International Journal of Multidisciplinary Research and Development
Online ISSN: 2349-4182, Print ISSN: 2349-5979, Impact Factor: RJIF 5.72
www.allsubjectjournal.com
Volume 4; Issue 8; August 2017; Page No. 207-210

Guided inquiry learning increase the skill of lesson-based study in biology at seventh grade of State junior high school 1 Airmadidi

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Abstract
Student centered learning may provide more benefits for the students by offering learning sources and learning opportunities. It is expected that the students may directly experience and explore their knowledge to increase their skills of process. Objective of the research was to study whether the Guided Inquiry learning and conventional learning may affect the students' skills of process. Results of the research showed significant influence of learning strategy on skills of process between the control class (conventional learning) and experiment class (guided inquiry learning). Data showed that results of the test between subjects. Effects showed F_{count} 4.584 and significance at 0.037. Meanwhile, F_{table} for df1:1 and df2:55 at significance level 95% was 4.0162 because $F_{count} > F_{table}$ (4.584 > 4.0162) significance at 0.037 < 0.05. It showed that the guided inquiry learning strategy equipment improve learning results of the students' skills of process.

Keywords: guided inquiry, skills of process, lesson study, biology

Introduction

Development of national education is totally based on the Indonesian development paradigm as subject, which has capacity to actualize optimal potencies and dimensions of humanity in facing globalization era. Dimensions that must be owned by students include, 1) cognitive as reflected on thinking capacity and intellectuality to explore knowledge and develop, as well as have control over the technology, 2) affective as reflected on quality of faith and belief, ethics and aesthetics, as well as noble deeds and good conducts, and 3) psycho motoric as reflected on the ability to improve technical skills and practical abilities. These dimensions can be found in learning competence at Junior High School, such as in learning Natural Science.

Natural Science relates to efforts to study the nature at the surroundings, so that it would not only learn about the concepts or principles, but also the discovering process. It is expected that in learning Natural Science, the students will get wider insights by experiencing directly the discovering process. Students who experience directly the discovering process will keep the experiences in their memories in long-term. Factor that could support implementation of Natural Science learning process is the availability of laboratory facilities.

Dimyati and Moedjiono (2002:141) in Wiwin Ambarsari (2013) [1] showed diverse skills of process, in which the skills comprise of basic skill of science process, started from observing, classifying, predicting, measuring, concluding, and communicating the integrated skills of science process, from identification of variable to the most complex one, the experiment. The skills of process could develop the ability to observe, categorize or classify, estimate or interpret, predict, implement, communicate, and design the research, Hamalik (2008) [6]: Usman, (2008) [14]: Nuryani, 2005: 80-81. Results of learning do not only refer to mastering the knowledge, but also abilities and skills to observe, analyze, and solve the problems, make plans and distribution of jobs, so that activities and products resulted from this learning activities will get an assessment.

Based on observation, which was conducted from 16th to 20th March 2015 on 3 biology teachers at SMP N 1 Airmadidi, it showed that 2 teachers (66%) apply student centered learning, 3 teachers (100%) prepare learning equipment's during the learning process, 2 teachers (66%) recognize the guided inquiry, 2 teachers (66%) comprehend it, 2 teachers (66%) know the steps, and 1 teacher (33%) applies it. Furthermore, 1 teacher (33%) recognizes the basic skills and integrated skills, 1 teacher (33%) comprehends it, and 1 teacher (33%) applies it. And then, 2 teachers (66%) recognize the concept comprehension, 2 teachers (66%) comprehend the concept of comprehension, and 2 teachers (66%) apply it. Moreover, 3 teachers (100%) recognize Lesson Study, 3 teachers (100%) comprehend it, and 2 teachers (66%) apply it. Data showed that such learning should be improved. The problems above can be overcome by many ways that can be applied by teachers in learning biology to improve activities of the students, scientific attitudes, and results of learning, such as implementation of the Guided Inquiry learning strategy. In this learning, teachers play their roles as facilitators and motivators. Before applying such learning, teachers should prepare learning equipment's, such as syllabus, Instructional Implementation Design (RPP), Student's Worksheet, evaluation devices, materials and main subject of assignments. Kawuwung (2012) [7] stated that the application of Guided Inquiry learning strategy could improve the skills of process, concept, and increase thinking ability. According to Solihin, 2010 in (Kawuwung, 2012) [7]; Sulistina (2010); Guided Inquiry learning has proven to be effective in increasing the students' learning results (cognitive, affective, and psychomotor). Guided inquiry learning is a group learning, in which students are given opportunities to think by themselves and help to each other. Such guided inquiry learning guides

the students to have individual responsibility and mutual responsibility in group or in pairs. Based on description of the background above, some problems are identified as follow: 1) activities of the students in teaching and learning process of Biology should be improved in order to encourage the students to be more creative in exploring their knowledge. If the learning is teacher centered, it would just make the students memorize materials of the subjects, which have been given by the teachers, without comprehend them that make the learning process to be more meaningful. 2) Lack of the students' response to learning process. 3) Lack of the teachers' knowledge about the Guided Inquiry learning model. Teachers play important roles in improving results of the students' study. Breakthrough is required to improve quality of the teachers; and one of them is Lesson Study. Lesson Study is a form of study to increase quality of learning and development of teachers' professionalism (Susilo, 2011) [12, 13]. Lesson Study is not only used as means of mutual learning about how to put the skills in 21st century and inquiry learning, but also as efficient means to inquiry about how to learn the students.

