JPPS (Jurnal Penelitian Pendidikan Sains)
p-ISSN: 2089-1776
e-ISSN: 2549-1597
Volume 8, No.1, November 2018
https://journal.unesa.ac.id/index.php/jpps/index

THE EFFECTIVENESS OF SCIENTIFIC APPROACH-BASED SCIENCE LEARNING MATERIALS TO EDUCATE STUDENTS SCIENCE LITERACY

Arfiati Ulfa Utami[1], Selly Candra Citra Murti[1]

[1]Lecturer at Department of Mathematics and Natural Science, PGRI University of Banyuwangi, Jl. Ikan Tongkol No.1 Kertosari-Banyuwangi
e-mail: fieare@ymail.com

Abstract. The purpose of this research is to test the effectiveness of scientific approach-based science learning materials. Data collection techniques include: observation, test, and questionnaires. Research instruments include; sheets of learning implementation using scientific approach-based science learning materials, test, and questionnaires. Technique of data analysis used was classical mastery analysis on test result of learning (cognitive). In this research the effectiveness of scientific approach-based science learning materials can be measured through: (1) learning implementation, (2) learning outcomes, (3) activities, (4) students' responses. Percentage of learning achievement reached 83,8% with well executed category, the percentage of students' learning outcomes on cognitive aspect in terms of classical mastery in replication I and II reached 82.8% and 85.7% with complete category, the percentage of students activities on replication I and II reached 84.11 and 83.23 with active category and the percentage of students' respons reached 82% with positive response category. Based on the data exposure, the implementation of scientific approach-based science learning materials was effective to educate students' science literacy

Keywords: effectiveness, scientific approach, science literacy, learning materials

INTRODUCTION

The Ministry of Education and Culture (Kemendikbud) said the achievement of the PISA (Program for International Student Assessment) according to the results of the 2015 survey released shows a significant increase in educational attainment in Indonesia by 22.1 points. These results put Indonesia in fourth place in terms of student achievement improvement compared to previous survey results in 2012, from 72 countries taking the PISA test. PISA is a test system organized by the Organization for Economic Cooperation and Development (OECD) to evaluate the education system of 72 countries around the world. PISA measures what students know and what can be done with their knowledge. The theme of the survey is rotated every three years, by 2015 the focus of the theme is the competence of science. The process of teaching science teaching in schools should be more on the skills of critical and creative thinking, because in essence science learning is characterized by scientific work. Scientific work on science learning is a way of working that is used to solve problems through scientific inquiry. This is based on the journal of Physics by Kusmaryono and Suyitno (2015) that scientific learning is learning that adopt scientist in building knowledge through scientific method. The learning model is needed that allows created scientific thinking skills, developing "sense of inquiry" and creative thinking abilities of students.

Scientific approach based sciences learning materials in schools means learning that focuses on a scientific approach to school learning. This scientific approach aims to enable students to think scientifically, logically, and critically and be able to apply the concept of IPA in everyday life. According Joko Susilo (2016) science lesson related to how to find out, so that science is not only the mastery of the concept of knowledge but also a process of discovery. In the Curriculum 2013, the scientific approach in learning as referred to in Permendikbud No. 81A 2013 includes: observing, questioning, trying, associating, and communicating. According to Sudarwan who was quoted by Musfiqon in his book (2015) that the scientific approach is intended to give understanding to students to know, understand, practice what is being studied scientifically. Therefore, in the process of pursuit is taught to learners to find out from various sources through observing, asking, trying, processing, presenting, concluding and creating for all subjects. It is expected that science-based science-based learning can improve students' science process skills so that science literacy can be achieved. This is based on the International Journal of Education and Research by Wahyono et al (2017) that Learning using a scientific approach provides a positive influence on teachers and students, because its learning refers to a scientific thinking process that trains systematic and holistic thinking. The implementation of learning uses a scientific approach to conduct excavation, planting, enhancement, and development of knowledge through research from this activity will form an analytical thinking pattern, and will bring the facts of the phenomenon that occurs.

The ability of science literacy in schools is influenced by several factors, among others, the unavailability of science learning devices to train students' science literacy, and science learning approach used by teachers in constructing the concept of science. A learning approach that generates curiosity and motivates students to solve process-based skills is a scientific approach or a scientific approach. According Artati (2013) the importance of science literacy, especially for junior high school students is to prepare students face modern life with the development of science and technology so fast. Teachers must make new innovations in learning to improve the passion of learning, one of them through learning materials. Learning materials according to Zuhdan, et al (2011) are tools or equipment to implement processes that enable educators and learners to carry out learning activities. Learning tools are designed and packed in such a way that students are motivated and enthusiastic in learning science. The learning tools developed in this study include: Learning implementation plan (RPP), Student Activity Sheet (LKS), Student Textbook (BAS), and test. Learning materials that have been developed should be tested effectiveness by testing the students in SMP Negeri 1 Srono. Based on these reasons, this research describes the results of research on the effectiveness of scientific approach-based sciences learning material to train student science

