and characteristics that are determined by researchers to be studied and then conclusions drawn. The target population in this study were students of SMA Negeri

1 Airmadidi and SMA Negeri Kauditan. Affordable populations are students of class XI IPA of SMA Negeri 1 Airmadidi and SMA Negeri of Kauditan

2. Research Sample

According to Sugiyono (2010), the sample is part of the number and characteristics possessed by the population. The research sample used in this study was 2 (two) classes, i.e. the class with TPS (A1) cooperative learning model treatment and the class with conventional learning model treatment (A2). Classes A1 and A2 are determined randomly from existing classes.

The two classes are separated into students based on the learning interest of each class. The first group is the group that has a high learning interest in the class taught by the type of cooperative learning model TPS (A1B1). The second group is students who have a high interest in learning in classes taught by conventional learning models (A2B1). A third group is a group of students who have low interest in learning in classes taught by the type of cooperative learning model TPS (A1B2). The fourth group is the group of students who have low learning interest in the class taught by conventional learning models (A2B2).

3.3. Data collection technique

Data collection in this study is intended to obtain data that is relevant, accurate, and reliable. The method used in this study, namely:

3.7.1 Questionnaire or questionnaire

Sugiyono (2010: 199) argues that "the questionnaire is a data collection technique that is done by giving a set of questions or written statements to respondents to answer". This questionnaire is used to obtain information about student learning interests.

3.7.2 Test technique

The test technique used in this study is a cognitive ability test of students, which is a test used to measure a person's achievement after learning something. The test is used to obtain student learning outcomes data.

3.4 Research Instruments

This study uses research instruments such as questionnaires and tests. For the interest in learning to use a questionnaire instrument and for learning outcomes to use tests. To test the validity of an instrument is tested for the validity and reliability of the instrument.

3.5 Data analysis

To conduct hypothesis testing using ANAVA-2 avenue steps 2 x 2 by level analysis is used:

Results and Discussion

A. Research Results

Testing Requirements Analysis

Normality test

A normality test is used to see whether data is normally distributed or not. The normality test used in this study is the Liliefors normality test using the help of Microsoft Excel calculations. The significance level used is α = 0.05 for n = 32 ($L_{calculation}$ <0.156), n = 16 ($L_{calculation}$ <0.213) then the data is normally distributed and for n = 32 ($L_{calculation}$> 0.156), n = 16 ($L_{calculation}$> 0.213), the data not normally distributed.

Table 2: Data Normality Test Results Student Mathematics Learning Outcomes

Treatment group	**n**	**Average**	**Standard Deviation**	**L_{count}**	**L_{table} (α = 0,05)**	**Conclusion**
A1	32	79.813	12.45	0.109	0.156	Data is normally distributed
A2	32	75.343	8.830	0.116	0.156	Data is normally distributed
B1	32	82.75	10.33	0.110	0.156	Data is normally distributed
B2	32	72.406	9.019	0.137	0.156	Data is normally distributed
A1B1	16	89.75	5.495	0.127	0.213	Data is normally distributed
A1B2	16	69.875	8.913	0.145	0.213	Data is normally distributed
A2B1	16	75.75	9.262	0.170	0.213	Data is normally distributed
A2B2	16	74.937	8.660	0.124	0.213	Data is normally distributed
Treatment group	n	Average	Standard Deviation	L_{count}	L_{tabble} (α = 0,05)	Conclusion
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A2	32	75.343	8.830	0.116	0.156	Data is normally distributed
B1	32	82.75	10.33	0.110	0.156	Data is normally distributed
B2	32	72.406	9.019	0.137	0.156	Data is normally distributed

Information:
A1: TPS type cooperative learning model group
A2: Group conventional learning models
B1: High interest in learning groups
B2: Low interest in learning groups
A1B1: TPS type cooperative learning model group with high learning interest
A1B2: Group type TPS cooperative learning model with low learning interest
A2B1: Group of conventional learning models with high learning interest
A2B2: Group of conventional learning models with low learning interest