National Research Council (2000) [8] suggested that, in general, inquiry-based learning strategy gives priority to discovery process in gaining knowledge, and one of the objectives is to make the students to have the way of thinking and scientific method of work as scientist. According to Zuriyani (Anonymous) inquiry means a process of asking a question and searching the answers over the scientific questions that have been asked. Scientific question is question that could direct to investigative activity toward object of the question.

Advantage and Disadvantage of the Inquiry Learning Strategy

Bruner in Amin (1987) suggested 4 advantages of teaching by the application of inquiry strategy: 1) students will be better in understanding the basic concepts and ideas, 2) assist the students in using their memories and transfer them to new situation of learning process, 3) encourage the students to think and work in accordance with their initiatives, and 4) motivate the students to think initiatively and formulate their hypotheses. Besides that, the learning becomes student centered, form, and develop self-concept, may develop individual talent and ability, avoid traditional learning methods through memorizing, give much time for the students to assimilate and accommodate information. Santoso (2007) [10] suggested 7 practical advantages of learning process in scientific investigation through inquiry: 1) encourage relationship between students, 2) cooperate between students, 3) students learn actively, 4) give quick feedback, 5) emphasize the time in completing the tasks, 6) correlate with more assumptions, and 7) responsive to different talents and learning methods. According to Sanjaya (2006) [9], disadvantages of inquiry are as follow: 1) occasional implementation that requires much time, so that teacher soften face some difficulties in adjusting the given time, and 2) inquiry activity requires different mental process, such as cognitive and analytic equipment's.

Stages of Inquiry Learning Strategy

Borich, *et al.* (2006:32) [3] suggested syntax of inquiry-based learning strategy, such as: 1) question, in which the students make questions or hypotheses, 2) investigation, in which the students design some investigations and collect data, 3) creation, in which the students analyze the collected data and formulate the explanations after summarized the evidences, 4) discussion, in which the students discuss their findings, share ideas, and draw some conclusions, and finally 5) reflection, in which the students reflect their conclusions and correlate them to the explanations.

Skills of Process

According to Kawuwung (2012) [7], the basic skills of process in learning Biology include 1) observation, 2) classification, 3) measurement, 4) communication, 5) prediction, and 6) make the references. Integrated skills of process in learning Biology include: 1) formulate the problems, 2) identify the variables, 3) formulate the hypotheses, 4) design the experiment, 5) perform the experiment, 6) collect the data, 7) analyze the data, 8) interpret the data, and 9) draw some conclusions.

Design of the Research

This research is a quasi-experiment design. It involved both control and experiment groups (Moehnilabib, 2003: 50). The control group refers to class without any treatment, or learning method, which is usually used by the teachers. The experiment group refers to class, which uses the Guided Inquiry learning strategy. In short, design of the research is presented in Table 1.

Table 1: Pre-test and Post-test Experiment Designs

Group	Pre-test	Treatment	Post-test
A (KE)	O_1	X_1	O_2
B (KK)	O_3	X_2	O_4

(Source: Sukmadinata, 2006:205)

Notes:

A : Group/experiment class of Guided Inquiry
B : Control Group
X1 : Guided Inquiry Learning Strategy
X2 : Control

Prior knowledge of the students as outer variable, which is tried to be controlled by the researcher, therefore, in analyzing the data, results of the research used inferential statistics by anacova analysis. Variables used in this research were independent and dependent variables. Independent variables in this research included Guided Inquiry learning strategy and the Control. The dependent variable was the skills of process.

Population and Sample

1. Population of the research was the seventh grade students of Junior High School, which comprised of 10 classes. Each class comprised of 28 students at SMP Negeri 1 Airmadidi.
2. Samples of the research included two classes, which were taken randomly out of ten classes because no superior class and most of the students have comparable abilities. Based on the reason and result of consideration from the researcher, 2 classes were chosen, VIIa and VIIb, which comprised of 56 students at SMP Negeri 1 Airmadidiin academic year of 2015/2016.

Instruments of the Research

Instruments used in this research are as follow: a. Instrument for the Test; It is in an essay test form, which is used to measure the skills of process. Learning implementation is

measured by the instrument of process observation in the form of learning implementation sheets. It is expected that the learning implementation sheets could be adjusted to syntax of the learning strategy used, b. Scoring Column; Column for the skills of process was be adapted from Hart (1994) [5] by score interval 0 – 4, which was gained through test: C4 (analyze), C5 (evaluate), and C6 (create). The scoring column for skills of process may be found in main subjects of task.

Collecting Data

Data was collected through: preliminary test, which was done at both experiment and control classes. Preliminary test was done following the application of learning strategy. The test was done by teachers and assisted by the researcher. Test for learning results of the dependent variable is: the skills of process. At last, final test was given to both experiment and control classes.

