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Lembaga Penelitian dan Pengabdian Kepada Masyarakat (LPPM)
Indonesia University of Education
Gedung LPPM UPI 3rd Floor
Jl. Dr. Setiabudhi No.229 Bandung
E-mail : wals2014@upi.edu
Website : wals2014.upi.edu



LESSON STUDY: COMPARISON STUDY OF THE GRAPH THEORY LEARNING TOWARD STUDENTS LEARNING OUTCOME

Uswatun Khasanah¹, Harina Fitriyani²

*Mathematics Education Study Program, Faculty of Teacher Training and Education,
Ahmad Dahlan University, Jalan Prof. Dr. Soepomo Waringboto, Yogyakarta, Indonesia*
¹uswatun.khasanah2@yahoo.co.id
²rin.najmi@yahoo.co.id

Abstract:

Lesson study is collaborative activity lecturers to enhance the quality of learning. In the lesson study activity, lecturers in same concentration collaboratively plan, do and evaluate (see) learning obviously. This research aims to know affectivity of the graph theory learning on lesson study-based by using problem based learning (PBL) approach toward student learning outcome in mathematics education department of Ahmad Dahlan University compared with learning without lesson study-based and PBL. This research is experimental research. The population is students of mathematics education department at 7th semester, sample is taken randomly. Method of collecting data is documentation to obtain data of initial capability; test technique is to obtain data of learning outcome. Instrument that used is a test. Instrument test used construct validity test, which was with validated by expert. The result of the research is the graph theory learning on lesson study-based is not more effective than learning without lesson study-based. This case was indicated with obtained $t_{hitung} = 1.161$ on the significant level 0.05 and degree of freedom 119 and $t_{tbl} = -2.2$ such that $1.161 > -2.2$. This case may be caused by observer too much in a class so that concentration of students and model lecturer during learning process was disturbed.

Keywords: Lesson Study, Comparison Study, Graph Theory

1 INTRODUCTION

Mathematics is a science that is considered to be difficult for most people. In mathematics learning at both the elementary education, secondary education and higher education still much an activity learning, reasoning ability and communication skills are still lacking. It is characterized by the lack of mathematics learning outcomes. Based on empirical data of the student learning outcomes against several subjects in mathematics education study program FKIP UAD obtained that student learning outcomes in general is still low. It is characterized by the number of students take remedial at each semester and there are many students who earn a low GPA. Related to the above, an attempt to improve the efficiency and quality of learning is cultivated concentrations increase by mathematics education study program.

Discrete mathematics are compulsory subjects in mathematics education study program is given in semester 7 with 2 credit. This subject is one applied subject that does not require a lot of prerequisites so that it can be classed as an easy subject. Therefore, based on the observation of discrete mathematics learning for several semesters found that this course is in great demand by students of the semester 5. Although relatively easy subject but still found many students who did not pass and take remedial.

Based on these problems, this study is limited to a comparative study of graph theory learning based on lesson study using PBL on student learning outcomes in mathematics education study program Ahmad

Dahlan University in academic year 2013/2014. The purpose of this study was to determine the effectiveness of graph theory learning based on Lesson study using PBL on the students learning outcomes of mathematics education at the University of Ahmad Dahlan with learning-based without lesson study.

Lesson study is a collaboration activity of lecturers to improve the quality of learning. In lesson study activities, all lecturers collaboratively plan, implement and evaluate learning in a real. Lesson Study emerges as one of the alternatives to address the problem of learning practices that have been seen as less effective (Lewis, 2002). The implementation of lesson study in lectures to develop the professionalism of lecturers. This is because the continuous of LS will provide eight opportunities for lecturers (model and observer) which relate closely to the lecturer's professional development, namely (1) determining learning objectives that match the needs of the student, (2) reviewing and enhancing learning that are beneficial to students, (3) deepening the knowledge of the learning material presented by the lecturer, (4) determining the long-term goals to be achieved by students, (5) planning collaborative learning, (6) analyzing both of the learning process and student behavior carefully, (7) developing a reliable knowledge of learning, and (8) reflecting on their learning implementation based on the development of both students and colleagues. There are three phases of the lesson study. They are planning (plan), implementation (do) and reflection (see).



Problem-based learning according to the Vernon and Blake in Sockalingam (2010) propose that PBL is an instructional approach that uses problems as a context for the student to acquire both problem-solving skills and knowledge. Meanwhile, according to Grant and Kolmos (2003) Problem-based learning is an educational approach whereby the problem is the starting point of the learning process. Thus the problem-based learning can be understood as a learning approach that is characterized by the giving of the problems as a stimulus for students to practice critical thinking and problem solving skills. Problems that used can be raised either from students or lecturers.