METHOD

This research is quantitative descriptive. Data collection techniques include; observation, tests, and questionnaires. Research instruments include: instructional sheets using scientific approach based sciences learning materials, test, and student response questionnaires. Data analysis technique using classical mastery analysis on test result of learning. In this study the effectiveness of learning materials can be measured through: (1) learning implementation, (2) student learning outcomes, (3) student activities, and (4) student responses

RESULT AND DISCUSSION

In this study to test the effectiveness of learning devices measured based on aspects of learning, student learning outcomes, student activities, and student responses. The results of the implementation of scientific approach based sciences learning materials are shown in Table 1 below.

Table 1. Result of Learning Implementation

Indicator	Average (%)
Learning in accordance the lesson plan	85,6
Delivering material clearly	79,6
Accompanying experiments	86,0
Evaluating lessons	85,3
Managing time	82,6
Average	83,8

Indicators of learning activities include: learning in accordance with the Lesson Plans (RPP), delivering material clearly, accompanying experiments, evaluating lessons, and managing time. Based on Table 1 above, learning outcomes using science-based science-based learning apparatus reached an average of 83.8% in which case learning was done well. This is in accordance with the measurement of learning activity criteria using Likert scale by Sugiyono (2016). Teachers have done well in accordance with the plan contained in the Learning Implementation Plan (RPP) which reached the percentage of 85.6%, as well as the material has been clearly communicated. Subject matter in this research is measurement include: measurement of length, mass, time, and temperature. In this learning, teachers also assist students in experimenting, students feel happy because they can learn while doing, this becomes the highest percentage reached 86%. Teachers also do not forget to do evaluation in learning to know the results of the learning process that has been done. The importance of learning evaluation in order to reflect how much success in learning, implementation of learning evaluation reaches 85.3%. Teachers also manage time so that all learning process can run well and according to plan. Percentage of time management implementation reached 82.6%.

The second effectiveness indicator is measured based on the cognitive aspect learning outcomes in terms of students' literacy skills. Science literacy indicators include: observing ability, formulating problems, predicting, collecting and processing data, drawing conclusions, and concept applications. The students' literacy skills were measured using a written test that included pre-test and post test. Student learning outcomes are shown in Table 2 below.

Table 2. Result of Science Literacy

Class	Classical Mastery	
	Pre Test (%)	Post Test (%)
Replication I	28,5	82,8
Replication II	42,8	85,7

In Table 2 above is the result of student learning on replication I and II. Replication is a repetition of the same treatment in an experiment to obtain valid results. The treatment referred to in this study is learning using science-based science-based learning tools. Based on the above data exposure, on replication I the percentage of pre tests and test posts reached 28.5 and 82.8. In replication II the percentage of pre tests and test posts reached 42.8 and 85.7. Learning using science-based learning tools science-based student approach lebh required to perform activities observing, asking, trying, reasoning, and communicate during the learning took place. Based on learning activities that have been done percentage of students to observe greater than other indicators. This is supported by Permendikbud No. 81a Year 2013 on implementation in the Curriculum 2013, in observing the activities of teachers open widely and varying opportunities for learners to observe through viewing, listening, listening and reading activities informed in the learning process scenario. Teachers provide facilities to learners to observe, train them to pay attention to the important things of an object or object. The teacher gives Student Activity Sheet (LKS) to each group to conduct an experiment guided by Student Textbook (BAS). The average value of pre test and lowest test post is in the indicator formulate the problem. Most students have not been able to formulate problems, how to formulate a comprehensive and clear problem formula. It is a learning tool that includes Learning Implementation Plan (RPP), Student Activity Sheet (LKS), Student Handbook (BAS), test of learning result can help students to increase science literacy in school

The third indicator that determines effectiveness is student activity. Table 3 shows the results of student activities during the lesson. Student activity indicators include: observing, asking, trying, reasoning and communicating. Student activity observation results are shown in Table 3 below.

Table 3. Result of Activities

Indicators	Average	
	Replication I	Replication II
Observing	88,23	91,17
Asking	80,88	82,35
Trying	98,52	95,58
Reasoning	80,88	75,00
Communicating	72,05	72,05
Average	84,11	83,23
	83,67	

Based on Table 3 above, the observation of student activity is done at each meeting. The average result of student activity accumulation on replication I reach 84,11%, while at replication II reach 83,23%. The highest percentage of replication I was attempted activity (98.52%), while the lowest percentage was communicated (72.05%). Observers have observed that students are more enthusiastic to experiment, students are asked to take measurements of length, mass, time, and temperature of objects or objects around them. Learning outcomes will be well recorded when the teacher gives students the opportunity to do or try something new. This

will differ in student learning outcomes if the teacher only gives the material and the students listen without doing an experiment. Students can learn while experiencing, this will make students happy and enthusiastic in learning. Although they feel motivated by learning using scientific approach-based science learning materials but there are still students who have not been able to formulate the problem, therefore teacher guidance is needed to assist and teach students how to formulate the problem well.

