

IMPLEMENTATION OF SCIENTIFIC APPROACH TO ENHANCE MATHEMATICS LEARNING ACHIEVEMENT OF STUDENTS

Rahma Nasir

Ms, Universitas Pendidikan Indonesia, Indonesia, rahma.nasir@student.upi.edu

Abstract

This study is a classroom action research that aims to enhance mathematics learning achievement of students in eight grades in one of the junior high school in South Sulawesi, Indonesia. The target of classroom action research is to overcome eighty percent of students reach learning score more than minimum completeness standard that is seventy five. This action can solve some problems such as low comprehension of prerequisite, poor understanding of the advantage and application of topic in daily life, fewer students for asking and arguing, noisy students talking out of topic, low enthusiasm to reply feedback, low confidence to present their opinions either writing or oral. The point of that action is to give a chance to the students to observing, questioning, associating, experimenting, and communicating. This research shows mathematics learning achievement of students in positive change. This research explains qualitatively by the change of students activities such as 1) the attention of students in teaching and learning process, 2) observe and complete the student worksheet, 3) ask and opine the teacher/ friends who have a presentation, 4) discuss in group, 5) the confidence of students to present their work group and to conclude the material, 6) the number of student who collect homework, 7) student can reflect their own study. By pay attention to mathematics learning achievement of students and student activities from the first cycle to the second cycle that implementation of scientific approach can enhance mathematics learning achievement of students in eight grades in one of the junior high school in South Sulawesi, Indonesia.

Keywords: Classroom Action Reserch, Scientific approach, mathematics.

1 INTRODUCTION

Mathematics is a tool that has a role in the development of science and technology. Because of it reason, mathematics is introduced from the elementary school. But, base on the interview with several students at Junior High School 5 South Sulawesi, Indonesia, almost all students said that mathematics is difficult to learn. It make them lazy to learn mathematics so that make them get low result at mathematics.

From the observation and result of interview with mathematics' teacher at grade VIII of Junior High School 5 South Sulawesi, there are several problems that the teacher has to face at the teaching and learning process, they are 1) the students don't understand prerequisite' lesson, 2) the students don't understand the advantages of the lesson at the daily activity, 3) the students has low curiosity, 4) the students afraid to show their suggestions, 4) the teacher don't give feedback about the students' strenght and weakness.

Based on these problem, so it needs the role of teacher to make it's student interest to learn mathematics. So that, the teacher must has the skill to choose model, method, and technique that suitable with the

students.

Together with the implementation of 2013 curriculum that demand the implementation of scientific approach. The scientific approach asks the students to observe what they do, read, hear concerned to mathematics' object. After they observe, and then they have to ask about the lesson. After that, they have to look for the information from the mathematics' book or other sources. Then they have to process the information to improve their knowledge. And then, they have to communicate what they got or make the conclusion base on the analysis' result by oral, writing, or media. At the end of the day, students have to communicate the information about the lesson's difficulty and the students' strength and weakness on the lesson to the teacher.

Base on that analysis, so the writer does the research about "The Implementation of scientific Approach to Enhance Learning Result of Mathematics Student.

2 LITERATURE REVIEW

2.1 Mathematics Learning Achievement

Mathematics learning result is the indicator to measure the successful of student at mathematics learning. The learning result has the important role in education world, because it can determine the quality of students' achievement at school. The definition about the learning result that the writer mean is the learning result that the students achieve in certain lesson that use the test as the measure tool of the students' successful.

Mathematics learning achievement is the student achievement in understand and implement the mathematics' concept after the process of mathematics learning. So, to measure the students' successful use the test instrument.

2.2 Scientific Approach

The scientific approach is a scientific method that reference to the investigates techniques of the phenomena or indication to get the new information and relate to the knowledge before. It called as scientific because of the inquiry's method is base on the proofs from the observable object, empiric, measurable with the priciple of scientific reasoning.

The teaching and learning's approach have to consider three domains, they are attitude, knowledge, and skill. The final result is the enhance and equilibrium between the ability to be good human (soft skill) and to be the human that has the skill and knowledge to has good life (hard skill) from the student that include the aspect attitude, skill, and knowledge.

