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Development of Student Collaboration Skills In Learning Mathematics Through A Lesson Study Approach

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Abstract

The purpose of this research is: to see the development of students' collaboration skills in learning mathematics through the Lesson Study approach in the Mathematics Education Study Program. This type of research is descriptive research with a qualitative approach. The subjects of this research were students of the Mathematics Education Study Program at Halu Oleo University, who were enrolled in the Kapita Selecta Mathematics course. The implementation of this research consists of 3 cycles, and each cycle consists of 3 stages, namely preparation, implementation, monitoring and evaluation. The method used in this research consists of 3 stages, namely plan, do, and see. Data collection techniques in this study include two kinds of instruments, namely the main instrument and supporting instruments. The data analysis technique follows the Miles, Huberman, and Saldana analysis model, consisting of three activities that occur simultaneously: data condensation, data presentation, and conclusion drawing/verification. The result of this research is the development of students' collaboration skills in learning mathematics through Lesson Study approach in Mathematics Education Study Program. Generally, there is an increase in student learning outcomes in mathematics learning with the Lesson study approach, namely for Cycle 1, average 83.0; Cycle 2, average 78.0; and Cycle 3; average 85.0.

Keywords: collaboration; development; lesson study; mathematics learning.

INTRODUCTION

Lesson study is a form of learning in which not only lecturers who implement learning can benefit from it, but also the observers (other lecturers/partners, students, and other parties) who are present during the open class in the implementation of Lesson Study (Herman, 2017). While observing the learning activities carried out by a lecturer, the observer is encouraged to reflect on the learning that is carried out and how to improve its quality. Therefore, it is necessary to innovate learning through lesson study as an alternative to overcome the problems of learning practices. Lesson study is a model of professional development of educators through collaborative and sustainable learning assessment based on the principles of collegiality and mutual learning to build a learning community (Mutiani et.al., 2020).

Fulfilling the needs of students in the 21st century that are increasingly high and complex, all parties related to the world of education need to carry out effective cooperation and collaboration. Collaboration between LPTK lecturers as educators of future teachers and teachers as implementers of education in schools must be implemented in order to create more effective education for students. This is in accordance with the opinion (Henuk, 2015) that "If you cannot establish cooperation, then you will not be able to work. Therefore, cooperation and collaboration between lecturers is very important in order to develop curriculum and learning in the classroom.

The benefits that can be taken from lesson study include: (1) lecturers can document their work progress; (2) lecturers can get feedback from other members; and (3) lecturers can publish

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and disseminate the final results of the lesson study. Lesson study as a new activity implemented in the Kapita Selekta Mathematics lecture process at the Halu Oleo University Mathematics Education Study Program needs to continue to be promoted or developed to improve the quality of learning quality. According to (Lewis, 2002), lesson study is one of the effective ways that can be done to improve the quality of lecturer learning and student learning activities. According to (Vitantri, 2014), lesson study provides a process to collaborate, design learning, and evaluate the success of teaching strategies that have been applied in an effort to improve the process and acquisition of student learning. The fundamental emphasis of lesson study is that students have a high quality of learning. Thus, the quality of student learning can improve (Mahendra, 2016).

Lesson study consists of 3 (three) stages, namely planning (plan), implementation (do), and observation (see) (Mitasari et al, 2016; Sairo, 2021; Wulandari et al, 2015). Through lesson study, teachers/lecturers can collaboratively attempt to translate educational goals and standards into the real world in the classroom. The collaboration aims to design learning in such a way that students can achieve the basic competencies they are expected to master. In this collaboration, teachers who are members of the lesson study group try to design a learning scenario that takes into account basic competencies, the development of scientific habits of mind, and the learning strategies used so that students can gain certain knowledge related to the material being taught (Suana, 2018; Hermawan, 2020). Teachers/lecturers in the lesson study group must also make other tools needed in learning such as LKS, teaching guides, learning media, learning evaluation instruments.

