

# Implementation of Lesson Study to Increase of Mathematical Problem Solving Ability and Mathematical Communication Ability for Students Teacher Prospective of Mathematics Education Semester Iii University of Bengkulu

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**Abstract:** *This study aims to determine the enhancement of problem solving skills and mathematical communication skills after applied lesson study on prospective students of mathematics education semester III University of Bengkulu. This type of research is an exploratory research by applying Lesson Study, which consists of three stages: planning, implementation, and reflection. Subjects in this study were 38 students of mathematics education teacher candidate of Faculty of Teacher Training and Education Science Mathematics University of Bengkulu, with subjects capita selekta mathematics. Data collection was done using observation sheets, test sheets, and documentation. Data obtained from the observation sheet on the student lesson study and test sheet were analyzed descriptively. The results showed that the application of Lesson Study can improve the communication skills and solving mathematical problems Students of Mathematics Teacher candidate of Semester III at KapitaSelekta Mathematics Education Elementary Course as much as 20% seen from the average score of problem solving ability and student's mathematical communication ability from 49,79 to 50,26.*

**Keywords:** Lesson Study, Problem solving ability, mathematical communication ability

## 1. Introduction

WahyuWidada (2015) said that various efforts to improve the quality of education in building intelligent, competent, and character human beings have been conducted by various parties, but the achievement is still relatively low, it shows that efforts to improve the quality of education has not been able to solve basic problems National Education. According to WahyuWidada (2015: 1), one of the main tasks of government in the field of education is to strive for the quality of education can reach the established National Education Standards (SNP). Achievement of SNP can be done through various process of school education and education outside of school, but the main key in achieving SNP is quality of learning process.

Based on the results of observations of researchers at the third semester students of mathematics education at Bengkulu University, it appears that students tend to be less active when conducting learning. This is proven when the lecturer ask questions to students and students should be stimulated in advance to be able to answer questions from the lecturer. Students still seem shy to express what is in their thinking.

Shirley (2001) also said that we should seek alternatives and innovations in order to improve our students' mathematical skills. One of the keys is the improvement of the learning process, especially by improving the portion of reasoning, problem solving, argument and communication, through more contextual or realistic teaching materials. Speaking of mathematical ability, when the researcher did observation on student of mathematics education teacher of third semester of Bengkulu University, it can be seen that student still

difficult to catch what is communicated by lecturer this is proven when lecturer give problem to student to do in front of class, student repeatedly ask the point of the matter. Students basically understand what is meant by the lecturer, but the student is less able to write answers with his own language, less able to re-reveal a description of mathematics in his own language, less able to provide written explanation of the answers given. This proves that the ability of students' mathematical communication is still low. As Baroody (1993: 107) says that learning should help students communicate mathematical ideas through five aspects of communication: representing, listening, reading, discussing and writing. The above facts as said by DwiYanti (2017) about the difficulty of solving problems related to the application of concepts, especially in daily life. Dwiyanti (2017) also stated that it is also marked by the difficulty of making or designing mathematical models appropriately in accordance with existing problems, and still difficult to connect between objects and concepts in mathematics.

Then based on the results of observations, the researchers also found that students of mathematics education candidates in the third semester of university Bengkulu still difficulty in solving mathematical problems given by lecturers it is seen when lecturers provide a real problem in the form of story problems, students tend to be fixated on the examples of settlement given by lecturers, students quickly feel satisfied when it has gained with shortcuts from problems without any effort to work in a structured, learning tend to be conventional, this causes a lack of challenges for students in learning activities. Though solving the problem itself can train students to think creatively, in order to be able to solve the problem open ended. Because with an open ended problem, students are able to come up with creative

ideas with their flexible thinking. The National Council of Supervisors of Mathematics (NCSM) states, "learning to solve problems is the main reason for studying mathematics" (Wahyudin, 2008: 20).

