

Scientific approachon biology subject to improve students' learning result

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ABSTRACT: Developing devices based on the Scientific Approach Produce is a viable biology learning tool for completing high school student learning outcomes on the respiratory system in humans. This research was conducted to develop the learning tools include Lesson Plans (RPP), Student Handbook (BAS), Student Activity Sheet (LKS), The Student Result Test (THB) validated by experts; The validated device is then tested. The methods used quantitative and qualitative descriptive analysis. The findings from this research are: 1) Learning tools developed valid; 2) learning works very well; 3) student activity shows active student learning build their own knowledge through scientific approach; 4) student learning outcomes from aspects of attitudes, knowledge and skills to achieve mastery. Based on the results of this study, it can be concluded that the learning tools based on scientific approaches that have been developed is valid, practical and effective so that feasible to be used to complete student learning outcomes.

1. INTRODUCTION

Advantages of learning-based scientific approach that makes the knowledge obtained by students can be long and easy to remember, can improve students' reasoning and the ability to think freely. The low learning outcomes of IPA viewed from the level of critical thinking in Indonesia can be seen from the results of international research conducted by TIMSS (Trends in International Mathematics and Science Study) which is a comparative system of mathematical achievement of students in the field of mathematics and inter-state science conducted periodically. TIMSS tests students' skills in cognitive domains consisting of knowledge, application, and reasoning. Indonesia for science based on TIMSS 2007 survey results was ranked 35th out of 46 participating countries and in 2011 Indonesia's rank decreased (Williams, et al., 2009).

The low quality of learning results also occurs in the biology of learning in SMA Negeri 1 Peso, Peso, Bulungan District, North Kalimantan Province. The latest data obtained by researchers can be seen from the results of daily re-examination of student's class XI IPA academic year 2016/2017, where the results of student learning for biology eye less than 50% have not reached KKM. This is because teachers emphasize learning outcomes on aspects of knowledge, and less attention to aspects of attitude and skills. Students only receive information from the teacher, so less actively involved in the learning process. Lack of participation in the learning process can lead to more students' ability to remember and memorize, so that less than optimal learning outcomes. Sugiarto (2004) explains the ability to remember by finding his own concept last longer than listening from others. The ability to

memorize causes students to be less able to apply the knowledge gained in school in real life, and problem-solving. Therefore, to maximize the students' absorptive capacity in receiving lessons requires a way of learning that involves direct student interaction. With such conditions, it is necessary to use a learning model that can improve the activity and complete the student learning outcomes during the learning activities.

The material chosen by researchers is the human respiratory system, is a complex material and is closely related to the daily life of students. In addition, the characteristics of this material are well suited to a student-centered scientific approach model, so that all students are actively involved in learning activities. Students are required to understand the material and can improve the learning outcomes so that students can have the opportunity to develop their thinking skills, link the material with daily life, the ability to work together, and become independent learners.

Based on the fact that there is a field, then one of the learning models that are expected to provide solutions and increase student learning interest based on Curriculum 2013 is by using a learning model based on a scientific approach. The implementation of the 2013 Curriculum brings the consequences of a fundamental change in classroom learning and assessment processes. The 2013 curriculum requires that the learning process in schools be conducted with scientifically based approaches and assessments using multi-faceted and multi-method approaches. Students in the learning process are required to actively develop attitudes, knowledge, and skills that is by applying the scientific process includes the stages of observing, asking, gathering information / trying, associate / reason, and results. Assessment is not only done at the end of the learning process, but it is also done throughout the learning process, which is called authentic assessment for students' attitude,

knowledge, and skill aspects, in addition to authentic assessment, the assessment can also use the test. The low learning outcomes of students and the negative attitudes of students can be attributed to several factors, namely: (1) a dense curriculum, (2) there are too many textbooks that are difficult to follow, (3) traditional and non-interactive learning methods (4) less effective learning media, and (5) poor evaluation (Zulkardi, 2007).T

The purpose of the learning-based scientific approach that makes the knowledge obtained by students can be long and easy to remember, can improve students' reasoning and the ability to think freely. Learning discovery can train students' skills to find and solve problems without the help of others. Learning activities like this make students more active, teachers only act as facilitators and motivators in learning. According Sadijan (2014) learning process is bring positive impact on student learning outcomes. Learning-based approaches can facilitate students to develop self-confidence, as part of the attitude competence through the gathering of information from various sources. Gathering the information in question is the activity of communicating information that has been processed orally and in writing.

