JAIPTEKIN | Jurnal Aplikasi IPTEK Indonesia
ISSN Print: 2548-348X – ISSN Online: 2548-3498
Universitas Negeri Padang
http://bk.ppj.unp.ac.id/index.php/aiptekin/index
Vol.3, No.1, 2019, pp. 23-40
DOI: https://doi.org/10.24036/4.32146

The Influence of Cooperative Learning Model of Group Investigation Type and First Knowledge on Mathematics Learning Outcomes of Students

Fitri Yanti 1, Abizar 2, Ramalis Hakim 3
[123]Universitas Negeri Padang 123

Abstract: The purpose of this research to know the effect of teach of type in cooperative learning group investigation model Too many nouns and the effect of the first student's knowledge in students learning in mathematics. Kind of this research that used is quasi experiment. The research sample were 24 students on experiment and students on control group. The analysis data used test- t and anova two way test. The first result of the students' mathematics learning that follows the cooperative learning model of group investigation higher than the students who follow the direct learning both seen in whole, and based on the high and low initial knowledge. Secondly, there is no interaction between cooperative learning model of group investigation type and initial knowledge in influencing student's mathematics learning outcomes.

Keywords: Group Investigation Type, First Knowledge, Result Study

Received December 06, 2018;
Revised Decenber 17, 2018;
Accepted December 25, 2018;
Published Online January 30, 2019

Conflict of Interest Disclosures:
The authors declare that they have no significant competing financial, professional or personal interests that might have influenced the performance or presentation of the work described in this manuscript.

Introduction

Mathematics is one of the subjects contained in the curriculum of education, which contains more concepts and theories oriented to the calculation of numbers and mathematical symbols. In the process of learning mathematics teachers should be able to create a meaningful learning process for students to achieve the purpose of learning mathematics. But in reality mathematics is still considered difficult for students. This is evident from the results of mathematics learning students in the following table:

JAIPTEKIN | Jurnal Aplikasi IPTEK Indonesia
ISSN Print: 2548-348X – ISSN Online: 2548-3498

Table 1. Average MID of 1st Semester

A Students	Average
VIII 1	60.38
VIII 2	46.41
VIII 3	54.00
VIII 4	53.73
VIII 5	54.27

Source: Administration SMPN 4 Padang Panjang

From the interview result of the writer with one of the teachers of mathematics obtained data that in the learning process students tend to be passive. One of the learning model that is expected to increase student activity in learning process of mathematics is cooperative learning model of Group Investigation type. In this type of Group Investigation cooperative learning model is a learning model that involves students actively in learning, because in this learning model demands the participation of each group in an investigation. So in each group the students must think and act creatively, because students must design a formula discovery and solve the math problems learned. In addition, communication and social skills within the group are also indispensable.

The implementation of the cooperative learning process of group investigation is closely related to the initial knowledge. Because students who master good knowledge early can support its success in learning. Based on the above description the authors are interested in conducting a study by applying cooperative learning model type Investigation Group and early knowledge on learning mathematics students in VIII SMPN 4 Padang Panjang.

Cooperative learning type of group investigation is a type of learning that includes 6 stages described by Robert E. Slavin (2009: 218-229) that is 1) Identify topics and organize students into groups, 2) Plan the tasks to be studied, 3) Implement investigation, 4) Preparing the final report, 5) Presenting the final report, 6) Evaluation.

The purpose of this research is to reveal: 1) The difference of mathematics learning result of grade VIII students of SMPN 4 Padang Panjang taught by cooperative learning model of group investigation type with direct learning. 2) Differences in mathematics learning outcomes of students with high initial knowledge taught by cooperative learning model of group investigation type higher than the mathematics learning outcomes of students with high initial knowledge taught by direct learning model. 3) Differences in mathematics learning outcomes of students with low initial knowledge taught by cooperative learning model type of group investigation is higher than the results of learning mathematics students who have low initial knowledge are taught by direct learning model. 4) Interaction between learning model and preliminary knowledge on student learning result of mathematics.

The formulation of problem in this research are: 1) Is the result of learning mathematics of student of VIII SMPN 4 Padang Panjang which is taught by cooperative learning model of Group Investigation type higher from student learning result which is taught by direct learning? 2) Are the students' mathematics learning outcomes that have high initial knowledge taught by cooperative learning model of group investigation type higher than the mathematics learning outcomes of students with high initial knowledge taught by direct learning model? 3) Is the result of mathematics learning of students with low initial knowledge taught by cooperative learning model of group investigation type higher than the result of learning mathematics of students who have low initial knowledge taught by direct learning model? 4) Is there an interaction between learning model and preliminary knowledge on students' mathematics learning outcomes?

