

PROCEEDING

THE 8th INTERNATIONAL CONVENTION OF INDOONESIAN ASSOCIATION
OF TECHNOLOGICAL AND VOCATIONAL EDUCATION (APTEKINDO)
AND 19TH INDOONESIAN CONGRESS OF FT/FPTK-JPTK

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Regional Association for
Vocational Teacher Education
in East and Southeast Asia

EDUCATIONAL TECHNOLOGY AND VOCATIONAL IN ASEAN ECONOMIC COMMUNITY, INTERNATIONAL CONFERENCE PROCEEDINGS

3-6 August 2016

Auditorium State University of Medan, Medan, North Sumatera, Indonesia

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**FACULTY OF ENGINEERING
STATE UNIVERSITY OF MEDAN
NORTH SUMATERA, INDONESIA**

**EDUCATIONAL TECHNOLOGY AND VOCATIONAL IN ASEAN ECONOMIC COMMUNITY,
INTERNATIONAL CONFERENCE PROCEEDINGS**

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Preface

We feel thankful to Allah for the blessing so that the book of proceeding of National Seminar completely compiled in relating to the 8th National Convention of Indonesian Association of Technological and Vocational Education (APTEKINDO) and 19th Indonesian Congress of FT/FPTK-JPTK 3 - 6 August 2016 in State University of Medan.

The main objectives of the seminar is to improve the capability in vocational technology in theme: **The role of educational technology and vocational in Asean Economic Community (AEC)** which is adopted from the researches in order to upgrade the graduates to be International standard so that the output of LPTK-PTK be able to compete in AEC. Therefore, the National seminar, convention and workshop of Indonesian LPTK-PTK may emerge the thoughts how to strength the role of LPTK to improve the quality of the vocational teachers in Indonesia.

Hopefully this proceeding book will be useful to develop technology, art, and culture. This book also can be as a reference to intensify the National development.

The committee would express our gratitude to all participants and stakeholders in supporting the National seminar, convention and workshop of Indonesian LPTK-PTK

Medan, 6 August 2016
Chairman,

Prof. Dr. Abdul Hamid K, M.Pd.
NIP. 195802221981031001

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EI-02-082

IMPROVEMENT OF LEARNING QUALITY OF ELECTRONIC CONTROL LAB WORKS USING LESSON STUDY

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ABSTRACT : *The purposes of this study are: (1) to improve learning quality, (2) to enhance students' confidence, students' ability to deliver their own opinions, students' analytical capability and also their study interest and motivation so that the overall students' competence also increased on Electronic Control Course (Lab Works) at Electrical Engineering Education Department, Yogyakarta State University. Lesson Study is a collaborative learning study which was chosen as a way to achieve enhancement of students' competence. Problem-based Learning (PBM) approach and Cooperative-Learning method were implemented in lesson study. Learning tools used were weekly course planning, learning media, students' worksheets, observation sheets, and evaluation sheets. The results show that: (1) Cooperative Learning method is sufficiently effective to utilize on Electronic Control Course since this course pushes students to work together due to limited equipments and tools. (2) PBM approach is highly suitable to implement on Electronic Control Course, thus students are able to develop logical thinking in order to solve control-system circuit. (3) In the nutshell, lesson study was carried out smoothly but the time given was insufficient. (4) It is possible to advance cooperative character, critical thinking, the ability to speak, confidence and positive competitiveness. In addition, comfortable class environment and fun learning are also fulfilled.*

Keywords: lesson study, cooperative learning, problem-based learning

I. INTRODUCTION

One of main purposes of Electronic Control Lab Works is for students to be able to design system circuits and test ones using electronic hardware. Nevertheless, there were several obstacles faced in conducting this course.

To begin with, ratio of sets of lab modul and the number of students is too low, 1:10. Secondly, students' motivation in doing the experiments was diverse. Lastly, the first and the second inhibition mentioned requires the lecturer to be creative in designing learning strategy and learning method. Those various learnings have to be sustained, thus classes become more alive and interesting.

In order to seal with the obstacles, *lesson study* (LS) was chosen and implemented in Electronic Control Lab Works. Lesson Study is a way of collaborative learning involving: sharing among lecturers, setting the plans, and collective evaluating. According to Lesson Study Team of Faculty of Mathematics and Natural Sciences, Yogyakarta State University, there are two essential reasons to choose lesson study (2007:7-8).

