European Journal of Education Studies
ISSN: 2501 - 1111
ISSN-L: 2501 - 1111
Available on-line at: www.oapub.org/edu

doi: 10.5281/zenodo.1495337 Volume 5 | Issue 6 | 2018

PROBLEM BASED LEARNING APPLICATION USING LESSON STUDY APPROACH TO IMPROVE THE EFFECTIVENESS OF MATHEMATICAL ECONOMIC LEARNING

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Abstract:
The essence of education is a process for establishing individuals as a whole human. Excellent Human capital is a target of education. University students are always expected to have critical thinking, innovative, independent, and able to solve any problems fast and accurately. Therefore, the lecturers of university are expected to be able to organize learning process using a method which can actively stimulate critical thinking, innovative and independent attitude of the students, so the effective learning can be created. University of Nusantara PGRI Kediri, still uses conventional teaching pattern, i.e. a lecturer must be responsible by himself for all courses he has. Mathematical economic is basic course before the student getting more complicated course, such as calculus, econometrics, etc. Hence, it is required a similar point of view and standard in learning activity, then the learning application based on problem based learning with Lesson Study approach is required. This research aims to improve effectiveness of Mathematical Economic learning using problem based learning method with lesson study approach. The method used in this research is classroom action research through two research cycles. Based on the research finding, generally, it can be concluded that the application of problem based learning (PBL) method using lesson study approach proved to be able to improve the effectiveness of mathematical economic learning.

Keywords: problem based learning (PBL), lesson study, the effectiveness of learning, mathematical economic

1. Introduction

The essence of education is a process in establishing individuals as a whole human. In Act No. 20 of 2003 stated that education has purpose to develop potential of the

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students in order to be faithful to God, noble, healthy, knowledgeable, capable, creative, independent, and to be democratic and responsible citizens. *Excellent Human capital* is actually a target of education.

University students are always expected to have critical thinking, innovative, independent, and able to solve any problems fast and accurately. However, in fact, a lecturer organizes a learning process dealing with individuals who are still in the process of becoming adults both psychologically and intellectually. Intellectually, the students change from instructive and teacher centrist learner into independent and direct-self learner. Therefore, in university, the lecturers are expected to be able to organize learning process using a method which can actively stimulate critical thinking, innovative and independent attitude of the students, so the effective learning can be created. Hence, problem statement of this research is how can *Problem Based Learning* which use *Lesson Study* approach improve the effectiveness of Mathematical Economic learning? Meanwhile, this research aims to find out the difference of the students' effectiveness learning before and after *problem based learning* using *lesson study* approach is applied in mathematical economic course.

2. Literature Review

According to Watkins, Carnell, and Lodge (2007) Effective learning should help students to: a) *think logically, independently and creatively*; b) *make rational decision*; c) *solve problems independently and in cooperation with others*; and d) *cope with stress and change.* In other words, in effective learning a lecturer should not only teach factual knowledge about course disciplines, but also guide them to improve their *skills to think*. Watkins, Carnell, and Lodge (2007) also stated that effective learning will create students who have: a) *Critical Thinking*, it means the students' ability in making conclusion based on data or statement given by their lecturer. It is also related to the accuracy of the statement given by the students. Furthermore, critical thinking always involves interpretation and logical reasoning; b) *Creative Thinking* means the students' ability to improve their idea or new product based on data or the statement given by lecturer. Creative thinking emphasizes on the students initiative skill to create an alternative or new action; c) *Problem Solving* is students' thinking skill to solve any problems appearing from the data or the statement given by their lecturer. The students who have ability in solving problem will usually conduct an observation by collecting any facts related to the data, then they will take the best action; d) *Decision Making* is students' skill to choose the best response from variety of choices.

Based on the 4 effectiveness learning output indicators above, each indicator can be described into *involved skills* within the table below:

Critical Thinking	Creative Thinking	Problem Solving	Decision Making
a. Focus on question; b. Analyze arguments or controversies c. Judge the credibility of the statement d. Interpret the statements, and e. Generalize ideas	a. Extend their pre-acquired skills to new or novel situations b. Generate new strategies to face problems. c. Engage in tasks even when there is no obvious solutions, d. Elaborate given statements or data e. Confront questions with different answers	a. Visualize the whole picture about a problem, b. Analyze problems, c. Systematize information, d. Generate action plans, e. Prioritize action, f. Be flexible and try different approaches	a. Assemble various information relating to a topic or an issue, b. Compare the advantages or disadvantages of alternatives, c. Decide on the most effective response or action.

