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The analysis of discussion pattern of lesson study-based learning process skill in vocational school

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The analysis of discussion pattern of lesson study-based learning process skill in vocational school

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Abstract. Theory and practice are the ones that must be mastered in studying biology. The facts in the field show that biological knowledge is not accompanied by activities to practice the knowledge so that it focuses just on the theory. For this reason, a learning approach that develops knowledge acquisition processing skill which is a process skill is needed. Apart from the implementation of the strategies used, the success of the teaching and learning process cannot be separated from the teacher's efforts. Lesson Study is one that can be used as a method for teachers to exchange ideas in the preparation and development of Biology learning plans. The purpose of this research was to determine the discussion pattern of Lesson Study-based learning process skill in High School (Vocational High School). The type of research is quasi experimental by applying learning skills based on the Lesson Study processes in the experimental class and conventional learning model in the control class. The results of the research analysis showed that there were varied patterns of discussion between collaborative groups and other group members with a significance of 0.041 (sig. = 0.041 <0.05). The pattern of discussion between teachers and students happened widely, teachers did not side with any group, and also guided people to be able to carry out learning well.

1. Introduction

Science plays important role for the development of countries and societies. In order for scientific studies to be successful, there is an essential need for well-educated scientists who are equipped with sufficient and required knowledge, skills, and motivation [10]. In Biology Lesson, in this context, the Biology Course Curriculum is redesigned in a way to make innovations and changes in the light of laws, theories, practices, and concepts of biology to provide more room for applications such as research and questioning, using information technology, establishing a relationship between biology and daily life, and creating social awareness [9].

This is relevant to the purpose of education, especially Vocational High School (SMK), that is applying science as the basis for mastering productive competencies and self-development because basically the nature and characteristics of science learning, especially science learning as part of science are formed and developed through a scientific process that must also be developed to students as meaningful experiences that can be used as a provision for further personal development [3].

Effort to overcome these problems is that the biology teacher should be more involving the role of students in learning. Experiment is the most basic tool used to obtain scientific knowledge. As it is in mother disciplines, experiment is the method of testing the correctness of a piece of knowledge in the Biology and Science Education as well. The most important feature of Physical and Living Sciences is their attaching importance to experiment, observation, exploration, developing students' skills of asking questions, researching and providing possibilities of hypothesizing and interpreting appearing results [17].

The science process skills involve skills that require more complex experiences in our early ages, as well as comparison skills, data gathering, data interpretation and hypothesizing skills [6]. The application of process skill approaches in biology learning can be integrated in students' practical activities, but special learning strategies are needed so that students' process skills continue to develop



[12]. Selection of learning strategies is important in improving the quality of the learning process. Learning will run optimally when choosing the right learning strategy [14].

Aside from the application of the strategies used, the success in the teaching and learning process is inseparable from the teacher's own efforts in studying the lesson. A form of learning assessment that provides a process for collaborating and evaluating the success of teaching strategies is known as Lesson Study [1]. Lesson Study is a popular approach for teacher professional development used widely in Japan. It involves a small group of teachers co-planning a series of lessons based on a shared learning goal for the pupils, with one teacher leading the co-constructed lesson and their colleagues invited to observe pupil learning in the lesson. The team then develop their practice further, based on the feedback [7].

Based on this background, a research was needed entitled "the analysis of discussion pattern of lesson study-based learning process skill in vocational school".

2. Research Method

The type of research used is quasi experimental. The sample determination used in this research was a method with normality and homogeneity tests with leavene statistical techniques using the SPSS Statistics 18.0 application. From the homogeneity test results it was obtained homogeneous results so that, this research used a random sampling method that was by lottery technique to determine the control class and the experimental class.

After determined the experimental class and the control class, the Lesson study stage was continued. Planning stage (plan), model teacher and observer designed the learning using a process skill approach, both implementation stage (do) and implication from the planning stage held a pre-test in the experimental class and the control class before the lesson took place and the reflection stage (see) to evaluate learning or model teacher. The students' science process skills well measured by SPSS using the independent sample t test.

3. RESULTS AND DISCUSSION

3.1. Research result

The determination of the research sample began with the normality test of the grade X. This was done to find out the distribution of values of the students was normally distributed or not. Based on the results of the normality test on the distribution of students' biology values, it was known that the significance of the X ATU 1 class was 0.386; X ATU 2 was 0.512; X ATU 3 was 0.205. The three classes had a significance level greater than 0.05 so that the students' biology UAS (final test) value was normally distributed.

