Differences in Mathematics Problems Solving Students With Implementing Learning Model Think Pair Square and Group Investigation in Junior High School

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***Abstract*—Think Pair Square and Group Investigation are models cooperative learning to used teach students to active in learning. Cooperative learning model gives students the chance to work together with other students to improve problems solving skills. The purpose of this study is to test difference in mathematical problem solving ability of students taught by cooperative learning and the interaction between models learning towards problem solving abilities. This study is a quasi-experimental research using two classes experiment. The research subject is determined based on random sampling class and measurement instruments using essay test. The results of measurements of problem solving ability in the form of data and analysis varians two path. Base on the data analysis, average varians the differen problem solving ability students with Fcount=13.105, and the interaction between learning model towards problem solving ability with Fcount=5.774. The results of analysis varians shows that the values problem solving ability and the interaction learning models between toward problem solving ability more than 4.001. this means that H_0 refused and H_1 accepted so that there is the differen problem solving ability and interaction between learning models toword problem solving ability taught cooperatives learning think pair square and group investigation.**

Keywords—problem solving ability; learning model think pair square; learning model group investigation

I. INTRODUCTION

The level of achievement of educational reform implementation and learning of mathematics can be seen through the achievement of learning objectives have been included in the content standards for elementary and secondary education units. One of the goals of mathematics lessons for SMP / MTs is that the students are able to solve the problem [1]. The ability of the intended above a mathematical abilities *(mathemathical power).*Mathematical ability can be defined as *"Mathematical power includes the ability to explore, conjecture, and reason logically; to solve non-routine problems; to communicat about and through mathematics; and to connect ideas whithin mathematics and between mathematics and other intellectual activity*"[2].

Problem solving skills needed to train students to get accustomed to facing various problems in an increasingly complex life, not just a math problem itself but also to problems in other subject areas and problems in daily life [3]. The solution contains a four-step problem-solving solutions, namely: "(1) to understand the problem; (2) planning processes, (3) to solve the problem according to plan; and (4) checking back for all the steps that have been undertaken "[4]. Such measures are expected to help students in solving problems.

From the observation of fact the field stated that many students' difficulties in solving problems in the form of problem solving. It is known to investigators after giving the matter to the students. Students having difficulty in solving algebra problems especially on the material grade eight junior high school. Students have difficulty to find a solution. The results showed that of the 30 students who took the tests, only 26.6% or 8 people who pass, while 73.4% or 22 uncompleted.

In this issue the teacher should start using a model that can make the students active in learning, as it also is able to hone the skills of mathematical problem solving. One model of learning that involves the active participation of students is a cooperative learning model. Cooperative learning model gives students the chance to work together with other students in tasks in the system is structured and teachers act as facilitators [5]. The nature of the use of social and peer group becomes an essential aspect of cooperative learning [6].

Learning model used is cooperative learning model Think Pair Square and Group Investigation. In the learning model *Think Pair Square "Think Pair Square is similar to Think Pair Share. Students first discuss problem-solving strategies in pairs and then in groups of fours. Since problem solving strategies can be complicated, this structure may be more Appropriate with experienced collaborative groups "[7].*

While the cooperative model type *Group Investigation* (GI) is learning that emphasize the cooperation between

students in teams to do the *investigation*,collect information, analyze data, and make a CONCLUSION in which each member should contribute to the discussion so the group was able to clarify and synthesise all ideas [8]. Mathematics learning outcomes by using scientific investigation group learning model is better than the classical scientific model study [9].

Based on the background of the above problems, researchers interested in applying for a study entitled "Differences in Mathematical Problem Solving Ability Students Taught Model Cooperative Learning *Think Pair Square* and *Group Investigation* in junior high school".

II. METHODS

A. Population and Sample

The research was conducted in junior high school on Langkat. The reason for this is a site selection study for similar research has not been implemented at the school. The research was conducted in the first semester of the academic year 2017/2018 in class eight during the two meetings.

B. Reaserch Design

The design of experiments in the study can be described in the following Table 1. [10]:

Table 1. Research Design

Treatment Group	Treatment	Post-test
Think Pair Square	X_1	O_2
Group Investigatiom	X_2	O_2

Source: statistic sugiono

Description:

O_2: Posttest (final test capability solving the problem) is given treatment after

X_1: Treatment of cooperative learning model Think Pair Square

X_2: Treatment of cooperative learning model Group investigation

1. Variables

Variables are the object of study, or what is the focal point of a study [11] .variabel in research among others; independent variable is the type of cooperative learning model Think Pair Square and cooperative learning Group Investigation, the dependent variable is the mathematical problem solving ability and variable attributes that students' motivation.

2. Reaserch Procedure

Toin greater depth look at the research procedure can be seen in Figure 1. below.

