

# Effectiveness of the Module with Scientific Approach to the Study of Biology in Senior High School

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**Abstract**— *The learning process at first only lasted one direction or just focused on teachers (teacher centered), such as the concept of behavioristic. The process of learning that goes something like this causes students cannot develop creativity and he thought patterns tend to be monotonous. Therefore, the Government is encouraging a process the concept of learning and learning activities using the paradigm of Constructivism, concept of learning Constructivism form, i.e. by creating a media independent study that make proactive students. Module with scientific approach is media of learning in the form of independent learning materials include a series of learning process is arranged systematically with the steps that have been set, this module aims to help students learn independently but remain focused on the goal of the competence to learn, so that students master the competencies taught more easily and have an impact on the results of his studies, this research is research development. The subject of this development is research grade XI IPA high school Affairs Pakusari Jember Indonesian 2017/2018 academic year. Technique of data analysis used IE use the formula N-gain. Based on the results of the study showed that the scientific approach with the module on the respiratory system in high school Pakusari effective against student learning outcomes with high criteria.*

**Keywords**—*Effectiveness, Biology Module, Scientific Approach, Student Learning Outcomes.*

## I. INTRODUCTION

Biology is the science of the knowledge learn of living things or the scientific study of life which has concept of biology, usually a theory, principle or science product containing a number of value through scientific measures (Rustaman, 2013). In accordance with the learning objectives of the 21st century, that is a fun

learning and encourage students to have the skills to become learners who can solve various problems with step and scientific attitudes (Park et al., 2006).

Curriculum learning done by 2013 demanding scientific approach to cultivating the ability to think, work, and communicate scientific attitude, as one of the important aspects in life skills. (Kemendikbud, 2016). As it has been known that learning in the curriculum 2013 demands change patterns of Teacher Centered Learning in the direction of Student Centered Learning, so that with any change that required a pattern of learning materials which can grow the positive response of the students against the lessons so that they can train students in learning high order thinking skill.

Based on the results of research by Sirait et al. (2016:7) stated that the media in General is learning books from publishers and student worksheets that contain exercises reserved or review of each topic. These materials have yet to train students in the process of scientific inquiry as a whole, but it was just a matter of practice. It is similar with research conducted by Tjiptiany et al. (2016:193) which stated that the Government has already published books but 2013 curriculum students are not clearly show how scientific steps in it. So that educators need a media learn can stimulate scientific activities and facilitate students to understand the concepts learned.

Based on the research of Jatmiko, et al., (2016) and Wicaksono, et al., (2017) the students more easily understand the concept of the existence of a medium of instruction. According to Nagpal, et al., (2013) understanding students will be more meaningful if learning is controlled independently For that, required a learning media that can help students understand the concept of human respiratory system by looking at events directly or independently.

The module is the one medium that can make students to work independently (Rufii, 2015). In addition to the practical, the use of the module can also improve the efficiency and effectiveness of learning in school, both efficient use of time, funds, facilities, and personnel in order to achieve the goal of optimally. Based on previous research by Compassion et al., (2015:249-252) developed modules development emphasizes the process reasoning, communicate the experiment and practice of reserved, rather than explaining the concept the material described, while students prefer and easy-to-understand the concept of learning when accompanied by examples of the real and scientific steps (Good, et al., 2010).

Biology module with this scientific approach can fill the deficiencies that exist because in this module includes scientific learning steps comprising steps (observe, ask yourself, try, reasoning, and communicating) so students more whole in receiving the learning, in this module there are also examples of existing problems in daily life and exercise problems supporting a scientific learning stimulate students to learn more effectively. According to Asta et al. (2015:21-10) States that the scientific approach is one approach that can be used to hone the students' ability to more critical and proactive because on this approach places emphasis on the aspect of thinking effectively and train students in its own way or independently.

## II. METHODOLOGY

The type of this research is Research and Development. It was implemented at Vocational grade XI IPA2 high school Pakusari Jember Indonesia academic year 2017/2018 consisting of 35 students. This research is oriented on analysis of the impact of module with scientific approach on the respiratory system by students to improve students' learning outcomes and concept understanding. Data collection techniques used in this research, are observation, test, and documentation. Data collection techniques used in the measurement of effectiveness is in the form of written tests on post test amounted to five essay questions. While the data analysis techniques use N-Gain Test to determine the effectiveness of student learning outcomes.