Teachers' assignments before learning should prepare well learning and experimental tools in the Lesson Plans (RPP). According to Sanjaya (2010) the teacher is one that determines the success of one learning system, this is because the teacher is a person who directly dealing with students and can act as implementator. Similarly, in replication II, the highest and lowest percentages are on try and communicate activities. In this study communicate to be the lowest student activity of the presentation because in time to present the results of the work in front of the class orally, the other students less respond to the results of his friend's work causing the class condition is less conducive, so communicating activity becomes the lowest percentage. According to Yunus (2015) in kompasiana, along with advances in information and communication technology, teachers can use the sophistication to communicate the best works of students in cyberspace, so that can be responded by the wider readers. According to Musfiqon (2015) communication provides the learning experience to carry out learning activities in the form of conveying the results of observations that have been done, the conclusions that have been obtained based on the analysis, done either orally, in writing or other means and media. It is intended that learners have the opportunity to develop their competence in the development of honest attitude, thoroughness, tolerance, systematic thinking, expressing opinions in a clear and clear way, so that the ability to speak well and correctly.

The fourth effectiveness indicator is student response. The student's response at the end of the lesson uses an IPA learning device with several criteria including: student interest, student comments, language usage, and image usage. The result of student response recapitulation is shown in Table 4 below.

Table 4. Result of Students' Responses

Indicators	Average (%)
Student Interest	84
Student Comments	78
Language Usage	81
Image Usage	85
Average	82

Based on Table 4 above the percentage of students 'interest in achieving 84% of students expressed pleasure if learning using scientific approach basedsciences learning material, the percentage of students' comments reached 78% agreed using learning innovation, the percentage of language usage 81% with language easily understood by students, and the percentage of the use of images reaches 85% meaning that in textbooks and student activity sheets show images easy to read by students. Based on the average result of student response reach 82%, hence study using science-based science apparatus based on learning have postitive response.

CONCLUSION

Based on the results of research and discussion can be concluded that the effectiveness of scientific approach based sciences learning material is measured based on aspects of learning activities, student learning outcomes, student activities, and student responses. Percentage of learning achievement reaches 83,8% with well executed category, the percentage of student learning outcomes evaluated from classical completeness in replication I and II reaches 82.8% and 85.7% with complete category, the percentage of student activity on replication I and II reaching 84.1% and 83.2% with active category and the percentage of student response reach 82% with positive response category. Based on the exposure of these data, learning using scientific approach based sciences learning material was effective to train student' science literacy.

REFERENCES

Artati, July. 2013. *Literacy Science Literacy Analysis of Junior High School Students in Integrated IPA Learning on Extreme Weather Theme*. Essay: UPI Bandung

Kemdikbud. 2016. *Ranking of PISA Indonesia Achievement Improved*. www.kemdikbud.com

Kusmaryono Imam & Suyitno Hadi. (2015). *The Effect of Constructivist Learning Using Scientific Approach on Mathematical Power and Conceptual Understanding of Students Grade IV*. Journal of Physics: Conference Series 693: IOP Publishing

Musfiqon & Nurdyansyah. 2015. *The Approach of Scientific Learning*. Sidoarjo: Nizamia Learning Center Sidoarjo

Permendikbud No. 81a Year 2013. *Implementation Curriculum 2013. Regulation of the Minister of Education and Culture of the Republic of Indonesia*

Sanjaya, Wina. 2010. *Strategy of Learning-Oriented Standard Process of Education*.Jakarta: Prenada Media Group

Sugiyono. 2016. *Qualitative Quantitative Research Methods and R & D*. Bandung: Alfabeta

Susilo, Muhammad Joko. 2016. *Scientific Science-Based Scientific Learning Approach at SMP Muhammadiyah 2 Depok Sleman.* Proceeding Bology Education (ISSN: 2528-5742), Vol 13 (1) 2016: 97-101

Wahyono, et al. (2017). *Implementation of Scientific Approach Based Learning to Think High*

Levels in State Senior High School in Ketapang. International Journal of Education and Research Vol. 5 No. 8 August 2017. www.ijern.com

Yunus. 2015. *Implementation of Scientific Learning 5M*.www.kompasiana.com

Zuhdan, et al. 2011. *Development of Integrated Learning Learning Tool to Improve Cognitive, Process Skills, Creativity and Implementing Scientific Concept of Junior High School Students*. UNY Graduate Program.