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Implementation of Lesson Study in Undergraduate to Improve Mathematics Communication Ability

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Abstract: ***The purpose of this research is exploratory research by applying Lesson Study, which consists of three stages: planning (Plan), implementation (Do), Objectives, and reflection (See). Subjects in this study are prospective teachers Teachers Faculty of Teacher Training and Education Dehasen University in Statistics courses amounting to 31 people. Data collection was done using observation sheets, test sheets, and documentation. The data were obtained from the observation sheet in the lesson study activity and the test sheets were analyzed descriptively. The results showed that the implementation of Lesson Study can improve students' mathematical communication ability. This is seen from the average value of tests in Cycle I, which is 69.83 and Cycle II is 84.84..***

Keywords: Lesson Study, Mathematical Communication Skill

1. Preliminary

Learning is a process of behavioral change in the form of knowledge, attitude, and skills in the form of a result or experience. This means that the individual learning process is something that the students do and not something created by the students. According to Yanuarto (2014: 2) that the implementation of active participation learning need to pay attention to several principles as follows. First, based on learning needs (learning needs based) as the desire and the will felt by students. Second, oriented to the purpose of learning activities (learning goals and objectives oriented). The process of abstention from an activity through mathematics is about how to reorganize vertically (mathematical vertical) of mathematical objects constructed in the new structure (Widada, 2016: 85). According to Herawaty (2017: 47) that learning mathematics should be directed to activities that encourage students to learn actively both mentally, physically and socially. So in learning, it should prioritize the involvement of all senses, emotions, initiative, work and reason actively to find their own knowledge through interaction with the environment and teachers act as facilitators and motivators in optimizing student learning. Widada and Herawaty (2017: 140) explains that the individual can build a new structure based on the mature schemes he has had. Thus a structured collection of mental activities that construct blocks (categories) to describe how concepts / principles can be developed in the mind of an individual (Widada, 2017: 30). Improved problem-solving abilities through the application of mathematical learning models based on individual cognitive conflicts (Herawaty and Rusdi, 2016: 110). Students are able to organize, arrange activities and create algorithms to form concepts / principles with appropriate and functional students can also perform the process of abstraction by using rules in a mathematical system (Widada, 2016: 84). This means that student caon teacher penjaskes able to do the learning process in statistics even though this is the opposite for their field. This is because every individual has a space in their thinking to solve problems through their cognitive abstraction process.

The ability of mathematical communication according to Lestari and Yudhanegara (2015: 83) is the ability to convey mathematical ideas / ideas, both orally and in writing and the ability to understand and accept other people's mathematical ideas / ideas carefully, analytically, critically and evaluatively to sharpen understanding. Son (2015:4) says that the ability of mathematical communication is the process of expressing mathematical ideas and understanding in writing using numbers, algebraic symbols, images, graphs, diagrams, and words. Yanuarto (2014: 3-4) suggests the ability of mathematical communication is the ability of a person to communicate ideas or mathematical ideas with symbols, tables, diagrams, or other media to clarify the situation or problem and discuss it with others. Sumarmo (2002: 15) Mathematical communication includes students' abilities: (1) Connecting real objects, images, and diagrams into mathematical ideas; (2) Describe ideas, situations and mathematical relations, orally and in writing with real objects, drawings, graphs and algebra; (3) Stateing everyday events in language or mathematical symbols; (4) Listening, discussing, and writing about mathematics; (5) Reading with the understanding of a written mathematical presentation; (6) Create a conjurer, arrange arguments. According to Elida (2012: 178) the ability of mathematical komunkasi includes the ability of students in connecting real objects, images, and diagrams into mathematical ideas; explaining ideas, situations and mathematical relationships both orally and in writing in the form of drawings or graphs; explain and make questions about the mathematics learned from a given situation. According to Bernard (2015: 199) that communication skills must be possessed so that students can understand the mathematical problems given and express the solutions of the problem is not just an idea to draw conclusions on the reasoning ability, as well as provide arguments for the ideas expressed. It can be concluded that the ability of mathematical communication is the ability of students to convey or describe and explain from language, table or picture or from a model through their idea of thinking. the indicators of mathematical communication skills to be used in this study are (1) explaining the ideas and situations in writing, (2) declaring images or diagrams into mathematical ideas, (3) stating situations into mathematical models / drawings.

