

# Statistics Learning Improvement:

## The power of lesson study

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**Abstract**—Statistics is a subject taught in higher education, usually as part of research subject that involves the data analysis routine. One biggest obstacles faced by the students in their research subject is in processing and in interpreting the obtained data. The aim of this study was to apply “lesson study” approach enabling students to collaboratively plan, do, and reflect on their data collection and analysis routines. The study employed qualitatively approach with descriptive method. It is applied to Statistics subject class in four cycle processes consisting of ‘Plan, Do, and See’. The participants of the study were the sixth semester students of English Education Study Program. Lesson study was implemented in every cycle as a tool to enhance students’ improvement in learning statistics. The exploration of lesson plan was discussed within a team based on the findings in each cycle. As a result, the students were able to process data correctly and meaningfully. They are also able to create informative decision based on the calculated data.

**Keywords**—*learning improvement; statistic; lesson study*

### I. INTRODUCTION

Nowadays, data literacy has become valuable skill to master. Data literacy cannot be separated from statistics as a tool of data processing. Statistic is often taught in university to help the students to deal with obtained data in their research project. Statistics is a powerful tool for data processing and calculation. It supports students to conduct the research as a requirement to get bachelor degree. However, this subject is considered difficult for those who have weak quantitative skills. So, students prefer to conduct their research in qualitative approach than quantitative. Previous research mentioned that the students got some difficulties in using statistical formula especially in interpreting research data [1]. This perception lead to reluctance in learning statistics [2].

Lesson study is an alternative approach to make improvement in education as it emphasizes on learning reflection which aims at enhancing the next learning process. The reflection itself shapes teachers’ awareness on the learning process as much as the product. This can only be completed if a teacher collaborates in a team and this is the basic concept of having professional learning. Lesson study is fundamentally a team-based model of professional learning. Several studies have examined team- work as a structure or an impetus for the production of col- laborative professional norms and instructional conversations. Team-based model promotes a

structure for the production of collaborative professional norms and instructional conversations [3]. Lesson Study is not merely for teaching them but it also contributes for giving insight to their teachers thus the teachers can teach effectively.

Literally, lesson study derives from the word *jugyou* (instruction, lessons or lesson) and *kenkyuu* (research or study). It can be said that lesson study is done by examining the lessons to improve students’ learning quality. It is accomplished through continuous collaborative concept based on collegiality and mutual learning. There are three steps done in lesson study: plan, do and see; these stages is illustrated in Fig. 1.

The stages can be described as follow:

- Goal setting: the team of the teachers engages in collaborative work and discussion in order to determine research theme which is relevant to the school.
- Planning: it is started by identifying of a learning challenge in order to giving description to the team to plan and evaluate a research lesson. The team works together to design and create the students’ needs pedagogically.
- Teaching with peer observation: the model teacher teaches while the others in the team will observe for the students’ response in that learning.
- Debriefing the lesson: the evaluation of the lesson gives description of the students’ learning will contribute for making next plan. It will be useful to revise the lesson and to formulate subsequent lessons in line with the students’ needs.
- Consolidation of learning: making a discussion about what the students have done and showed as their progress in learning. Some changes related to the way the teacher deliveries the materials or the selected materials or media or activities given can be done if needed. The cycle will continue until the goal of learning is achieved [4].

III. RESULTS AND DISCUSSION

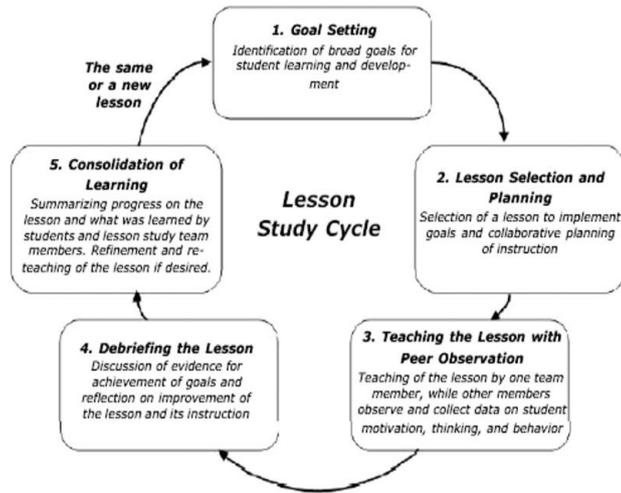


Fig. 1. Lesson study stages.