Research results (Wood, 2016) indicate that lesson study has the potential to be an excellent vehicle for developing lecturers' reflective practice. Discussions held with students provided a number of new insights into the work as practitioners and researchers. Discussions about the learning process itself, and in particular the various pedagogical approaches that students find valuable, have greatly enhanced understanding as lecturers. Research results (Obara, 2019) state that using lesson study for professional development has great potential to improve the quality of learning. In principle, lesson study still offers educators the opportunity to reflect collaboratively on their application of learning. The main purpose of lesson study is to provide opportunities for educators to improve their teaching skills.

Based on the results of community service in SMA Negeri 7 Kendari and SMP Negeri 11 Kendari, it is concluded that the implementation of Lesson Study in schools can help teachers in preparing lesson plans well, conducting open classes in accordance with lesson plans, and a culture of collaboration among teachers in improving the learning and collaboration skills of students in the classroom. (Masi & Misu, 2014). Similarly, the results of KKN-Thematic Integrated Community Service activities with the theme: "Socialization and Assistance of Junior High School Teachers in Implementing Open Class through Lesson study Approach". Teachers' responses about the implementation of Lesson study program socialization in schools that (1) generally (72.27%) teachers strongly agree that Lesson study socialization is very important to be held, and can have a good impact on the development of teaching and learning processes in schools, and (2) there are (81.82%) strongly agree that Lesson study is useful for teachers to build collaborative fellow teachers in the field of study (Misu, & Salam, 2023).

The description above shows that the implementation of Lesson Study on campus can foster increased collaboration and student activeness in learning and learning outcomes. Thus, it is necessary to implement lesson study in the study program in order to strengthen the knowledge of lesson study and the application of research through lesson study. Therefore, through the LPTK and school Lecturer Partnership Program, it is very necessary to assist

lecturers in implementing open class with Lesson Study approach in college, with the title "Development of Student Collaboration Ability in Mathematics Learning Through Lesson Study Approach in Mathematics Education Study Program". The purpose of this research is to see the development of students' collaboration skills in learning mathematics through the Lesson Study approach in the Mathematics Education Study Program.

METHODS

This type of research is descriptive research with a qualitative approach. Descriptive research is intended to describe the ability of student collaboration in learning mathematics and improving learning outcomes in each open class. While the qualitative approach, researchers prioritize the things that subjects think and do during research activities through lesson study rather than the final result of the problem itself. The subjects of this study were students of the Mathematics Education Study Program at Halu Oleo University. The implementation of this research consists of 3 cycles, and each lesson study cycle consists of 3 stages, namely preparation, implementation, monitoring and evaluation.

The method used in the implementation of learning with Lesson Study approach consists of 3 stages, namely plan, do, and see. The plan activity is carried out by the model lecturer delivering the lesson plan in the form of RPS, teaching materials, learning media, and evaluation. While the observer responds by giving criticism and suggestions about the lesson plan for its perfection. Implementation of Do, the model lecturer conducts open class based on the lesson plan that has been agreed upon during the implementation of the plan. Implementing this Do, the observer observes the situation in the classroom both the appearance of the lecturer in class and the behavior of students in receiving the subject matter provided by the lecturer. The See activity was carried out after the completion of the Do implementation. Implementing See, the model lecturer conveyed the weaknesses or shortcomings that he had realized during the open class. Then, the observer conveyed his findings about the classroom situation, student behavior, and lecturers. Based on the shortcomings of the open class implementation and supported by student learning outcomes data, it was agreed to continue the open class for the next cycle, by improving the shortcomings of the previous cycle implementation.