Lesson Study is an activity that can encourage the formation of a learning community that consistently and systematically perform self-improvement, both at individual and collective levels. Lesson study is a model of professional education through collaborative learning and sustainable learning based on the principles of kolegalitas and mutual learning to build learning community (Rusman, 2010: 384). According to Fachruddin (2010), lesson study is a model of educator profession development through collaborative and continuous learning learning based on the principles of kolegalitas and mutual learning to build learning community. While Friedkin (2005) defines lesson study as a process involving teachers who work together in planning, observing, analyzing, and improving learning. Lesson Study is not just a grant program but it is conducted solely to improve the quality of learning as a form of responsibility (Santoso, et al., 2015: 22). Lesson study has three stages in the process of do, plan, and see. According to (Susilo, et al., 2009) the learning assessment cycle is carried out in three stages as follows:

1) Planning phase (*Plan*), aims to produce a learning design that is believed to be able to membelajarkan students effectively and Generate student participation in learning.
2) Implementation stage (*Do*), intended to implement the planned learning plan. One member of the other group observed.
3) Observation and reflection stage (*See*), is intended to find advantages and disadvantages of learning implementation. The teacher served as a teacher to initiate the discussion by conveying his impression and his thoughts on the implementation of the lesson.

So by using these stages there are ways that can make learning more maximal and this resulted in learning will help result in improved mathematical communication of prospective teachers Penjaskes through the implementation of *lesson study* .

2. Research Methods

This research is an exploratory research with the implementation of *lesson study* , which consists of three stages: planning (*plan*), implementation (*do*), and reflection (*see*). Exploration research is a qualitative research conducted by the lecturers themselves when getting problems in learning and finding solutions in an effort to improve the quality of learning, it is used to improve the communication skills of mathematics. The subjects of this study were 31 Students of Teacher Candidate for Teaching Education of Faculty of Teacher Training and Education Dehasen University with S tatistika subject. Data collection techniques use observation sheets, test sheets, and documentation. Technique of data analysis in the form of observation analysis of student activity and test result analysis. This research was conducted in the form of a series of *lesson study* activities consisting of 3 stages: planning, execution, and reflection. In the implementation use two cycles.

3. Result and Discussion

The results of implementation in cycle I

a) Planning (*Plan*)

Planning done in this section is to do the design of learning to be done. This design is done before the day of implementation consisting of material, purpose, and how the question and answer activities undertaken. Lecture material that will be delivered is about "Hypothesis Test" which contains the formulation of the problem, hypothesis formulation, statistical hypothesis test.

b) Implementation (*Do*)

The first meeting

- Using Hypothesis Test material
- Students are asked to create a thesis title which will be taught how to make the problem formulation, hypothesis formulation.
- Students are asked to make a problem formulation of the title they make.
- Lecturers also pay attention to every activity they do work and continue to motivate them to be able to do it.
- In this activity the interaction of students already exists only there are still students who have not been serious, and there are still students who have not been able to complete the task given.
- The results of this learning are useful for prospective teachers of Penjaskes students and can spur them to the spirit because this learning is closely related to them in completing the thesis smoothly. Because even though they are prospective teacher penjaskes but did not escape from learning mathematics, especially statistical materials.

Second meeting

- Providing learning objectives and member i motivation to students.
- Continuing the material on the previous day by giving the material in advance by describing how to make the problem formulation along with the hypothesis by using power point.
- In this activity the students already have the effect of differences which can be more active and can be brave in asking and giving responses for every problem given and students are able to explain ideas and situations in writing .

The third meeting

This third meeting contains by conducting tests on Cycle I, the results of this test is a reference to see the development of a student's mathematical communication skills, which can be shown from the following figure.

