



**INCREASING THE MATHEMATICIS LEARNING THROUGH
THE DEVELOPMENT OF VOCATIONAL MATHEMATICS MODULES
OF STKIP MUHAMMADIYAH ENREKANG**

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ABSTRACT

This research is Classroom Action Research which will be carried out in two cycles and through several stages in each cycle, namely planning, implementing actions, observing and reflecting. The purpose of this study was to determine the increase in mathematics learning outcomes of STKIP Muhammadiyah Enrekang students through the development of vocational mathematics modules. The subjects of this study were the fourth semester students of the 2018/2019 academic year study program in mathematics, totaling 10 people. The data collection technique that will be used is a test of student learning outcomes conducted at the end of each cycle, observation, reflection and student responses. The implementation plan begins with asking questions, thinking together and answering; 2) Application of the development of vocational mathematics modules about improving the learning outcomes of the mathematics education study program STKIP Muhammadiyah Enrekang. The goals and objectives of education held at the mathematics education study program of STKIP Muhammadiyah Enrekang can be achieved well, in order to produce vocational math modules for mathematics education study programs.

Keywords; learning; matematics; development; teacher

A. INTRODUCTION

Mathematics is one branch of science which is the key to mastering science and technology, but until now Indonesia is still struggling with classic problems in this case, namely the quality of education. Reality in the field shows that student achievement in mathematics subjects is very low compared to student learning outcomes in other subjects. This is reflected in the average value of the Mathematical

MID Semester students of STKIP Muhammadiyah Enrekang mathematics education study program each year which is far below other subjects. Although it is acknowledged that various efforts have been taken by the government to solve the problem, both with psychological improvement and efforts to improve lecture methods, etc., these problems are like a circular chain and do not know where to start. Based on the observation of the writer with the dossier who teaches

mathematics, the STKIP Muhammadiyah Enrekang mathematics education study program shows that students have difficulty understanding the material taught by the lecturers, students have difficulty working on the questions given, students' lack of enthusiasm is less active college student. This is caused by the lack of attention of students in participating in the learning process, lack of communication between students and lecturers, and the lack of motivation of students to study. As a result students are unable to solve problems faced in solving the questions given, mastery of concepts and student mathematics learning outcomes are low, and mathematics learning becomes boring. By looking at the results of student mathematics learning, a lecturer should use a method in teaching that can activate students in the learning process. One suitable method of learning is the method of giving quizzes with feedback.

In accordance with previous experience that students will actively study, can concentrate on lectures, actively ask questions and take notes, including paying attention to the teacher's explanation, if students are told beforehand that in each lesson a quiz is held whose values are a consideration in determining the final grade. Another goal to be achieved through giving a quiz is to look at the abilities of individual students on the subjects given. In order for the quiz to be able to produce something as expected optimally, it will be even better if it is accompanied by feedback (feed back). The feedback will provide an overview of the students' ability to understand the course material that has been given.

B. RESEARCH METHOD

This research is Classroom Action Research with the stages of implementation include: planning, action, observation and evaluation repeatedly. This study will be conducted at the STKIP Muhammadiyah Enrekang Mathematics Education Study Program with the subject of research is the fourth semester of the 2018/2019 academic year with the number of students 10 people. The factors that will be investigated in this study are student factors, namely to see whether student mathematics learning outcomes increase after being given an action in the form of giving quizzes with feedback in the learning process. This research was conducted in two cycles, each cycle carried out in accordance with the changes to be achieved. The first cycle is carried out for 3 weeks and the second cycle is held for 2 weeks. Each cycle is divided into four stages, namely: planning, action, observation and evaluation and reflection.

In detail the procedure of this action research can be described as follows. The Planning Phase is: a) Reviewing the fourth semester mathematics competency-based curriculum of STKIP Muhammadiyah Enrekang which includes preparation of lesson plans, allocation of time by adjusting between the time available in the competency-based curriculum and the time of the study. b) Make a learning plan for each meeting. c) Designing and making initial test questions that will be given to students. d) Make an observation format to observe the conditions of learning in class when the implementation takes place. e) Making

research instruments in the form of learning motivation scales and learning outcomes test questions for the final evaluation of the cycle.

b. Action Stage

In general the activities carried out at this stage are as follows.