Second, conducted homogeneity test to determine the level of uniformity of class X in SMK 5 Jember, so that it could be used as the basis for determining the control class and the experimental class. Leavene test results that showed a significance number of 0.468 or greater than 0.05 so that the three classes had biology values with the same variant (homogeneous).

Third, conducted a t-test to test the differences in science process skills and differences in the affective learning outcomes of students between the control class and the experimental class. Based on the results of the t-test it was obtained from a significance value of 0.041 (sig. = 0.041 < 0.05) so that based on the Samme variant assumption, the two classes had significant differences in science process skills or in other words there were differences in the treatment of the students' science process skills. Then, judging by the average science process skills each indicator had the following values.

Table 1. Summary of t-test for students' science process skills

	db1	db2	Sig.
Assume the same variant	2,119	34	0,041

M

2,348

28,047

0,026

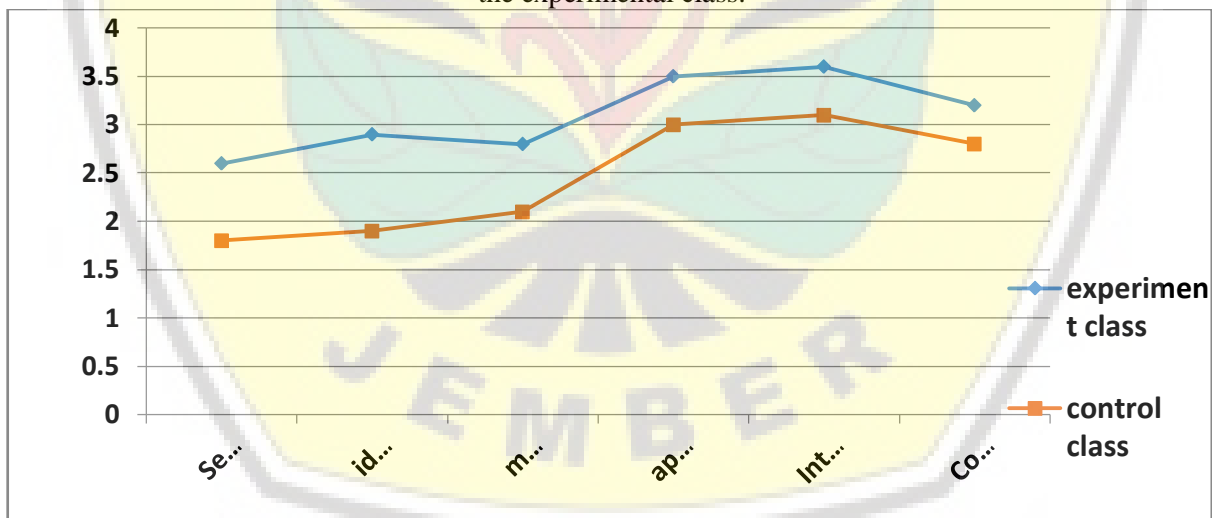
The assumption of variance is not the same

Fourth, calculating the average value of the students' science process skills between the control class and the experimental class and calculating the average value of the students' science process skills for each indicator.

Table 2. The average value of the students' science process skills between the control class and the experimental class

Group Statistics					
	Kelas	N	Mean	Std. Deviation	Std. Error Mean
Nilai	kelas eksperimen	24	70.54	11.516	2.351
	kelas kontrol	12	62.58	8.458	2.442

Figure 1. The average value of science process skills for each indicator between the control class and the experimental class.



Fourth, analyzing the discussion patterns of lesson-based learning skills between teacher and teacher, students and students, and students and teachers.

