

# PROJECT-BASED INSTRUCTION GUIDED LESSON STUDY IMPROVE THE ACHIEVEMENT OF LEARNING OUTCOMES ON EDUCATIONAL RESEARCH METHODOLOGY COURSE AT DEPARTMENT OF BIOLOGY

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## Abstract

The research of impact project-based instruction guided lesson study in Educational Research Methodology course has been conducted in 2010 until 2012. The research was focused to improve student achievement of learning outcomes in Educational Research Methodology course at Department of Biology, State University of Malang. The learning outcome was defined on three skill levels, understanding of educational research basic concept, creating of research proposal, and final grade. The research approach was classroom action research guided lesson study. The data is analyzed by comparing student score with the minimum requirement score and the improvement of score from cycle 1 to cycle 2 and cycle 3. The mean score of understanding research basic concept increase from cycle 1 to cycle 3. The implementation of project-based instruction guided lesson study improved the ability of students to create research proposal. The percentage of students who got the final grade of A and A- increased from prior research to cycle 1, cycle 2 and cycle 3. On the contrary, percentage of students who have final grade C, D, and E were reduced. The study showed that project-based instruction guided lesson study improved the ability of students to achieve learning outcomes, comprehend research basic concept, creating research proposal, and higher final grade.

*Keywords* : Project-based Instruction, Lesson Study, Educational Research Methodology, Learning Outcomes.

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## 1. INTRODUCTION

The students of Biology Department, Malang State University, have to take course of Educational Research Methodology in Semester VI. The competence of Educational Research Methodology course that is after finishing this course students expected achieve the learning outcomes as follows.

1. Understand the principles and procedures of educational research.
2. Develop the sensitivity and the ability to monitor and assess its performance later as a teacher through Classroom Action Research
3. Self- train to implement the principle of reflection on practice and practice based on reflection through journal writing and portfolio
4. Understand and utilize research findings in education field for the preparation of thesis
5. Practice to develop research proposal.

The achievement of learning outcomes of students in Educational Research Methodology at Even Semester 2008/2009 was not successful. The score of understanding basic concept was less than minimum requirement (75). The mean score of class A was 51.1 (STDEV 5.6), class B was 54.4 (STDEV 4.2), class AA was 49.7 (STDEV 5.2), and class AB was 45.4 (STDEV 5.7). The percentage of students exceeded of minimum requirement of all class is 0% (N=99). The final grade of students that was counted based on score of understanding basic concept and score of task, showed the percentage of students who have final grade B-, C+, C and C- were high.

During teaching activities the students were passive. Research proposals generated by the students still has many weaknesses. The identification of problems was not based on the real situation in educational field. The formulation of the problem was not based on problems identification. The operational definition of research variables unclear and difficult to measured.

The low score of learning outcomes thought to be caused by such things as the follows.

1. Teaching and learning method had not provide an opportunity for students to actively learn research concept, identify the issues and problem, and learn to conduct research in depth.
2. Teaching and learning process had no provide students to learn research process from journals and references

3. Students have limited time to develop their understanding with others and lectures.
4. Students did not know the difficulties in understanding the principles of research, research planning, and implementation of research
5. Students didn't inform their difficulties in understanding the principles of research, research planning, and implementation of research to lecturers.
6. Lecturers gave less feedback to students' work.
7. Students did not reflect their learning process.

Based on the weaknesses of teaching and learning process that have been described in paragraph above need to be done the improvement quality of teaching and learning using appropriate strategies and a sustainable improvement through collaborative reflection.

Project-based instruction (PJI) was chosen to be used to increase learning outcome of students. Project-based instruction is an authentic instructional model or strategy in which students plan, implement, and evaluate projects that have real-world applications beyond the classroom (Railsback, 2002). Wikipedia said that project-based instruction (PJI) is the use of classroom projects, intended to bring about deep learning, where students use technology and inquiry to engage with issues and questions that are relevant to their lives. Project-based instruction is a comprehensive instructional approach to engage students in sustain and cooperative investigation (Petrosino, 2009). Within its framework students collaborate and working together to plan, implement, and evaluate the project that have real-world applications. Based on this reason PJI was an appropriate model to apply in this course, where students practice to plan an educational research.

Suwono (2011a) showed that project based instruction guided cooperative learning improved students learning outcomes in Limnology course. The ability to design and conduct research of students in limnology was improved. Suwono (2011b) in his research on *Program Pendidikan Guru Matematika dan IPA Bertaraf Internasional* showed that PJI improved the score of conducting and communicating research project of students in Research Method course from 2009/2010 to 2010/2011. The percentage of students who got the final grade of A and A- increased from prior research to Academic Year 2009/2010 And 2010/2011.

