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Implementation of Group Method Project in Increasing Mathematical Experiences

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ABSTRACT

Mathematics as a vehicle for education has the purpose of educating students, forming the personality of students, and developing certain skills so that they can direct students to learning values in life through mathematics. One of the fundamental problems in education in Indonesia is the lack of students who can understand mathematical concepts well. One method that promises to reduce this problem is the group project method.

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1. INTRODUCTION

Education plays an important role in preparing quality human resources who are competent in the development of science and technology, so education must be implemented as well as possible to get maximum results. Education is well managed both in quantity and quantity. This can be achieved with the implementation of timely and appropriate education in order to achieve learning objectives, which is carried out in the teaching and learning process which is the implementation of the school curriculum through activities.

Learning is how the techniques and strategies approach the teacher, so that students can easily understand the learning material presented. Maybe the teacher just does it by explaining, lecturing, or explaining in a monotone or by making learning innovations that are more effective and efficient. Many schools have implemented mathematics learning well, namely improving the quality and quality of students, easy and fun mathematics learning needs to be developed. Various concepts, methods, and strategies need to be developed so that the creation of learning, especially in the field of mathematics, which so far has been deemed by students to be unpleasant, becomes fun and requires teacher creativity. Teachers can take advantage of mathematics learning methods that develop outside the classroom if they can help create fun mathematics learning.

The development of mathematics learning in Indonesia is very concerning, because of the low mastery of technology and the ability of Indonesian human resources to be competent globally. Indonesia is a country with abundant natural resources. However, the low ability of Indonesian children in the field of

mathematics, many people think that learning mathematics is difficult, as well as the lack of teachers who follow the development of mathematics.

Nur (2001) states that mathematics education in Indonesia is generally still in conventional mathematics education which is characterized by structuralism and mechanism. In addition, the curriculum content is too dense and classroom learning is teacher-dominated or teacher-centered. Tran Vui (2001) reports that teachers in Indonesia and in Southeast Asia tend to use traditional learning strategies known by several terms such as; teacher-centered learning (teacher centered approaches), direct instruction, deductive teaching, expository teaching, and whole class instruction without classifying students and so on.

With a learning strategy like this, it can result in a very low level of student activity. Students only use low-order thinking skills. As a result, during the learning process in the classroom, students are less creative in thinking and do not participate in learning. The problem that arises is how mathematics should be studied? This question seems simple, but it requires an answer that is not simple. Because the teacher's view of the mathematics learning process is very influential on how they do.

The group project method in this study is the development of a project-based learning method. In project-based learning, it is still seen that teachers dominate learning and students in project work are less active in interacting with nature and other students. The students are still working on the project and concluding the research results independently. By using the group project method, teachers and students will collaboratively design learning in the form of projects and students will work together with other students in solving problems in the context of reality and are required to make a conclusion from the research results and be able to present the results of their research in groups so that constructivism in mathematics can go well

2. RESEARCH METHODE

Group Project

According to Thomas (in Bell, 1978), project method learning is a learning model that provides opportunities for teachers to manage classroom learning by involving project work. Project work contains complex tasks based on questions and problems that are very challenging and requires students to design, solve problems, make decisions, carry out investigative activities, and provide opportunities for students to work independently.

Group Project Method Syntax

In this model, there are several syntax (steps) that need to be considered, including the following:

a. Determination of basic questions (start with the essential question) Learning begins with essential questions, namely questions that can assign students to carry out an activity. Take a topic that matches real-world reality and begin with an in-depth investigation. The teacher tries to make the topics that are relevant to the students;
b. Design project planning (design a plan for the project). Planning is done collaboratively between teachers and students. Thus students are expected to feel ownership of the project. Planning contains the rules of the game, the selection of activities that can support in answering essential questions, by integrating various possible subjects, and knowing the tools and materials that can be accessed to assist in project completion;
c. Develop a schedule (create a schedule). Teachers and students collaboratively arrange a schedule of activities in completing the project. Activities at this stage include: (1) creating a timeline for completing the project, (2) making project completion deadlines, (3) bringing students to plan new ways, (4) guiding students when making methods that are not related to the project , and (5) asking students to make explanations (reasons) about choosing a method;
d. Monitor students and the progress of the project (monitor the students and the progress of the project) The teacher is responsible for monitoring the activities of students while completing the project. Monitoring is carried out by facilitating students in each process. In other words, the teacher acts as a mentor for student activities. In order to simplify the monitoring process, a rubric is created that can record all important activities;