The stages of the Lesson Study were divided into 3 stages, namely:

a. The Stage of Planning

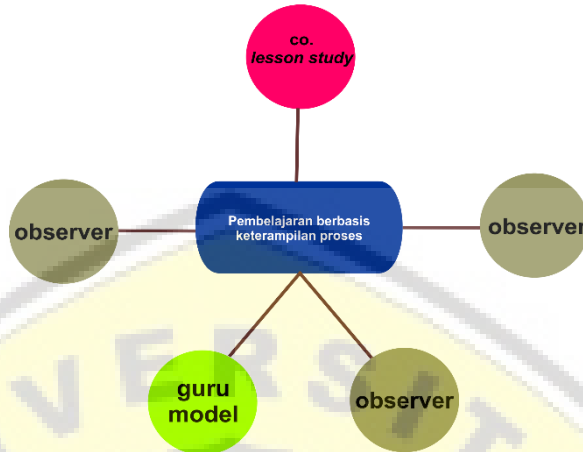


Figure 2. Discussion Pattern in the Stage of Planning

b. The Stage of Doing

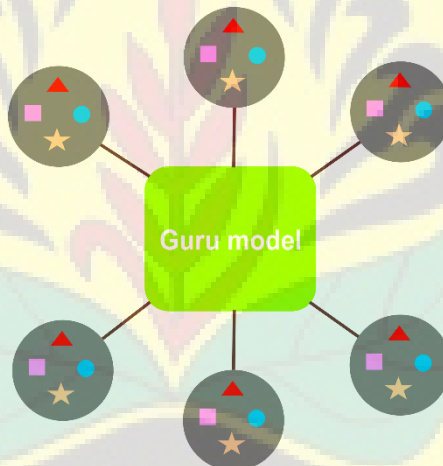


Figure 3. Discussion Pattern in the Stage of Doing

c. The Stage of Seeing

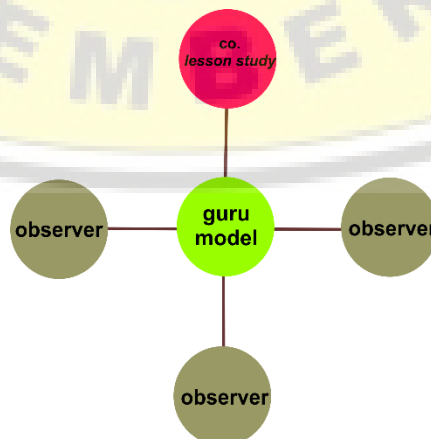


Figure 4. Discussion Pattern in the Stage of Seeing

3.2. Discussion

Determination of this research sample began with the normality test of grade X. This was done to find out whether the distribution of values of these students were normally distributed or not. Based on the results of the normality test on the distribution of values of the biology students, it is known that the significance of the ATU X class 1 was 0.386; X ATU 2 of 0.512; X ATU 3 was 0.205. The three classes had a greater significance level than 0.05 so that the biological UAS value of the students was normally distributed. The learning process used the Skill Approach based on the Lesson Study. The process began by forming a Lesson Study team consisted of biology teachers at SMKN 5 Jember as the Lesson Study coordinators, 4 Observers and model teacher and researcher. The first step in the Lesson Study was planning. The learning planning step is carried out to get the right learning strategy in order to obtain optimal learning outcomes in accordance with the learning objectives [5]. The Lesson Study cycle begins when teachers collectively identify overarching goals for the students' learning, then jointly plan a lesson that aims to achieve that goal [7].

The second step in the first lesson of the Lesson Study is the implementation (doing) of learning to implement the learning planning that has been formulated in the previous stage, namely planning. The learning using a process skills approach. "DO" the activity has been implemented for what the teacher has prepared for. It is the implementation of learning tools that are applied in the classroom teaching and learning process. Classroom learning activities are emphasized in collaborative learning with various learning models that enable the students to be more active and provide tasks with the aim of enhancing high-level thinking skills such as on jumping tasks [3].

The third step of Lesson Study is reflection (seeing). After the learning process is complete, the discussions are held by all members of the Lesson Study. During the discussion, the observer gives comments on the model teacher during the learning process. Observers are given the opportunity to provide feedback and suggestions for improvements needed to be used in the next cycle. The observers' statements are based on the observations during the learning process [2].

The thing that distinguished between the control class and the experimental class was the presence or absence of learning steps using the process skills approach. The first learning step was a preliminary activity that directed the students to the subject so that they were ready, both mentally, emotionally and physically. The activity was in the form of arousing and directing the attention of the students by asking questions, opinions and suggestions, showing pictures or other objects related to the material to be given. Problems given to the students at the beginning of learning to train the students to understand problems related to the learning material.

