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Application of LKS Vision of Science, Environment, Technology, and Society in Learning Science to Improve Students' Science Literacy of MTs

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Abstract

The involvement of science, environment, society, and technology or SETS (Science, Environment, Technology, and Society) in learning makes learning more meaningful. The fluency and success in learning can be supported by the availability of more varied learning facilities, one of them with Student Worksheets (LKS). SETS visionary worksheets as a learning tool that will be developed to train students' scientific literacy in accordance with the learning material. The purpose of this study is to describe the improvement of students' scientific literacy skills between the experimental class and the control class.This study uses Nonequivalent Control Group Design. Scientific literacy skills are measured by a description of 10 items. The results showed that there were differences in the increase in scientific literacy skills between the experimental class and the control class in the low improvement category, but there was a significant difference in both quality/statistics. The percentage increase in the experimental class (41.5%) was greater than the control class (24.7%). Students' responses to the worksheets applied were very good. The conclusions in this study are that SETS vision worksheets applied can improve students' scientific literacy.

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INTRODUCTION

Carin and Sund (Depdiknas, 2006) define science as systematic knowledge or organized regularly, generally accepted, and in the form of a collection of data from observations and experiments. Activities in science are always related to experiments that require skills and crafts. Simply put, science can also be defined as what scientists do. Thus, science is not just a collection of knowledge about living things or creatures, but involves the way of working, ways of thinking, and ways of solving problems.

Natural Sciences (IPA) is related to how to systematically find out about nature, so that IPA is not only mastering a collection of knowledge in the form of facts, concepts, or principles, but also a process of discovery. Natural Sciences is expected to be a vehicle for students to learn about themselves and their natural surroundings, as well as prospects for further development in applying them in their daily lives (Depdiknas, 2006).

The integrated learning approach in Natural Sciences (IPA) subjects is often referred to as an interdisciplinary approach. Integrated learning model is essentially a learning model that allows students both individually and in groups to actively seek, explore, and discover concepts and principles holistically and authentically (Trianto, 2010). One of them is integrating Basic Competencies. Through integrated learning students can get direct experience, so that they can add strength to receive, store, and produce impressions about the things they learn.

Literate according to Echol & Shadily (1993) comes from the word literacy which means "literacy". Literate on science is important to be mastered by students in relation to the way they can understand the environment, health, economy, and other problems faced by modern society that are highly dependent on technology and the progress and development of science. Literate in science is known as scientific literacy. According to De Boer (2000) stated the first person to use the term "Scientific Literacy" was Paul deHart Hurd from Stamford University, stating that Scientific Literacy means understanding science and its application to the needs of society.

Budiningsih (2015) the definition of scientific literacy can be viewed from two groups, namely the group "science literacy" and group "scientific literacy". The "science literacy" group considers that the main component of scientific literacy is understanding science content, namely basic scientific concepts. The scientific literacy groupviews science literacy in line with the development of life skills that is a view that recognizes the need for reasoning skills in a social context and emphasizes that scientific literacy is intended for everyone (Rychen & Salganik, 2003).

According to Holbrook & Rannikmae (2009) scientific literacy learning has such characteristics literation of science more than just knowledge and the means of knowledge, andscientific literacy is more than just the application of science or the development of positive attitudes towards science.

Binadja (2002) states that in SETS visionary learning, teachers and students share an important role in achieving learning goals. Through the SETS approach it is expected that students view things integrally, namely by paying attention to the elements in SETS. The teacher can relate the concepts of science taught by paying attention to the elements contained in SETS. The teacher can relate scientific concepts to the problems that occur in the community, the daily environment of students so that they can help students apply the results of their learning in everyday life so that learning in schools is beneficial for the community by paying attention to their impact on the environment.

Smoothness and success in learning can be supported by the availability of more varied learning facilities. Learning tools as an alternative teaching material that can be utilized are Student Worksheets (LKS). LKS is one of the teacher's handles in the form of sheets containing assignments that must be done by students.

The SETS approach is an approach that can link material with science, environment, technology and society. Handayani (2018) explains that the ability of scientific literacy within oneself learners can be built with using a learning-based approach SETS (Science, Environment, Technology, and Society). SETS visionary worksheets used in science learning are contextually packaged that is associated with students' lives get goals open insight and improve scientific literacy skills.

SETS visionary worksheets as one of the learning tools that will be applied to train students' scientific literacy in accordance with the learning material. From the above, it is necessary to do research for improve scientific literacy of students in linking knowledge with the environment, technology, and society.

METHODS

The study was conducted at MTs Negeri 3 Banjarnegara on material quantities and units. The study used the "Nonequivalent Control Group Design". The population in this study were seventh grade students of MTs Negeri 3 Banjarnegara, school year 2018/2019. The number of subject population is 6 classes. Two classes used as classes for research each consisted of 30 students.

Samples that have been classified into two groups given different treatment, the experimental group was given the learning of science's using vision LKS SETS, while the control group was given science learning with lecture (which is usually done at the school). The experimental results can be obtained by comparing the experimental class with the control class in the conditions before and after the learning treatment.

The independent variables in this study were science learning using SETS visionary worksheets conducted in the experimental class and conventional learning conducted in the control class. The dependent variable in this study is students' scientific literacy which includes aspects of content aspects, process aspects, and context aspects.