Teachers commonly starts their lesson study process by setting an objective for their students that they want to address through their instruction [5]. Lesson study allows teachers to have opportunities to be in a classroom together. It is seen as collaborative work resulted from a complex process in which the accuracy of data collection on students’ activities and behaviors will give new insight for the team to plan further research and discussion. It gives emphasis to students learning, not teacher teaching. In another word, it means that the focus of lesson study is to identify how the students can learn in the classroom, what the students’ problems, and any other things about learning. They are encouraged by the need of managing students as well as providing instructions so they work hand in hand observing how students learn. As it is line with Lewis at al “Lesson study focuses on student learning and development. It provides a rare and valuable chance for teachers to be in a classroom solely to investigate student learning, unencumbered by the need to manage students or provide instruction [6].”

II. METHOD

Descriptive method with qualitative approach is used in this research. It is intended to describe every single activity in the implementation of lesson study. As much as four cycle processes done which consists of plan, do and see. In each of the open lessons either the number or the name of the observers are the same. Documentations and observations are used in collecting the data. By getting the data from observation, it is possible to show extent of students’ improvement to process and interpret the data. Students’ activity is captured and recorded. Additionally, tasks are documented. The task given to the students has been validated by expert judgement. This study involves the students from semester six semester and one model lecturer.

A. Data from Observation

In the lesson, students are expected to be able to use the formula to process correlational data. In addition, students learned to interpret the data result. The observation cover five things: group work, monitoring activities, learning materials, classroom activities, and classroom equipment. The observation result of the first meeting is tabulated in Table 1.

TABLE I. FIRST MEETING OBSERVATION RESULT

Classroom management	Observation notes
<b>Group work</b>	Obs#1: One or two students in each group dominated the group discussion Obs#2: Students seemed talk to each other discussing but they did not manage to get the answer
<b>Monitoring activities</b>	Obs#1: Few students did not pay attention on another group presentation Obs#2: Few students did not pay attention on another group presentation
<b>Learning materials</b>	Obs#1: There were no written directions to do the exercises Obs#2: Formula was not available on the students’ worksheet
<b>Classroom activities</b>	Obs#1: In the middle of activity did not engage the students’ attention on the lesson Obs#2: Pre-activity did not engage the students’ attention on the lesson
<b>Classroom equipment</b>	Obs#1: The classroom was not able to accommodate the number of the students. Obs#2: The air conditioning and In-focus in the class disturbed the students’ concentration

During a group discussion, there were some groups which did not understand how to work efficiently, especially when they needed to fill in the worksheet. Instead of discussing the answer together with their team members, they wrote the answer directly on their own book then finally they discussed the answer with their team members.

Some passive students did not engage with their team mates during the learning activities. It was seen that the passive students worked and struggled by themselves without any discussions with their members.

There were some groups that were still discussing when another group was presenting their discussion result. They were talking to each other about their answer.

When one group was presenting their result, the other groups were checking and comparing their work with the result presented by the presenter group. It was also found that they did some corrections on their paper based on their understanding after the presenter group showed their answer.

It was found that there were some students working dominantly among their members. The rest of the other fellow members were being passive since they considered that there was a student who was able to handle the group task. Furthermore, the observer also found that there was a group in

which the members were still confused of what to do and they merely waited for the other groups to present their result.

Apart from the observation result mentioned earlier, it was also found that the students discussed actively with their own fellow members in the activity. Moreover, The lecturer's questions could make the students' motivation in order to answer it. It was proved that the students had motivation to be able on the task or questions given by the lecturer.

