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IMPROVING QUALITY LEARNING SUBJECT BUILDING MATERIALS SCIENCE THROUGH RESEARCH BASED LEARNING

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Abstract: Research based learning is a learning method that uses authentic learning, problem solving, cooperative learning, contextual, and the inquiry discovery approach. That is based on the philosophy of constructivism, to develop self-sustained and sustainable student. The purpose of research based learning is to create a learning process with analysis's activity, synthesis, and evaluation also to improve the student and lecture about assimilation and application of knowledge also increases the capabilities of student as researcher. It's make the subject building material science more significance. The purpose of the research is to improve the quality of the student subject building material science based on research, the method of research used quantitative research. Samples were selected 34 students. The results showed that the first phase gets 200.3 score, then the second phase gets 209.24 of score, based on the observation concluded that using research based learning improve the quality of learners.

Keywords: *quality, learning, research based learning,*

1 INTRODUCTION

Referring to the law No. 20 Sisdiknas that the 2013 Curriculum is prepared to produce a generation ready to face the future. The orientation of curriculum development in 2013 was the achievement of competence impartial, among attitudes, skills and knowledge, in addition to the holistic way of learning and fun. The most fundamental change is based on science and education will no longer based on memorization. Science based education, which is a greater emphasis on learning to enable students who use a minimum of three learning models, namely: problem based learning, project based learning and discovery learning. In competence based curriculum learners are required to apply than what obtained during the learning activities. The implementation of the 2013curriculum emphasizing on 5 important aspects, namely: observe, ask, try, reasoning and communication.

Based on the 2013curriculum above this research used active learning method that is research based learning in the subject of Science Building Materials.

Research based learning aims to create a learning process that leads to activity analysis, synthesis and evaluation and to improve the ability of learners and lecturer in terms of assimilation and application of knowledge also increases the significance of the course to make it more contextual with describing the results of research and strengthen the ability to think learners as researchers.

Based on general guidelines based learning research compiled Gadjah Mada University in 2010, Research based learning is a learning method that uses authentic learning (there must be a real example), problem-solving (answering case and contextual), cooperative learning (together), contextual (hands on & minds on), and the inquiry discovery approach (find something) that is based on the philosophy of constructivism (to development of student self-sustainable and ongoing).

With research based learning, the learners gets a variety of benefits in the context of the development of metacognition and achievement of competencies to be learned during the process of learning. Benefits may include the following;

1. Learners receive development and improvement of capabilities and higher competencies.
2. Learners have high motivation to learn and have the opportunity to be active in the learning process associated with the practice in the future of life.
3. Learners trained with the values of discipline, gain practical experience and ethics.
4. Learners to understand more about the importance of the values of discipline for society.

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The inherent nature of research based learning is as follows;

1. Encourage teachers to do research or update their knowledge by reading and utilizing the research results of others as learning materials.
2. Encourage learners a more active role in the learning process, even an active as partner teacher.
3. Learners become more competent in science and research as well as skilful identify problems and solve them properly.
4. Learners have the independence, critical, and creative so as to provide opportunities for the emergence of new ideas and innovation.
5. Learners are trained to have ethics, particularly professional ethics for example, keep away from bad behavior. For example, plagiarism.

The benefits of research based learning is for students can experience the development and improvement of capabilities and high competence. Such as to think critically and analytically, evaluate information and problem solving, and competence in implementation and evaluating the research. While, for lecturers have the spirit to continue the research and the result can be used as teaching materials.

The subject of Materials Science Building, materials discussed scope is constituent building materials such as wood, concrete, steel, brick, paving block, brick, tile, asbestos and others. These materials are always changing innovation in line with technological developments, therefore the use of research based learning methods can be used as a means to increase the quality of learning.

According to the Ministry of National Education in 2004, Quality Learning is the intensity of systemic linkages and synergy of lecturers, students, curriculum and learning materials, media, facilities, and learning systems in the generating process and optimal learning results in accordance with curricular demands.