Problem-based learning was developed based on the concepts proposed by Jerome Bruner. Features according to the problem-based learning according to Arends in Suprijono (2011) that authentic assessment, interdisciplinary focus, authentic investigations, product, collaboration. The characteristics of problem-based learning are: (1) learning begins with a problem, (2) ensure that the problems are related to the student's real world, (3) organize lessons around each problem, not around each discipline, (4) gives a great responsibility to the learners in forming and running their own learning process directly, (5) use of small groups, and (6) requires learners to demonstrate what they have learned in the form of a product or performance.

According to some experts quoted Sardiman (2012,) about learning definition such as; 1) Cronbach provided a definition: Learning is shown by the change in behaviors as the result of experience, 2) Harold Spears said Learning is to is observed to read, to imitate, to try something themselves, to listen, to follow direction, 3) Geoch said learning is a change in performance as a result of practice. Also according Sardiman (2012) learning is a changing in behavior or appearance, with a series of activities for example by reading, watching, listening, imitating etc. So learning can be understood as a change in the behavior of individuals towards a better life. Sudjana (2005) define student learning outcomes is essentially a change in behavior as a result of learning in a broader sense includes the areas of cognitive, affective, and psychomotor. Dimiyati and Mudjiono (2006) also mentioned learning outcomes are the result of an interaction act of learning and teaching acts. According to Gagne that mathematics learning outcomes are the abilities of the students after he received his math learning experience or it can be said that the results of learning mathematics is a change in behavior in students, who observed and measured in terms of changes in knowledge, behavior, attitudes and skills after studying mathematics. The changes are interpreted as the improvement and development direction is better than ever. Therefore, the results of study can be interpreted as the result of a learning

activity that determines the success of the learning process.

2. METHODS

The implementation of lesson study of discrete mathematics subject involved one lecturer as a model and 17 observers. The topic of material was graph theory. This type of research is experimental research. Experimental research is research done deliberately to cultivate the emergence of the variables, in this case generated variables that learning through lesson study and learning through lesson study of other variables are discrete math learning outcomes. The study involved two classes: one class of experiments and a control class. Both of these classes have the same relative ability (homogeneous). The design of this study used a posttest-only design control design, can be seen in table 1.

Table 1. experiment design

	Treatment	Student learning outcomes
Eksperiment	X	O ₁
control		O ₂

Remarks:

- X : Learning through lesson study
- O₁ : The learning outcomes through lesson study
- O : The learning outcomes without lesson study without

(Sugiyono, 2008)

The population in this research was students at semester VII of mathematics education study program in Ahmad Dahlan University which consisting of 5 classes. In this research, the sampling of the classes are conducted using random sampling techniques, class D as experiment and class C as a control class.

Data collection techniques used test. The data collection instruments used in this research was test of student learning outcomes. Instrument was essay test. The instrument before used validated at first. The purpose of validation was to determine whether the instrument has been qualified to use the research or not.

The data analysis technique was a method used to analyze data obtained through research. Data analysis techniques are: (1) Test Requirements Analysis: Normality with Chi Square test and Fisher's test of homogeneity of the test. (2) Hypothesis Testing with t test.

3 RESULTS AND DISCUSSION

Based on calculations of data, the average of student learning outcomes of discrete mathematics



which graph theory topic at class control was 61.715 and 56.448 of experimental class. For more details are presented in table 2 below.

Table 2. Summary Description of Mathematics Learning Outcomes

Variable	Treatment	
	LS	Without LS
Number of student	63	58
Highest score	100	100
Lowest score	0	10
average	61.715	56.448
Deviation standar	28.115	21.603
variance	790.465	466.673

Based on the results of normality test with chi squared test, learning outcomes data from the control class and the experimental class were normally distributed. For more details can be seen in table 3 below.

Table 3. Summary test for normality

Learning outcomes	χ^2_{count}	χ^2_{table}	Conclusion
Control	10.729	12.592	Normal
Eksperiment	2.421	9.488	Normal

Based on the results of homogeneity test with Fisher's exact test was obtained of $F = 1,694$, $F_{(0.025, 62, 57)} = 1.676$ and $F_{(0.975, 62, 57)} = 0.6$ so that $1.693 > 1.675$ then H_0 was rejected, so the data were not homogeneous.

Based on table 3 and 4, the analysis of hypothesis testing using t-test with variances not homogeneous. The steps of hypothesis test as follow:

1. Hypothesis

$$H_0 : \mu_1 \geq \mu_2$$

$$H_0 : \mu_1 < \mu_2$$

2. $\alpha = 0.05$

3. Test Statistics

$$t_{ku} = \frac{(\bar{x}_1 - \bar{x}_2)}{\sqrt{\left(\frac{S_1^2}{n_1}\right) + \left(\frac{S_2^2}{n_2}\right)}}$$

4. Area of rejection

$$t < -t_{(\alpha, v)} \text{ with}$$

$$v = \frac{(S_1^2/n_1 + S_2^2/n_2)}{\sqrt{\frac{(S_1^2/n_1)^2}{n_1-1} + \frac{(S_2^2/n_2)^2}{n_2-1}}}$$

5. Calculation

Based on the results of the data analyze obtained that $t = 1.161$ and $t_{(0.05, 11)} = 2.2$ then $1.161 > 2.2$, so H_0 was accepted.

