

The Effect of Formative Assessment Intensity to the Student Learning Outcomes in Learning Operations Unit 1

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Abstract – Evaluation conducted when the mid-term and at the end of the semester showed low learning outcomes in Operation Unit 1 course. Systems evaluation conducted intensively every after the end of a material is believed can improve this condition. This study aims to determine the effect of intensive formative assessment on learning outcomes described by the final scores on the course Operation Unit 1. The study was done using an experimental method. The t-test ($\alpha = 0.01$) showed that there is a difference in the final value of the operation unit 1 which is evident between the experimental class and the control class. The class was given intensive treatment assessment at each end of the material got final grade higher than the grade evaluated at the middle and end of the semester. The treatment intensive assessment of each end of the material is able to increase the number of students who receive grades of quality B 21.82% to 61.76%, the quality value of C 49.09% to 20.59%, the quality value of D 18.18% to 11.76%, and the quality value of E 7.27% to 0%.

Index Terms—evaluation, operation unit, learning outcome

1. Introduction

There is widespread recognition that evaluation and assessment arrangements are keys to both improvement and accountability in school systems. This is reflected in their increasing importance in national education agendas [1]. The evaluation result that obtained can be used as a feed-back for a teacher to improve and enhance the program and learning activity. The evaluation is also used as tools for understanding better how well students are learning, for providing the students performance information to parents and to society, and for improving teaching practices.

Evaluation is a process of determining the value of the performance and students learning outcomes based on the information obtained through the assessment. While, the assessment is the collection process of information or data that used to make decision about learning. The assessment process includes the collection of students' learning achievement evidences. Meanwhile, the test is an instrument or systematic procedure to observe or describe one or more students' characteristics by using numerical scale or classification scheme [2]. Evaluation is needed to improve the quality, performance, and productivity of students. Through evaluation process, it will be obtained the information about what has

been achieved and which has not been achieved. The information that obtained from the evaluation result can be used as an improvement of learning activities quality that conducted by a teacher [3][4][5].

Summative evaluation of the Operation Unit 1 course which is conducted at the mid-semester and at the end of the semester has not given the expected result. The final grades are low, ie 3,64% of students get A, 21,82% of students get B, 49,09% of students get C, 18,18% of students get D, and 7,27% of students don't pass the course or get E. The Operation Unit 1 course need high analysis and high understanding, so that the implementation of summative evaluation becomes less precise. In the summative evaluation, the evaluation is conducted at mid-semester and end-semester which there are more than one of discussion subjects that may be difficult for students to understand. Reference [6] got that formative assessment has positive effects on the achievements of students. Therefore, the formative evaluation can be used as an alternative in evaluating students learning outcomes that is believed to improve the student achievement. In addition, the formative evaluation provides an opportunity for the teachers to improve their teaching and learning process.

2. Methodology

A. Subject of the Research

This research is conducted in the Department of Agro-industry Technology of Education, Faculty of Education and Vocational Technology, Indonesia University of Education, Indonesia. The subjects are the students of the Agro-industry Technology of Education in the academic year 2011 and the academic year 2012. The experiment was conducted on the students of academic year 2012 that take the Operation Unit 1 course. Meanwhile, the control class was a class of 2011 who had followed the course of Operation Unit 1.

B. Research Design

The study was conducted using an experimental method. In this design there were a group that given treatment and a control group that was not given treatment. The variable of experiment in this research is the students' learning outcomes. The implementation framework can be seen in Figure 1.

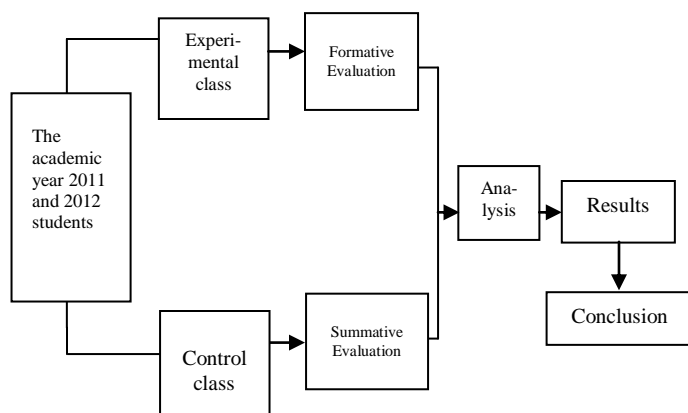


Fig 1. The scheme of research idea

C. The Instruments

The research instrument is tool or facilities that used by the researcher in collecting data to work easier and to get better result, it means the result is more thorough, complete and systematic so that it is easier processed. The instrument that used to get the data in the research is a test consists of essay task which is developed by the researcher. In this research, the experimental class uses 4 (four) kinds of tests, which are appropriate with the discussion subject; there are 1) the test question of “unit and dimension”, 2) the test question of “mass balance”, 3) the test question of “gas”, and 4) the test question of “energy balance”. Meanwhile, the control class only uses 2 kinds of tests; there are mid-semester test and final semester tests. The mid-semester questions in the summative evaluation consist of discussion subjects from “unit and dimension” to “mass balance”. The final semester questions consist of discussion subjects from “gas” to “energy balance”.

D. Data Analysis

The analysis is done by using the t-test. The tabulation of data is done by using Microsoft Excel 2007.