Achievement of optimal learning results one of them depends on the ability of lecturers, especially in directing learning activities in accordance with the planned lesson plan (Friansah, 2015: 133). A model of teacher development to achieve the quality of learning is the lesson study. Lesson study is a model of professional education through collaborative learning and continuous learning based on the principles of kolegalitas and mutual learning to build community learning (Fachruddin, 2010: 10). Therefore, researchers want to apply lesson study at universities in order to improve problem solving skills and mathematical ability of students. This is as rustono (2008) suggests that the Lesson Study is seen to excite learning innovation in schools because all parties are involved and concentrate toward improvement. Because lesson study is not a method or learning strategy, but lesson study activities can apply various methods or learning strategies that are appropriate to the situation, condition and problems faced (Fachruddin, 2010: 10). Sparks (1999) also states that lesson study is a collaborative process undertaken by a group of teachers in identifying learning problems, planning improvements in learning, conducting learning with one teacher to teach it while another as an observer, evaluating and revising learning, which have been revised based on evaluation

results, reevaluate, and share (disseminate) the results to other teachers.

Based on some opinions above so that it can be said that lesson study is a model of educator profession development process collaboratively done in planning, observing, analyzing, and improve learning, and in learning can use various methods, strategies, or approaches appropriate to the learning situation, conditions, and problems facing educators.

## 2. Research Methods

This type of research is an exploratory research by applying Lesson Study, which consists of three phases: planning, implementation, and reflection. Subjects in this study were 38 students of mathematics education teacher candidate of Faculty of Teacher Training and Education Science Mathematics University of Bengkulu, with subjects capita selekta math. Time Research is conducted for 3 months starting from the planning process until the reporting process is completed from October to December 2017.

This research is carried out in the form of a series of lesson study activities consisting of 3 stages of planning, implementation, and reflection as shown in Figure 1.1 below:

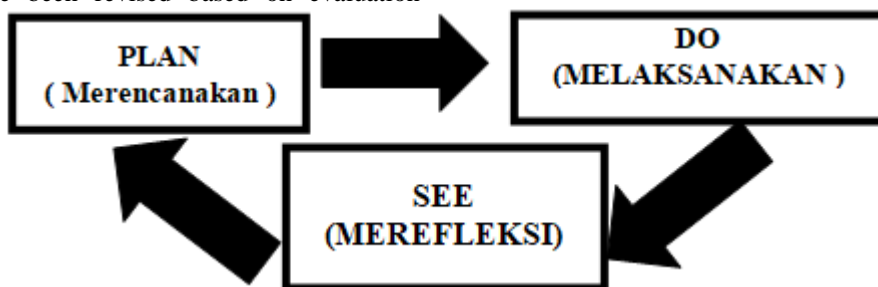


Figure 1.1: A series of lesson study activities

## 3. Results and Discussion

### 1) Implementation Plan

Based on the view of Ibrohim (2010), that at the planning stage (plan) aims to produce a learning design that is believed to be able to membelajarkan learners effectively and according to good planning can not be done alone. So at this stage, there are several activities that are done together with the team that is:

- a) PIPM permit to the University of Bengkulu Prodi Mathematics Education
- b) Discuss with the team, lecturer and supervisor, for class division based on lecture schedule.
- c) With the team determine the focus of the problem to determine the learning approach that will be used based on the RPS given by the lecturer.
- d) Together with the team to discuss the division of tasks PIPM-based project lesson study (model lecturer, observer, and documentary).
- e) Together with team prepare observation sheet for lecturer and student activity.
- f) With the team designing SAP. Includes LKM, Problem and test answers for the end of Cycle I and II

- g) Together the team designs the instructional media to be used.

### 2) Implementation Pembelajaran (Do)

Here is a description of the learning and reflection implementation that takes place in Cycles 1 and 2. The material to be covered includes measurement (length, weight, time, circumference, area, and angle), Measurement (Volume, Geometry Concept, Build Flat and Its Character, Build Room and its nature) in Cycle 1, and understanding of data, data collection and presentation techniques, as well as elementary mathematics of SD in Cycle II.

#### Cycle 1

The first meeting, the lecturer opened the lecture by greeting the students and checking the attendance. The reason is because in the previous week when the observations have been introduced by lecturers of subjects selekta level of basic mathematics education, and given the opportunity to introduce themselves. After opening the lecturers' learning to give motivation and reinforcement to prospective teachers, to train prospective teachers to be professional teachers, then lecturers distributed LKMs and display

learning media in the form of power point and present concrete examples in everyday life. Students pay attention to the materials presented by lecturers.