Source: Watkins, Carnell & Lodge (2007)

Daule (2014) stated that one of ways to create learning effectiveness is to make the learning process focus on the students. Learning with students as focus is usually called as *Student Center Learning* (SCL), and it can use *Problem Based Learning* or PBL as one of *the student center learning* applications (Mishan, 2011; Collins and O'Brien, 2003; Lathika, 2016; Demirel and Dagyar, 2016). PBL is one of *student-oriented* learning, the approach taken in PBL is to request the students to make a research, and then combine the theory with the result gained in the field, next they should find practical solutions from the problems they found using their knowledge and skills they have.

Higher education institutions in Indonesia, especially in University of Nusantara PGRI Kediri, still uses conventional teaching pattern. For example, a lecturer should be responsible by himself for all courses he has. The lecturer's responsibility in learning is compiling learning device, dictates or teaching modules, carrying out the teaching process in the classroom and conducting evaluations and measurements by himself. Dalal (2014) revealed that conventional teaching patterns are less supportive in forming effective learning. Dalal (2014) also stated that it is required a *Study Lesson* to make the learning effective. *Lesson Study* comes from Japanese *jugyokenkyu,* it is a combination from "*jugyo"* which means *lesson* or learning, and "*kenkyu"* which means *study* or research. Hendayana (2006:10) explained that lesson study is a form of educator profession development through collaborative and sustainable learning assessment based on the collegiality principles and mutual learning to build learning community. Meanwhile, Meyer and Wilkerson (2011) stated that *lesson study* is a deliberation and collaboration process of a group of teachers to plan learning and conduct an observation activity to the students.

Lesson study means "*two teachers are jointly responsible for class and plan teaching together, plan instruction together, share teaching duties and design collectively all teaching aids*" (Alikabri dan Nejad: 2013). *Lesson study* has responsibility to create effective

learning (Dalal, 2014; Alikabri and Nejad, 2013; Syh, 2006; Litle and Hoel, 2011). Meyer and Wilkerson (2011) explained that lesson study is carried out in several stages, they are; a) *teachers work collaboratively to: formulate goals for students learning;* b*) teachers work collaboratively to: plan lesson;* c*) teachers work collaboratively to: teach and/or observe the lesson;* d*) teachers work collaboratively to: reflect on gathered evidence;* e*) teachers work collaboratively to: revise the lesson for improvement; and* f*) teachers work collaboratively to: reteach the revised lesson*".

Setyaningsih (2012) also explained that *lesson study* can be implemented in every meeting by conducting: a) plan; b) do; c) reflection; and d) follow-up. Furthermore, each stage will be explained by Setyaningsih when the research conducted, a researcher acts as a model lecturer and the colleagues act as observer. The task of colleagues is to make observations by filling out the evaluation assessment forms which have been provided. The next stage, they hold a reflection conducted after the lecture ends. In the reflection stage, the team will discuss the observation result. Next, the observers give suggestions to the model lecturer about learning implementation, and then the model lecturer is asked to give response and impression during learning process. In addition, reflection discussion result will be made as a feedback for improvement at the next meeting.

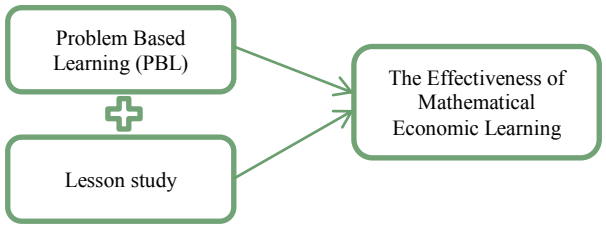

Image 1: PBL Conceptual Framework with a *Lesson Study* approach

Usually, the students have been framed that mathematics courses (mathematical economic) will be closely related to many questions and exercises, even the problem solving for these questions is impossible to be found in real-life. Mathematical economic is not a separate branch of economics, because mathematical economic is an approach to economic analysis. Kalangi (2012) explained that between mathematic and mathematical economic do not have any differences, because it will be difficult to understand mathematical economic without having comprehension about mathematic. Therefore, in learning mathematical economic, mathematical topics which are often used in economics should be chosen, i.e. functions, calculus, arithmetic progression and matrix. According to Abdullah, Tarmidzi, and Abu (2010) PBL is alternative learning strategy which can support the student in learning mathematic. Environment of PBL class gives the students a chance to develop their adaptation ability and change the learning method in order to be applicable to current situation. Hence, the problem based learning with lesson study approach is expected to improve the learning effectiveness of mathematical economics, and it is also expected to make the students think critically, creatively, able to solve problems and make decisions.

