



DEVELOPMENT OF TEACHING MATERIALS SCIENTIFIC APPROACH WITH HELP OF INFORMATION TECHNOLOGY

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ABSTRACT

Learning activities in schools affected by the prevailing curriculum development. Currently education in Indonesia to implement the curriculum in 2013 that uses a scientific approach. One supporter of the establishment of good learning process is to use the help of information technology. Development of teaching materials using information technology-aided scientific approach can facilitate learning in school. The aim in this study was to determine the feasibility and effectiveness of teaching materials with information technology-assisted scientific approach towards critical thinking skills and the skills of the students. This study is a Research and Development. The results showed Subjects who developed viable and effective against critical thinking skills and the skills of the students. This is evident from the average score of validation assessment by expert validation reach 72.31 valid with good criteria, improved critical thinking skills of students using the formula N-Gain by 0.73 while the skills of the students in the experimental class is higher than the skill the process of the students in the control class. Based on the results of the study concluded that the teaching material with information technology-aided scientific approach feasible and effective use of the ability of critical thinking and process skills of students.

Key Word: Scientific Approach, Information Technology, Critical Thinking, Process Skills

INTRODUCTION

A The learning process in schools affected by the development of a curriculum set by the government. Indonesia is currently implementing a curriculum of education in 2013, which uses a scientific approach.

Machin (2014) revealed that learning through the approach of the scientific is a learning process that is designed so that learners are actively constructing concepts, laws or principles through the stages observed (to identify or find the problem), to formulate the problem, propose or formulate hypotheses, collect Data with various techniques, analyze the data, draw conclusions and communicate concepts, laws or principles are found.

One of the advantages of the application of scientific approaches in the learning process is to improve the ability of the intellect students is one high-level abilities. Among the high-level capabilities possessed by the students is the ability to think critically.

Critical thinking is the basis or foundation of the thinking pattern of the other three mentioned by Costa (1995) creative thinking, problem solving and decision making.

Fakhiriyah (2014) revealed that the critical thinking skills can not be developed along with the physical development of each individual. Therefore it needs to be given treatment on the outside so that the students' critical thinking skills can grow and develop as critical thinking skills related to the ability to identify, analyze and solve problems creatively to get the right decision.

Proper use of media in learning is one of the achievement of learning goals in school one proper use of teaching materials with the applicable curriculum at school.

In addition to the use of appropriate teaching materials, the use of information technology in the learning process also supports the learning process

quality. Miarso (2004) reveals that in order to achieve quality learning process necessary help of information technology in learning.

Based on observations in SMP Islam Roudlotus Saidiyah Semarang shows that the school is already using curriculum 2013 to approach scientific, but the application is still not optimal because they use teaching materials on the previous curriculum in the form of textbooks that do not use the approach of scientific and aided by information technology.

Critical thinking skills in SMP Islam Roudlotus Saidiyah low. Low critical thinking is seen in the learning process of students do not dare argue or argued during the learning process takes place. Results of observation using a questionnaire critical thinking skills also shows the critical thinking skills of students in the school is low.

Based on these problems, necessary teaching materials were developed using information technology-assisted scientific approach that can improve students' critical thinking skills.

Research and development objectives are: 1) to test the validity of the environmental pollution impact of teaching materials developed for life, 2) describe the ability of critical thinking and process skills of students after using teaching materials science with a scientific approach with the help of information technology.

METHODS

This type of research used in this research is the development, the study was conducted in SMP Islam Roudlhotus Saidiyah Semarang VII class Lesson year 2014/2015 as a subject.

Products developed in this study is the impact of environmental pollution teaching materials scientific approach aided by information technology. The steps in this development include: (1) find the problem, (2) the design of the product, (3) design validation, (4) pilot scale is limited, (5) a revision of product design, (6) test wide scale, (7) product revision.