e. Assess the results (assess the outcome) Assessment is carried out to help teachers measure the achievement of standards, play a role in evaluating the progress of each student, providing feedback on the level of understanding that students have achieved, helping teachers in developing subsequent learning strategies;
f. Evaluating experience (evaluate the experience). At the end of the learning process, teachers and students reflect on the activities and results of the projects that have been carried out. The reflection process is carried out both individually and in groups. At this stage students are asked to express their feelings and experiences during the completion of the project. Teachers and students develop discussions in order to improve performance during the learning process, so that in the end a new finding is found (new inquiry) to answer the problems raised in the first stage of learning.

Experience in Mathematics Learning

The definition of learning experience is that learning experience is not the same as the content of learning materials or activities carried out by the teacher. The term learning experience refers to the interaction between learners and external conditions in the environment to which they react. Learning through active student behavior; that is, what is done when students learn, not what the teacher does.

Caswel and Campbell (1935) said that it is composed of all the experiences students have had under the guidance of the teacher. Based on this opinion, it can be explained that:

a. Experiential learning experience refers to the learner's interaction with external conditions, not the content of the lesson;
b. Experience learning refers to learning through active student behavior;
c. The student will be owned by the student after he has participated in certain teaching and learning activities;
d. Learning experiences are the results obtained by students;
e. There are various efforts made by the teacher in an effort to guide students to have certain learning experiences.

In this connection, of course the teacher also wants to know how far students have mastered the specified learning experience and how much effectiveness of the guidance that has been given to students. It is in this context that the evaluation of learning experiences is very important because the evaluation of learning experiences is a process of collecting and interpreting information or data which is carried out continuously and systematically to determine the level of achievement of student learning outcomes.

3. RESULT AND ANALYSIS

This research activity was carried out from December 2014 to April 2015. The research was carried out at 3 high schools in Padangsidimpuan namely MAN 2 Model, SMAN 1, and MA YPKS.

Description of Research Results

Learning activities with conventional methods. Implementation of learning with conventional methods is how teachers dominate more than students. The teacher delivers the material in a lecture which makes learning monotonous. By using the lecture method the teacher explains the triginometric comparison material. In this explanation the teacher dominates and occasionally asks questions to draw reactions from students in the class. The learning process refers to the Implementation Plan created by the researcher to guide the learning procedure. At the end of learning, students are given a test to see the extent to which students understand the learning material delivered by the teacher and assign assignments to students related to the learning.

Learning activities using the group project method.

At the next meeting, the teacher applies the Group Project method. At this stage, learning begins with essential questions, namely questions that can assign students to carry out an activity. Take a topic that matches real-world reality and begin with an in-depth investigation. Then the teacher and students plan student projects. Planning contains the rules of the game, the selection of activities that can support in answering essential questions, by integrating various possible subjects, and knowing tools and materials that can be accessed to help complete the project. Then the teacher and students collaboratively arrange a schedule of activities in completing the project. In working on the project for a predetermined time the teacher is responsible for monitoring the activities of students during the completion of the project and testing the results of student experiences. At the end of this group project method, the teacher and students make a review of the activities and project results that have been carried out. The reection process is carried out both individually and in groups. At this stage students are asked to express their feelings and experiences during the completion of the project

Description of Test Results

Data Student test results consist of the results of the student's pre-test to test students' initial abilities, then the results of student tests using conventional methods and in the last stage the test is carried out after the implementation of the group project method on students. The test instrument is given the same to all students in all schools and within the same processing time. Based on statistical analysis using the SPSS version 18.0 program, the results of the experimental class tests in each school can be seen as follows:

Statistics

		Nilai Pretest	Metode Konvensional	Metode Proyek Kelompok
N	Valid	23	23	23
	Missing	17	17	17
Mean		52,83	63,78	82,83
Std. Error of Mean		2,884	2,335	1,400
Median		50,00	65,00	80,00
Mode		60	60	80
Std. Deviation		13,832	11,200	6,713
Variance		191,332	125,451	45,059
Range		60	40	20
Minimum		30	45	75
Maximum		90	85	95
Sum		1215	1467	1905

Table 3.1 : Learning Outcomes Statistics Experiment Class MAN 2 Model

From table 3.1 it can be seen that the average value of the experimental class in the pretest is 52.83; Conventional methods 63.78; and group project method 82.83. The standard deviation in the pretest was 13.832; conventional method 11.2; group project method 6,173.

Statistics

		Nilai Pretest	Metode Konvensional	Metode Proyek Kelompok
N	Valid	32	32	32
	Missing	8	8	8
Mean		44,22	67,66	84,69
Std. Error of Mean		2,960	1,571	1,346
Median		47,50	70,00	85,00
Mode		50	60	90
Std. Deviation		16,742	8,889	7,613
Variance		280,305	79,007	57,964
Range		56	35	25
Minimum		14	50	70
Maximum		70	85	95
Sum		1415	2165	2710

Table 3.2 : Statistics of Experimental Class Learning Outcomes at SMAN 1 Model

From table 3.2 it can be seen that the average value of the experimental class in the pretest was 44.22; Conventional method 67.66; and the group project method 84.69. The standard deviation in the pretest was 16.742; conventional methods 8,889; group project methods 7,613.

Statistics

		Nilai Pretest	Metode Konvensional	Metode Proyek Kelompok
N	Valid	32	32	32
	Missing	8	8	8
Mean		38,91	61,78	85,53
Std. Error of Mean		2,972	1,710	1,324
Median		37,00	65,00	85,00
Mode		50	60[a]	95
Std. Deviation		16,813	9,671	7,492
Variance		282,668	93,531	56,128
Range		60	35	20
Minimum		10	40	75
Maximum		70	75	95
Sum		1245	1977	2737

a. Multiple modes exist. The smallest value is shown

From table 4.6, it can be seen that Kolmogorov-Smirnov based on the pretest result is 0.849, the test result after the conventional method is 0.125, and the test result after the group project method action is obtained 0.182. The overall normality test result is greater than 0.495, which means that the learning outcomes in the experimental class are normally distributed.

A. Hypothesis test

The hypothesis in this study is that the project method can improve the mathematics experience of high school students by testing student learning outcomes after the action using the group project method. Hypotheses can be calculated using the SPSS version 18.00 program. Learning completeness criteria in this study by looking at the learning outcomes using the group project method is 75 seen in the following table:

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Metode Proyek Kelompok	23	82,83	6,713	1,400

One-Sample Test

	Test Value = 75					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Metode Proyek Kelompok	5,591	22	,000	7,826	4,92	10,73

Table 3.7: Results of the Experimental Class Learning Analysis MAN 2
Model with One-Simple Test

The final test is the final result of the experimental class MAN 2. The model of 23 students obtained an average data rate of 82.83 with a standard deviation of 6.713 and a mean standard error (mean error) of 1,400. In this study, the value of learning completeness was determined to be 75, obtained t hit of 5.591 while the value of T tab = 2.81, with $\alpha = 0.05$ and db 23-1 = 22, from the hypothesis:

H0: $\mu = 65$ (average learning outcomes)
H1: $\mu = 65$ (average learning completeness)

Based on the comparison of Thit with T Ttab, it can be seen that Thit> Ttab tab ma Ho reject, meaning that accepting H1 is the average student learning outcomes in using a group project to achieve complete learning with an average of more than 75, it can be seen at the mean of 82.83.