Data collection techniques in this study include two kinds of instruments, namely the main instrument and supporting instruments. In-depth exploration of students' collaboration skills in learning mathematics through observation or observation. So that the main data used in this study is observation or observation data. Collecting data from observations or observations that are truly accurate can only be done by the researchers themselves. Therefore, in this study the main instrument is the researcher himself. While the supporting instrument is the learning outcomes test. The data analysis technique follows the analysis model (Miles et al., 2014), consisting of three activities that occur simultaneously: data condensation, data presentation, and conclusion drawing/verification. Data condensation refers to the process of selecting, focusing, simplifying, abstracting, and transforming data that approaches the entirety of written field notes, interview transcripts, documents, and other empirical materials. The presentation of this research data is more dominant in narrative form, although in summarizing everything that is narrated, schemes (networks) are also used. This scheme is intended to provide an easier overview of the entire data presentation in narrative form. Data presentation is based on data categorization, as previously stated. Rawing / Verification of conclusions is the final stage of the whole series of research data processing activities, namely analyzing the data obtained and drawing conclusions based on the findings of the data analysis results. Conclusions are drawn based on the results of data processing to answer the research question, namely how the development of student collaboration skills in learning mathematics through Lesson Study in Mathematics Education Study Program.

RESULTS AND DISCUSSION

Lesson Study activities of the Mathematics Education Study Program, FKIP UHO, were carried out in 3 cycles, with the following implementation results.

❖ Implementation Plan

Plan Cycle 1

The Plan Cycle 1 activity was held on Monday, August 7, 2023. The model lecturer presented Exponent material with PBL learning model based on Lesson Study. The plan presentation can be seen in Figure 1.

Figure 1. Presentation of cycle 1 plan by model lecturer accompanied by observer

Plan Cycle 2

The Plan Cycle 2 activity was held on Thursday, October 12, 2023. The model lecturer presents Matrix material with PBL learning model based on Lesson Study. The plan presentation can be seen in Figure 2.

Figure 2. Presentation of cycle 2 plan by model lecturer accompanied by observer

Plan Cycle 3

The Plan Cycle 3 activity was held on Wednesday, October 18, 2023. The model lecturer presents Limit material with PBL learning model based on Lesson Study. The plan presentation can be seen in Figure 3.

Figure 3. Presentation of cycle 3 plan by model lecturer accompanied by observer

❖ **Implementation of Do**

Do Cycle 1

The Do activity of Cycle 1, was held on Friday, September 22, 2023 at 07.00 - 09.30. The interesting thing about the Model Lecturer's presentation is that the designated student group prepares the Exponential topic lecture material by collaborating with their group members. Students present Exponential material in front of the class, and other members provide input for the improvement of teaching materials that are compiled together. Responses of other group members from the presentation of Exponential material by the presenting group. Other members of the presenting group observe the activities of other group members and help provide answers to the responses of other group members. Before the lecture is closed, members of the presenting group reflect on the implementation of the open class. The model lecturer summarizes and confirms the material as well as straightens out the wrong material presentation. The quiz results from the learning process of implementing DO cycle 1 are the average mathematics ability of students in exponential material 83.0.

Figure 4. Presentation of Do by student groups appointed by the Model Lecturer

Do Cycle 2

The Do activity of Cycle 2, was held on Friday, October 13, 2023 at 07.00 - 09.30. The interesting thing about the Model Lecturer's presentation is that the student groups that have been appointed prepare lecture materials on the topic of Matrix by collaborating with their group members. Students present Matrix material in front of the class, and other members provide input for the improvement of teaching materials that are compiled together. Other group members respond to the presentation of Matrix material by the presenting group. Other members of the presenting group observe the activities of other group members and help provide answers to the responses of other group members. Before the lecture is closed, members of the presenting group reflect on the implementation of the open class. The model lecturer summarizes and confirms the material as well as straightens out the wrong material presentation. The quiz results from the learning process of implementing DO cycle 2 are the average mathematical ability of Matrix material students 78.0.

Figure 5. Presentation of Do cycle 2 by student groups appointed by the Model Lecturer

Do Cycle 3

The Do activity of Cycle 3 was held on Thursday, October 19, 2023 at 07.00 - 09.30. The interesting thing about the Model Lecturer's presentation is that the designated student groups prepare the Limit topic lecture material by collaborating with their group members. Students presented the Limit material in front of the class, and other members provided input for the improvement of the teaching material that was compiled together. Other group members respond to the presentation of the Limit material by the presenting group. Other members of the presenting group observe the activities of other group members and help provide answers to the responses of other group members. Before the lecture was closed, the members of the presenting group reflected on the implementation of the open class. The model lecturer gave a summary and affirmation of the material as well as straightening out the wrong presentation of the material. The quiz results from the learning process of DO cycle 3 implementation are the average mathematics ability of students in Limit material 85.0.