Techniques and data collection instruments in the research and development of teaching materials include: validation, scale, test and observation techniques. Experimental design used was *one group pretest posttest design* Design for classroom testing limited scale, while for the large scale trials using experimental designs that *Nonequivalent Control Group Design* (Sugiyono, 2011)

Before the instrument used first conducted trials to determine the feasibility of the instrument. Statistical

hypothesis testing using nonparametric Mann Whitney (*U test*) because the data were not normally distributed. This study measured the Effectiveness of use of teaching materials on critical thinking skills and the skills of the students (Nachar, 2008)

RESULT AND EXPLANATION

Based on the results of the validation by experts, in general, teaching materials developed criteria for "good" ie with average scores given by the experts of 72.31. The criteria is the total score given by the experts of the teaching materials developed both aspects of feasibility assessment content, presentation and assessment language used in teaching materials. In addition to providing an assessment of the teaching materials developed experts also provide an assessment of syllabus and lesson plan used.

Results of the assessment showed lesson plan used had average scores of all experts is 91.67 with the criteria very well, while for the average syllabus assessment scores by all experts is 96.67 with the criteria very well. Results of the validation of teaching materials by experts in Table 1.

Expert	Score	Criteria	Description
I	58,87	Satisfactory	invalid
II	80,65	Good	invalid
III	77,42	Good	invalid
Mean	72,31	Good	invalid

Limited scale trial performed as a preparatory step for the use of teaching materials and to know the legibility of teaching materials before use in the wider class. Observational data collected on a limited scale trial is the questionnaire responses of students, grades pre-test and post-test. Pre-test administered before the treatment given to the application of teaching materials in information technology-aided scientific approach while the post-test administered after the treatment given to the application of teaching materials in information technology-aided scientific approach.

Based on the results of the study showed that 10 students responded positively to the teaching materials developed, the data analysis capabilities critical thinking indicates that there are 4 students to the value of critical thinking skills were, three students with low grades and three students with a value of critical thinking skills is very low, the calculation by using the gain also demonstrates the value of 0.51 which means an increase

by the criteria of being. While the data process skills possessed limited scale trial class has an average of 57.6 means graders limited scale trials have a good process skills.

The significance of the difference in average critical thinking skills were also analyzed using the t-test Paired Samples Test thus be concluded that all the criteria have been fulfilled the effectiveness of teaching materials on a limited scale trial so that research can be continued at the next stage of large-scale trials.

Large-scale trials in the study conducted on a class consisting of 32 students that VIIA VIIB grade 15 students and 17 students. The data collected in large-scale trials are the students 'response to instructional materials, grades pre-test and post-test students' critical thinking skills and the skills of the students. The average critical thinking skills of students in each class is presented in Figure 1.

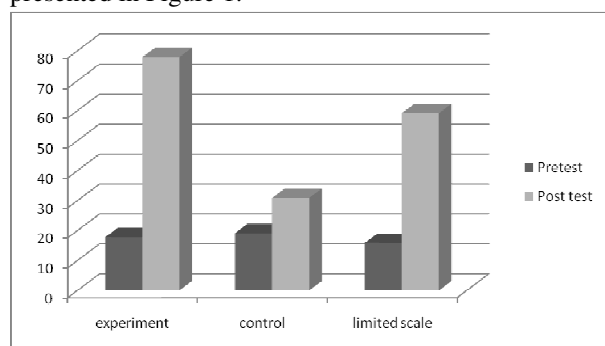


Figure 1. The Average Critical Thinking Skills

Based on the results of research and data analysis that critical thinking skills possessed by the experimental class has an average of critical thinking skills in the post-test score was 73.89, which means having the criteria were. To find out the average difference between the critical thinking skills with classroom control classroom experiments to test the hypothesis the average difference. Before the test the hypothesis first tested among other prerequisites normality test and homogeneity of data pre-test and post-test the data that will determine the type of statistics that will be used.

Normality test results showed that the data were not normally distributed significance value smaller than the value of alpha is 0.028 means that H_0 is rejected and it shows the data were not normally distributed. In addition to normality test, homogeneity test results demonstrate the significance of the data homogeneous where the value is greater than the value of alpha means that H_0 rejected and the data showed the data homogeneous.