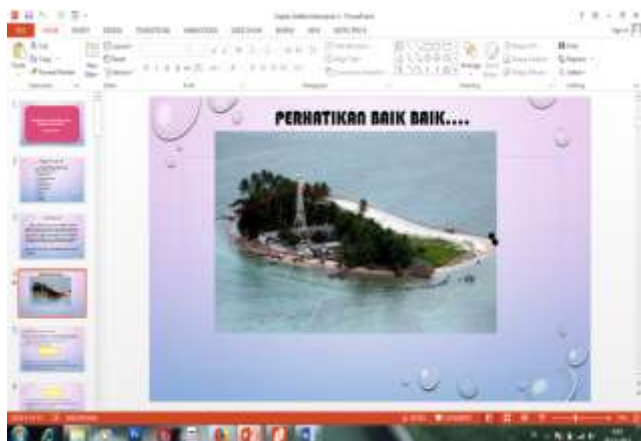


Figure 1.2: Sample Lecture Material

In Figure 1.2 the lecturer shows the mouse island as a concept to search the circumference, here the lecturer wants to show that realistic learning (related to everyday life) can be used as a learning that can make students understand the concept, and find themselves the concept of counting the circumference, this is expected to motivate prospective teachers can provide meaningful learning to students when they become a teacher. Lecturers give the concept of the initial concept of course material, then the lecturer gives problems in the form of questions within the LKM, the problem given in the form of problems that can train problem solving skills and students' mathematical communication skills. The lecturer gives a brief explanation as a reinforcement to the student, but does not show the completion of the problem, just to provoke the knowledge possessed by the student.

Lecturers give time to solve the problem, it is expected to train students to work quickly and accurately, also avoid lazy students to do the problem, and avoid the students who just want to see the answer from his friend. Lecturers also make lectures become interactive lectures so there is no opportunity for students to laze around. After the time is finished the lecturer gives the opportunity to present the result of the answer by appointing the student who raised his hand first when the lecturer invited, then the lecturer gives the student motivation by means will give additional point for the student who dare to present the result of the answer regardless of right or wrong, will be discussed and compared with other answers, if there are different answers. It is expected that students compete to raise their hands to present their answers, but only a few active students who raised their hands showed their willingness to present their answers, there were still students who were ignorant and silent, not even taking the matter seriously. There are still students who are busy with their own activities. In Figure 1.3 below, the student is presenting the results of the problem solving.



Figure 1.3: Students presented the results of the answers

If there are differences of opinion with other students, lecturers invite students to write down the answer that is considered different. Then conclude which answer is the most tepan. The lecturer's role here is to emphasize what things should be understood by the students, any concepts that can be used when the student becomes a teacher teaching on the material such as measurement concepts (length, weight, time, circumference, area, and corner). Lectures are conducted by giving problems or problems in order to train and know the ability of problem solving and students' mathematical communication skills. Lectures also end with the assignment that can be done students at home.

The second meeting, the lecturer opened the lecture by greeting the students and checking the attendance. After checking the student attendance, the lecturer asks about the assignment given at the previous meeting. Then discuss the problem together, if there are difficulties that can not be solved by the students, the lecturer will explain or provide solutions to the problem. The lecturers continue the lectures by conveying the purpose of the lecture and distributing the LKM to lecture activities.

Activities continued with lecturers displaying learning media in the form of power point, and ask students to pay attention and understand what is presented by the lecturer. Lecturers provide material that is associated with events or existing in daily life. In Figure 1.4 below is one example of lecture material presented by the lecturer.

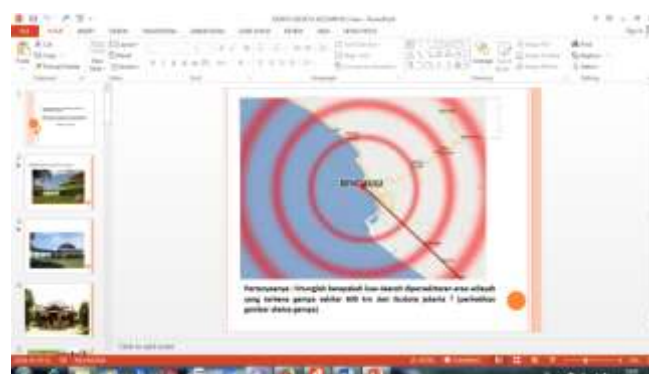


Figure 1.4: Sample of second lecture material

The lectures are performed the same step-by-step as the first lecture. Lecturers provide many problems that can train and know the ability of problem solving and mathematical ability of students. The role of lecturers here is to emphasize what things should be understood by students, any concepts