Project-based Instruction was applied in three cycles, where each end of cycles conducted collaborative reflection through lesson study. We called the learning method was project-based instruction guided Lesson Study (PJILS). Cerbin and Kopp (no date) said that the implementation of lesson study (LS) has four main objectives, (1) gain a better understanding of how learners learn and teachers teach, (2) obtain result that can be used by other teachers, outside participants of LS, (3) systematically improve learning through collaborative inquiry, and (4) construct pedagogical knowledge, where teacher can gain knowledge from other teachers. LS facilitate teacher to improve learning process by collaborative learning and encourage teachers to reflect collaboratively to improve the quality of processes and learning outcomes (Lewis, 2002).

Project-based instruction is a student-centered, multi-modality, active learning approach to education. Through this approach, students are encouraged to generate projects and work collaboratively as team members to complete a series of tasks resulting in a finished product (Anonymous, 2009). The application of classroom project facilitate student in deep learning, where students use technology and inquiry to solve problems and questions that are relevant to their lives. It means that learning activities in PJI are interdisciplinary and student centered. Thus throughout this methods students will be active in conduct activities to meet the learning outcome. Creativity of student will be growth by planning, implementing, and evaluating the projects. The implementation of project helped the students to apply their knowledge in the real-world problems.

The project-based instruction was appropriate method for teaching Educational Research Methodology. The implementation of project-based instructions guided lesson study was to improve the student achievement of learning outcomes of Educational Research Methodology course at the Department of Biology, State University of Malang. Learning outcomes Educational Research Methodology are measured in four level of thinking skill.

- a. The understanding of research basic concept was measured by factual and conceptual test.
- b. The ability of students in planning research was measured through scoring of research proposal that are created by students.
- c. The final grade of student calculated based on the test score of understanding research basic concept, score of practical tasks, score of research proposal, score of learning activities, and score of discussion activity.

## 2. METHODS

The study was conducted using collaborative classroom action research, where planning, implementation, observation, and reflection carried out in a collaborative manner through lesson study. This research was held in three cycles on three years. The steps in each cycle included planning of teaching and learning process, implementation, observation, and reflection. The results of reflection in earlier cycle (i.e. the strengths and weaknesses of action and suggestion) were used to improve learning process in the next cycle. The subject of

research was students participated in Educational Research Methodology course in Even Semester 2009/2010, 2010/2011, and 2011/2012.

The model of project-based was arranged in 6 steps of actions (adapted from Colley, 2008), 1) Identifying and Defining a Project, 2) Searching information, 3) Planning a project, 4) Implementing the Project, 5) Documenting and Reporting Project Findings, and 6) Evaluating Project Learning. Several data collected during the research. The data collected and analyzed in this study is described as follows.

1. The successful of lesson plan implementation.

The successful of the implementation of lesson plan was recorded by observation. The data was recorded in observation sheet.

2. Learning outcome

The achievement of learning outcome was collected by various methods.

a. The understanding of research basic concept was measured by test.

b. The ability of students in planning research was measured through scoring rubric.

c. The final grade of student was measured by calculated from test score of understanding research basic concept, score of practical task, score of research proposal, score of learning activities, and score of discussion activity.

3. Teaching situation

The teaching situation was recorded using the field note. The form of data was perception of observer concerning the situation of teaching, student activity, and response of student to teaching process.

4. Student's response

Student's response to teaching model was recorded by questionnaire.

5. Students and lecturer reflection

Student reflection was focused on the situation of teaching and learning process. Student reflection was analyzed to know the learning process. Lecturer reflection was focused on the execution of lesson plan and achievement of students on learning outcome.

The data collected in this research was analyzed in line with research objectives. The data of achievement of learning outcome was analyzed, and then compared between first, second, and third cycle to know the increment of achievement learning outcome. How far implementation of PJILS improved the achievement of learning outcome of Educational Research Methodology was described qualitatively. The strengthen of PJILS in improving the achievement of learning outcome of Educational Research Methodology were described from the students response, teaching steps, students activity, and teaching situation.

The score of understanding of research basic concept were analyzed by comparing test score with minimum requirement score. The minimum requirement score of research concept understanding was 75. The improvement of students understanding in research basic concept also defined by compared of test score in cycle 1 and cycle 2 and cycle 3. From this comparison the researcher know the improvement of test score and the number of students who passed of the minimum requirement.