Data Analysis

Data on results of the research was analyzed using inferential and descriptive statistics. Descriptive analysis was done to describe characteristic of each variable by describing the skills of process in biology. Inferential analysis used anacova to examine hypotheses of the research concerning with the effect of learning equipment implementation as a result of development toward the skills of process in learning biology. Scores of preliminary and final tests were used as covariates. Before anacova test, it was initiated by prerequisite test as follow: 1) normality test of data using *Kolmogorof-smirnof*and 2) homogeneity test of variance between groups using *Levene's Test* by significance level 5%. Furthermore, the anacova test was followed by significance test on difference of average scores of the dependent variables among groups. The significance test of difference among groups used *Least Significance Difference* (LSD) test. Data on results of the research was processed by computer using SPSS version 17, at significance level 5%.

Results and discussions

Table 2: Summary of Anacova Test Results on the Effect of Treatment on Skills of Process Proses

Source	Type III Sum of Squares	D f	Mean Square	F	Sig.
Corrected Model	325.446[a]	1	325.446	4.584	.037
Intercept	313651.446	1	313651.446	4417.503	.000
Class	325.446	1	325.446	4.584	.037
Error	3834.107	54	71.002		
Total	317811.000	56			
Corrected Total	4159.554	55			

(***Source*:** Results of Research)

Table 2 shows that value for $F_{count}$is 4.584 and significance is 0.037. While the value of $F_{table}$for df1:1 and df2:55 at significant level 95% is 4.0162 because $F_{count}>F_{table}$ (4.584 > 4.0162) significant 0.037 < 0.05 so that hypothesis of the research (H_1) is accepted and hypothesis of statistics (H_o) is rejected. Therefore, it can be concluded that significant difference was found in skills of process between the control class and the experiment class. Santoso (2007) [10] stated that 7 practical advantages of the scientific investigation learning process through inquiry: 1) encourage the students' relationship, 2) cooperation between students, 3) students learn actively, 4) provide quick feedback, 5) emphasize the right time to complete the task, 6) correlate with numbers of estimation or opinion, and 7) responsive to different talents and learning methods.

Skills of process in science (KPS) in accordance with Rustaman (2003 in Department of National Education, 2008: 27-28) stated that KPS is a learning approach, which is oriented to process of science, in the form of skills possessed by the scientists to produce inseparable products of science. The skills include: a) skill to observe, b) skill to interpret (interpretation), c) skill to classify (classification), d) skill to predict (prediction), e) skill to communicate, f) skill to hypothesize, g) skill to design the experiment or the research, h) skill to implement the concept and the principle, as well as i) skill to ask questions.

The basic skills of process offer some knowledge to the students to: 1) observe, 2) classify, 3) measure, 4) communicate, 5) predict, and 6) to make inferential, and after that finding out how to implement the guided inquiry syntax, which comprises of; Identification and determination of the scope, Formulation of hypotheses, Collecting data, Data interpretation, and Draw some conclusions. The students should have skills to observe the creatures in the environment, ability to classify, able to determine the species names of plants and animals by constructing a report of each group. Activities of the students showed their abilities to interact with other members in the group or interaction with other groups, then ability to communicate in establishing cooperation. Attitudes of the students show seriousness in searching knowledge by exploring their abilities, which effect on results of learning to improve their academic abilities.

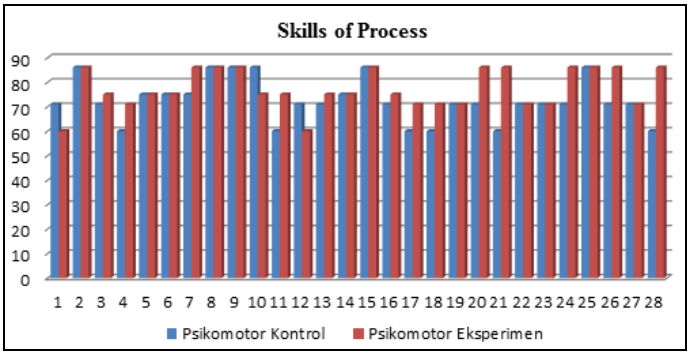

Fig 1: Graphic on Effect of Learning Strategy on Skills of Process

Data showed significant influence of the guided inquiry learning strategy on skills of process of the students. Average

scores for the skills of process in experiment class (guided inquiry learning) increase in comparison with the application of conventional learning. Such increasing refers to the students' comprehension toward their working sheets in learning process.

Skills of process, which have been taught to the students, have some benefits, such as: 1) the students could identify the problem and formulate it, 2) the students may think how to determine the problem, 3) the students may investigate by collecting evidences, 4) the evidences are numbers, which are arranged in table and estimate the numbers, and 5) communicate the results, which are gained by the small group and class.

Conclusions

Results of the research showed significant effect of learning strategy on skills of process between the control class (conventional learning) and experiment class (guided inquiry learning). It showed that the guided inquiry learning strategy may increase learning results on skills of process of the students, which correlate with observation, classification, measurement, communication, prediction, and inferential. Learning by guided inquiry improves activities of the students in learning process. The students concentrate, do activities, complete the working sheets, and more brave in expressing their opinions.

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