

Improving the Innovation of Mathematics Education Undergraduate through Cooperative Learning

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Abstract: *This study aims to determine the application of cooperative learning to improve the effectiveness of innovative mathematics learning of undergraduate students of mathematics education at Bengkulu University. The research method used in this research is using Lesson Study. Lesson Study activity is done in learning with 3 steps of research in learning that is, preparation (plan), implementation (do) and reflection (see). This activity is conducted by researchers as a model lecturer and peer 2 people as observers. With the results of research that is the increased activity and value of student learning outcomes. In the first cycle of students' activity observation of 61% and the average score of student learning outcomes was 69.79, the second cycle was 70% observation of student activeness as well as the average score of student learning outcomes of 75.79, the third cycle observed students' activeness of 86% as well as the average value of student learning outcome of 84.39. from the results of this study, it can be said that the application of cooperative learning can improve the effectiveness of learning.*

Keywords: Cooperative Learning, effectiveness, activity

1. Introduction

As an effort to promote a life of nation and state in accordance with the objectives that have been formulated then in it happened the process of education or learning process. Where learners are given understanding and views towards maturity and maturity. With this process will bring an influence on the development of the soul and the potential of a learner toward a more dynamic either to the talent or experience, moral, intellectual, and physical.

The government effort to solve the above problems is by improving the education curriculum, improving the quality of educators, including education facilities and infrastructure, the existence of school operational assistance and other businesses. However, the quality of education in our country has not achieved satisfactory results. This reflects that the quality of national education has not yet achieved an encouraging result. Mathematics is one branch of science that plays an important role in efforts to improve the quality of education.

Result of study Widada (2016), there are seven models decompositions of genetic students mathematics education reviewed based on the SRP Model about the concepts of Real Analysis namely Pra-Intra Level, Level intra, Level semi-inter, Level inter, Level semi-trans, Trans Level, level and *Extended-Trans*. However, the majority of intra students have difficulty in learning advanced mathematics.

The results of previous research Widada & Herawaty (2017), found that learners have obstacles in understanding the limit function (calculus), consequently, the occurrence of difficulties and mistakes learners understand the concept and derived principles.

The rapid development of mathematics requires teachers to further develop themselves. This should happen because the teacher is a person who plays a role in the learning process for students. Teachers must be able to make students learn,

understand, understand, and master every concept of each subject matter is taught well and able to apply it to real life.

One of the subjects that support the problem is Innovative Mathematics Learning as applied to the students of Bengkulu University Mathematics Education given to the 5th semester students. The learning effectiveness of this course should always be improved in order to produce prospective teachers who understand and be able to apply innovative learning in mathematics. One method that can be applied by a teacher is by applying cooperative learning to improve effectiveness in learning.

According Widada (2015), contextual learning media can effectively produce a pattern by which, with the teacher or friend guidance, the students can easily develop conjecture and perform vertical mathematization.

In a large Indonesian dictionary, effectiveness means the effectiveness of an object. While Perrott (Sahabuddin, 2007: 51) suggests that effective teachers are teachers who can demonstrate the ability to produce learning objectives that have been planned. According to Diamond, (Deski Diana, 2007) effectiveness can be measured by looking at students' interest in learning activities. If the student is not interested in learning something, it can not be expected that he or she will be successful in learning the subject matter. Conversely, if students learn according to their interests, then it can be expected the results will be better.

Cooperative Learning (cooperative learning) is one of the teaching and learning strategies that emphasizes the attitude or behavior together in working or helping among others in a regular structure of cooperation within the group. Artzt and Newman (Trianto, 2011: 56) Stated that cooperative learning students learn together as a team in completing group tasks to achieve common goals. Jonhson & Johnson (Trianto, 2011: 57) states that the main goal of cooperative learning is to maximize students to improve academic achievement and understanding both individually and in groups.

Table 1 Steps Of Cooperative Learning Model

Phase	Behavior
Phase -1 Convey goals and motivate students	The teacher conveys all the learning objectives to be achieved in the lesson and motivates the student
Phase -2 Presenting information	Teachers present information to students by way of demonstration or by reading
Phase -3 Organize students into study groups	Teachers explain to students how to form learning groups and help each group to transition efficiently
Phase -4 Guiding group work and study	Teachers guide learning groups as they work
Phase -5 Evaluation	Teachers evaluate learning outcomes about the material that each group has learned and present it
Phase -6 Reward	Teachers seek ways to appreciate both individual and group effort and learning outcomes

academic year 2017/2018. This research was conducted in September - October 2017.