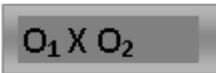
The 2013 curriculum mandates the essence of a scientific (scientific) approach in learning. The scientific approach is believed to be a golden tool for the development and development of attitudes, skills and knowledge of students in approaches or work processes that meet the scientific criteria, the scientists prefer to put forward inductive reasoning rather than deductive reasoning. Inductive reasoning sees a specific phenomenon or situation to draw the overall conclusion. Conversely deductive reasoning sees a common phenomenon to then draw a specific conclusion. Basically, inductive reasoning places specific evidence into a broader idea relation. Scientific methods

generally place unique phenomena with specific and detailed studies to then formulate general conclusions (Kemendikbud, 2013).

According to Machin (2014) a scientific-based learning approach is a learning process designed in such a way that students actively construct concepts, laws, or principles through observing stages (for identifying or finding problems), formulating problems, proposing or formulating hypotheses, collecting data With various techniques, analyzing data, drawing conclusions and communicating concepts, laws or principles found.

2. METHOD

This research used quantitative and qualitative descriptive analysis with a research development approach to produce a valid, practical, and effective learning tool of biology based on scientific approach to finish learning result. The researcher uses the One Group Pretest-Posttest Design developed by Campbell and Stanley in Arikunto (2010). The design of this study can be described as follows:



The research procedure uses the design of learning tool development model 4D (four D model). Data analysis was done by quantitative and qualitative descriptive statistical analysis

3. RESULTS AND DISCUSSION

Learning Device Validity Learning tools

Developed in this research are Learning Implementation Plan (RPP), Student Textbook (BAS), Student Activity Sheet (LKS), and Test of Learning Aspects of Knowledge. To get a learning device that is suitable to be used in the learning process, it is validated by expert validators and limited trials. The result of learning device validation can be

concluded that: RPP study result is feasible to use and good categorize; (2) The results of the BAS study are eligible to use and categorize well; (3) The result of the analysis of LKS is feasible to use and categorize well; (4) In the result of learning test of knowledge aspect, validation process with result is valid.

Practicality of Learning Devices

Implementation of RPP the results of observation on the implementation of RPP with biological learning tools based on a scientific approach conducted by two observers using the observation sheet of the implementation of RPP, calculated its reliability, and presented briefly on table 1 below.

Table 1. Reliability of Observation Sheet of RPP Implementation

Observing	Reliability RPP each meeting(%)			Everage (%)
	1	2	3	
Teacher	94.6	98.5	99.0	97.42

The results showed that the learning of each RPP exceeds 75%, with an average of 9.42%. The implementation of the RPP is also expressed by the percentage of implementation and the quality of the value of the commitment presented in Table 2. The findings of the implementation RPP used by school's can be seen in Figure 2.

Table 2. RPP Implementation Assessment

No	Aspect	Implementing RPP Value	Category
1	Introduction	3.80	Good
2	Main Activities	3.81	Good
3	Closing	3.89	Good
4	Management time	3.50	Good
5	Class Environment	4.00	Good
Average Value Implementing RPP		3.90	Good

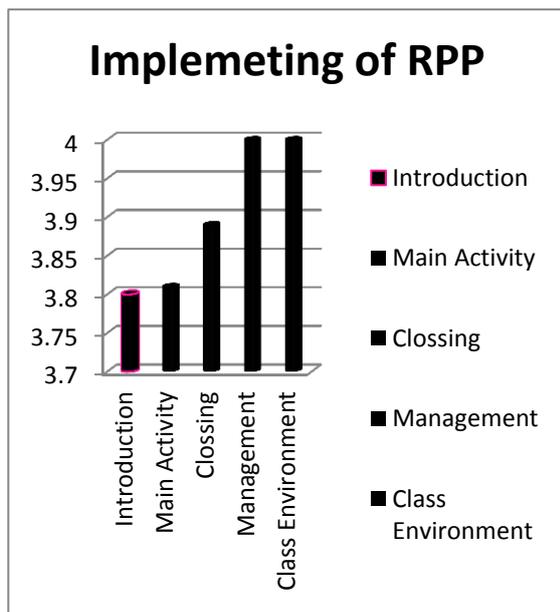


Figure 1 The domain classification of Implementation RPP.