First, LS in an effective way to bring the learning quality up because: (1) the development of LS conducted relies on professional knowledge sharing based on practice and learning outcome carried out by lecturers, (2) the main focus of LS is to encourage students to have high quality of learning, (3) learning objectives become the focus in class, (4) Based on real experiences in class, LS is able to be a base of learning development, and (5) LS situates



the lecturers as learning researcher.

Second, the well-designed LS produces professional and innovative lecturers. By implementing LS, lecturers are able to (1) determine student-oriented learning objectives, (2) study and improve the beneficial learning for students, (3) deepen the knowledge about learning materials delivered by themselves, (4) determine future objectives required to be mastered by students, (5) plan collaborative learning, (6) precisely study the learning process and students' attitudes, (7) develop reliable learning knowledge, and (8) carry out learning reflection based on students' development and colleagues' suggestions.

Specifically, the implementation of LS was focus on utilization of cooperative learning approach. The decision to select this approach is based on an assumption that unconfident feeling, low analytic capability, insufficient speaking ability, and less-motivated students are potentially enhanced by implementing Cooperative Learning.

LS implemented using cooperative learning approach has several goals as following:

1. Improving the learning quality made by lecturers in Electronic Control Course - Lab Works
2. Improving the students' confidence, analytic capability, speaking ability and their motivation so that learning quality is escalated.

II. STUDY METHOD

A. Time and Place of Study

Lesson Study was conducted in Basic Electronic Lab, Department of Electrical Engineering Education, Yogyakarta State University for two weeks on Mondays of november in second semester of academic year 2015/2016, consist of two cycles in which each had Plan, Do and See. Subjects chosen for this study are pupils taking Electronic Control Course - Lab Works which is a credit subject under Study Program of Mechatronics Engineering Education, Department of Electrical Engineering Education, Faculty of Engineering.

B. Improved Character Aspects

According to cooperative learning, improved character aspects in this research are: (1) Group members positively depends on each others, (2) individual and collective responsibility, (3) class meetings, (4) internal member communication, (5) diversity of grouping

C. Developed Learning Model

Cooperative learning approach was implemented in a less-active class. This approach aims to prepare students to think critically, to be able to deliver their thoughts, and to possess proper confidence. Moreover, convenient class environment and interesting learning kept on maintained. The implementation of this study involved RPP, learning media, students' worksheets, observation sheets and assessment sheets of lab works.



III. RESULT AND DISCUSSION

A. Implementation of Lesson Study

1. Implementation in Cycle I

The study was started with implementation of Cooperative Learning (CL) in either pairs or groups using Problem-based Learning (PBL) approach in which industrial control applications were introduced. The first cycle was conducted in 2x50 minutes class by a model lecturer who was act as both a teacher and a facilitator in learning. A moderator helped the model lecturer managing excecution of learning process and observing one, and was assisted by a technician to make a documentation of the ongoing class.

The implementation was done using CL, twenty students were divided into four groups which have five members each.

a. *Planning*

The first step called “Planning” was conducted in the Cycle I on November 18th 2015. It was begun with setting up the learning plans based on current data of students’ condition reported by the model lecturer. The learning plans were produced focusing on the importance of team working. According to the plans, the completion of the lesson study for next step which is called Doing needed some tools, namely learning media, work sheets, observation sheets, and assesment sheets.

b. *Doing*

The second step in the Cycle I dubbed “Doing” took place on November 20th 2015. The model lecturter opened the course by saying greetings, checking students’ readiness, apperceptioning, explaining course objectives and elaborating details of works at the day plus making a connection between today’s work to previous work.

Problems were listed on a power point slide, therefore students understand ones clearly. The lecturer elaborated control problems to help students to understand better. Each group of students built control circuit using available trainers (moduls).Once they finished, they reported it to the lecturer and the lecturer checked the circuit afterwards. In case incorrectness founded, the related group was asked to correct that. Having no more flaws, the circuit is permitted to connect to power supply and measurement was taken. The students made the precise analysis of built circuit along with its performance.