TABLE 1. The Steps of Scientific Approach

Step	The Lesson's Activity	The competence that Enhance
Observing	<ol style="list-style-type: none"> 1. Read the written's source 2. Listen to the oral information 3. Look the picture 4. Watch the video 5. See the natural, social, and culture phenomena. 	Train students to look for the information, facts, or the problems.
Asking	Make some questions about the things that they don't understand from somethings that they observed. The question can be factual or problematics.	Develop the curiosity and critical attitude.
Reasoning	<ol style="list-style-type: none"> 1. Collect the informations or facts to answer the question about the student asked before. 2. Process the informations or the facts that collected to be the formula of conclusion that suitable with the problems before. 	Develop the patient attitude, respectful, communicating ability, collecting information ability, develop the attitude to learn all day long.
Associating	Implementating (development) the understanding about the problems to the other problems that similar or different.	Develop the reasoning ability systematically and logically.
Communicating	Inform about the learning result to the other people clearly and communicative by oral or written.	Develop the honesty, self-confident, and tolerant when the students show the suggestion to the other people.

The teacher's activity in this learning are: provide the learning's material, motivate the students to interact with the learning's material (tasking), ask question to the students to make the students thinking about the interaction's result, observe the students perceptions' and thinking process and give scaffolding to the students, motivate the students to share their thinking result, confirm the understanding they got and motivate the student to reflect their learning's experience [6].

3 RESEARCH METHODOLOGY

3.1 Types of Research

This research is Classroom Action Research involving reflection repeatedly (cyclical).

3.2 Place and Time Research

This research was conducted in SMP Negeri 5 South Sulawesi. The subjects were students in grade VIII 8 of 39 students (by purposive sampling) and researchers collaborate with teachers of mathematics in class in the second term of academic year 2014-2015.

3.3 Research Working Procedure

The details of the activities to be performed at each cycle are as follows:

1. First cycle

a. The Planning Phase

1. Request permission to the school.
2. Examine the syllabus subjects mathematics class VIII 8 SMP Negeri 5 South Sulawesi to allocate the time used to create learning scenarios.
3. Discuss the study material with subject teachers.
4. Check the class, student books, libraries, absent student, math learning schedule.
5. Presenting the study design that will do the math teacher concerned.

b. Implementation of Actions

Once all plans are made well, the next step is the implementation of the action.

The first cycle was conducted over four sessions, details of the action are as follows:

- 1) Check the presence, do apperception, convey themes and learning objectives.
- 2) Delivering to students learning procedure.
- 3) Collect and respond to comments and suggestions from students.
- 4) In the activity observed, teachers and vary widely open learners the opportunity to make observations through: look, listen, hear, and read.
- 5) In the event ask, teachers widely open opportunity to ask questions about what has been seen, listened to, read, and so on.
- 6) Follow-up of asking is to dig and gather information from a variety of sources through a variety of ways (read more books, more careful attention to the object).
- 7) Students do analyze the data, classify, categorize, summarize and predict/estimate by utilizing the students' worksheets.
- 8) In communicating the results of the activities, students write or tell what was found in the activities of finding information, associate and find patterns.
- 9) teacher and learner makes a summary at the end of the lesson.
- 10) Provide feedback, conduct an assessment of the activities that have been implemented.
- 11) Plan follow-up (remedial, enrichment, counseling services, giving tasks). Introduce the lesson plan at the next meeting.

c) Observation and Evaluation

At this stage of the process carried out observation and evaluation of the implementation of the action.

- 1) During the learning process, conducted observations:
 - a. active participation of students, such as: students who are present at the time of learning, students who pay attention to the teacher and recorded at the time of learning, students active during individual and group work.
 - b. Students can make the observation through viewing, listening, hear, and read.
 - c. Students can prepare and ask questions independently.
 - d. Students read sources other than textbooks.
 - e. Student activities include analyzing the data, classify, categorize, summarize and predict / estimating by utilizing the students' worksheets.
 - f. Students can submit observations, conclusions based on the analysis results orally or in writing.
- 2) The response of students to the learning activities.
- 3) The results of the implementation of measures of student learning is evaluated by providing test results at the end of the cycle of learning.

d) Reflection

All the data obtained during the execution of actions and observations collected and analyzed to assess the achievement of objectives. Furthermore, the results of reflection serve as the basis for planning measures in the next cycle.