Based on Table 2 and Figure 1 on the implementation of RPP shows that the ability of teachers in implementing learning includes aspects of preliminary activities with a value of 3.80 categories of good, core activities value 3.81 good category, closing activities 3.89 good category, time management 4.00 and atmosphere class value 4.00 good category. The average value of implementation of RPP of 3.90 with good category.

The results of the data analysis presented from the table above indicate that the teacher can implement all the planned learning scenarios planned in the RPP well.

Students Activity

Student activity during the learning was observed by two observers using observation sheets of student activities. The reliability of student activity observation sheets is presented in Table 3.

Tabel 3. Reliability Observe student activity KBM

Observing	Reliabilitas activity (%)	Student each meeting	Average (%)
1	2	3	
Students	96.4	96.4	98.5
	2	5	4
			97.13

Tabel 3 Shows that the average reliability of student activity observation sheets is 97.13%. Student activity data during KBM is presented in Table 4.

Tabel 4. Students Activities KBM

No.	Aspect	Average (%)
1	Pay attention to teacher explanations	8.41
2	Read and search material information according to content	12.06
3	Make observations at the time of taking data in accordance with the LKS	3.58
4	Collecting data	8.97
5	Discuss the task / question in the LKS	6.47
6	Presenting the results of the discussion	15.74
7	Convey opinions and ask questions	16.67
8	Answering teacher questions	13.8
9	Summing up the results of learning activities	8.82
10	Ask the teacher for guidance	4.38
11	Irrelevant action	1.01
Jumlah		100

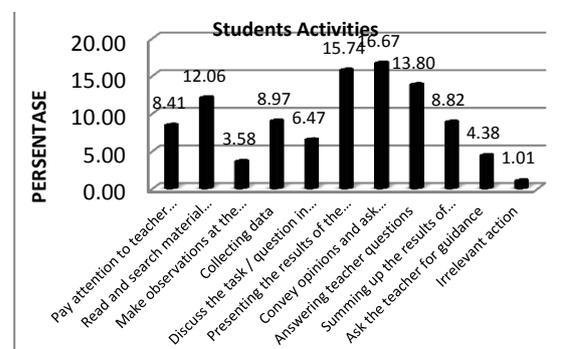


Figure 2. Percentage students' activities

Based on the stem diagram about the percentage of student activities in KBM, it can be argued that the dominant percentage of activity done by the students is to convey the opinion and ask the teacher, present the result of the discussion, convey the opinion and ask, read and seek information that is 16.67%. Thus the activities of the students show the activities that are in accordance with the scientific-based learning approach, which provides opportunities for students to observe, ask, try, associate and communicate. In accordance with the objectives of the 2013 curriculum to produce students as an independent human being and not stop learning, the learning process in RPP is designed to focus on students to develop motivation, curiosity, creativity, independence, learning skills and encourage active participation of learners (Permendikbud No 81A).

Obstacles Encountered

The obstacles encountered during the application of biology-based learning tools to a scientific approach are that students are not yet accustomed to learning-based scientific approaches, but this can be overcome by providing guidance and information on learning-based scientific approaches. Constraints faced by researchers related to time management ie the use of time that does not match (exceeded) with RPP, can be overcome at the next meeting so that in general learning can run well.

4. CONCLUSIONS

Based on the analysis, discussion, and findings of the research results, it can be concluded that developed tools are feasible of biological learning tools based on a valid scientific approach (valid, practical, and effective) are used to complete student learning outcomes on the respiratory system material in humans. The learning-based scientific approach that makes the knowledge obtained by students can be long and easy

to remember, can improve students' reasoning and the ability to think freely.

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