The ability of students in planned research was measured through scoring rubric. The analysis of scoring data of proposal was conducted by comparing proposal score with the minimum requirement score. The minimum requirement score was 75. In cycle 1 student wrote a draft of a research proposal as well as in cycle 2 and 3. The improvement of student ability in planned of research was defined by comparing of proposal score from cycle 1 to cycle 2 and cycle 3. From this comparison the researcher know the improvement of proposal score and the number of students who passed of the minimum requirement in research planned.

The data of final grade was describe in mark A, A-, B+, B, B-, C+, C, C-, D, and E, followed the rule of academic regulation at Malang State University. To know the increment of learning outcome, final grade of students were compared between cycle 1 and cycle 2 and cycle 3.

### 3. RESULT

The implementation of project-based instruction guided lesson study (PJILS) was conducted to improve understanding research basic concepts, planning research project, and evaluating the process of learning. In PJILS student explained the research concept and learn how to plan a research by asking and refining questions, searching information and reference, making predictions/hypothesis, designing plans of research method, communicating their ideas to others, and producing creative report. Result of the implementation of PJILS in Educational Methodology Research Course was explained as follows.

#### 3.1 Understanding of Education Research Basic Concept

The understanding of research basic concept of students was measured by test. The test items were asking about the scope of educational research, identify dependent and independent variables in educational research,

identify control variables and control groups, classroom action research, quasi experimental design, descriptive and qualitative research, and formulate of hypothesis.

The mean of test score in the first cycle is only 66.1 (Table 1). The mean score gained by students was lower than the minimum requirement. It was showed that the concept understanding of the students was low. In cycle 2 researchers modify the lecturing procedure to improve the student achievement in research basic concept. The improvement of teaching model was based on lecturer reflection in the end of cycle 1. In the cycle 2 students were given homework and practice assignment that are collected and discussed. Some students present their homework in classroom discussion and the others gave comment. In the cycle 2 the mean test score of students increase to 67.4, although is still below than the minimum requirement. In cycle 3 the mean score of student relatively high than in cycle 1 and 2, but still under the minimum requirement.

Table 1 the Achievement of Students in Understanding Research Basic Concept

Even Semester in Year of	Mean of Test Score
2009/2010	66.1
2010/2011	67.4
2011/2012	69.4

The researcher explained why the students have not passed the minimum requirement.

1. The ability of students to learn research basic concept were limited by their ability in English. Some reference of this course was written in English. The English of some students were limited, so that they still have difficulties to comprehend research basic concept.
2. The students need the explanation from the lecturer to understand research basic concept, whereas lecturers minimize explanation and forced the students to help them self (lecturers promoted concept of self regulated learner for student).

### 3.2 Educational Research Planning

Creating a research proposal was done to develop the ability of student to apply their understanding research concept to plan an educational research. In create creative research proposal student have to identify problem, variables and its level, control variables, identify appropriate references, and method/procedure to solve problem. The early step student created a draft of proposal. The draft of research proposal include introduction (background of study, problems, research objectives, research benefit, hypothesis (if any), operational definition of variables), review of literature, and method (research approach, subject, research procedure, instrument for data collecting, procedure of data collection, and data analyses). Students create research proposal individually. There are five type of research that created by students, classroom action research, quasi experiment, qualitative research, descriptive research, and developmental research.

The draft of research proposal presented in group and classroom discussion to got input from lecturer and other student. After presentation student revise their draft of proposal, based on input from lecturer and other student, became operational design of research. Students create design operational of research individually. Design operational of research was scored by using scoring rubric.

The mean score of research proposal of student in the cycle 1 (2009/2010), average from four classes was 73.1 (Table 2). The score gained by students was lower than the minimum requirement.

Table 2 the Achievement of Students in Creating of Research Proposal

Class	Score of students		
	2009/2010	2010/2011	2011/2012
PGMIPABI (A)	76.4	87.8	84.1
Regular AA	70.1	85.9	78.1
Regular B	78.0	80.4	83.7
Regular BB	64.8	79.9	75.1
Mean	73.1	83.5	82.0

In the cycle 2 student were assigned to complete their proposal with the useful information from literature. Students were assigned to search literature and made critical analyses. Students conducted critical analysis on 6

papers, 3 papers in English and 3 papers in Bahasa Indonesia. Students use their critical analyses to complete their proposal. The score of research proposal in cycle 2 and 3 increase than cycle 1. The data of research proposal showed that mean score in cycle 2 was 83.5 and cycle 3 was 82.0. In cycles 1 and 2 all of students passed the minimum requirement. The data pointed out that there was improvement ability student in creating of research proposal from 2009/2010 to 2011/2012.

### 3.3 Final Grade

In this research learning outcomes also defined as final grades. The final grade was calculated based on test score of understanding research basic concept, score of practical tasks, score of research proposal, score of learning activities, and portfolio.