2. Cycle II

In the second cycle was conducted for four meetings. Basically, the steps are performed in the second cycle refers to the results of the first cycle of reflection, further develop and modify the stages that exist in the first cycle with several improvements and additions in accordance with the data that was collected.

3.4 Data collection technique

1. Source of data: data sources of this research is from students and teachers.
2. The type of data: types of data obtained in this study is the quantitative and qualitative data.
3. Data collection: The test results of study, observation sheets, questionnaires student's response to determine a student's response, documentation.

3.5 Data analysis technique

The data obtained in the classroom action research, generally analyzed through qualitative descriptive.

For the study results on cognitive and affective domains were analyzed quantitatively. Cognitive using descriptive analysis. While the data in the form of student activity observation result, learning activities, student responses were analyzed qualitatively.

Data tests for cognitive learning outcomes obtained categorized by standard categorization techniques obtained from the classroom teacher interview VIII 8 SMP Negeri 5 South Sulawesi namely:

Interpretation Category Value of Learning Outcomes scores Category

No	Score	Students' activity
1	$0 \leq \text{score} < 55$	Very Low
2	$55 \leq \text{score} < 65$	Low
3	$65 \leq \text{score} < 80$	Medium
4	$80 \leq \text{score} < 90$	High
5	$90 \leq \text{score} \leq 100$	Very High

Data from observation to the affective supplied with a range of 1-4 votes, where the value 1 is less, the value of 2 is enough, three is a good value, and a value of 4 is very good. Furthermore, the value is converted in

accordance with Permendikbud No. 81A in 2013 [17] is as follows:

No	Score	Students' activity
1	3.33 <score ≤ 4.00	Excellent
2	2.33 <score ≤ 3,33	Good
3	1.33 <score ≤ 2,33	Enough
4	score ≤ 1.33	Less

3.6 Indicators of Success

Indicators of success in this class action research is an indicator of the process and results in research using the scientific approach. Using the following references:

1. The average score of students' mathematics learning outcomes increased after the application of a scientific approach, classical completeness is reached which is characterized by at least 80% of students complete.
2. Student activity increases when the learning takes place, include:
 - a) active participation of students, such as:
 - 1) Students who are present at the time of learning.
 - 2) Students who pay attention to the teacher and recorded at the time of learning.
 - 3) Students active during individual and group work
 - b) Students can make the observation through see, listen, hear, and read.
 - c) Students can prepare and ask questions independently.
 - d) Students read sources other than textbooks.
 - e) Student activities include analyzing the data, classify, categorize, summarize and predict / estimating by utilizing the students' worksheets.
 - f) Students can submit observations, conclusions based on the analysis results oral and writing.
3. Students collect homework in on time.

4 RESULTS AND DISCUSSION

4.1 The results

1. First cycle

a. Observation and evaluation

The results of observations obtained through observation of student activity sheet in the first cycle shows that

- 1.) There is only one different students were not present at every meeting with the permission or illness reasons.
- 2.) Less than half of the students who pay attention to the teacher's explanation to clarify that when the teacher student knowledge acquired either when apperception, discussion groups, and when students make a conclusion because some students do other activities such as storytelling with other friends and students are busy preparing their learning equipment.
- 3.) At the initial meeting the number of students who observe and do worksheet less for students not yet accustomed to observe them they often complain to read. Students are more likely to directly ask the teacher without examining it first. Students who do worksheet only the group leader and a smart student, other students just sit and rest talked with other friends. So that at the next meeting suggested teachers put more attention on students who are less active.
- 4.) The number of students who ask questions or give feedback to teachers/friends who related presentation material is very less for students indifferent and not feel a responsibility to understand the material.

- 5.) There are still students who do not collect homework on time with a reason to forget. Thus, the teacher asks the students to collect homework as soon as possible. Students who collect homework on time but there is a calculation error.

b. Reflection

Issues examined in this study are student learning outcomes in the material loop 80% of students still under the standard is 75, the teacher becomes the only source of learning, students do not excited to express their opinions and ask the teacher or other friends, students do not understand the learning material which causes students noisier and stories with other friends during the learning process. Therefore, researchers select and implement a class action that takes place with a better learning as guiding students individually or in groups, more teachers supervise students complete worksheet.