Indicators of the quality of learning can be seen from, such as;

1. Teacher educator's behavior.
2. Student`s behavior.
3. Learning climate.
4. Learning materials
5. Learning system

2 METHOD

2.1 Research Approach

The approach of this research is a quantitative research with data collection using the questionnaire.

2.2 Design Procedure Research

In this research, the selected material in the subject of Materials Science Building is a concrete material, wood material and steel material, through the three steps of observations carried out in the first semester of the school year 2015. The allocation of time spent on the first phase consists of five meetings is 5 x 150 minutes. In the learning process is carried out a five-step learning techniques that include material explanations, review the manuscript publication or journal, preparation of materials research, research in the laboratory and publications. Such measures are also implemented in the second phase with the wood material and the third phase of the steel material.

2.3 Data Collection

2.3.1 Technic of Data Collection

2.3.1.1 Data result of learning

From several sources of assessment include: Mastery of material, review publication or journal manuscript Assessing research, preparation of research proposals, implementation of research and publication of research results.

2.3.1.2 Data quality learning

Data collection tool in the form of a questionnaire, a questionnaire which is a technique of data collection is done by giving a set of questions or a written statement to the respondent to be answered (Sugiyono, 2006: 199).

2.3.2 Scale Measurement and Instrument Research

2.3.2.1 Scale Measurement

The measurement scale used in this research is a likert scale. According Sugiyono (2012), Likert scale used to measure attitudes, opinions and perceptions of a person or group of person's social phenomenon. Each answer item instrument has a graduation from very positive to very negative form of words. Each answer has a value / score. Likert scale can answer in the form of words among others: strongly agree, agree, doubtful, disagree, and strongly disagree.

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Here is a scale of measurement used to measure the quality of learning in the subject of building materials. Scoring for each statement are described in Table 1 and Table 2.

Table 1. Scores Favourable

Answer	Scale
Strongly agree	5
agree	4
Doubtful	3
Disagree	2
Strongly Disagree	1

Table 2. Scores Unfavourable

Answer	Scale
Strongly agree	1
agree	2
Doubtful	3
Disagree	4
Strongly Disagree	5

2.3.2.2 Research Instruments

The research instrument is a tool used to measure the natural and social phenomena are observed (Sugiyono, 2012). Instruments in this study form questionnaire. The type of questionnaire used is a closed questionnaire, so that respondents, just only choose the answer and give marks (√) in the available space (Arikunto, 2006).

The questionnaire used in the research is as follows;

1. Teacher Educator's Behavior

(a) Lecturer explaining science applications in real life.
(b) Lecturer simply explain the science theoretically.
(c) Lecturer evoke the spirit of learning.
(d) Lecturer mastered the science described.
(e) Lecturer using instructional media interest.
(f) Explanation confusing lecturer.
(g) The language used is clear and easy to understand lecturer.
(h) Lecturers provide motivation aroused. Enthusiasm to learn.
(i) Lecturer appreciate the shortcomings of each individual student.
(j) Lecturer uses a variety of learning methods that are acceptable to all individual students.
(k) Lecturer always make a lesson plan before teaching.
(l) Lecturer create novelty / innovation in learning.
(m) Lecturers give students the opportunity to ask questions.
(n) Lecturer never asked the student if the student understands described or not.
(o) Lecturer to innovate in every evaluation.
(p) Each task given good feedback.
(q) Assessment of the assignments and exams lecturer transparent.
(r) Lecturer provide opportunities remediation on each competency exam.
(s) In the learning process is dominated by a question and answer session between students and lecturers.

