



The Implementation of Scientific Approach on Biology Learning Process Performed by Teachers.

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Abstract

The learning process of the 2013 curriculum uses a scientific approach, this approach encourages students to be more active in learning process. Scientific approach is applied through various learning models. In the implementation of 2013 curriculum, teachers still become the determinant domain in the learning process, it as a planner, implementer, assessment and evaluation. This research was aimed to discover the implementation of scientific approach on biology learning process of grade X in discovery learning model performed by teachers. The type of this research was descriptive by using a survey method. The sample was collected through convenience sampling. The population in this research was biology teachers in Bantul, and this sample was 4 biology teachers of grade X in State High Schools of Bantul Regency. The instrument used in this research was a questionnaire, related to the perception of students toward the learning performed by teachers. The acquired data then analyzed descriptively by calculating the level of tendency of each learning aspect. The research results have indicated that the scientific approach in biology learning process of grade X through discovery learning model has been implemented properly in accordance with the stages of discovery learning learning model.

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INTRODUCTION

Biology as a science is in principle contains four elements, namely scientific processes, scientific knowledge, scientific attitudes, and technology. The processes in science contain a meaning as the scientific ways or activities to describe natural phenomena toward the state in which the science products such as facts, principles, laws, or theories have been acquired^[1]. One of the scientific processes that can be done is adapting scientific approach which at present used in 2013 curriculum. Scientific/natural approach is a learning process that uses scientific thinking process. According to Hosnan (2014), the learning activities in scientific approach includes Observing, Asking, Collecting data, Associating, and Communicating. Scientific approach is meant to provide comprehension toward students in recognizing and understanding various materials through scientific approach in which the information can be derived from everywhere, anytime, not depending on one-way information from teachers^[2]. This approach invites students directly in finding problems exist in the form of hypothesis and formulation of problem, the interest/concern toward environment and curiosity.

In the implementation of 2013 curriculum, teachers still become the determinant domain in the learning process. Successful learning is constantly demanding teachers' creativity, so thus in the learning process of 2013 curriculum which based on characters and competencies. In that order, conducive learning environment that also challenges the curiosity of students need to be created, therefore, the learning process can be performed effectively. Teachers are demanded to create conducive learning climate which also evoke the curiosity of students. In order to fulfill that needs, thus, the learning has to be oriented toward the interest of students, adjusted to their characteristics, thus, teachers should change the learning method into a student-centered learning.

In the scientific approach itself, various learning model have been recognized which can be implemented by teachers. The learning model as mentioned in the Regulation of Minister of Education and Culture No.103/2014 and No.22/2016 is the learning model which features activities and creativities, inspiring, fun, initiative, student-centered, authentic, contextual, and meaningful for the daily life of students, namely (1) Discovery Learning, (2) Inquiry Learning, (3) Problem-Based Learning, (4) Project-Based Learning, and others

The application of the learning models, expectes that the learning process can run in a systematic manner, thus, studying to achieve the learning purpose can be accomplished. Many teachers have implemented learning models which stated in each lesson plan, however, in the actual condition, teachers are frequently having less understanding and rarely implementing the pre-designed model, as mentioned in the manuscript of learning models formulated by Supervising Directorate of High School (2017) which stated that most of the related problem is that not all teachers understand learning models, there is a time when teachers master a particular learning model then include it into the lesson plan but unable to apply it. This condition has indicated that teachers are recognizing the model but did not have the comprehension regarding the selected learning model.

Based on the explanation, the author attempted to discover the implementation of scientific approach process on biology learning in discovery learning model which applied by teachers at schools.

RESEARCH METHOD

This research was a qualitative-descriptive study through a survey method. This research was done in February 2019. The sample of this research was taken by convenience sampling, because this population is hipotetik population. The population of this research was the entire biology teachers of High Schools in Bantul, this sampel was 4 biology teachers of grade X derived from 3 selected high schools in Bantul Regency namely State High School A, State High School B, and State High School C. Questionnaire was used as the research instrument which intended for students. The instrument was constructed based on Likert's Scale, involving 32 statements related to biology learning implemented by teachers.