From Table 2.1. the results of the normality test carried out in the treatment group A1 obtained the value of L_{hitung} = 0.109 where the value is smaller than the rejection limit value at the 0.05 significance level that is 0.156. Thus it can be concluded that the data in the A1 treatment group is normally distributed. From the table of results of the normality test conducted in the A2 treatment group, it is obtained that the value of L_{count} = 0.116 where the value is smaller than the rejection limit value at the 0.05 significance level that is 0.156. Thus it can be concluded that the data in the A2 treatment group is normally distributed. From the table of results of the normality test conducted in the B1 treatment group, it is obtained that the value of L_{count} = 0.110 where the value is smaller than the rejection limit value at the 0.05 significance level, 0.156. Thus it can be concluded that the data in the B1 treatment group is normally distributed. From the table of results of the normality test conducted in the B2 treatment group, it is obtained that the value of L_{countg} = 0.137 where the value is smaller than the rejection limit value at the 0.05 significance level, which is 0.156. Thus it can be concluded that the data in the B2 treatment group is normally distributed.

From the table of results of normality tests conducted on the A1B1 treatment group, the value of L_{count} = 0.127 is obtained where the value is smaller than the rejection limit value at the 0.05 significance level of 0.213. Thus it can be concluded that the data in the A1B1 treatment group is normally distributed. From the table of results of normality tests conducted on the A1B2 treatment group, the value of L_{count} = 0.145 is obtained where the value is smaller than the rejection limit value at the 0.05 significance level of 0.213. Thus it can be concluded that the data in the A1B2 treatment group is normally distributed. From the table of results of the normality test conducted on the A2B1 treatment group, the value of L_{count} = 0.170 is obtained where the value is smaller than the rejection limit value at the 0.05 significance level of 0.213. Thus it can be concluded that the data in the A2B1 treatment group is normally distributed. From the table of results of normality tests conducted on the A2B2 treatment group, the value of L_{count} = 0.124 is obtained where the value is smaller than the rejection limit value at the 0.05 significance level of 0.213. Thus it can be concluded that the data in the A2B2 treatment group is normally distributed. The normality test data can be seen in Appendix 11.

Homogeneity Test

The homogeneity test is intended to determine the assumptions that apply in the use of Variance Analysis, which is the data used that has the same or not variance. The homogeneity test used in this study is the Bartlet homogeneity test using the help of *Microsoft Excel* calculation. The significance level used α = 0.05 for the treatment group A1 and A2 if X2 count $< X2_{table}$ = 3.84 then the data is said to be homogeneous, for the treatment group B1 and B2 if X2 count $< X2_{table}$ = 3.84 then the data is said to be homogeneous and for the treatment group A1B1, A1B2, A2B1 and A2B2 if $X2_{count} < X2_{table}$ = 7.82 then the data is said to be homogeneous. And if $X2_{count} > X2_{table}$, the data is said to be homogeneous. Homogeneity test data can be seen in Appendix12.

Homogeneity Test of Treatment Groups A1 and A2

Table 3: Homogeneity Test Results Data Learning Outcomes Mathematics Treatment Group A1 and A2

Treatment group	db	s^2	log s^2	db log s^2
A1	31	154.996	2.19032	67.89993
A2	31	77.9748	1.891954	58.65058
Amount	62	232.9708		126.5505
s^2 combined	116.4854			
B=	128.1088			
X^2 count=	3.588			
X^2 (0.05) (1) =	3.84			

Based on the homogeneity test results in the above table, $X2_{count}$ = 3,588 $< X2_{table}$ = 3.84 thus the data between the two research groups has the same or homogeneous variance.