The percentage of final grade of students, especially grade of A and A- increase from the year of 2009/2010 to 2011/2012. Data Table 3.3 showed that the percentage of students who earned of A and A- increase from year 2009/2010 (29.2%) to year of 2011/2012 (87.8%). The percentage of students who earned of A, A-, and B+ increase from cycle 1 at year 2009/2010 (59.5%) to cycle 2 at year 2010/2011 (87.4%) and cycle 3 at year 2011/2012 (98.6%). In contrary, the percentage of students who earned of B- to E decreased from cycle 1 at year 2009/2010(24.7%) to cycle 2 at year 2010/2011 (2.8%) and cycle 3 at year 2011/2012 (1.4%). The data in Table 3 indicate that PJILS increase student final grade at Educational Research Methodology.

Table 3 Percentage of Students Final Grade in Three Years

Final Score Mark	Even Semester 2009/2010		Even Semester 2010/2011		Even Semester 2011/2012	
	Number of Students	Percentage	Number of Students	Percentage	Number of Students	Percentage
A	3	<b>3.4</b>	0	0.0	20	<b>27.0</b>
A-	23	<b>25.8</b>	19	<b>26.4</b>	45	<b>60.8</b>
B+	27	<b>30.3</b>	42	<b>58.3</b>	8	<b>10.8</b>
B	14	15.7	9	12.5	0	0.0
B-	12	13.5	2	2.8	0	0.0
C+	3	3.4	0	0.0	0	0.0
C	2	2.2	0	0.0	1	1.4
D	1	1.1	0	0.0	0	0.0
E	4	4.5	0	0.0	0	0.0
Total	89	100.0	72	100.0	74	100.0

### 3.4 Student's Response

Student's response to teaching model is recorded use questionnaire. Data of student response showed as follows.

1. Most of the students said that Educational Research Methodology was an important course because improve the ability of students in research.
2. The implementation of PJILS improved student to understand research concept and creating educational research proposal (55% very agree and 45% agree).
3. Most of the students agree that PJILS encourage student to find the problem and look for method to solve the problem, students easy to comprehend research concept, students easy to develop creative research planning to solve problems, students have high willingness to follow lecturing, and easy to apply theory of research into practice.
4. The PJILS awake the willingness the students to collaborate with others to solve problem. They believe that collaboration improve their ability in conduct research.
5. All of student agree that Project Based and Lesson Study improve their view about what research is. Although, they still met the difficulties to create a good research proposal, conduct experiment based on their proposal, and writing the report based on their project execution.

### 3.5 Reflection

The reflection is conducted after cycle 1 as well as cycle 2 and cycle 3. The data reflection in each cycle was used to improve teaching process in next cycle. The learning outcomes of student on understanding research basic concept still need to improve. Although, student was given homework and practice assignment and then student assignment collected and discussed, some of students still difficult to understand these concept. The concept of educational research still difficult mastered by student i.e. problem identification, formulating hypothesis, determine variables and level of variables, sampling technique, data analyses, quasi experiment in education, and describe of research procedure. The lecture was suggested to give explanation about basic concept of educational research by using real example. Student learn problem identification, stating hypothesis, determine variables and level of variables, sampling technique, data analyses, quasi experiment in education and describe of research procedure, collaborative with others.

The result of research proposal and research report has ever been good but possibly to be improved. Observation of lecturer to student research proposal pointed out that it was lack of information. In the next time lecture was decided to assign student to complete their proposal with the useful information from literature. Students is assigned to search literature and made critical analyses. The students conducted critical analysis more than three papers or at least six papers, three papers in English and three papers in Bahasa Indonesia. The critical analyses expected to improve the quality of research proposal and research report, and also improve the ability of students in writing research proposal and research report in English especially for PGMIPABI student.

Project-based instruction is a student-centered, multi-modality, active learning approach, and multi discipline. Implementation of PJI stimulate student to increase their ability in other discipline, i.e. data analyses, statistic, computation, and writing.

The implementation of project-based instruction needs cooperation between lecturer, assistant, and student. Evaluation and reflection of students learning process was conducted through lesson study. Lesson study improved ability of assistant and lecturer to analyze of weakness and strengths of teaching process. Improvement of student achievement on learning outcome was also supported by improvement the quality of teaching process that was result by lesson study.

## 4. DISCUSSION

The research showed that PJILS improve student learning outcomes, the understanding research basic concept, the ability of students preparing research proposals, and the final grade. Project-based instruction is an authentic instructional model or strategy in which students plan, implement, and evaluate projects that have real-world applications beyond the classroom (Railsback, 2002). By the definition above, the project-based instruction is an appropriate teaching method in Educational Research Methodology course to meet the standard competence that was students understand and develop research skill and practice in designing educational research, generates ideas to construct a proposal research project, and write an operational design of educational research.