Figure 6. Presentation of Do cycle 3 by student groups appointed by the Model Lecturer

❖ **Implementation of See**

See Cycle 1

The activity of See Suklus 1, was held on Friday, September 22, 2023 at 10:30 - 11:00. Recommendations for improvement from the Model Lecturer's learning are to strengthen student collaboration in each group, especially the group presenting lecture material. Implementation of See cycle 1 can be seen in Figure 7.

Figure 7. Implementation of See cycle 1 by Model Teacher with Reviewer

See Cycle 2

The See activity of Cycle 2, was held on Friday, October 13, 2023 at 10:30 - 11:00. The recommendation for improvement of the Model Lecturer's learning is to strengthen student collaboration with each other group. The implementation of See cycle 2 can be seen in Figure 8.

Figure 8. Implementation of See cycle 2 by Model Teacher with Reviewer

See Cycle 3

The See activity of Cycle 3, was held on Thursday, October 19, 2023 at 10:30 - 11:00. Recommendations for improvement from the Model Lecturer's learning are to strengthen student collaboration in all groups, especially the group presenting the lecture material. The implementation of See cycle 3 can be seen in Figure 9.

Figure 9. Implementation of See cycle 3 by Model Teacher with Reviewer

❖ **Interview Results**

After the implementation of Lesson Study cycles I, II, and III, interviews were conducted with both observers and students as follows.

> The observer interview results stated that the development of student collaboration during open class from cycle 1 to cycle 3 increased. The form of student collaboration in the learning process is the establishment of discussions between group members in completing worksheets given by the model lecturer. In addition, there were responses and questions from other group members to members of the presenting group about the topic/material presented in front of the class. Then, the collaboration of the presenting group members in responding to or answering questions from other group members. The results of student interviews stated that there was collaboration between group members in compiling teaching materials

presented in the form of papers. Then, this material is presented in turn by group members in the classroom. However, students are also aware that their numeracy literacy skills are still lacking, so they need to study harder.

Based on the results of the research above, it can be seen that the implementation of the lesson study of the Mathematics Education Study Program, FKIP UHO cycle 1 has built collaboration among students, both collaboration among group members and interaction with other group members. This can be seen from the results of observations during the learning process from cycle 1 to cycle 3 that the results of student collaboration in developing mathematics learning have increased. The results of this study are in accordance with research (Sarimanah, 2017; Sari et al., 2022), concluding that Lesson Study promotes the development of good collegiality between fellow teachers or educators. Teachers together learn from the implementation of learning in the classroom, together see the shortcomings and contribute to better learning in the future.

Similarly, the results of research (Wahyuni, 2020) that the effectiveness of Lesson Study Learning Community in improving the quality of learning is very good because the collaborative principle that occurs between lecturers has an impact on the continuous learning improvement process which ultimately has a significant impact on the improvement and development of lecturers' professional abilities and student learning achievement. Furthermore, the development of student collaboration skills in learning mathematics through the Lesson Study approach in the Mathematics Education Study Program can improve student learning outcomes. This is in accordance with the opinion (Haryanto, 2012) that lesson study can streamline learning based on the principle of improvements made by teachers in teaching so that it has a direct impact on improving student learning outcomes.

CONCLUSION

There is a development of students' collaboration skills in learning mathematics during the KDS Program in the Mathematics Education Study Program at FKIP UHO.Generally, there is an increase in student learning outcomes in the implementation of the Mathematics Education Study Program, FKIP UHO, namely for Cycle 1; average 83.0; Cycle 2; average 78.0; and Cycle 3; average 85.0.

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