3. Results And Discussion

One of the aspects that must be present in the learning planning is a setting of teaching goal as the expected target from teaching learning process and the way how the objectives and the teaching learning process can be obtained effectively. To know the achievement of the teaching objectives, it needs learning evaluation. The learning evaluation is an integrated part in the whole of learning process, so that the evaluation activity must be conducted during the learning process. A teacher must be able to evaluate, to improve and to develop the evaluation tool so that the level of learning achievement can be measured.

After following this course, the students are expected to have (1) the comprehensive understanding about the application of process technique in the agriculture industry; (2) implementing the knowledge in the agro-industry vocational education and in the industry especially on solving the agriculture industry problems.

This course contains the application of chemical engineering and the processes in agriculture industries, the control of chemical engineering calculations, the unit conversions, the scale in chemical engineering, the basics of material balance and energy balance calculations that is heavy enough to be followed by most of the students, so that it is often difficult for students if the evaluation only done at the mid-term and at the end of the semester. It can be seen from the low learning outcomes described by the final score of the students who have attended this course. Systems evaluation conducted intensively every after the end of a subject is believed to improve this condition. The evaluation that only conducted in each of mid-semester and in the end of semester (summative evaluation) has more than one discussion subject that is difficult for students in understanding each of discussion subject in the Operation Unit 1 course. The design of learning implementation at the control and experimental class can be seen in Table 1.

Table 1. Design of learning at the control and experimental class

Schedule	Topic Discussion	
	Control class	Experimental class
1 st	Orientation, Unit and Dimension 1	Orientation, Unit and Dimension 1
2 nd	Unit and Dimension 2	Unit and Dimension 2
3 rd	Unit and Dimension 3	Unit and Dimension 3
4 th	Mass Balance 1	1 st Evaluation Test and Mass Balance 1
5 th	Mass Balance 2	Mass Balance 2
6 th	Mass Balance 3	Mass Balance 3
7 th	Mass Balance 4	Mass Balance 4
8 th	Mid Semester Test	2 nd Evaluation Test
9 th	Gas 1	Gas 1
10 th	Gas 2	Gas 2
11 th	Gas 3	Gas 3
12 th	Energy Balance 1	3 rd Test and Energy Balance 1
13 th	Energy Balance 2	Energy Balance 2
14 th	Energy Balance 3	Energy Balance 3
15 th	Energy Balance 4	Energy Balance 4
16 th	End Semester Test	4 th Test

The students outcomes in the experimental class consist of 5,88% of students who get A, 61,76% of students who get B, 20,59% of students who get C, and 11,76% of students who get D. The evaluation that was used in experimental class was formative test. The formative test has advantage that it can be measured. Besides that, the course of “Operation Unit 1” needs a good mastery and a good analytical ability of the subjects to solve a problems.

Table 2. Student learning outcomes at control and experimental class

No	Score	Number of Student (%)	
		Control class	Experimental class
1	A	3.64%	5.88%
2	B	21.82%	61.76%
3	C	49.09%	20.59%
4	D	18.18%	11.76%
5	E	7.27%	0

The test was given to the students at the end of the discussion of the discussion subject (Table 1). It aims to determine how far the learning process of “Operation Unit 1” subject goes as planned, to controll how far the students have mastered the material, and to facilitate the students in understanding each lecture material. The student outcomes in

the experimental class are better than the student outcomes in the control class (see Table 2).

The students outcomes result in the controll class mostly scattered on grade C, which is about 49.09%. In the control class also found the students who don't pass this subject, which is about 7.27%. The treatment that given to the experimental class was able to decrease the number of students who got C and it was able to increase the number of students who got A and B. It also was able to remove the number of students who got E (Figure 2).

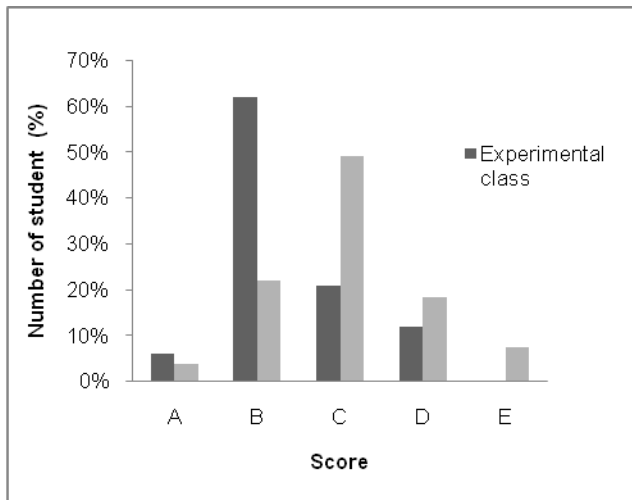


Fig 2. Percentage of student learning outcomes at control and experimental class

The results of t-test ($\alpha = 0.01$) showed that there is a difference in the final score of the operation unit 1 between the experimental class and the control class. The class was given intensive treatment assessment of each end of the material got final grade higher than the control class. Based on the result, giving formative assessment per each discussion subject is more effective than giving summative evaluation in the learning process of "Operation Unit 1" subject. This result is appropriate with the result that obtained by Black and William. Reference [7] got that formative assessment showed a significantly impact to the learning outcomes of the students in several countries.

4. Conclusions

The class was given intensive treatment assessment of each end of the material got final grade higher than the grade evaluated at the middle and end of the semester. The t-test ($\alpha = 0.01$) showed that there is a difference in the final value of the operation unit 1 between the experimental class and the control class. Based on the same of quality value determination standard A, B, C, and D, the treatment intensive assessment is able to increase the number of students who receive grades of quality B from 21.82% to 61.76%, the quality value of C from 49.09% to 20.59%, the quality value of D from 18.18% to

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