Project-based instruction is a student-centered method, where students can help their self to learn different skill. They are afforded many more opportunities and avenues to demonstrate knowledge and develop skills. The time required for each project will vary but must be of sufficient duration to allow for completion of the project. In project-based instruction, the students are actively involved in learning process. They actually are doing activities which require the application of basic skills and problem-solving strategies. Unlike some teaching which involves only one activity or topic at a time, project-based instruction involves the layering of many skills and content areas.

Project based learning is a systematic teaching method that engages students in learning knowledge and skills through an extended inquiry process structured around complex, authentic questions and carefully designed products and tasks (Yuxia and Fong-Lok, 2006). Asan and Haliloglu (2005) said that Project-based learning is an effective educational approach. It focuses on creative thinking, problem solving, and the interaction of students with their peers to create and use new knowledge. Project-based learning provides an authentic environment in which teachers can help students increase their skills through cooperative learning and collaborative problem solving. In project-based learning environment the teacher acts as facilitator, designing activities and providing resources and advice to students.

Projects involve students in a constructive investigation. An investigation is a goal directed process that involves inquiry, knowledge building, and resolution. Investigations may be design, decision-making, problem-finding, problem-solving, discovery, or model-building processes. The central activities of the project must involve the transformation and construction of knowledge. Implementation of PJI stimulate student to increase their ability in other discipline, i.e. data analyses, statistic, computation, and writing scientific paper.

Implementing a project is a very hands-on, practical matter. Students use tool, material, and technology to collect and record data. They analyze data and prepare reports, which may have to be rewritten in multiple drafts before they are ready for presentation. During the implementation process, students are expected to work collaboratively with one friend in a spirit of cooperation and mutual respect.

This research pointed out that the first step of the project-based learning, Identifying and Defining a Project is the most important. Project-based learning begins with the identification of problems or essential questions. This question may arise from the lecturer or from students or collaboration of lecturer and students. Essential question or scientific question is a central of project-based learning. Problems that have been identified will determine the design and implementation of research. Success in identifying and defining the project will lead to the success of conduct research. The main difficulty of students in conducting research is to identify the research problem. Project-based learning guided students to identify research problems. Therefore, PJI improved student ability to conduct educational research.

The strength of project-based instruction in improving the achievement of learning outcomes of Educational Research Methodology students, based on facts as follows. PJI is a student-centered method in lecturing. In PJI students collaborating and working together in the project (to plan, implement, and evaluate the project). Students conduct activities to meet the learning outcomes, the students' creativity had grown through project activities. Students explain the research concept and learn how to do research by asking and refining questions, making predictions, designing plans of research methods, collecting and analyzing information, communicating their ideas and findings to others, and producing creative report. The implementation of project helped the students to apply their knowledge to solve the real-world problems.

Research on lesson study indicates that as teachers collaborate, set goals, observe, and discuss lessons, they assume responsibility for their own learning and student achievement increased. The implementation of lesson study in learning process using project-based learning was used to meet the high quality of student learning, because lecturer continuously reflect learning process collaboratively and revise their learning process using decision of reflection. Teaching process improved research skill of student. Research skill is improved because teaching process facilitate student to identify problem, search information to solve problem from various source, plan problem solving, data analysis, formulate report through collaborative activity. Improvement of student learning outcomes obtained due to an increased quality of learning. The improvement quality of learning is caused of lesson study.

The results of this study indicate that lesson study improve teaching and learning process. Lesson study facilitate teacher to improve learning process by collaborative learning and encourage teachers to reflect collaboratively to improve the quality of processes and learning outcomes (Lewis, 2002). Improvement of teaching and learning process provides benefits to the lecturer and the student. LS encourage teachers become more skilled for manage learning. The improvement of teaching and learning process through improved model of learning and capacity building of lecturer through lesson study have impact on the improvement of student achievement on learning outcomes.

## 5. CONCLUSION

The implementation of project-based instruction guided lesson study (PJILS) improved the ability of students to achieve learning outcomes, comprehend educational research concept, creating research proposal, and higher final grade. The mean score of understanding research basic concept increase from cycle 1 to cycle 3. The score of research proposal showed that mean score in cycle 2 and cycle 3 increased than cycle 1 and all of students passed the minimum requirement. The percentage of students who got the final grade of A and A- increased from prior research to cycle 1, cycle 2 and 3; instead of students who have final grade C, D, and E were reduced.

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