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Metode Proyek Kelompok	32	84,69	7,613	1,346

One-Sample Test

	Test Value = 75					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Metode Proyek Kelompok	7,198	31	,000	9,688	6,94	12,43

Table 3.8: Results of the SMAN 1 Experiment Class Learning Analysis with the One Simple Test

The final test is the final result of the experimental class at SMAN 1 from 32 students, the average data obtained is 84.69 with a standard deviation of 7.613 and a mean standard error (mean error) of 1.346. In this study, the value of learning completeness was determined to be 75, obtained Thit 7.198 while the value of T tab = 2.75 with $\alpha = 0.05$ and db 32-1 = 21, from the hypothesis H0: $\mu = 65$ (average learning outcomes)

H1: $\mu = 65$ (average learning completeness)
Based on the comparison between Thit and Ttab, it can be seen that Thit> Ttab then H0 rejects, meaning that it accepts H1, which is the average student learning outcomes in using a group project to achieve complete learning with an average of more than 75, it can be seen at a mean of 84.69.

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Metode Proyek Kelompok	32	85,53	7,492	1,324

One-Sample Test

	Test Value = 75					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Metode Proyek Kelompok	7,952	31	,000	10,531	7,83	13,23

Table 3.9: Results of the MA YPKS Experiment Class Learning Analysis with the One Simple Test

Tes Akhir merupakan hasil akhir dari kelas eksperimen MA YPKS dari 32 siswa diperoleh rata-rata data 85,53 dengan standar deviasi 7,952 dan standar error mean (rata-rata kesalahan)sebesar 1,324. Dalam penelitian ini ditentukan nilai ketuntasan belajar 75, diperoleh Thit 7,952 sedangkan nilai Ttab = 2,75, dengan alpha 5persen dan db 32-1=21, dari hipotesis H0 : $\mu = 65$ (rata-rata hasil belajar)

H1 : $\mu = 65$ (rata-rata belajar mencapai ketuntasan)

Based on the comparison between Thit and Ttab, it can be seen that Thit> Ttab then H0 rejects, meaning that it accepts H1, which is the average student learning outcomes in using a

group project to achieve complete learning with an average of more than 75, it can be seen at a mean of 85.53.

4. CONCLUSION

The discussion of research results related to the results of the hypothesis test proposed by the discussion hierarchy is as follows:

1. The results of hypothesis testing have proven empirically that the mathematical experience of students in class X MAN 2 Padangsidimpuan Model using the group project method can achieve complete learning with statistical data obtained by the mean value of 23 students 82.83 with a standard deviation of 6.713 and obtained Thit 5,591> Ttab = 2 , 81. Based on the criteria for testing the hypothesis, H0 is rejected, meaning that it accepts H1 which means that the results of learning mathematics using the project method can increase students' mathematical experience by seeing the test results of students who can achieve at least 75 complete learning.

2. The results of hypothesis testing have proven empirically that the mathematical experience of class X students of SMAN 1 Padangsidimpuan by using the group project method can achieve complete learning with statistical data obtained by the mean value of 32 students 84.69 with a standard deviation of 7.613 and obtained Thit 7.198> Ttab = 2, 75 Based on the hypothesis testing criteria, H0 is rejected, which means accepting H1 which means that the results of learning mathematics using the project method can increase students' mathematical experience by seeing the test results of students who can achieve minimal learning completeness

3. The results of hypothesis testing have proven empirically that the mathematical experience of students in the MA YPKS Padangsidimpuan class using the group project method can achieve complete learning with statistical data obtained by the mean value of 32 students 85.53 with a standard deviation of 7.492 and obtained Thit 7.952> Ttab = 2.75 Based on the hypothesis testing criteria, H0 is rejected, which means accepting H1 which means that the results of learning mathematics using the project method can increase students' mathematical experience by seeing the results of student tests that can achieve at least 75 complete learning. This is rationally caused by using the group project method. can involve students more actively and have social interaction in solving math problems and construction in mathematics in improving student experience. Active learning can lead students to improve scientific skills and performance. Scientific performance includes academic achievement, quality of interpersonal interactions, a sense of self-worth, perceptions of greater social support, and harmony among students.

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