The model lecturer observed the works to the end of the course. The lecturer closed the learning with making a summary of entire lab works at the day, explaining the outcome of control circuit made, mentioning the evaluation of student’s mistakes during working on the tasks and the class was end up with further assignments.

c. *Seeing*

The last step is named “Seeing” which was completed right after “Doing” had done, on November 20th 2015. The Lesson Study team discussed the whole excecution of “Doing”. Based on



observation, “Doing” has several drawbacks:

- 1) Time management allocated by model lecturer was not well-organized, thus several jobs in “Planning” were not accomplished.
- 2) There were a few students who did not attend the class on time and did not wear stipulated outfit (wearpack).
- 3) Team working was not fully solid yet, there were some of team members who participated less than others

According to the discussion conducted by Lesson Study team, it was needed to enhance and re-plan the learning in order to gain more advance one in Cycle II, so that the objectives of LS are achieved.

2. Implementation in Cycle II

The study was started with implementation of Cooperative Learning (CL) in either pairs or groups using Problem Based Learning approach in which industrial control applications were used. The Cycle II was conducted in 2x50 minutes class by the model lecturer who was act as both teacher and facilitator in learning. A moderator helped the model lecturer managing execution of learning process and observing one, and was assisted by a technician to make a documentation of the ongoing course. An observer was invited solely to observe the learning process.

The subjects of Cycle II are different from those of Cycle I. The implementation was done with CL, twenty students were divided into four groups which have five members each.

a. Planning

The first step was conducted in the first cycle on November 23th 2015. It was begun with setting up the learning plans based on up-dated data of students’ condition reported by model lecturer. The learning plans were produced focusing on importance of team working. According to the plans, the completion of the lesson study for next step needed tools, namely learning media, work sheets, observation sheets, and assesment sheets.

b. Doing

The second step took place on November 24th 2015. The model lectutrer opened the course by saying greetings, checking students’ readiness, apperceptioning, explaining course objectives and elaborating details of works at the day plus making a connection between today’s works to previous works.

Problems were listed on a power point slide, therefore students understand ones clearly. The lecturer elaborated control problems to help students to understand better. Each group of students built control circuit using available trainers (moduls). Once they finished, they reported it to the lecturer and the lecturer checked the circuit afterwards. In case incorrectness founded, the related group was asked to correct that. Having no more flaws, the circuit is permitted to connect to power supply and



measurement was taken. The students carefully made the analysis of built circuit along with its performance.

The model lecturer observed the works until the end of the course. The lecturer closed the learning with making a summary of entire lab works at the day, explaining outcome of control circuit made, briefly discussing the evaluation of student's mistakes during working on the tasks and the class was closed with further assignments.

c. Seeing

The last step was completed right after "Doing" had done, on November 24th 2015. The Lesson Study team discussed the whole execution of "Doing". Based on observation, "Doing" has several drawbacks:

1. Time management allocated by model lecturer was improved and became well organized, thus all jobs in "Planning" were accomplished.
2. There were a few students who did not wear stipulated outfit (wearpack).
3. Team working was not fully solid yet, there were some of team members who participated less than others caused by the fact that there were too many students using the same trainer (too crowded group)

According to the discussion conducted by Lesson Study team, to conclude, LS had been carried out well and were able to achieve the objectives.

B. Barriers on Implementation of Lesson Study

There were some barriers encountered on the implementation of LS on sites as following:

1. The length of time given, which was one month, was considered less sufficient to come up with optimum result of LS implementation. One of main reasons is, the beginning of LS was started on the second half of semester, thus the effective period in delivering and acquiring knowledge had passed and LS could not be conducted on the same groups of students.
2. Limited lab equipment, tools and trainers highly disturbed students' level of achievement even though it had been anticipated by the model lecturer with giving more support to students.

IV. CONCLUSIONS AND RECOMMENDATIONS

A. Conclusions

Based on Lesson Study completed, we can conclude that:

1. Cooperative Learning method is considered sufficiently effective to implement in Electronic Control Lab Works since this course requires students immensely involved due to limited lab facilities.
2. Problem-based Learning approach is highly suitable to implement in in Electronic Control Lab Works as it allows students to develop their thinking logic in solving problems related to control



circuit.

3. In general, the implementation of LS is successful yet several obstacles were present regarding limited time given.
4. Team working, critical thinking, speaking ability, confidence and competitive attitude were developed. Moreover, convenient class environment and interesting learning were achieved.

B. Recommendations

1. Well-allocated time is required, therefore the implementation of LS will become more successful.
2. Cooperative learning with Problem-based Learning approach might be implemented for other courses which have the similar characteristics and objectives because this method is sufficiently effective to grow students' character and logical thinking in solving problems related to electronics and also incline the cooperation among students.
3. Workshop as further action is needed.

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