Method

This research is quantitative research with quasi experiment type research. The population in this research is all students of VIII.

Table 2. Number of Students VIII

Students	Male	Female	Total
VIII 1	11	12	23
VIII 2	12	11	23
VIII 3	13	11	24
VIII 4	12	11	23
VIII 5	12	12	24
Total	60	57	117

Source: Administration SMPN 4 Padang Panjang

Sampling is done by purposive random sampling, that is random sampling based on destination. Since the students VIII3 and VIII5 have homogeneity in the number of students, the average grade values are not much different, then these two classes are selected as research samples. A students VIII 3 as experimental class while class VIII 5 as control class. And the test class is selected one class from within the population but outside the sample is Students VIII1.

This research procedure contains the following stages: a. Experimental class, conducted initial knowledge test, then apply cooperative learning model type group investigation consisting of 6 stages that is 1) Identifying topic and arranging student into group, 2) Planning task to be studied, 3) Conducting investigation, 4) Preparing report end, 5) Present the final report, 6) Evaluation. then performed the test results of learning. b. control class, also conducted the initial knowledge test, then apply the direct learning and then carry out the test result learning.

The data of this study were analyzed by using the mean analysis. The steps in this data analysis include: 1) Creating a data description; 2) Conduct testing requirements analysis; 3) Conducting testing of research hypothesis.

Technique of data analysis in this research use test of difference of mean. Sudjana (2002) says that in using the mean difference test, the data must come from normally distributed populations and homogeneous variant group data.

a. Normality test

Normal data testing was performed by using Liliefors test. The purpose of this normality test is to examine whether the population is normally distributed. If L_count <L_table, then Ho is accepted, so it can be concluded that the sample comes from a normally distributed population. If L_table <L_count, then Ho is rejected, so it can be concluded that the sample comes from a population that is not normally distributed.

b. Homogeneity Test

According to Sudjana (2002), homogeneity test aims to find out whether the sample class data in this study comes from a homogeneous population. To test the homogeneity of Barlett test.

The data in this study were analyzed to test the hypotheses The first, second, and third hypothesis testing was performed using t-test, which is the statistical test of the equality test of the average of two population groups. Mathematically, this t-test uses the formula put forward by Sudjana (2002: 239) as follows:

This test is performed by comparing the t_count values obtained with the known t_table from the t-distribution table at the selected level α. The criterion of this test is rejected by Ho if the value of t_count

JAIPTEKIN | Jurnal Aplikasi IPTEK Indonesia
ISSN Print: 2548-348X – ISSN Online: 2548-3498

obtained is less than t_tabel means that the difference is not significant or not significant, and if the value of t_hitung obtained is greater than t_tabel means that the difference is meaningful or significant, then Ho is accepted.

Meanwhile, to test the fourth hypothesis, with the aim to know the meaning of interaction between the learning model with the initial knowledge of student learning outcomes used Analysis Of Varians.

Results and Discussion

a. Results of students' math learning experiments and control classes.

Table 3. Results of students' math learning experiments and control classes.

Statistics	**Mathematical Learning Results**	
	class experiment	Class of Control
Total	2026	1729
Average	84.42	72.04
Median	86	72
Modus	89	67
Standard Deviation	12.02	14.24
Maximum	100	100
Minimum	61	44

From table 3, it can be seen that the mean score of the overall students' mathematics learning outcomes using cooperative learning model of group investigation higher than the average mathematics learning outcomes of students using direct learning models.

b. Results of mathematics learning of experimental class students and control classes based on high initial knowledge.

Table 4. The data of students' experimental learning and experiential class of controls are high initial knowledge.

Statistics	**Mathematical Learning Results**	
	class experiment	Class of Control
Total	1088	962
Average	90.67	80.17
Median	91.50	78.00
Modus	100	89
Standard Deviation	8.61	10.71
Maximum	100	100
Minimum	78	67

From table 4, the average score of learning outcomes of math students in early learning is higher than experiment class higher than control class. The standard deviation of students with a high initial knowledge of the experimental class is lower than that of the control class. This means that the students' mathematics learning outcomes with high initial knowledge in the control class are more diverse than the experimental class. This means that the results of learning mathematics students knowledgeable early high-grade experiments better than the results of learning mathematics students control classes.

b. Results of mathematics learning of experimental class students and control classes based on low initial knowledge.