1. At the beginning of each meeting students are given a 10-minute test to see the extent to which students can receive previous lessons, as well as the readiness of students to receive prior material.
2. The student answer sheet is collected, then check it. If it turns out there are still many students who have not been able to finish correctly, then the teacher again explains the relationship with the material and its solution before discussing the next material.
3. Discuss the subject matter according to the learning scenario that has been made.
4. Give some sample questions, then students are given the opportunity to ask questions.
5. Students are directed to solve math vocational module questions and collect the results.
6. Students are asked to write their work on the board.

c. Observation and Evaluation Phase

At this stage an observation process is carried out on the implementation of the action using an observation sheet that contains notes about the situation that occurred in the classroom during the action took place, and carried out evaluation of learning outcomes after Cycle 1 was completed.

d. Reflection Stage

Data obtained at the stage of observation and evaluation, then analyzed quantitatively. From the

results of the analysis, a reflection on the activities of the actions that have been carried out and the results achieved has been carried out including obstacles and constraints faced.

Data and How to Take It

a. Data source

The source of data in this study is the fourth semester Mathematics Education Study Program STKIP Muhammadiyah Enrekang.

b. Data Type

The types of data to be collected are quantitative data and qualitative data which consist of: (1) observation results, (2) learning outcome questionnaires.

c. Research Instrument

- 1) Observation sheet to record data about the state of the student during the action activity.
- 2) Tests to retrieve data about student mathematics learning outcomes.

Data analysis technique

The data collected will be analyzed quantitatively and qualitatively. For observational data analyzed qualitatively using descriptive statistics, then qualitative using categorization techniques. Learning outcomes data were analyzed quantitatively with descriptive.

The criteria used to determine the category of learning outcomes are scale five based on report card writing criteria and grade raising, namely: 0% - 34% categorized Very low, 35% - 54% categorized as low, 55% - 64% categorized as medium, 65% - 84 % is categorized as high and 85% - 100% categorized as very high.

C. DISCUSSION

Mathematics taught at the school level is elementary school, junior high school and high school is called school mathematics. School mathematics is the elements or parts of mathematics chosen based on the educational interests and development of science and technology. This shows that school mathematics still has the characteristics possessed by mathematics, which has an abstract object of thought and a deductive mindset.

School mathematics is not entirely the same as mathematics as a science, because it has differences in terms of presentation, mindset, universe limitations, and abstract level.

1). Presentation of Mathematics

The presentation or disclosure of items in the School of Mathematics is adjusted to the estimates of the intellectual development of students. So the indirect presentation of mathematical items.

2). Mathematical Mindset

The pattern of thinking of mathematics as science is deductive. The nature or theorem which is found inductively or empirically is then verified by deductive steps according to its structure. Not so with school mathematics, although students in the end are expected to be able to think deductively but in the learning process can be used inductive mindset.

3). Limitations of the Universe

As a result of choosing elements or elements of school mathematics by paying attention to aspects of education, simplification can occur in complex mathematical concepts. The definition of universe of conversation is still needed but may be narrowed

down.

4). Abstraction Level

A math teacher must try to reduce the abstract nature of the mathematical object so that it makes it easier for students to catch lessons at school.

b. School Mathematics Function

School mathematics functions to develop the ability to calculate, measure, decrease and use mathematical formulas needed in everyday life.

c. School Learning Objectives

The learning objectives of school mathematics demanded in the Competency Based Curriculum (CBC) are:

1. Train ways of thinking and reasoning in drawing conclusions.

2. Develop creative activities involving imagination, intuition, and discovery by developing divergent thinking, originality, curiosity, making predictions and predictions and experimenting.

3. Develop problem solving skills.

4. Develop the ability to convey information or communicate ideas.

Learning is an activity that is often carried out by everyone. A person's knowledge, skills, habits, hobbies, and attitudes are formed, modified, and developed due to learning. Therefore, learning is marked by a change in a person. Changes that occur in a person as a result of the learning process can be realized in various forms such as changes in knowledge, learning outcomes, attitudes and behaviors, skills, abilities and abilities, and changes in quality aspects that occur in individuals.