3. Material and Methods

This research uses classroom action research. According to Wardani (2004), Classroom Action Research aims to solve problems and reform teaching and learning process reflectively in order to improve learning quality and students' learning outcomes. In other words, Classroom Action Research is not merely about learning outcome, but the improvement of the effective learning also part of improving education quality. Young, Rapp, and Murphy (2008) explained that there are four essence stages within the Classroom Action Research, they are: a) Preparation and Planning; b) Implementation; c) Observation; d) Reflection.

Classroom Action Research is implemented to improve the effectiveness of mathematical economic learning using *problem based learning*. It also uses *lesson study* approach. The subjects of this research were 15 students of second-year students of the Economic Education Program at University of Nusantara PGRI Kediri. The object of this research is the effectiveness of mathematical economic learning. Technique of analysis data used in this research is descriptive analysis using Microsoft Excel as a tools to find out the effectiveness of mathematical economic learning before and after conducting Classroom Action Analysis.

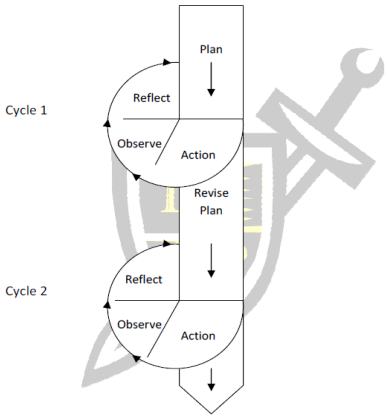

Image 2: Cycle of Classroom Action Analysis Young, Rapp, and Murphy (2008)

4. Results and Discussion

Based on the research finding that was adjusted to cycle and procedure of the classroom action analysis, it was known that Problem Based Learning (PBL) using Lesson Study approach was able to improve the learning effectiveness with critical thinking, creative thinking problem solving, and decision making as the indicator on the mathematical economic learning. Each indicator will be explained in the discussion below:

Based on the research finding, it showed that the PBL application through *lesson study* approach was able to improve critical thinking skills of the students. The grades range of 1-5 in this study is very low, 6-10 is low, 11-15 is high, and 16-20 is very high. In the pre-cycle, it showed that there were 4 students who had very low grade in critical thinking skill. It rapidly decreased in first cycle, there were only 2 students who had

low grade in critical thinking skill, and there were no students who had low grade in the second cycle. It was directly proportional to the results of the students who had a very high grade, which was in pre-cycle no one had very high grades but it increased up to 3 students after the second cycle was applied.

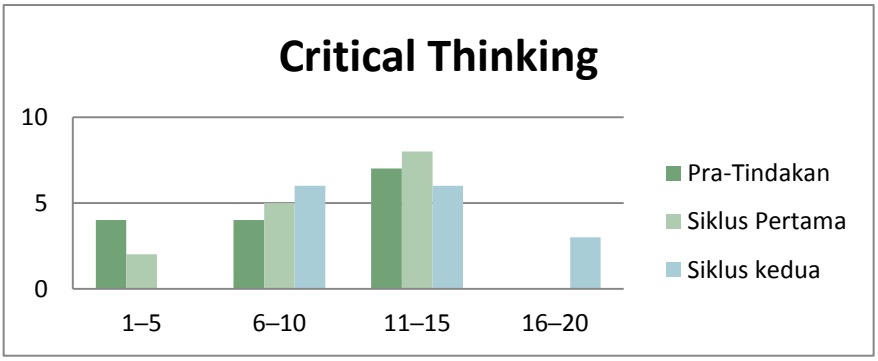

Image 3: Category of *Critical Thinking* Indicator (research finding processed in 2018)

In the creative thinking, grade range of 1-5 is very low, 6-10 is low, 11-15 is high, and 16-20 is very high. It showed on the table below, in the pre-action, there was only one student who has very low grade in creative thinking, and in the first cycle, there was no student who had very low grade in creative thinking. Meanwhile, since pre-action, there was one student who gained very high grade in creative thinking, and it significantly increased in second cycle, there were 6 students.