Homogeneity Test of Treatment Groups B1 and B2

Table 4: Homogeneity Test Results in Mathematics Learning Outcomes of the B1 and B2 Treatment Groups

Treatment group	Db	s^2	log s^2	db log s^2
B1	31	106.7097	2.028204	62.87432
B2	31	81.34577	1.910335	59.22038
Amount	62	188.0554		122.0947
s^2 combined	94.02772			
B=	122.3419			
X^2 count =	0.569			
X^2 (0.05) (1) =	3.84			

Based on the homogeneity test results in the table above obtained X2 count = 0.569) <X2 table = 3.84 thus the data between the two study groups have the same or homogeneous variance.

Homogeneity Test of Treatment Groups A1B1, A1B2, A2B1 and A2B2

Table 5: Homogeneity Test Results in Mathematics Learning Outcomes Treatment Group A1B1, A1B2, A2B1, and A2B2

Treatment group	db	s^2	log s^2	db log s^2
A1B1	15	30.2	1.480007	22.2001
A2B1	15	85.8	1.933487	29.00231
A1B2	15	79.45	1.900094	28.50141
A2B2	15	74.99583	1.875037	28.12556
Amount	60	270.4458		107.8294
S^2 combined =	67.61146			
B=	109.8012			
X^2 count=	4.540			
X^2 (0.05) (3) =	7.82			

Based on the homogeneity test results in the table above obtained X2 count = 4,540 <X2 table = 7.82 thus the data between the two research groups have the same or homogeneous variance.

Hypothesis Testing Results

By fulfilling the requirements of normally distributed data and data between groups having the same or homogeneous variance, hypothesis testing can be carried out. Hypothesis testing uses the Variance Analysis test or the two-way F test with treatment by level design. The calculation of the Variance Analysis test follows the direct method recommended by Kadir (2010) can be seen in Appendix 13. The two-way F test for the first hypothesis is the learning outcomes of Mathematics in students who are taught with the cooperative learning model TPS type is higher than the results of students learning Mathematics which taught with conventional learning models and the second hypothesis that there is an influence of interaction between learning models and students' interest in learning towards student mathematics learning outcomes can be seen in the table below:

Table 6: ANAVA Test Results

Source of Variance	JK	db	RJK	F_{count}	F_{table} α = 0.05
Delivery A	319.515625	1	319.515625	4.725	4.00
Delivery B	1711.890625	1	1711.890625	25.319	
Interaction AXB	1453.515625	1	1453.515625	21.498	
In	4056.6875	60	67.61145833		
Total	7541.609375	63			

Because the hypothesis testing of the interaction effect between the learning model and students' learning interest is significant, it should be tested for a simple or simple effect. Before conducting a simple influence test, it is necessary to test the differences or similarities of the four treatment groups by applying the one-way variance procedure. Based

on the calculation results obtained F_{count} = 17.181> F_{table} = 2.76 (α = 0.05) can be seen in appendix 13. Thus there is an average difference between the four treatment groups.

The tests for the third and fourth hypotheses were tested further by t-Dunnet. The test results for the third hypothesis namely student learning outcomes in Mathematics taught with cooperative learning model TPS type with high learning interest is higher than student learning outcomes in Mathematics taught with conventional learning models with high learning interest. the TPS type cooperative learning model with low learning interest is lower than the mathematics learning outcomes of students taught with conventional learning models with low learning interest can be seen in the table below:

Table 7: Simple Effects Test Results with t-Dunnet Test

The average score of learning outcomes in Mathematics	A1B1	A2B1	A1B2	A2B2
	Y11	Y21	Y12	Y22
	89.75	75.75	69.875	74.9375
Testing the simple effect for B1, the difference between A on B1	t(A1B1-A2B1)		ttable (α=0.05)	
	4.815		1.67	
A simple test of effects for B2, the difference between A on B2	t(A1B2-A2B2)		ttable (α=0.05)	
	-1.741		-1.67	

Based on the tables above the results of hypothesis testing are as follows:

Student mathematics learning outcomes taught by TPS type cooperative learning models are higher than student mathematics learning outcomes taught by conventional learning models.