Under the prerequisite test shows that the selection of the test statistic to test the average difference between the critical thinking skills in the experimental class control class using non-parametric subset of the statistics among others test or Mann-Witney U because the data were not normally distributed and homogeneous. Based on test results obtained using the Mann-Witney U value of 6.500 When converted to the value Z, the magnitude of -4.597. Sig value 0.000 < 0.05. If sig < 0.05 critical limit then there is a significant difference between the two groups or meaning H_0 is accepted.

Results calculation process skills possessed by the experimental class is greater than the skills possessed by the control classes, namely: (1), the experimental classes have an average of 61.35 process skills with the criteria of "good". Score is calculated process skills in two meetings means any gathering process skills of observation.

Score each of the students in the experimental class in the first meeting two criteria: 6 students with the criteria of "good" while 9 students have process skills with the criteria of "sufficient" with average skills possessed process is 60.28 with both criteria. While the scores each of the students in the experimental class at the second meeting two criteria as an experimental class at the first meeting of which 9 students with the criteria of "good" while 6 students have process skills with the criteria for "enough" with average skills owned processes is 62, 41 with both criteria so that the average process skills possessed by the experimental class at the first meeting and the second becomes 61.35 with the criteria of "good". (2) Class namely process control skills at the first meeting had an average of 26.02 with three students obtained a score of process skills with the criteria of "very poor" and 11 students with the criteria of "less".

Skills class process control at the second meeting had an average of 26.96 with the criterion of "less" with the overall students have individual scores process skills with the criteria of the "lesser" so that the average skills possessed by the process control class at the first meeting and the second is 26.49 with the criteria of "less". Score the skills of each class in Figure 2.

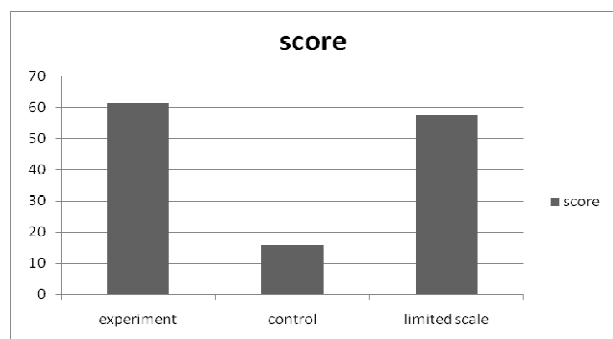


Figure 2. Scores Process Skills of Each Class

To find out the average difference between the process skills that owned the control class with the class of experiments to test the hypothesis of the average difference. Such as the measurement of the difference in average critical thinking skills, measurement differences in average skill test process that is a prerequisite for the selection of statistical tests of normality and homogeneity. Results of data normality test process skills between the experimental class and control class is the data classified as not normally distributed with significant value smaller than the value of negligent while relatively homogeneous homogeneity test results because of the significant value is greater than the value of alpha.

Under the prerequisite test shows that the selection of the test statistic to test the skills of the average difference between the experimental class with a process control using a subset of the statistics class, among others, using the non-parametric *U test* or the Mann-Witney because the data were not normally distributed and homogeneous. Based on test results obtained using the *Mann-Witney U* value of 0.000 When converted to the value *Z*, the magnitude of -4.816. *Sig* value $0.000 < 0.05$. If *sig* < 0.05 critical limit then there is a significant difference between the two groups or meaning H_0 is accepted. This suggests that the skills possessed process experimental class and control class differences and process skills is greater than the experimental class skills class process control.

CONCLUSION

Development of teaching materials with a scientific approach with the help of information technology to improve the critical thinking skills of students on the theme of environmental pollution for the life that has been developed is said to be valid according to experts at the level of validity of "good" with an average score of 72.31, is able to improve critical thinking skills students by 0.73 as well as the skills of the

students are learning with teaching materials developed skills that process is higher than the skills possessed by students who do not study the teaching materials developed.

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