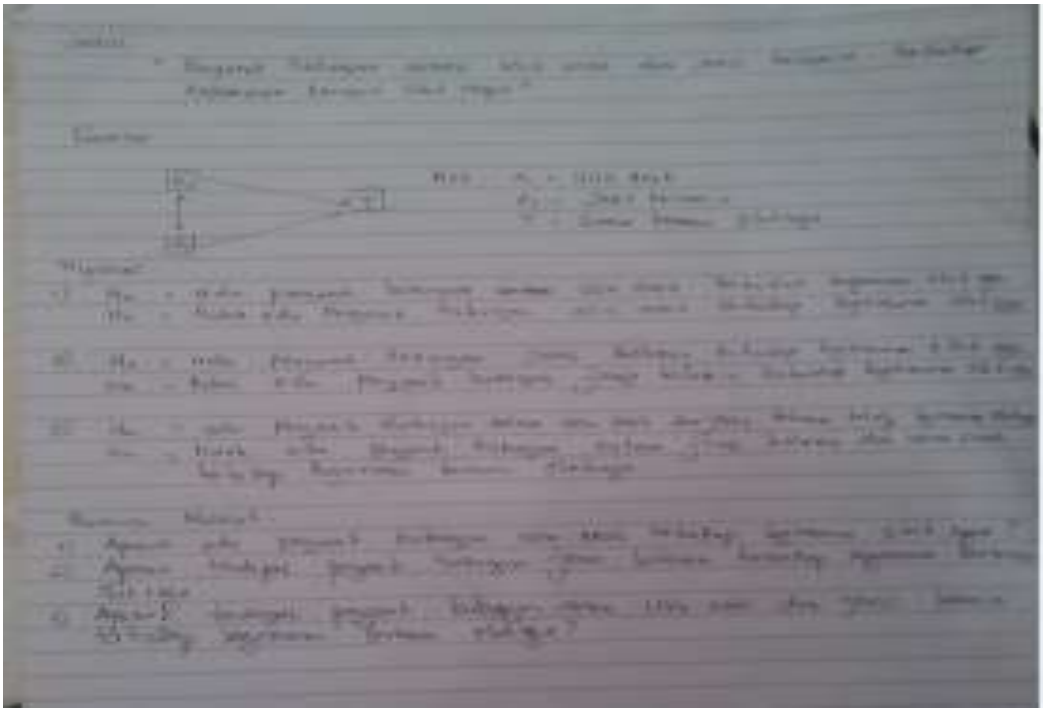

Figure 1: The result of one of the Cycle I student test answers

From the results of student answers obtained achievement of the average score scores from the test Cycle 1 shown in the following figure:

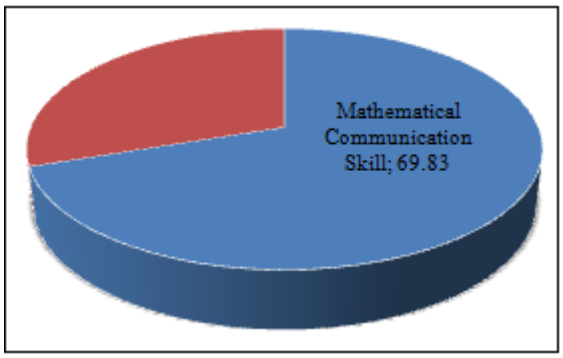

Figure 2: Average Test Results Cycle Value I

c. Reflection (*See*)

The results of reflection on the first cycle can be described as follows:

- Model lecturers must continue to motivate students to be more active in construing their knowledge into the given problem.
- Model lecturers have to do a lot of approaches to be able to overcome the things that become topics of problems experienced by students include student laziness, indifferent to learning and others.
- With the background of the student is to be a prospective teacher penjaskes and this is the opposite for them in learning mathematics, so that the model lecturer should be able to change them in the delivery of more emphasized appersepsi, so that students more tends to perform in the work of more deep training .

4. The Results of Implementation in Cycle II

a. Planning (*Plan*)

In this section is still doing the design and preparation of material about the material to be delivered on the next day. In this design is the improvements that will be made to be able to improve learning outcomes and increase the ability of students' mathematical communication.

b. Implementation (*Do*)

Fourth meeting

- This learning uses one-way anova material.
- Lecturers motivate students by saying that the material to be learned today will be related to the previous material.
- Lecturers encourage students to ask questions about unfamiliar material, or an unsolved solution.
- Students are given the task to be completed and displayed next day.
- The result of interaction at this stage seems that the student can do by stating in solving the situation problems into the mathematical model by making the analysis of variance in the form of anovatable although there are still some students who are still confused.

The fifth meeting

- The lecturer asks the task and asks the students to represent the future and hopefully the other students can respond, if there is an error
- Learning materials still use one-way anova, the difference is data given each different column.
- The result of interaction at this stage seems that the students have become more enthusiastic in following the learning and the mathematical communication ability of the students increasingly seem to increase, it can be seen from how students explain the ideas and situations in writing, stating the situation into the mathematical model /

drawing that is what they do in the settlement anova one lane.

Sixth meeting

This sixth meeting contains a test of Cycle II , the results of this test to see an improvement of the mathematical communication skills of a student, which can be shown from the following figure.