The research data which have been obtained then be tabulated in tables and diagrams, the it is identified and explained descriptively. Each aspect in the discovery learning process was measured by the tendency level in reference to Supervising Directorate of High School (2010)^[8] with the criteria table of tendency level as follows:

Table 1. Criteria of tendency levels

No	Criteria of Score	Criteria
1	$Mi+1,5 SBi \leq M \leq Mi+3,0 SBi$	Very Suitable
2	$Mi+0 SBi < M \leq Mi+1,5 SBi$	Suitable
3	$Mi-1,5 SBi < M \leq Mi + 0 SBi$	Less Suitable
4	$Mi - 3 SBi < M \leq Mi - 1,5 SBi$	Unsuitable

Information: $Mi = \frac{1}{2}$ (highest ideal score + lowest ideal score)
 $SBi = \frac{1}{6}$ (highest ideal score – lowest ideal score)

RESULTS AND DISCUSSION

This research was conducted to see the implementation of biology learning performed by four teachers, namely teacher A, teacher B, teacher C, and teacher D in 3 State High Schools of Bantul Regency by using questionnaire which has been validated by experts. The questionnaire was regarding the perception of students who followed the learning process of teachers. The questionnaire contained eight aspects of learning based on the steps of discovery learning model divided into 32 question items. To discover the implementation, thus, the researcher performed analysis by finding the criteria of tendency level based on Supervising Directorate of High School in 2010. Based on the tendency level, the score criteria, along with the interpretation, was acquired. The data of this research were presented into two, namely the implementation which seen from each teacher and from the entirety.

Seen from each teacher

Seen from each teacher was intended to saw how each teacher to implementation scientific approach in nine learning aspect. The assessment for each teacher was seen from each learning aspect based on the level of tendency.

Table 2. Indicators of tendency level of each learning aspect

Aspects 1 and 5		Aspects 2, 4, 7 and 8		Aspects 3 and 6	
Criteria	Interpretation	Criteria	Interpretation	Criteria	Interpretation
$16.25 \leq M \leq 20$	Very Suitable	$13 \leq M \leq 16$	Very Suitable	$9.75 \leq M \leq 12$	Very Suitable
$12.5 < M \leq 16.25$	Suitable	$10 < M \leq 13$	Suitable	$7.5 < M \leq 9.75$	Suitable
$10.25 < M \leq 12.5$	Less Suitable	$7 < M \leq 10$	Less Suitable	$5.25 < M \leq 7.5$	Less Suitable
$8 < M \leq 10.25$	insuitable	$4 < M \leq 7$	Insuitable	$3 < M \leq 5.25$	Insuitable

From Table 2, there are several learning aspects which have the same amount of indicators namely aspect 1 and aspect 5, aspect 3 and aspect six as well as aspects 2, 4, 7, and 8, therefore, only three columns of tendency level. In the table 2 can be known that the assessment indicators and the results of learning implementation of each teacher. The result shown in table 3.

Table 3. The results of learning implementation of each teacher

Teachers	Discovery Learning Aspect							
	Preliminary activity	Stimulati on	Problem Statement	Data Collect ion	Data Analysis	Verific ation	Generali zation	Closing Activity
Teacher A	15.93	12.2	9.2	11.86	15.13	8	13.56	12.63
Teacher B	18.22	13.67	9.77	13	16.41	9.41	13.87	13.87
Teacher C	16.7	11.29	7.7	10.44	13.33	7.44	10.85	12.7
Teacher D	17.53	13.4	9.04	13	16.4	8.64	13.32	13.24

The interpretation of the results above are as follows:

Table 4. The interpretation results of learning implementation of each teacher

Teachers	Discovery Learning Aspect							
	Preliminary activity	Stimulati on	Problem Statement	Data Collect ion	Data Analysis	Verific ation	Generali zation	Closing Activity
Teacher A	S	S	S	S	S	S	VS	S
Teacher B	VS	VS	VS	S	VS	S	VS	VS
Teacher C	VS	S	S	S	S	LS	S	S
Teacher D	VS	VS	S	S	VS	S	VS	VS

Information: S = Suitable ; LS= Less Suitable ; VS = Very Suitable

In Tables 3 and 4, it can be seen that each teacher has gained different rating from 8 learning aspects performed by them. In the preliminary activity, four teachers have obtained good results with the assessment of the interpretation resulted in suitable and very suitable, then, in the aspect of stimulation, teachers B and D have gained very suitable rating and teachers A and C have gained suitable rating. For the problem statement aspect, 3 teachers (A, C, and D) have gained suitable rating and teacher B has gained very suitable rating. For the data collection, the entire teachers have rated as suitable, then, in the aspect of data analysis, teachers B and D have

rated as very suitable and teachers A and C have rated as suitable. For the verification aspect, three teachers (A, B, and D) have rated as suitable and teacher C has rated as less suitable. For the generalization aspect, 3 teachers (A, B, and D) has rated as very suitable and teacher C has rated as suitable and the last, for the closing activity, teachers A and C have rated as suitable while teachers B and D have rated as very suitable.