The second step, which is the core part of the learning process skills approach. After the students are able to understand the problems related to the learning material, the students are directed to be able to formulate hypotheses. In the process of compiling hypotheses, the involvement of active students is needed at the time of psychological activity by using prior knowledge in solving problems faced [13]. Thus, when the students understand the problems associated with the learning, the skills to develop hypotheses can be developed. The science process skills identifying variables is the next step. The research variable is the object of research or what is concerned to a point of attention of a study [4]. Variables are everything in the form of what is determined by the researcher to learn so that information is obtained concerning about it, then drawing conclusions [8]. Thus in conducting the research, the research variables should be well established so that the research variables are relevant to the research objectives and can be observed and can be measured.

The next step referred to Applying, in which the students who had been directed to formulate the hypothesis would conduct the experiments according to the learning material. Hypothesis is defined as the answer to the formulated question for a while based on the literature review or the result of deduction from any theories, logical thinking, or experiences. In relation to the previous statement, the hypothesis can be said to be a temporary or suspected answer as it needs to be verified for truth [11]. In answering the hypothesis, the students needed to carry out the experiments within groups and the data obtained would make the hypothesis either accepted or even rejected if it was not supported by the data itself. In the process of Applying, the students conducted the experiments within groups.

Collaboration is a team process whose members support each other to achieve the results through the contribution of understanding and guidance from one to another, so that all of them participate. This is what happens during the implementation [8]

Data interpretation was a step done after the students carried out the experiments in accordance with the learning material. This step was an attempt had by the students to find out the meaning from the collected data to answer the research problems. Learning Biology is not merely about mastering the concepts, but also leading to the process of discovery. Hence, through this step, the students will find the facts from the concepts he has learned before [15]. The results of the analysis would be presented in the description form and tables available in the LKS. Through the step of data interpretation, the students were able to find the meaning from the collected data to answer the problems in the research, then they could draw the conclusions of the experiment. After carrying out the learning process, the final step was to conclude the results of the experiments written in the form of summary. The activities summed up that the students are capable to review the activities that have been carried out and formulate the results they have obtained [2].

Therefore, learning by using the process of approach based on Lesson Study was very appropriate to develop the students' science process skills. It covered especially the skills of presenting problems, making hypotheses, identifying variables, applying, interpreting data and drawing conclusion. Process skill approach becomes a solution to learning problems which can enhance the students' science process skills. Hence, learning by using the process of approach based on Lesson Study is considered appropriate to develop students' science process skills. The activity of lesson study can be implemented at all levels of schools as well as in remote schools. It was useful especially in the skills of presenting problems, making hypotheses, identifying variables, applying, interpreting data and drawing conclusion. Process skills approach plays as a solution to learning problems that can foster science process skills [16].

Compared to the first meeting, the class condition was far more optimal than the second one. The students become more active in asking the questions and the teacher could manage the classroom atmosphere well. Class learning was only a beginning to determine the learning system that would be applied and it depended on the situation and characteristics of the students in the class. Lesson Study helped the teacher create the learning based on the conditions and characteristics of students. The teacher continuously provided the students with an innovative learning in which it aimed at the teaching and learning that had been done repeatedly. Continuous lesson study activities will produce a learning community [12].

In this case, Lesson Study was introduced to provide fresh air and new ideas for teachers to make some learning changes that could be applied in ATU X class 2. The team of Lesson Study had contributed their thoughts and energies in order to improve learning in ATU X class 2 in which an increase had been indicated in the second meeting. It was the teacher's ability to manage the classroom so that the teacher was able to realize and maintain the optimal teaching and learning atmosphere in the second meeting. With the existence of Lesson Study, it helped teachers in planning the learning well, helping teachers to be better in the teaching and learning process beforehand. Lesson Study provided a way for teachers to be able to improve the learning systematically. The students were expected to evaluate their performances by themselves and to pay attention to others' opinions about their performance of study groups [1].

The existence of Lesson Study team also helped the teachers to maintain their abilities, as stated by one of the observers at the reflection stage, teacher's voice sounded loud and firm so that the students could hear it even in crowded classroom atmosphere. The model teacher could also evaluate the teaching abilities that he had, which the observer considered were lacking in time allotment and firmness in dealing with the students who were less disciplined. In addition to the improvement of students' science process skills, the implementation of Lesson Study in this research basically had a direct positive impact on both model and observer teachers. The positive impact of implementing Lesson Study for teachers is that the teachers are more motivated to prepare teaching through mature

learning planning, teachers think and develop more innovative and varied learning strategies and Lesson Study provides opportunities for teachers to reflect on themselves.