that can be used when students become a teacher who teaches on the material such as kosep Measurement (Volume, Geometry Concept, Build flat and its nature, Build space and nature). The difference between the first and second meetings is that students have started to show up, and are actively involved in the lectures. Even the students have started to dare to ask questions if there is something that he considered contradictory or unreasonable. Figure 1.5 shows the student lecture activity, visible to one student who responds or questions responded by other colleagues.



**Figure 1.5:** Student activities during lectures



**Figure 1.6:** Students focus on the presentation of the material

Lectures also end with the assignment that can be done students at home.

The third meeting of lecturers opened the lesson as usual. Appropriate information at the previous meeting, then all the students already look ready for the test. The lecturer then conveyed that before the test begins, one lesson will be used to discuss the tasks given last week and other issues related to Measurement (Volume, Geometry Concept, Build Flat and Its Character, Build Space and Its Character) understood students. Two hours later will be used for test 1. After the first test is completed, the lecturer closes the lesson by passing on the information for the next meeting.

Figure 1.7 is one of the student's answers when given an open ended problem. So there is more than one answer to one such problem.



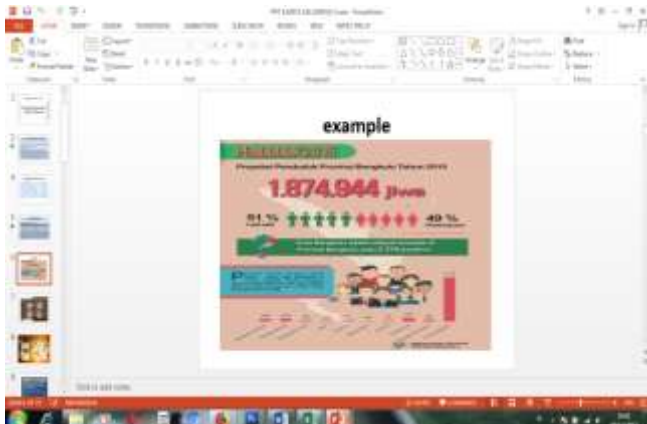
**Figure 1.7:** Student answers at the end of Cycle 1 test

With the help given by the lecturers at the first meeting, it helps students to easily understand the desired learning objectives. So at the next meeting the assistance of lecturers has begun to decrease. Students have started to learn actively and well. While the final test result on Cycle one shows the highest score of 56 students and the lowest score 42 of the total score of 65, with an average score of 49.79.

**Cycle 2**

Fourth meeting, the lecturer opened the lesson by greeting the students, and check the attendance. After checking the student attendance, the lecturer guides the students to discuss the 1st test at the previous meeting about the

measurement. The activity continued by asking the students to understand what to do step by step in the LKS and so on the same as the previous meeting. The learning ends with providing the problem as a home task to know the understanding of problem solving and mathematical communication of students on the understanding of data, techniques of collection and presentation of data. Figure 1.8 shows an example of the lecture material at the fourth meeting.



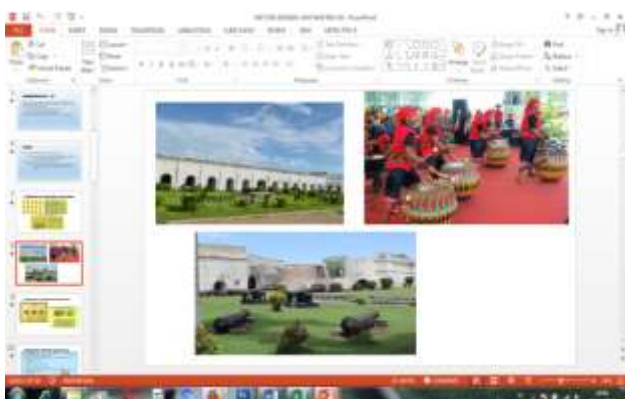
**Figure 1.8:** Fourth Course Lecture Material

In Figure 1.9 shows the activity of the lectures, where the students look very enthusiastic about learning. The activity is when the lecturer gives problems and gives opportunity to the student to present the answer result to the future of the class.