Thus obtained the result that at the end of the first cycle is seen that students begin to follow the procedures applied learning teachers, observe, ask, gather information, reasoning and communicate although initially it is foreign to the students because of the dominant teacher becomes a source of student learning. Some students are reluctant to ask and respond to the results of his presentation and when learning takes place, new students began eagerly asked when given a final test of each meeting when the test must be done individually. Generally, students are indifferent when instructed by to cooperate with the group as well as the current worksheet as if only the task of the group leader and a smart student.

Towards the end of the first cycle of meetings already apparent lack of progress in terms of active students to present the group's work. This was shown by the four groups are ready to present their group's work. After the test, the thoroughness of learning outcomes and completed the classical ≥ 75 not been achieved because there is less than 80%. Therefore, it will proceed to the second cycle.

c. Recommendation

After reflecting the results of the implementation of the first cycle, obtained a description of actions to be implemented in the second cycle, as an improvement of the actions taken in cycle I. Therefore, the researchers recommend that the second cycle focusing new actions undertaken improvements include:

- 1) When the preliminary activities, teachers check students' understanding of the previous meeting with the student's name immediately for comment.
- 2) Teachers are more frequently check the story in his group of students during these discussions.
- 3) Ensure that each group completed the task in a timely groups so that all the groups are ready to do a presentation.
- 4) More guides students individually,
- 5) The name of the students at random to present the results of their group discussions,
- 6) More tighten oversight of each group with direct guiding students who still have trouble understanding the material covered.
- 7) Always remind the task that delayed collected to be submitted.

2. Cycle II

a. Observation and evaluation

The results of observations obtained through observation sheet on the second cycle showed that

- 1) All the students present at the meeting in cycle two.
- 2) More than half of the students who pay attention to the teacher's explanation to clarify that when the teacher student knowledge acquired either when apperseption, discussion groups, and when students make inferences. Because when the teacher asked the students, the teacher directly mention the names of students who are less active so that students feel obliged to answer questions from the teacher when apperseption, discussion groups, and when students make inferences course with the help of a teacher.
- 3) At the last few meetings the number of students who observe and do worksheet than half because students are used to observe worksheet first. Students who do worksheet not only head of the group and smart students only, the other students also started to discuss because every student has had worksheet be solved alone by talking to a friend of the group.

- 4) The number of students who ask questions or give feedback to teachers / friends related presentation material are increasing because of feeling responsible for understanding the material.
- 5) More and more students are collecting homework on time.

b. Reflection

From the observations and test cycle II, can be obtained reflection as follows: Improvements made teachers are continuously guide students to dare to ask about the material that has not been understood and increasingly active in group discussions as well as guiding students to dare to present the results of their group work.

In general, a very good student attendance, student activity on paying attention during a lesson has been good as well as the student who asked the question and the response is getting better, students do exercises and students who are active in the discussion groups also increased.

Improvement in the ability to understand the material very apparent as students begin to look more effort in working together do the questions given by the teacher. Similarly, the task of students has increased, students are more conscious to finish and collect homework on time. And when compared to the first cycle, the second cycle increased.

4.2 Discussion

1. First cycle

Mastery learning students in classical yet been reached. This is due to the number of students who pay attention during the learning process is less, there are students who do not observe and do not do worksheet, students still hesitate to ask friends and teachers during group discussions, some students did not on time to collect homework. On the other hand, the number of groups who are ready to do a group presentation increases.

2. Cycle II

Mastery learning students in the classical style already achieved adjusted in SMPN 5 South Sulawesi that students are said to be thoroughly studied if obtaining a minimum score of 75 from the ideal value, and complete the classical if 80% of the number of students who have been thoroughly studied so that the study was discontinued in the next cycle.

TABLE 3. Improved Learning Outcomes Scores Eighth Grade SMPN 5 South Sulawesi in Learning Mathematics in every cycle.

Number	Cycle	Student Achievement			Pass	
		Maximum	Minimum	Average	Pass	Not Pass
1	Cycle I	95	40	66,54	11	28
2	Cycle II	100	50	86,54	34	5

5 CONCLUSIONS

Based on the research results can be concluded as follows:

1. Applying a scientific approach can provide an important source of information related to teachers about learning difficulties, their misconceptions, the strengths and weaknesses of the students' learning.
2. Scientific approach can improve mathematics learning achievement of student of class VIII 8 SMP Negeri 5 Makassar

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