## III. RESULTS

Student learning outcome data is used to find the value of effectiveness by using N-Gain Test during teaching and learning activity by using Biology module with a scientific approach media which get from result of pre-test and post-test. The large increase in student learning outcomes by using the N-Gain test using Biology module with a scientific approach media can be seen in table 1.

Table.1: The effectiveness of student learning outcomes using Biology module with a scientific approach media

| Category                              | Score |
|---------------------------------------|-------|
| Average Overall Pre-test              | 50.1  |
| Average Entire Post-test              | 83.2  |
| Average Pre-test of Klasikal Pre-test | 11.4% |
| Average Post-Test Klasikal Completion | 90.5% |
| Average N-Gain                        | 0.72  |
| Category N-Gain                       | High  |

Based on the learning result analysis in table 1.1 in high school Pakusari Indonesia, shows that the average pre-test of students is 50.1 meanwhile post-test value 83.2 average of pre-test classical pre-test 11.4% while the average of 90.5% post-test completeness, and the average score of N-Gain 0.72. From the results of the above analysis can be concluded that the biological module with scientific approach of the respiratory system in humans can improve learning outcomes from the average of 50.1 to 83.2, from the level of completeness of the minimum criterion value of 77 increased from the average of the initial classical completeness 11.4% to 90.5% (over 80%), as well as the high-categorized N-Gain 0.72.

The data indicates that the module has been developed effectively against student learning outcomes, it is also supported by research conducted by Jatmiko et al. (2016: 55-61) concluded that the average activity in the learning activities of students who get learning with scientific approaches increased higher than the average value of the liveliness / role of students who received learning by conventional methods. It means that the scientific approach gives a positive influence on the activity of peseta learners in the process of teaching and learning activities, which will have an impact on the student's own learning outcomes. Learning with a scientific approach can emphasize students' involvement in various activities which enable them to actively observe, ask, try, reason, communicate (build network). The first four capabilities are to develop personal capabilities, while building networks of interpersonal skills. The capability emphasized in such scientific methods, whether related to personal abilities or interpersonal skills, can be applied in effective, creative, and fun learning (Kemendikbud, 2013).

Learning to use the biology module with scientific approach on the respiratory system in high school will involve students actively. The development of this learning module are also arranged systematically to make students study independently, where the concept of the new material actively adjusted with the knowledge that already exists, so it should start learning from things that

are already known and understood the student, then teacher adds elements of learning and new competencies tailored to the knowledge and competencies already owned, with students like that, the concept of the material more easily understood the students, so that later impact on student learning outcomes.

Learning using a module with a scientific approach on the respiratory system materials at senior high school will involve students actively. The development of this learning module is also structured systematically to make students learn independently, in modules with this scientific approach emphasizes on targeted steps, both supported by using a model and exercise questions which can lead to a five-stage activity on the learning module later will be linked to the concept of biological material to be conveyed, where the new material concept is actively aligned with existing knowledge, so that learning should start from what is already known and understood by the students, then the teacher adds new learning and competency elements tailored to the knowledge and competencies which have been owned by students, later will impact on student learning outcomes are getting better and better.

Based on the results of the research, it is suggested that the next researcher is expected to create a biological module of scientific approach with broader material and pay attention to the material content applied in the steps of scientific approach.

#### IV. CONCLUSION AND SUGGESTIONS

Based on the research objectives and the result of the research that has been done then it can be concluded the use of scientific approach to Biology module on the respiratory system can increase student learning outcomes with increased score N-Gain 0.72 and fairly high category. It is supported by the can improve learning outcomes from the average of 50.1 to 83.2, from the level of completeness of the minimum criterion value of 77 increased from the average of the initial classical completeness 11.4% to 90.5%, so that scientific approach to Biology module media can be said to be effective.

Based on the research results, it is advisable for the next researcher can make a scientific approach to biology module with broader material, pay attention to the content of the material being applied with scientific measures and stimuli as well as examples problems existing in real life students to students more easily understand.

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