Learning system development method applied in this research is lesson research with lesson study model Lewis (2002). Implementation is carried out in 4 cycles adjusted to the time allocation and subject matter that has been determined. In each cycle consists of 3 stages of activity, namely: 1) planning (plan), 2) implementation and observation (do), 3) reflection (see). Can be seen in the following figure:

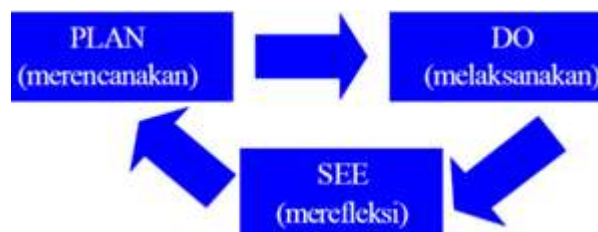


Figure 1. Research Cycle Lesson Study (Lewis, 2002)

2. Methods

The method undertaken in this study is with lesson study on Innovative Mathematics Learning as applied to undergraduate students of Mathematics Education, University of Bengkulu given to students of 5th semester of

In the diagram, the general description of the lesson study can be illustrated as follows.

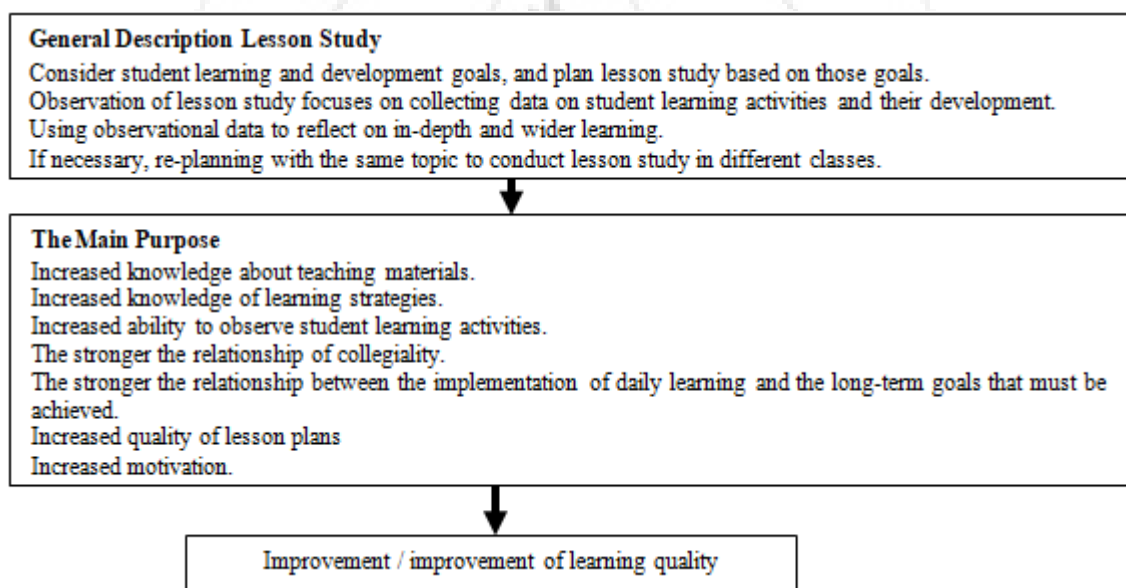


Figure 2: Overview of Lesson Study (Sumar Hendayana, 2006: 39)

3. Discussion

Based on the results of the study, there is a significant increase in student activity from cycle I, cycle II and cycle III can be seen in table 2. For student learning outcomes there are also improvements as presented in table 2. So that in cooperative learning in course class Innovative Mathematics Learning can be applied to increase student activity and improvement of student learning result of mathematics student of S1 Mathematics Education of FKIP University of Bengkulu hence there is increasing effectivity of student learning.

Table 4. 4: Recapitulation of Activity Value and Learning Outcome on 3 Cycles Conducted

No	Description	Cycle I	Cycle II	Cycle III
1	Percentage Observation of Classical Student Activity	61 % (enough category)	70 % (enough category)	86 % (High category)
2	Average learning result value	69,79	75,79	84,38

The data can be displayed in the form of diagrams, which are as follows:

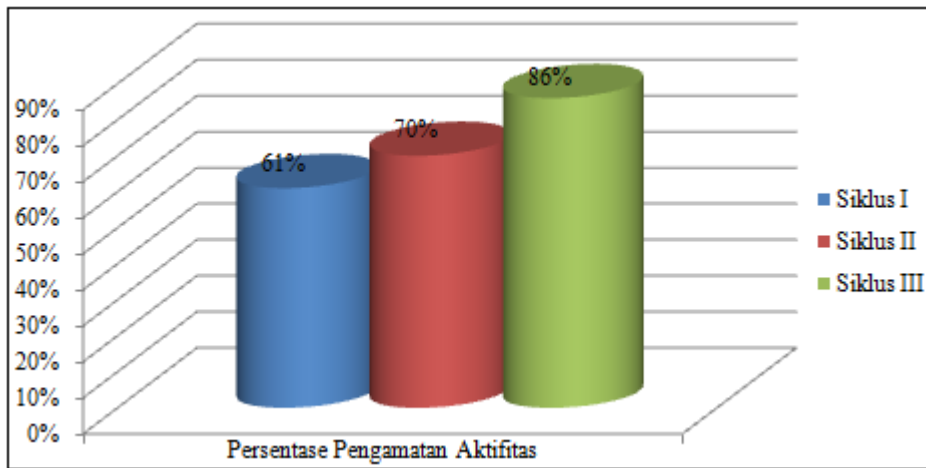


Figure 3: Graph of student activity observation by 2 observers

In the graph, seen the increase of student activeness with observations made by 2 observers. The improvement suggests that cooperative learning can improve students'

activity in learning. For student learning result score, it can be shown in following graph:

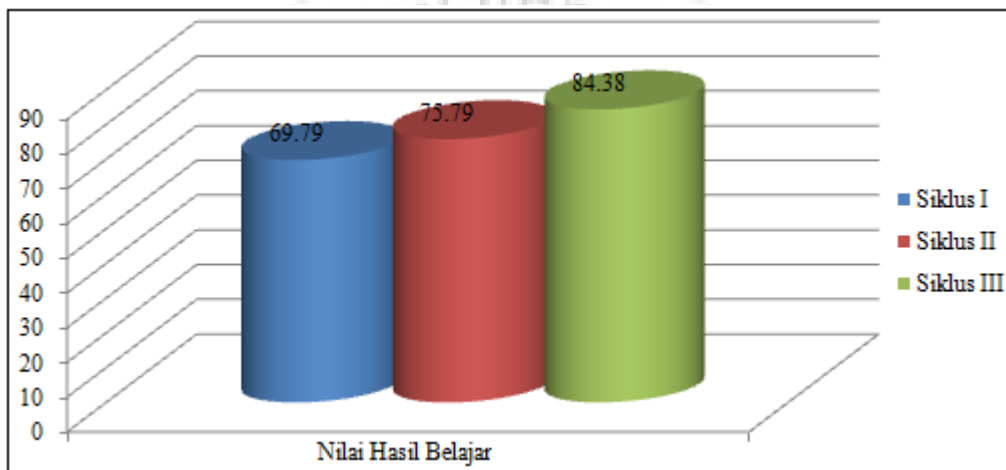


Figure 3: Graph of student learning outcomes

In the graph, it can be seen that there is an increase of student result value by giving postes at the end of cycle. The increase states that cooperative learning can improve the value of student learning outcomes in learning.

Cooperative learning displays its form in group learning. Assessment is shown to know the students' mastery of the subject matter individually. The results of this assessment are then submitted by the teacher to the group so that all groups know who the group needs help and who can provide assistance, meaning that can teach to their friends. The value of the group should be based on the average, so group members should contribute to the group. The point is individual accountability is a group assessment based on the average mastery of all members individually.

Increased activity and value of student learning outcomes described above, states that the application of cooperative learning can improve the effectiveness of learning. This result is in accordance with the application of cooperative learning in accordance with the ones stated by Lie (2004):

- a) Positive Interdependence
 In cooperative learning, teachers create an atmosphere that encourages students to feel the need for each other or commonly called positive interdependence that can be achieved through: interdependence to achieve goals, interdependence completion of tasks, interdependence of materials or sources, interdependence role, interdependence prize
- b) Face to face interaction
 This can force students to meet face-to-face so they will have a dialogue. Dialogue is not only done with teachers but with peers as well because students will usually be more flexible, easier to learn with peers.
- c) Individual accountability

- d) Interpersonal relationship skills
 Social skills in relationships between students should be taught. Students who can not have interpersonal relationships will get a reprimand from teachers as well as other students.

Cooperative learning in this research, is inseparable by the existence of lesson study action applied in this research. So that in each implementation model lecturer can give some difficulties in doing the learning. The other team's job is to provide input and corrections to the learning that has taken place. So that the implementation of the next learning will be better than the previous learning.

So it can be proven in this research, that the application of cooperative with Lesson Study can increase student activity and increase understanding of student math concept.

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4. Conclusion

Based on the implementation of learning that has been done, it can be concluded that:

- a) Cooperative learning model is considered quite effective in learning subjects. Mathematics, Innovative, development of more english subjects.
- b) Lesson Study activities held in general run smoothly, however, some obstacles regarding time and class size make a special problem that must be faced.
- c) Lesson Study activities developed can be concluded able to give a significant impact on the continuity of the implementation of cooperative learning in improving student activities and the ability to comprehend the concept of mathematics.

5. Suggestion

Based on the above conclusions, it can be gives suggestions as follows:

- a) The need for a more adequate time allocation, so that the implementation of lesson study can take place more leverage.
- b) The need for class size settings, so the class is more effective with the number of students who are not too many.
- c) Cooperative learning activities can be done not only in the course of education technology exhibition, but also can be implemented in other courses, because it is considered effective enough to be able to build character and ability to cooperate among students.
- d) There is a need for workshop activities as a follow up of research results.

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