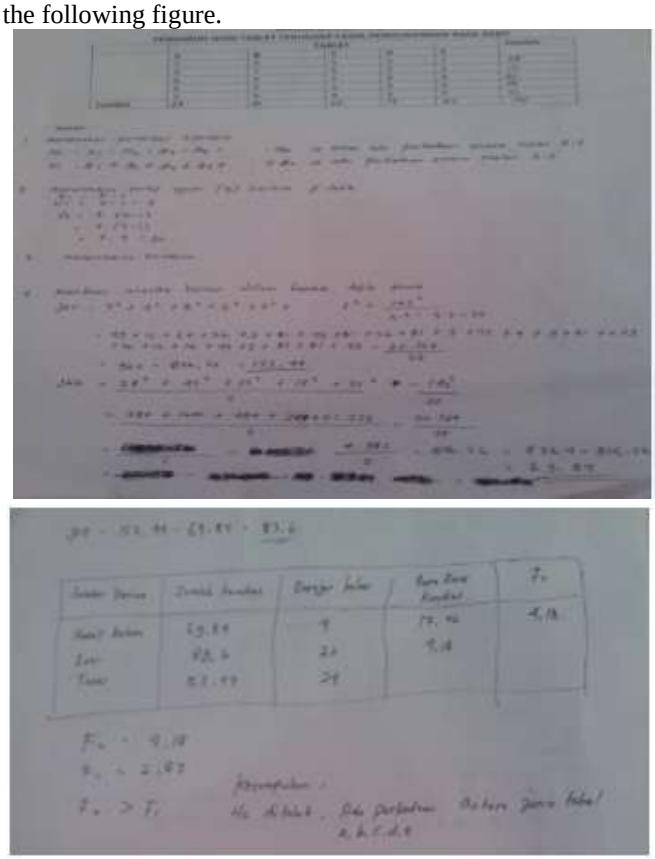

Figure 3: One of the students answers from the second cycle test results .

Figure 4: One of the students answers from the second cycle test results

c. Reflection (*See*)

The reflection result of the second cycle is described as follows:

- Students are already more active in learning. This is evident from their motivation in learning.
- Students are more diligent in completing the assigned task, and their attention has been focused on the lessons to be taught.
- Students have the courage to ask questions, or things that are not understood.
- The ability of students' mathematical communication is increasing, in i seen from the learning activity.

Based on the description above and to refer the results refleksinya obtained from the average value of Cycle II test students shown in the picture below.

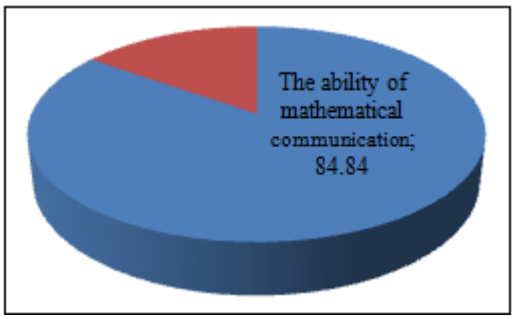

Figure 5: Average Test Results Values cycle II

Based on the above description both through Cycle I and Cycle II can be obtained that by using the Implementation of lesson study prospective teacher teacher can improve the ability of communication mathematics is seen from the results of learning in accordance with the indicator of: students can explain ideas and situations in writing, students can declaring images or diagrams into mathematical ideas, and students in changing situations into mathematical models as well as drawings or tables. This is also supported by the results of every cycle test conducted at the third and sixth meeting, can be seen from the following graph.

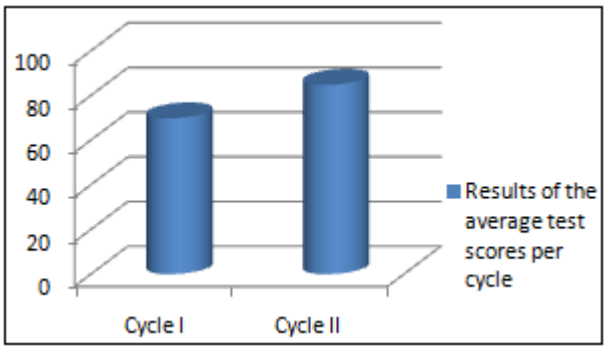

Figure 6: Average Value Test Results Each Cycle

5. Conclusions and Suggestions

Based on the results of research and discussion can be concluded that the implementation of Lesson Study can improve the communication of mathematics students prospective teacher penjaskes. The average score of students' mathematical communication in Cycle I was 13.97 with an average score of 69.83 and in Cycle II was 42.42 with an average score of 84.84. The results of this study provide advice to teachers and lecturers in learning to pay attention to the things as follows:

- Students must be considered by lecturers consistently
- Facilities and infrastructure that support learning are constantly being improved.
- Implementation of *lesson study* can be used as an alternative learning for each lecturer because it can improve students' mathematical communication skills.
- Implementation of *lesson study* can be applied by using varied models, approaches, and methods to improve the quality of a learning.

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