Thus learning the lesson study in discrete mathematics learning was no more effective than discrete mathematics learning without learning the lesson study.

4 DISCUSSION

Lesson Study aimed to improve the learning through processes of collaboration among the lecturers. If the quality of learning was better cause the student's understanding of material related to discrete mathematics increased. However, based on the analysis of the data shown that the discrete mathematics learning through lesson study was not more effective than learning without lesson study.

Based on information from several students, during learning students felt strained. This happened because at the time of the lecture, students were observed not only from his teachers but some other lecturers who served as an observer. They sit spread in the classroom. However, because the number of observers was quite a lot, in the classroom during learning process student was shy to ask. There are some observers who talk behind so unsettle the class. This case can disturbing concentration of students. Based on information from the lecturer models, during lectures felt less comfortable because observed by 17 observers. This caused less of the delivery of content. Many students who took discrete mathematics subject was repeaters and they still took field experience practice in the school, so they joined the learning at 2nd meeting of LS. This caused there was difference in the level of understanding of the material.

In addition to the above possibilities, the other possibility of discrete mathematics learning using LS ineffective can be identified: 1) Small class which size was $9 \times 8 \text{ m}^2$ with a group of 58 students and 17 observers. 2) the seating arrangement was not optimal because there were some empty seats in the classroom. 3) The repeater student has not been entered at 3 first meetings. 4) the role of observer was not maximal.

Another research stated that the learning through LS was not more effective than the learning non-LS was the research conducted by Khasanah, U. et al (2013). With the same conditions, namely the large number of observers, small class sizes with a large number of students, number of students repeater. This is in contrast with studies and theories existing LS in Indonesia, Japan, or any other State which said that learning based LS was better. (Sanders, 2009). Therefore, the implementation of LS in the mathematics education study program of UAD need to be evaluated.

3 CONCLUSION

Based on the wording that has been described above it can be concluded that discrete mathematics learning using PBL in lesson study activities are no more effective than discrete mathematics without



learning the lesson study activities. Some of the factors that lead-based learning activities suboptimal lesson study is the role of the observer is not optimal, the number of many observers, the size of the room and the seating arrangement of the students.

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5 REFERENCES

- Dimiyati dan Mudjiono. 2006. *Belajar dan Pembelajaran*. Jakarta: Rineka Cipta.
- Graff, E.D & Kolmos, A. 2003. *Characteristics of Problem Based-Learning*. Int. J. Engng Ed. Vol. 19, No. 5, pp 657-662. Great Britain : Tempus Publication.
- Hamalik, O.2008. *Kurikulum dan Pembelajaran*. Jakarta: Bumi Aksara
- Khasanah,U. Fitriyani, H & Nurrohmah, S. 2013. Studi komparasi pembelajaran kalkulus integral berbasis *lesson study* terhadap hasil belajar mahasiswa program studi pendidikan matematika universitas ahmad dahlan tahun akademik 2012/2013. Paper not publish.
- Lewis, C. 2002. *Brief guide to Lesson Study*. Downloaded at September 20, 2013 from <http://www.lessonresearch.net/briefguide.pdf>
- Permendiknas no 41 tahun 2007 tentang Standar Proses untuk Satuan Pendidikan Dasar dan Menengah
- Sanders, P. 2009. *Lesson Study : AN Effective School-based Teacher Professional Learning model for Teacher of Mathematics*. Downloaded at October 20, 2014 from http://www.merga.net.au/documents/Sanders_RP09.pdf
- Santyasa, I.W. 2009. *Implementasi Lesson Study dalam Pembelajaran*. Paper presented at the "Seminar on the Implementation of Lesson Study in Learning for Teachers Kindergarten, Primary School and Secondary School in the District of Nusa Penida on January 24, 2009, in Nusa Penida.
- Sardiman.A.M. 2012. *Interaksi dan Motivasi Belajar Mengajar*. Jakarta : Rajawali Press.
- Sockalingam, N. 2010. *Characteristics of Problems in Problem-based Learning*. Disertation. Netherland : Erasmus University Rotterdam.
- Sudjana, N. 2005. *Penilaian hasil proses Belajar Mengajar*. Bandung : Remaja Rosdakarya
- Suprijono, A (2011). *Cooperative Learning Teori dan Aplikasi PAIKEM*, Pustaka Pelajar, Yogyakarta.
- Sugiyono, (2008), *Metode Penelitian Kuantitatif Kualitatif dan R&D*, Penerbit Alfabeta, Bandung.
- Tim Lesson study. 2007. *Rambu-rambu pelaksanaan lesson study*. FMIPA UNY Yogyakarta