Based on the calculation results in table 25, it can be seen that the cooperative learning model group of the TPS type and the conventional learning model group give the price F_{count} = 4,725> F_{table} = 4.00. This price indicates that at the significance level α = 0.05, H_0 is rejected, which means H1 is accepted. In other words, the results of learning mathematics in students taught with the cooperative learning model TPS type is higher than the results of learning mathematics students who are taught with conventional learning models, in accordance with the formulation of the hypothesis for the first hypothesis. So it can be concluded that there are significant differences in Mathematics learning outcomes between students who are taught with cooperative learning models of the TPS type and conventional learning models.

There is an interaction effect between the learning model and students' interest in learning towards student mathematics learning outcomes.

Based on the calculation results in table 25, it can be seen that the interaction between learning models cooperative TPS type and students' interest in learning towards Mathematics learning outcomes give a price F_{count} = 21,498> F_{table} = 4.00. This price indicates that at the significance level α = 0.05, H_0 is rejected, which means H1 is accepted. In other words, there is a significant interaction effect between the learning model and students 'interest in learning towards students' Mathematics learning outcomes, according to the hypothesis formulation for the second hypothesis.

Mathematics learning outcomes of students taught with the TPS type of cooperative learning model with high learning interest are higher than mathematics learning outcomes of students taught with conventional learning models with high learning interest.

Based on the data in table 26 the simple effect test results show that students who have high learning interest who are taught with cooperative learning models of the type of TPS and conventional learning models give a price of t_{count} = 4,815> t_{table} = 1.67. This price indicates that at the significance level α = 0.05, H0 is rejected, which means H1 is accepted. This is in accordance with the formulation of a third alternative hypothesis where the learning outcomes of students taught Mathematics with the type of cooperative learning model TPS with high learning interest is higher than the results of learning mathematics students taught with conventional learning models with high learning interest.

It can be concluded that there are significant differences in Mathematics learning outcomes between students who are taught with the cooperative learning model TPS type with high learning interest and students who are taught with conventional learning models with high learning interest.

Mathematics learning outcomes of students taught with TPS type cooperative learning models with low learning interest are lower than mathematics learning outcomes of students taught with conventional learning models with low learning interest.

Based on the data in table 26 the simple effect test results show that students who have high learning interest who are taught with the cooperative learning model type of TPS and conventional learning models give the price $t_{count\ it}$ = -1.741 < t_{table} = -1.67. This price indicates that at the significance level α = 0.05, H_0 is rejected, which means H1 is accepted. This is in accordance with the formulation of the fourth alternative hypothesis in which student learning outcomes in Mathematics taught with cooperative learning models of the type of TPS with low learning interest are lower than student learning outcomes in Mathematics taught with conventional learning models with low learning interest.

It can be concluded that there are significant differences in mathematics learning outcomes between students who are taught with the cooperative learning model TPS type with low learning interest and students who are taught with conventional learning models with low learning interest.

Discussion

First Hypothesis

The group of students who get the cooperative learning model TPS type has better results than the group of students who get the conventional learning model can be seen from the average learning outcomes of students from both groups, the group of students who get TPS type cooperative learning models have an average value of 79,813 and groups of students who get conventional learning models have an average value of 75,344.

TPS type of cooperative learning model is a type of cooperative learning that is done to influence student interaction patterns. Students are trained to work together with others, so they can understand the material better with the support and help of their friends. Students are better trained to minimize the nature of boredom in class when they are learning.

Based on direct observations by researchers in classroom learning activities, the TPS cooperative learning model provides a new atmosphere for students which gives

students more time to think, respond and help each other and motivate students in learning so that student learning outcomes are better than learning with models conventional. Students are actively involved in the teaching and learning process while the conventional learning model, students who are active in the class are only certain students who are diligent and quick to accept the material delivered by the teacher while other students are only as listeners of the material delivered by the teacher.