2. Student's Behavior

(a) I am very enthusiastic about attending the science of building materials.
(b) I learned before attending the science of building materials.
(c) I feel lazy to go to college if there is a schedule of the science of building materials.
(d) I do the task, if I gets the science of building materials.
(e) The task of science of building materials I do so given the task.
(f) I respect lecturer in the science of building materials.
(g) According to my, the lecturer of science of building materials is professional.
(h) According to my lecturer of science of building materials well mastered the subject material.
(i) I create a conducive atmosphere in subject science of building materials.
(j) I easily understand the explanation of the lecturer in subject science of building materials.
(k) I understand the science of building materials application in real life.
(l) I deepen knowledge of the building materials by reading a book from other reference of lecturer.
(m) I am satisfied the explanation from lecturer itself.
(n) I apply my knowledge in everyday life.
(o) I mastered the science of building materials from the lecturers.
(p) I learned the learning method in accordance with my ability.
(q) I am satisfied with the assessment of the lecturer

3. Learning Climate

(a) The classroom atmosphere conducive to learning activities.
(b) Class rowdy thus reducing the ability of concentration.
(c) Lecturer creative in teaching the subject material.
(d) Lecturer can be a role model for students.

4. Learning Materials.

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(a) The material presented accordance with the purpose of learning.
(b) The material presented is not accordance with the competencies that must be mastered students.
(c) Lecturer arrived on time.
(d) The time of learning in accordance with the number of credits.
(e) The time aviable to learning is enough time.
(f) The time aviable for the science of building materials is too long.
(g) The time aviable for science of building materials is too fast.

5. Learning System
(a) Lecturer arouse the interest of the students to the subjects of material.
(b) Lecturer give special time to talk about subjects outside of class hours.
(c) Lecturer use research results as a reference teaching materials.
(d) Learning media are used to support the learning process.
(e) The atmosphere of class is life because students play an active role in the learning process.
(f) Learning tend to like lecture and students just listen.

2.4 Test Validity

Test data using a test construction validity. Testing is done by testing instruments. The instrument is tested on a sample where the population is taken (testing of empirical experience is shown testing the external validity), after the data is tabulated, then testing the validity of the construction done by factor analysis, by correlating between the scores of items instruments in a factor and correlating factor scores with a total score (Sugiyono, 2012: 172-173). The instrument would be worth invalid if $r_{\text{(the calculation results)}} > r_{\text{(table)}}$. $r_{\text{(the calculation results)}}$ can be calculated as equation 1.

$$R_{hit} = \frac{n\sum xy - \sum x \sum y}{\sqrt{\{n\sum x^2 - (\sum x)^2\}\{n\sum y^2 - (\sum y)^2\}}} \quad (1)$$

Where x is the value of the items on all respondents, y is the total value of each respondent of item 1 - the last, α is significance level. R Table is determined from a table of values r product moment, the determination to r table using the formula N = n - 2 (with α = 5%).

In addition to testing the validity, item questionnaire was also tested reliability. The formula used in the reliability test as equation 2.

$$r_{11} = \left[\frac{n}{n-1}\right]\left[\frac{St^2 - \sum pq}{St^2}\right] \quad (2)$$

Where r11 is reliability of the instrument, n is number of the questions, St is the total variance, p is proportion of scores obtained, q is maximum score in reducing the proportion of scores obtained.

2.5 Data Analysis

For quantitative data analysis used descriptive statistics. In this study, quantitative data needed to provide a concise overview of the variables as well as data describing a group variable by looking for numbers (indexes) that can represent the entire group. The technique used is a statistical technique that consists of the mean and categorization ordinal level.

Mean is obtained by dividing the total number of data with lots of data. Mean can be calculated as equation 3.

$$\bar{x} = \frac{\sum xi}{n} \quad (3)$$

If each having the mean frequency referred to as the average weighted. Mean can be calculated as equation 4.

$$\bar{x} = \frac{\sum fi.xi}{\sum fi} \quad (4)$$

3 RESULTS AND DISCUSSIONS

The results of the evaluation of quality improvement learning was divided into two, among others:

1. Quality Results learning.

Namely learning outcomes in the form of the ability to absorb the theory, review research journals, develop proposals and conduct research in the laboratory and prepare research reports. The complete stages as follows:

Phase-1 is the result of five meetings with the allocation of time 5x150'. In the process of research based learning method of this first

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meeting is to do aperrception and question and answer, followed by an explanation of the theory of concrete covering material sense, functions, powers, types, testing standards, and others, followed by the evaluation of the ability to absorb theory, with work on the problems in writing to measure learning ability.