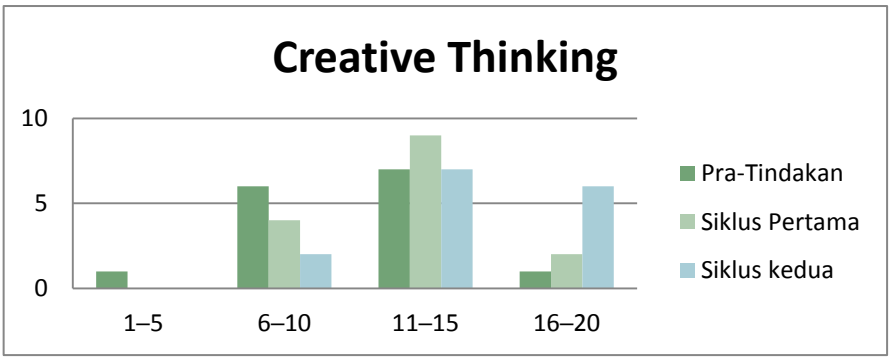

Image 4: Category of *Creative Thinking* Indicator (research finding processed in 2018)

Problem solving is one of indicators which can be categorized as low category since pre-action was started. In other words, the student's ability in solving some problems given by their lecturer was very bad. Even though there was one student who gained very good category in problem solving section, there were 5 students who had very bad category. However, it decreased to 2 students when second cycle conducted, and the student who gained very high grade increased to 5 students

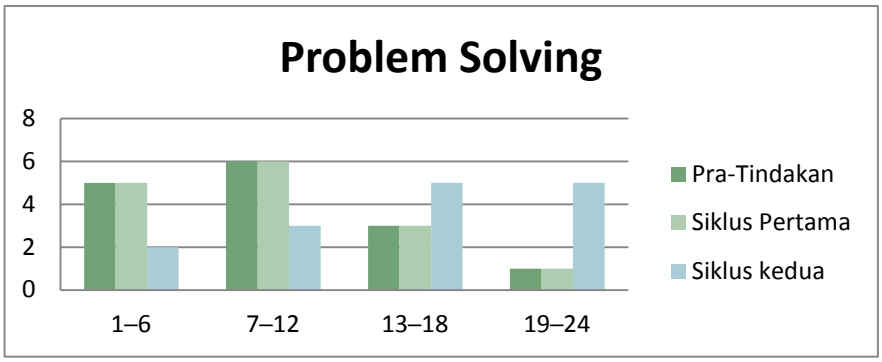

Image 5: Category of *Problem Solving* Indicator (research finding processed in 2018)

Decision Making is one of indicators which can be categorized as good category since pre-action was started. It showed in the table below, there was 1 student in the pre-action who got very bad category in decision making, and there were no students who got very bad category in the first cycle. Meanwhile, there were 4 students who had decision making skill since the beginning of pre-action. In the second action, the students who had decision making skill significantly increased to 10 students.

Based on the descriptive analysis, it can be proven that the application of *problem based learning* with *lesson study* approach can improve the effectiveness of learning on the mathematical economic course.

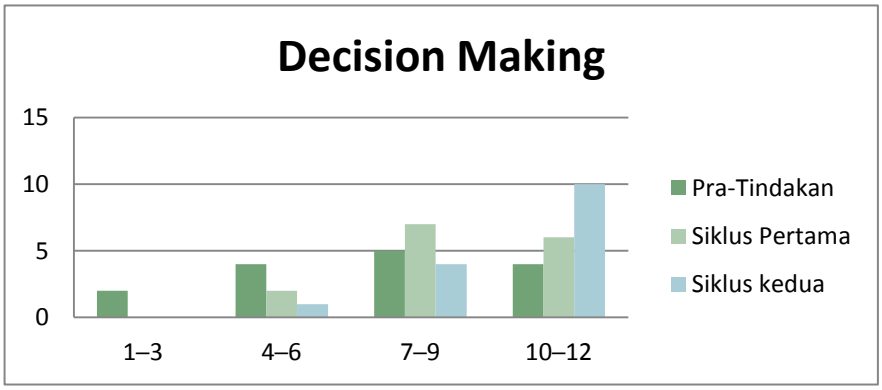

Image 6: Category of *Decision Making* Indicator (research finding processed in 2018)

5. Conclusion

Based on the discussion and analysis which has been explained above, it can be generally concluded that it is time for university or other colleges to use students center learning method, and one of the learning centered or focused on the students is problem based learning. The application of PBL method using *study lesson* approach proved to be able to improve the effectiveness of student learning in the classroom. Therefore, this research finding complements previous researches which have similar conclusions and results.

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