Based on the aspects of learning performed by the four teachers, they can be determined as suitable, there was only 1 aspect which in the implementation has acquired low rating namely verification. From the four teachers, it can be seen that teacher B has rated as the best, then followed by teacher D, teacher, A and the last one is teacher C. The difference of assessment on biology learning the four teachers can be caused by the role/contribution of teachers in understanding the curriculum, such as the study conducted by Sudarisman (2015) which stated that biology teachers as the implementer of curriculum at schools tend to experience obstacles in implementing the scientific approach, as a result, the completion of curriculum seems to be slow especially at the implementation level.

The suitability in here means that the teachers has implemented the scientific approach agree with learning model used. The suitability implementation of the scientific approach in every learning aspect possible because of the teacher's background. Based on the result of the authors' short interviews with the four teachers, it was found that them had more than 10 years of teaching, it was possible to influence the successful implementation of the scientific approach. Muslich (2007) said that state that the length of teacher's experience supports the teaching process of a teacher. The same thing was stated by Ewetan & Ewetan (2015) explaining that the length of teacher's experience can determine the teacher's quality and student learning outcomes.

Another possibility is experience of participating in the training or seminar was followed by teacher. According Mondy & Robert (2005) said that training is an activity or program carried out to develop skill and explicit knowledge. Goldstein & Ford (2002) said that training is a systematic combination of abilities (skill), rule, concepts or attitudes which caused increase of performance in different environments. Based on short interviews with four teachers, all of them have received training of 2013 curriculum implementation, and then technical guidance of 2013 curriculum. So, it does not rule out the possibility of this impact on the implementation of scientific approach that are applied during the learning process.

If interrelated the two possibilities above are closely related to the experience of the teacher. According to Cruickshank *et.al.*,(2014) said that experience of the teacher influences the effectiveness, level of satisfaction, accuracy of the use of learning methods, teaching behavior, self-confidence, and the ability to overcome problems¹. And this further explains that the suitability of implementing a scientific approach can be influenced by the teacher's background.

Seen as Entirety

Seen from each teacher was intended to saw how the implementation of scientific approach on each learning aspect carried out by all teachers (teacher A, B, C and D) who are sample. For the entirety of teachers, it was seen from the largest value given by students (modus/most appear values) toward the learning performed by teachers. Then interpreted based on the indicators of tendency level in which the results are shown in table 5.

Table 5. The implementation of scientific approach conducted by teachers in discovery learning model based on the perception of students

No	Learning aspects	Implementation based on the perception of students	
		Scores	Interpretation
I	Preliminary Activity	17	Very Suitable
	Core Activities		
	Stimulation	12	Suitable
II	Problem Statement	9	Suitable
	Data Collection	10	Suitable
	Data Analysis	15	Suitable
	Verification	9	Suitable
	Generalization	12	Suitable
III	Closing activity	14	Very Suitable

Then, seen from the entirety, all teachers can be determined as have implemented the learning properly which indicated by the rating from students in Table 4. Very suitable for preliminary and closing activities, while the core activities have rated as suitable. From the core activities which become the center of biology learning, the implementation has been suitable. Suitable in this matter is indicating that teachers have implemented the learning process in accordance with the steps of discovery learning model which means that the teachers have applied the learning process by prioritizing the scientific approach for the students to be more active in the learning process. Good learning implementation by teachers is indicating that the role of teachers in 2013 curriculum can be determined as functioning which means that teachers are able to make students understand the materials through the application of learning model that used, this condition is supported by the argument of Toth (2012) who stated that an effective learning could only be happened if teachers determine the method, form, and meaning of learning that will be delivered toward students by maintaining the characteristics of students^[14]. In addition, according to Sudjimat (2014), the appropriate role of teachers in the development and delivery of learning is when teachers choose and transform the existing learning materials to be suitable with the study needs of students in accomplishing Core Competencies (KI) and Basic Competencies (KD) which have been pre-determined in the content standard.

The success of the scientific approach implementation is not merely the responsibility of teachers, instead, the role of students also has impact within it due to the activeness and participation of students become the second determinant factor whether the scientific approach has ran properly or not. Therefore, it is expected that the quality of education in Indonesia will be more developed in the future.

CONCLUSION

From this research, it can be concluded that the discovery learning model implementation of the scientific approach in the biology learning process of X Class of State High School performed by teachers have been implemented accordingly and appropriately. Therefore, teachers able to teach the students to be actively involved in each biology learning process at schools.

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