**Figure 1.9:** Lecture Activities

The fifth meeting, the lecturer opened the lecture by greeting the students, and checked the attendance. After checking the attendance of the students, the lecturer guides the students to discuss the exercise questions at the previous meeting on understanding the data, the techniques of collecting and presenting the data. The activity continued by asking the students to understand what to do step by step in the LKM, and so on. The learning ends with providing the problem as a home task to know the understanding of problem solving and mathematical communication of students to the essential mathematical concepts of elementary school. Figure 1.10 shows one example of the lecture material at the fifth meeting.



**Figure 1.10:** of the fifth meeting course material

Sixth meeting, the lecturer opened the lecture as usual. The lecturer then said that before the second test begins, it will take about ten minutes to discuss the practice at the previous meeting on elementary mathematics of elementary school. Two hours of lecture will then be used for test 2. While 25 minutes will be used to discuss test questions 2. After the second test is completed, the lecturer closes the lecture by expressing his gratitude for the students' participation during the lecture.

Figure 1.11 is one of the student's answers when given the problem of mathematical communication.



**Figure 1.11:** Student Answers on Cycle 2

Figure 1.11 is one of the answers from the students on the Cycle II test, where the problem is a problem that can see students' mathematical communication ability. Students are able to read tables, graphs, diagrams and write them down as solutions of the given problems.

Just like in previous meetings, with the help given by the lecturers are very helpful for students to easily understand the desired learning objectives. So at the next meeting the assistance of lecturers has begun to decrease. Students have started to learn actively and well. Students are also getting used to the problem of open-ended problem solving, and problems of mathematical communication. While the final test results in the second cycle showed an increase with the highest score of 52 students and the lowest score 48, with an average of 50.26.

### 3) Reflection (See)

Reflection activities are based on observations, as well as video as a comparison. As for some things as input, to be improved on the next Cycles.

#### Cycle 1

- 1) Lecturer model must be more creative in giving problem or motivation especially at apperception activity, and or make conclusion so that student is more active to ask and construct his knowledge.
- 2) There are some students who seem so indifferent, play hp, or busy themselves with the activities lectures are done. Therefore it takes a special approach to overcome these problems.
- 3) At the time of rehearsal, there are some students who carelessly or even not do it. So the need for emphasis for individual exercises so that students are more excited and not careless in solving problems given.

## Cycle II

- 1) Students have been seen actively in expressing their opinions, even they are competing in solving the problems given and then presented in front of the class. There was even a debate among students discussing the solution of the problem.
- 2) Students who look indifferent to Cycle 1 have started to follow the lecture well, have started interested to learn, where the lecturers provide motivations through video-heating problems that can stimulate the thinking ability of each student. Students are seen enjoying the lecture.

## 4. Conclude

Based on the results of research and discussion can be concluded that the application of Lesson Study can improve communication skills and solving mathematical problems Student candidates Mathematics Teacher Semester III in the Course Capita Selektta Mathematics Basic Education. This can be seen from the average score of problem solving ability and students' mathematical communication ability from 49.79 to 50.26, which increased by 20%.

## 5. Suggestion

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

- 1) The use of this Lesson Study can be an alternative for Lecturers, because it can increase the activity and ability of problem solving and students' mathematical communication ability and train the students ability to be more responsible and train the students to be able to find their own problems and solve the problems creatively and innovatively.
- 2) Through Lesson Study can be used as input for lecturers in knowing the varied learning models, because in Lesson Study can use various models, approach or method varies.
- 3) Lesson Study needs to be socialized to be used as an alternative in mathematics learning.
- 4) Lesson Study needs to be applied to other subjects so that it can improve student activeness and can maximize communication skill and problem solving of student mathematics or on other aspect that is five standard capability in learning mathematics like ability of mathematical connection or creative thinking.
- 5) Lecturers should provide problem-solving problems and interesting math communication in order to stimulate students to think and more easily understand the problem in the learning process.

## 6. Acknowledgments

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