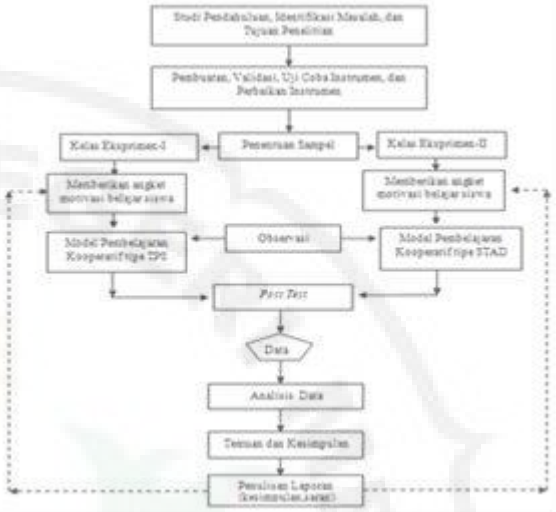

Figure 1. Procedure Research

III. RESULTS AND DISCUSSION

The primary objective of this study was to determine the differences between students' problem-solving abilities are given learning by using cooperative learning model Think Pair Square and cooperative learning model type Group Investigation.

A. Results Validation Assesment

validated learning device includes lesson plan (RPP) and student activity sheets (LAS). Learning device validation results can be seen in Table 2 below.

Table 2. Results of Validation Tool Learning

No.	Object Assessed	Value Validator	Category
1.	Lesson Plan	4.46	Good
2.	Student Activity Sheet	4.42	Good

From Table 2 above shows the learning device can already valid

B. Results for Test Instruments

Results Summary validity , reliability, difference and difficulty index test mathematical problem solving ability of students can be seen in Table 3 below:

Table 3. Results of Trial Research Instrument

No.	**Validity**		**Power Different**		**difficulty index**		**Reliability**
Problem Solving Ability Test							
1.	0.756	Valid	0.31	Enough	0.33	Average	0.901 Very High
2.	0.883	Valid	0.29	Self	0.37	Medium	
3.	0.883	Valid	0.43	Good	0.35	Average	
4.	0,836	Valid	0.32	Enough	0.4	Medium	
5.	0.876	Valid	0.41	Good	0.43	Average	

From Table 3 above shows that the test instrument used has met the criteria for the validity test, reliability test, the power difference and difficulty index grains question. It can be concluded that the test instrument to test the ability of mathematical problem solving can be used.

C. Normality and Homogeneity Test Results Problem Solving Ability

1. Test Normality

Normality calculation result postes problem solving skills mathematical Table 4 below:

Table 4. Normality Test Capabilities Troubleshooting

Class	N	D_0	D_{tables}
Experiment I	32	0.139	0.240
Experiment II	32	0.118	0.240

Soucrce: spss16.0 for windows

It can be seen from Table 4 above shows that the value of D_0 is 0,139 and 0,118 respectively less than $D_{table,}$ then the data for the experimental class I and class II experiment normal distribution.

2. Homogeneity test

Results of homogeneity test can be seen in Table 5 below:

Table 5. Test Homogeneity of Problem Solving Ability

Class	of Variance (s2)	F_{count}	F_{table}
Experiment I	71.544	1.021	1.822
Experiment II	73.032		

Soucrce: spss16.0 for windows

Based on Table 5 obtained that F_{count} amounting to 1,021 less than $F_{table,}$so that the sample is derived from data variance homogeneous group. Both sets of data experimental class I and class II experimental data have homogeneous varians.

D. Variance AnalysisTwo Paths

ANOVA Two Paths Calculation results for mathematical problem solving ability of students can be seen in Table 6 below:

Table 6. Test analysis of variance Two Line Troubleshooting Capabilities Problem

Varians Source	**JK**	**Db**	**RJK**	**F_{count}**	**F_{tabel}**
Learning Model	744.620	1	744.620	13.105	4.001
Students Motivation	390.063	1	390.063	6.865	4.001
Interaction learning Model and Motivation	328.061	1	328.061	5.774	4.001
In	3409.194	60	56.820		
Total	4871,938	63			

Soucrce: spss16.0 for windows

Based on Table 6 above, the value of F_0 for learning model is 13.105, if the value of F_0 is in confirmation to the value of F_{table} at $\alpha = 5\%$, then F_0 is greater than F_{table} 4.001. Concluded sufficient evidence to reject H_0. This means that there are significant learning model to the students' problem-solving abilities. In other words, there are significant differences between cooperative learning model Think Pair square and cooperative learning model type group investigation in terms of problem-solving ability of students.

The calculation result analysis two paths toward students' scores on the learning model Think Pair coopertive type group investigation square and Fvalues obtained$_0$ student motivation factor of 6.865 to$F_{table.}$ 4.001 Because the F_{count} more than F_{table} it can be concluded grouping students 'motivation also affects the students' problem-solving abilities.

For learning model factors related to student motivation acquired F_0 of 5.774 toF_{table} 4.001then $H_{0\ is}$ rejected, which means there is no interaction between factors MBS model of learning by students against students' problem-solving abilities. This suggests that the cooperative learning model Think Pair Square and group investigation have an influence on problem solving ability of students, whereas if it is connected with the student's motivation was also influential in the problem solving ability of students.

IV. CONCLUSIONS

Based on the results of research and discussion can be obtained several conclusions as follows:

1. There are significant differences in the ability of students who are taught problem solving through cooperative learning model Think Pair Square with the students taught by cooperative learning model of Group Investigation.
2. There is interaction between learning models and student motivation toward differences inmathematical problem solving abilitiy students.

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