From the findings the writer and his team re-plan the lesson to fix the problem. In the new lesson plan, the writer manage central group discussion activity and presentation activity. It is done to minimize group discussion while another group is presenting. Besides, the students are asked to bring textbooks or other sources so that they can get valid reference to answer the questions given by the lecturer or the problems they find during the discussion session.

In the next lesson, the new plan is implemented and many negative findings in the previous lesson decreased significantly. For example, more students bring textbooks and other references into the classroom, and since the grouping places the students with heterogenously, the group discussion worked better; more students were involved in the group discussion activity. The observation result of the last meeting is presented in Table 2.

In general, the observers evaluate that the lesson run better and better from one class to another class. The students' responses given in the reflection stage strengthen the observers' findings. The students said that the class which implements open lesson is more dynamic and enthusiastic. Discussion activity in group made them able to give opinion freely without being afraid of making mistakes. Besides, various activities given such as individual work, pair work and group work make the students who are dominant give opportunity to other group member to give opinion, and passive students start to speak and get involved in the discussion activity. Since Statistics is deemed as the difficult one, therefore the condition of the classroom and the good equipment needed in the class are also considered as the thing that can support this students' improvement in learning this subject.

**B. Data from Documentation**

The issue of students' perspective on Statistics subject give a little influence on students' ability to understand material taught in Statistics. Even though they find it difficult, they know it is important to support their research whether it is quantitative or qualitative. What make them do not understand Statistics is they do not know how the steps to process the numerical data. The idea of implementing lesson study in Statistics class considers an alternative to build learning quality.

Before lesson study implemented in the class, students' ability to process numerical data is quite poor. Here is the result of students' score before lesson study is implemented.

TABLE II. SECOND MEETING OBSERVATION RESULT

Classroom management	Observation notes
Monitoring activities	Obs#1: Many students were very active Obs#2: Few groups are less active in doing the discussion.
Learning materials	Obs#1: Few groups made mistakes. Obs#2: Some students could explore more problems.
Classroom activities	Obs#1: Few students could not respond the lecturer's question. Obs#2: Few groups could give very clear explain.
Classroom equipment	Obs#1: the classroom used had accommodated the number of students Obs#2: the classroom equipment supported students' comfort

Based on the result of the exercise from the first cycle, it is shown that the lowest score is less than 60 which means they performed limited skill at processing quantitative data. Significant result after lesson study was implemented gives possitive influence on how students process numerical data. They are able to identify which data they must put into the product. It means that they can distinguish dependent variable from independent variable.

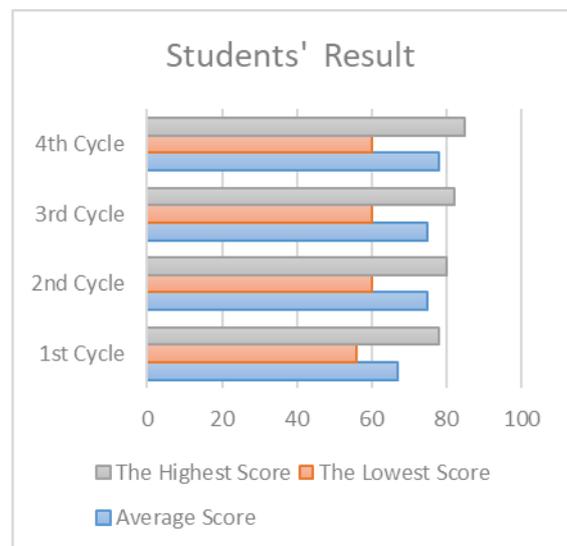


Fig. 2. Students' result.

**IV. CONCLUSION**

Statistics as a subject in higher education necessary to process and to interpret data. One important aspects from statistics is how the research could create meaningful conclusion. Unfortunately, undergraduate students got difficulties in this subject due to low interest. Lesson study can be employed as an alternative approach. It was found that the implementation of lesson study has improved students' perception and enhanced necessary skills to meaningfully interpret the data.

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