Lesson Study could also lead to good relationships between model teachers, observers, and Lesson Study coordinators. Model teachers and teachers who participated in the implementation of the LS and the service team could establish good working relationships. This good relationship was feasible to be continued so that the collaboration between teachers increased and the fulfilment of the learning rights of the students of SMK 5 Jember was fulfilled.

The results obtained during the implementation of learning by using lesson-based learning process that had been applied in the experimental class could be seen from several improvements. Compared to the first meeting, the class condition was far more optimal rather than in the first meeting. Students became more active in asking questions and the teacher could manage the class well. Learning class was a beginning to determine the learning system that would be applied to the participants and the character of the students in class. Lesson Study helped teachers to jointly create learning in accordance with the conditions and characteristics of the students.

The Lesson Study Team who contributed thought and energy in order to improve learning in the ATU 2 class had proven the increase in participation in the second meeting. That was the teacher's ability to manage the class so that the teacher could achieve and maintain optimal learning in the second meeting. The existence of Lesson Study helped teachers in learning, it helped teachers to be better in the teaching and learning process beforehand. In accordance with Podhorsky (2006) Lesson Study provides a way for teachers to be able to improve learning systematically. The presence of the Learning team also helped teachers to maintain what they already had, as stated by one observer during the reflection of loud and confirmed teacher's voice so that could communicate with students in a crowded classroom.

Improvement of the ability of teachers and learning in accordance with the conditions and character of students would have impact on the students. The class atmosphere became more conducive in the second meeting, although it was undeniable that during the learning process the classroom atmosphere became crowded but students still did their assignments well. According to Hidayanto, meaningful learning can occur if students have been able to connect between new knowledge and knowledge they have. It was seen in the learning process that the interaction among students in learning looked effective, because in groups between students discussed each other and worked together in completing their tasks.

In addition to the improvement of science process skills and student learning outcomes, the application of Lesson Study in research basically had a direct positive impact on both model and observer teachers. Chanji states that the positive impact of the implementation of Lesson Study for teachers is that teachers are more motivated to prepare for teaching well through mature learning planning, teachers think and develop more innovative and varied learning strategies and Lesson Study provides opportunities for teachers to reflect himself. For teacher observers, with Lesson Study the observer teacher would get a lot of knowledge with the material that had been obtained from the model teacher and the collaborative activities of the Lesson Study team.

Lesson Study could also lead to good relationships between model teachers, observers, and Lesson Study coordinators. In accordance with Sripatmi's, model teachers and teachers who participate in the implementation of the LS and the service team can establish good working relationships. This good relationship was feasible to be continued so that the collaboration between teachers increased and the fulfilment of the learning rights of students of SMK 5 Jember was fulfilled.

4. Conclusion

Learning using the Lesson Study lesson-based learning approach was effective in improving students' science process skills. The data was supported by the results of different tests (t test) between the experimental class and the control class with a significance of 0.041 (sig. = 0.041 < 0.05) which showed that there was an influence of learning between the experimental class and class on the experimental class process skills was higher compared to the control class.

The pattern of discussion between teachers and teachers was spread out, between model teachers, lesson study leaders, or observers who had the same position, namely planning process learning skills. While the discussion patterns between students and students occurred in the same direction, heterogeneous group selection, and the teacher became the center. Finally, the pattern of discussion between teachers and students occurred widely, teachers did not side with any group, and also guided people to be able to carry out learning well.

For recommendations, you can read the results by Riailita which concludes that the application of the science process skills approach in Biology learning can improve cognitive learning outcomes and student character. That learning with a science process skills approach provides stimuli to students in the form of better understanding of facts and concepts of science.

Based on the results of observations and research that had been done, the suggestions that can be submitted are as follows.

- a. We recommend that in learning using the process skills approach based on Lesson Study, the teacher must pay attention to the allocation of time used. So that there is no time wasted and in accordance with a predetermined time allocation.
- b. It is better if learning uses the process skills approach based on Lesson Study is done again by biology subject teachers, because it is proven effective in improving student learning outcomes as well as teachers and observers benefit from the learning.

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