Table 5. The data of results mathematics learning of experimental class students and control classes based on low initial knowledge.

Statistics	**Mathematical Learning Results**	
	class experiment	Class of Control
Total	938	767
Average	78.17	63.92
Median	80.50	64
Modus	89	67
Standard Deviation	11.95	12.86
Maximum	94	83
Minimum	61	44

From table 4, it can be concluded that the result of learning mathematics of experiment class students with low initial knowledge is better than the result of learning control class with low knowledge.

2. Testing Requirements analysis Data Research results

a. Test the normality of research data

Normality test is done by using Liliefors test.

Normality test of mathematics learning result of experiment and control class students it can be the significance value of the normality test of the test result of the experimental class study with the number of students is 24 students is 0.0994 and the control class which is 24 students is 0.1174. Because L_count <L_table on the level of real α = 0.05 it can be concluded that the two classes are normally distributed.

Normality test of mathematics learning result of students with high initial knowledge

The normality test data of the students' learning achievement of high student learning math experimental class with the number of 12 students is 0.1466 and the control class with the number of 12 students is 0.1931. Since L_count <L_table at the real level α = 0.05 it can be concluded that the two classes are normally distributed.

The normality test of the students' learning outcomes is low

The normality test data of the students' learning outcomes of math students with low initial knowledge of the experimental class with the number of 12 students is 0.1751 and the control class with the number of 12 students is 0.1552. Since L_count <L_table at the real level α = 0.05 it can be concluded that the two classes are normally distributed.

Test the homogeneity of research data

Homogeneity test is done to see the similarity of variance (diversity) ability of experimental class and control class. Homogeneity test in this research was conducted by using Barlett test.

Test the homogeneity of the learning result test

The result of homogeneity test of variance of experimental and control experimental learning result obtained X ^ 2 _count = 0,53 and X ^ 2 _table = 3,84 with real level 0,05. This means that X ^ 2 _count <X ^ 2 _table or 0.53 <3.84 it can be concluded that the student learning outcomes have homogeneous variance.

Test homogeneity test of student learning outcomes based on high initial knowledge

Result of homogeneity test of test result variance with high initial knowledge obtained X ^ 2 _count = 0,253 and X ^ 2 _table = 3,84 with real level 0,05. This means X ^ 2 _count <X ^ 2 _table or 0,253 <3,84 it can be concluded that the data of mathematics learning outcomes of students with a high initial knowledge has a homogeneous variance.

JAIPTEKIN | Jurnal Aplikasi IPTEK Indonesia
ISSN Print: 2548-348X – ISSN Online: 2548-3498

Homogeneity test of student learning outcomes based on low initial knowledge

Result of homogeneity test of test result variance with low initial knowledge is obtained X ^ 2 _count = 0,253 and X ^ 2 _table = 3,84 with real level 0,05. This means that X ^ 2 _count <X ^ 2 _table or 0,253 <3,84 it can be concluded that the data of learning result of mathematics of students with low knowledge of early have homogeneous variance.

Hypothesis testing

Based on the results of the test requirements analysis, then for testing the hypotheses 1, 2, and 3 used t test because the data is normally distributed and homogeneous. Furthermore, for hypothesis 4 anava test.

The first hypothesis

The results of the first hypothesis test using t test is obtained by the value of t_count = 3.2324. While t_table = 2.00 at significant level alpha 0,05 and dk = 46. t_hitung> t_tabel is 3.2324> 2.00, then H_0 rejected, thus can be concluded that the results of student learning in the subjects of mathematics are taught with cooperative learning model type of investigation group higher than the student learning outcomes in subjects mathematics taught using direct learning model on students of VIII.

Second Hypothesis

The results of the first hypothesis test using t test is obtained by the value of t_count = 2.6475. While t_table = 2.074 at significant level alpha 0,05 and dk = 22. t_count> t_table is 2.6475> 2.074, then H_0 rejected, thus it can be concluded that the results of student learning in mathematics subjects who have high initial knowledge taught with cooperative learning model type of investigation group higher than the student learning outcomes in mathematics subjects with high initial knowledge taught using direct learning model on grade VIII student.

Third Hypothesis

The results of the first hypothesis test using t test is obtained by the value of t_count = 2.8136. While t_table = 2.074 at significant level alpha 0,05 and dk = 22. t_count> t_table is 2.8136> 2.074, then H_0 rejected, thus it can be concluded that the results of student learning in mathematics subjects who have low initial knowledge that is taught with cooperative learning model type of group investigation is higher than the student learning outcomes in mathematics subjects with low initial knowledge taught using direct learning model on grade VIII students of SMPN 4 Kota Padang Panjang.