According to Mohamad Ali (1987: 14), in general learning can be interpreted as a process of changing behavior due to

Statistic	Statistical Value
Subject	31,00
Ideal score	100,00
Maximum score	90,00
Minimum score	40,00
Score range	50,00
Average score	70,61
Median	70,00
Standard deviation	11,17

the interaction of individuals with their environment. The intended behavior includes knowledge, learning outcomes, skills, attitudes and so on. Every behavior is visible and some are not visible (not observable). Observable behavior is called appearance whereas behavior that cannot be observed is called behavioral tendency.

b. Understanding Mathematics Learning Outcomes

Learning outcomes are the results achieved by someone after learning which is marked by a change in the person. The changes referred to are changes in the level of learning outcomes and mastery. To measure learning outcomes must be in accordance with the goals of cognitive achievement tailored to the ability of students. If it is associated with mathematics, then the learning outcomes of mathematics are the results achieved by someone after learning mathematics which is marked by changes in the level of learning outcomes mastery of the material that has been taught.

In the success of learning mathematics, it is influenced by several things as stated by Samekto (Alimin, 2002: 6) as follows: "A person's success in learning mathematics is not only influenced by interest, awareness, willingness, but

also depends on his ability to mathematics, and intellectual skills, such as numeracy skills, are needed."

In the learning process, students always want to get better results in learning. To make this happen, students must have sufficient intellectual skills.

3. Giving Tests and Feedback

The final test is a test given to students to do after presenting certain material. This test is carried out with the aim of measuring the level of student mastery of the basic material that has been given previously to receive further material. Good mastery of the prerequisite material will improve.

D. THE RESULTH OF THE RESEARCH

A. Student Mathematics Learning Outcomes

B.

1. Descriptive analysis of learning outcomes after giving action in cycle 1
Data on student mathematics learning outcomes for the first cycle is obtained through giving a test of mathematics learning outcomes after completing 4 sub-subjects, namely the general form of quadratic equations, solving quadratic equations with factoring, solving quadratic equations by completing perfect squares and solving quadratic equations using formulas. Then the data is obtained as follows:

Table 4.1. Description of Student Learning Outcomes in the Final Cycle

If the data is grouped into categories five based on the criteria for writing report cards and raising classes, then the frequency

1 Test

distribution table is obtained as follows:

Table 4.2 Frequency Distribution of Student Learning Outcomes in the Cycle 1 Final Test

Score	Category	Frequency	Percentage (%)
0 – 34	Very low	0	0,00
35 – 54	Low	2	6,45
55 – 64	Is being	4	12,90
65 – 84	High	21	67,75
85 – 100	Very high	4	12,90
	Total	31	100

Based on table 4.2, it was found that of the 31 STKIP Muhammadiyah Enrekang students, after being given the action in the first cycle, 6 students were included in the incomplete category. This can be seen from the values obtained from 40 to 64 and students who got the value of 64 there were 2 people who were actually almost close to the value of learning completeness, namely 65.

While students who entered the complete category had 25 students, in general the values obtained were above 65. Classical learning completeness was 80.65%.

Based on table 4.1 and 4.2 it is also known the level of ability and mathematics learning outcomes of STKIP Muhammadiyah Enrekang students, after being given the action in the first cycle most students are in the high category.

2. Descriptive analysis of learning outcomes after giving action in cycle II
Data on student mathematics learning outcomes for the second cycle was obtained through giving a test of mathematics learning outcomes after completing 3 sub-subjects namely discriminant and their use, number and results of times the roots of quadratic equations, and compiling quadratic equations. Then the data is obtained as follows:

Table 4.3 Description of Score of Student Learning Outcomes in the Final Cycle II Test

Statistic	Statistical Value
Subject	31,00
Ideal score	100,00
Maximum score	95,00
Minimum score	55,00
Score range	40,00
Average score	79,55
Median	80,00
Standard deviation	10,49

If grouped into categories five based on rapordan writing criteria and class increases, then the frequency distribution is obtained as follows:

Table 4.4 Frequency Distribution of Student Learning Outcomes in the Final Cycle II Test.