The second meeting is to prepare the results on relevant research to the concrete material along with the development of concrete technology like normal concrete, heavy concrete and lightweight concrete (paving, brick, and brick foam). Lecturer gives examples of the review and presentation of research results, then students review and presentation of research results from the journal in collaboration with study group, while that which needs to be understood in the journal is the background of the problem, research objectives, methods of research and discussion and conclusion, on this phase is assessment.

The third meeting is learners try drafting of research in the form of a simple proposal for each study group, the research proposal containing the title, the background, the purpose, the basic theory and research methods.

The fourth meeting, each group learned to do research based on the proposal carried out at the Laboratory.

Fifth meeting, each group prepared a report on the results of the research study with the preparation sequence, title, introduction, literature review, research methods, results discussion include analysis of data, conclusions advice.

While the phase-2 is the result of five meetings with the allocation of time 5x150', do the same as above with the material wood and steel.

Based on the above data obtained by the average value of cognitive for the first stage and the second stage 80.25 is obtained an average value of 85.

2. Quality Process learning.

The resulting increase in the quality of the data obtained from the questionnaire, the questionnaire as in research instruments.

The first stage

After the data obtained from the questionnaire then further analyzed. the results of such analysis in Table 3.

Table 3. The results of the quality of the learning process Stage 1.

Score Range	Number of	Percentage	Category
X ≤ 95,4	0	0%	Strongly agree
95,4 < X ≤ 137,8	0	0%	agree
137,8< X ≤ 180,2	1	3%	Doubtful
180,2 < X ≤222,6	27	79%	Disagree
222,6 < X	6	18%	Strongly Disagree

Based on the calculation and analysis of questionnaires as in Table 3, the respondents stating the quality of learning is not increased as much as 0%, of respondents said that the quality of learning does not increase as much as 0%, of respondents said that the quality of teaching to be increased as much as 3% of respondents said that the quality of learning increased by 79%, of respondents said that the quality of learning is greatly increased as much as 18%.

While the mean value obtained as follows;

$$\text{Mean} = \frac{\sum(F.X)}{\sum F} = \frac{6812}{34} = 200.35$$

Thus it can be seen that the highest percentage in the statement of the quality of learning increased, with the average value of 200.35.

The second Stage

Data from the questionnaires were obtained as Table 4.

Table 4. The results of the quality of the learning process stage 2.

Score Range	Number of	Percentage	Category
X ≤ 95,4	0	0%	Strongly agree
95,4 < X ≤ 137,8	0	0%	Agree
137,8< X ≤ 180,2	1	3%	Doubtful
180,2 < X ≤222,6	25	74%	Disagree
222,6 < X	8	24%	Strongly Disagree

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Based on the calculation and analysis of the questionnaire, as in Table 4, respondents who said the quality of learning is not increased as much as 0%, of respondents said that the quality of learning does not increase as much as 0%, of respondents said that the quality of teaching to be increased as much as 3%. of respondents stated that the quality of learning increased as much as 74%. of respondents stated that the quality of learning is greatly increased as much as 24%.

While the mean value obtained as follows;

$$\text{Mean} = \frac{\sum(F.X)}{\sum F} = \frac{7114}{34} = 209.24$$

Thus it can be seen that the highest percentage in the statement of the quality of learning increases with the average value of 209.24.

4 CONCLUSIONS

The results showed that the assessment of the quality of learning at first phase gets 200.3 score, then the second phase gets 209.24 of score, based on the observation concluded that using research based learning improve the quality of learners.

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