Fourth Hypothesis

Test hypothesis 4 using anava test. The result of hypothesis test 4 by using anava test is for interaction of A × B with F_count = 0,37 and F_table = 3,19 with alpha 5%, it means F_count <F_table so that H_0 accepted hence can be concluded that there is no interaction between learning model type group investigation and initial knowledge of student learning outcomes in the subjects of mathematics a student of VIII.

B. Discussion

Based on the formulation of the problem and hypothesis testing conducted obtained some findings as follows:

1. The results of learning mathematics subjects of students of VIII group of students taught by cooperative learning model type of investigation group higher than the learning result of mathematics subjects group of students who taught with direct learning model.

In the first hypothesis testing, the average value of the experimental class using cooperative learning model of group investigation type is better than the average student score with direct learning model. Where the average value of the experimental class is 84.42 while the control class average is only 72.04.

Cooperative learning model of group investigation type focuses on student activeness during the learning process while on the control class learning students tend to passive.

2. The result of learning mathematics subjects of students of VIII group of students with high initial knowledge taught by cooperative learning model type of group investigation higher than the result of learning mathematics subjects group of students with high initial knowledge taught with direct learning model.

From the result of hypothesis test 2 shows the average of experimental class learning result with high initial knowledge is 90, 67 while the mean value of mathematics learning result of control class student with high initial knowledge is 80,17. Based on the result, it can be said that cooperative learning model of group investigation type can improve student learning outcomes that have high initial knowledge in the control class. This is because in the process of conducting the research, it is seen that the students in the experimental class are more active than the students who are taught in the control class so that the students in the experimental class are more understanding about the material compared with students in the control class.

3. The results of learning mathematics subjects of students of VIII with low initial knowledge taught by cooperative learning model type group investigation is higher than the learning result of mathematics subjects group of students with low initial knowledge taught with direct learning model.

From the results of hypothesis 3 testing shows that the average of the learning outcomes of the two sample classes has a significant difference that is the average learning outcomes of students with low initial knowledge in the experimental class is 78.17 and the average learning outcomes of students with low initial knowledge in the control class is 63.92. Based on the result, it can be said that cooperative learning model of group investigation type can improve student learning outcomes that have low initial knowledge when compared with control class. From the result of hypothesis 4 test shows that there is no interaction between cooperative learning model in influencing student learning result of mathematics. The result of the analysis gives an understanding that cooperative learning model of group investigation type can be used either for students having high initial knowledge as well as low in terms of improving students' mathematics learning outcomes. This is because cooperative learning model of group investigation type unites students with high and low ability in small groups so that students are more active tointeract investigate in understanding the learning materials.

Conclusion

Conclusion in this research as follows:

1. The result of learning mathematics of students VIII SMPN 4 Padang Panjang was taught using cooperative learning model type of investigation group higher than with result of learning of student mathematics taught using direct learning.
2. The results of mathematics learning of grade VIII students of SMPN 4 Padang Panjang with high initial knowledge were taught using cooperative learning model of group investigation type higher than mathematics learning result of students taught using direct learning.
3. The results of mathematics learning of students VIII with low initial knowledge were taught using cooperative learning model of group investigation type higher than students with low initial knowledge were taught using direct learning.
4. There is no interaction between learning model of and initial knowledge in influencing student's mathematics learning outcomes.

Acknowledgment

In the implementation of research writing this article many authors get help and guidance from various parties. On this occasion the author would like to thank sincerely to Mr. Prof. Dr. Abizar as mentor I and Dr. Ramalis Hakim, M.Pd. as mentor II.

JAIPTEKIN | Jurnal Aplikasi IPTEK Indonesia
ISSN Print: 2548-348X – ISSN Online: 2548-3498

References

Arikunto, Suharsimi. 2010. Research Procedures A Practice Approach. Jakarta: Rineka Cipta

Arikunto, Suharsimi. 2009. Fundamentals of Educational Evaluation. Jakarta: Earth Literacy

Aunurrahman. 2009. Learning and Learning. Bandung: Alfabeta.

Slavin, Robert E. 2009.Cooperative Learning Theory, Research and Practice. Bandung: Nusa Media.

Sudjana. 2002. Statistical Method. Bandung: Tarsito.