Score	Category	Frequency	Percentage (%)
0 – 34	Very low	0	0,00
35 – 54	Low	0	0,00
55 – 64	Is being	2	6,45
65 – 84	High	14	45,16
85 – 100	Very high	15	48,39
	Total	31	100

Based on table 4.4, it was found that of the 31 STKIP Muhammadiyah Enrekang students after being given the action in the second cycle which entered the incomplete category decreased from 6 students to 2 students, while 29 students entered the complete category, and classical learning completeness was 93.55%. With an average score of 79.55 converted into a scale of five, the mathematics learning outcomes of students in the second cycle are in the high category.

Thus it can be said that the mathematics learning outcomes of the fourth semester students after being held for

two cycles have increased, this means that by giving initial tests at each meeting will be able to increase students' mathematics learning motivation which has implications for improving mathematics learning outcomes.

A. Changes in Student Attitudes

Besides the increase in student learning outcomes during the first cycle and second cycle there were also a number of changes in student attitudes. These changes are quantitative data obtained from the observation sheet of each meeting recorded by the teacher in each cycle.

The changes referred to are as follows:

a. Increased frequency of student attendance, from cycle I to 96.25% of students during 4 meetings to 100% in cycle II 3 meetings. This shows the increasing motivation of student mathematics learning.

b. The attention of students in the teaching and learning process from cycle I to cycle II noticed an increase with the increasing number of active students at each meeting. This can be seen from the number of students who ask questions about the subject matter or questions that cannot be resolved, have increased. From the first cycle of 25% students became 30.33% in the second cycle. This reflects the emergence of student awareness that without taking lessons seriously, students will not be able to answer and understand the questions given.

c. Student self-confidence also showed an increase with the increasing number of students who dared to appear to work on the questions on the board. From the first cycle of 22.75% students increased to 30.33% of students in the second cycle.

d. The sincerity of students working on the assignments given also increased. This is indicated by the number of students working on assignments given and collecting on time. If in the first cycle there were 95% of students working on assignments and collecting on time, then the second cycle increased to 98.33% of students.

e. The courage and enthusiasm of students to answer oral questions from the teacher correctly also increased. This can be seen from the number of students who raised their hands repeatedly to

answer the teacher's oral questions. From the first cycle, it was recorded that 22.50% of students were able to answer teacher's oral questions correctly, increasing to 25.33% of students in cycle II.

f. Besides that, the increased attention of students can also be seen from their efforts to ask questions and discuss with their friends to solve their problems in completing their tasks, even asking the teacher about the material that has not been understood outside the hours of mathematics courses.

B. Reflections on the Implementation of Actions in the Teaching and Learning Process in Mathematics.

1. Cycle 1 Reflection

At the beginning of the implementation of the first cycle, the enthusiasm and activeness of the students in carrying out their assignments and initial tests were given almost no significant changes. In general, students act passively and just listen to what is explained by the teacher. Even if the teacher asks questions, students only dare to give verbal answers together so that the teacher is difficult to detect the source of the answer.

From the results of interviews and observations it is also known that the tasks answered by students are mostly done together with how to copy the answers from friends who have finished. The willingness and awareness of students to ask for a solution to the problem is still lacking. This is shown if randomly taken jobs from students who have finished and asked again about what was written, it turns out in general can not answer. From the initial assignment or test given, it was also found that some students were still

lacking in the calculation operations. This is seen from the results of his work which did not obtain the correct final result, even though the steps of the work on the questions were correct.

Towards the last week of the implementation of the first cycle, there has been little progress. This can be seen from several students who dare to ask questions or responses during the teaching and learning process. But in general the active students are students who are already familiar with the teacher or student

E. CONCLUSION

Based on the results of the research and discussion in the previous chapter, it can be concluded as follows: there are still very few students who dare to raise their hands to solve the questions on the board, new students want to appear in front of the class after the teacher appoints them directly. This was marked by a sense of remorse after his friend worked on the problem and it turned out the answer was the same. So generally students have not shown courage and confidence. From the results of the quantitative analysis showed that there was an increase in learning outcomes seen in the first cycle obtained an average score of student mathematics learning outcomes of 70.61 with an ideal score of 100 which is in the high category, while in the second cycle to 79.55 with an ideal score of 100 which is in the high category. Qualitatively there is an increase in the frequency of student attendance, activeness and seriousness of students in the learning process of mathematics. Based on the results of

this study it can be concluded that learning mathematics through giving quizzes with feedback can improve mathematics learning outcomes of STKIP Muhammadiyah Enrekang students

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