So, there are significant differences in Mathematics learning outcomes between TPS cooperative learning models and conventional learning models. And although the TPS type cooperative learning model shows an increase in student learning outcomes, in its implementation the educators must realize that not all subjects in Mathematics must be taught or match the TPS type cooperative learning model.

Second Hypothesis

Lack of interest in learning can result in a lack of interest in a particular field, it can even give birth to an attitude of rejection of the teacher. If students do not pay attention to the subjects taught, it is difficult to expect these students to learn well. This certainly affects learning outcomes.

Based on the results of the calculation of the research results show that there is a significant interaction between the learning model and student interest in giving the price Fcount it 21.498> Ftable 4.00. The magnitude of the interaction effect of learning models and students' interest in learning towards Mathematics learning outcomes by 24.258% can be seen in appendix 13. The use of TPS type cooperative learning models can improve mathematics learning outcomes but there are also other factors namely student interest in learning that affect student learning outcomes. Thus, the implications for educators, especially teachers who teach Mathematics, should pay attention to students 'interest in learning Mathematics because students' interest in Mathematics will support their learning outcomes. Therefore, to improve student learning outcomes in Mathematics, teachers should first motivate students to generate or foster low student interest in Mathematics, especially if they use the right learning model.

Third Hypothesis

The group of students with high learning interest who are taught with the cooperative learning model TPS type provides higher learning outcomes compared to the group of students with high learning interest who are taught with conventional learning models. It can be seen from the average value obtained by both groups, the learning interest group Higher learning with TPS learning has an average value of 89.75 while high learning interest groups taught with conventional learning have an average value of 75.75 and the price of the tcount it given from the results of data analysis of 4,815 prices is more than the ttable price of 1.67.

Students with high learning interest are taught with TPS type cooperative learning models that can improve their learning outcomes and will continue to foster concentration or seriousness in learning because in this learning students are given the freedom to interact with their peers. Instead taught by learning lecture methods students feel that the information conveyed by the teacher is something that must be received straight. This causes boredom in students to learn because the learning used by the teacher is dominated by the teacher, thus affecting the learning outcomes.

So that there are significant differences in mathematics learning outcomes between students who are taught with the cooperative learning model TPS type with high learning interest and students who are taught with conventional learning models with high learning interest.

Fourth Hypothesis

The group of students with low learning interest who are taught with the TPS type of cooperative learning model provides lower learning outcomes compared to the group of students with low learning interest who are taught with conventional learning models. Seen from the average scores obtained by both groups, the low learning interest group taught with TPS learning has an average value of 69,875 while the low learning interest group taught with conventional learning has an average value of 74,937 and the price $t_{count\ it}$ given from the results of data analysis of -1.741 the price is less than the table price of -1.67.

Students who have low learning interest like to solve problems step by step and need complete procedures given by the teacher to solve a problem in learning. Students with low learning interests are taught with TPS type cooperative learning models their learning outcomes are lower when compared to conventional learning models because in cooperative learning models TPS type of learning is student-centered so it is not appropriate to apply to students with low learning interest. While the conventional learning model is very appropriate to be applied to students with low learning interest because this learning is centered on the teacher so students with low learning interest will easily accept the material and wait for instructions and direction from the teacher. The teacher presents the material while the student is only listening and trying to understand.

So, there are significant differences in Mathematics learning outcomes between students who are taught with the cooperative learning model TPS type with low learning interest and students who are taught with conventional learning models with low learning interest.

Conclusion

Based on the results of data analysis and discussion above obtained:

1. There is a significant difference in mathematics learning outcomes between students who are taught with cooperative learning models of the TPS type and conventional learning models.
2. There is a significant interaction effect between the learning model and students' interest in learning towards Mathematics learning outcomes.
3. There are differences in mathematics learning outcomes in students with high learning interests who are taught with cooperative learning models of the TPS type and those who are taught with conventional learning models.
4. There are differences in mathematics learning outcomes in students with low learning interest who are taught with the type of cooperative learning model TPS and those who are taught with conventional learning model.

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