Data collection techniques are carried out using tests and questionnaires. This test is used to measure students' scientific literacy skills. The form of the test used is a description. Tests are given to students before and after learning (pretest and post-test) to measure the improvement of students' literacy skills in material quantities and units, both in the experimental class and in the controlclass. Test questions consist of 10 description problem. Data of research on students' scientific literacy improvement were analyzed by increasing the N-gain test to determine the magnitude of the increase in students' scientific literacy before being treated and after being treated. t-test to compare students' science literacy experimental class control class.

RESULTS AND DISCUSSION

The data used to conduct research data analysis were the students 'scientific literacy abilities at Banjarnegara 3 Islamic Junior High School before and after being given science learning using SETS visionary worksheets in the experimental group and students' scientific literacy skills before and after being given the lecture method in the control group. An overview of the results of the research data is presented in Table 1.

Based on Table 1, the average value in the experimental group after being given learning using SETS vision worksheets was higher than the average value for the control group.

Analysis of the improvement of students' scientific literacy abilities was conducted to find out how much the treatments were in the experimental group or in the control group. The results of the calculation of the increase in scientific literacy ability can be seen in Table 2.

Table 1. Pretest Results and Posttest of Experimental and Control Groups

Source of Variation	Pretest		Postest	
	Experiment Class	Control Class	Experiment Class	Control Class
The number of students	30.00	30.00	30	30
Average value	52.43	53.00	74.20	66.07
Standard deviation	13.19	13.09	14.56	12.62
The highest score	83.00	93.00	100.00	93.00
Lowest value	36.00	35.00	50.00	46.00
Range	47.00	58.00	50.00	47.00

Table 2. Summary of the average pretest, posttest and n-gain pre-post-test

No.	Class	Average value		Enhancement	Enhancement %	Normal Gain (%)	Factor criteria g
		Pretest	*Posttest*	*pretest – posttest*	*pretest - posttest*	*pretest - posttest*	*pretest - posttest*
1	Experiment	52.43	74.20	21.77	41.5	20.2	Low
2	Control	53.00	66.07	13.07	24.7	12.2	Low

Based on Table 2, it is obtained information about the percentage of improvement in students' scientific literacy ability for the experimental group by 41.5% and the percentage of improvementin students' scientific literacy ability for the control group by 24.7% . The improvement of scientific literacy skills of these students showed an improvement after being given learning by using SETS visionary worksheets as well as the usual lecture methods at the school.

Evaluation of students' scientific literacy skills on subject matter quantities and units used description test questions. The subject given that the amount and the unit, which is presented in an integrated manner with the model association/ connectedness (connected). The topics studied include measurement, quantities and units, as well as the application of quantities and units in the SETS element. Based on the interpretation of data the average scientific literacy ability of students increased after following the learning with the treatment.

The percentage of improvement in scientific literacy after learning is supported by the results of N-gain analysis of the scientific literacy ability test (pre-test and post-test). N-gain for early and final students 'scientific literacy skills is presented in Table 2. Based on the results of N-gain analysis and description of scientific literacy ability tests, it was concluded that students' scientific literacy skills increased after learning science using SETS visionary worksheets. In other words, the SETS vision worksheet that is applied can improve students' scientific literacy.

The aspects of scientific literacy measured include aspects of content, aspects of the process and aspects of context. The following is a table for improving scientific literacy skills for each aspect.

Based on Table 3, shows that students 'scientific literacy skills in each aspect for the experimental class are higher than students'

scientific literacy skills for the control aspect are still in the low category. class. Students' scientific literacy skills for each

Table 3. Improved Science Literacy of Each Aspect

No.	Class	N-gain		
		Content Aspects	Process Aspects	Context Aspect
	Experiment	0.16	0.11	0.11
	Control	0.11	0.07	0.07

Hypothesis testing aims to compare students' scientific literacy abilities with the experimental class with the control class using the t test.

Table 4. Posttest Results of Experimental Groups and Kotrol Groups

Source of variation	Experimental Group	Control group
Amount	2226	1982
N	30	30
Average value	74.20	66.07
Variance (s^2)	212.0966	159.2368
Standard deviation (s)	14.56	12.62

Based on the calculation results obtained the value of t count = 2.312> 2.001 so Ha is accepted. So it can be concluded that there are differences in the improvement of students' scientific literacy skills between the experimental class and the control class. Based on the results of the average value between the experimental class and the control class, the average value of the experimental class was higher than the control class after being given science learning using SETS visionary worksheets.

This is in line with the results of research conducted by Handayani (2018) which states that SETS-based physics modules effectively improve scientific literacy skills and there are differences in the increase in scientific literacy skills between the experimental class and the control class.

The research conducted by Atmojo & Kurniawati (2018) states that the validity of thematic textbooks with the vision of science, environment, technology and society developed is in the valid category. The average student activity during learning is in the good category, the response of students and positive teachers to the textbook developed.

Research conducted by Rakhmawan et al. (2015) proved that inquiry-based science literacy learning in the form of laboratory activities is able to improve the scientific literacy of high school students in aspects of the content, context, process and attitude of students' science.

In the science learning process contained in SETS visionary worksheets using stages of a scientific approach that includes observing, asking questions, gathering information, associating/processing information/reasoning, drawing conclusions, and communicating. This is in accordance with the scientific literacy component in the process aspects, namely recognizing the limitation question, identifying evidence, drawing conclusions, communicating conclusions, and showing understanding of scientific concepts.

With the above activities through SETS visionary worksheets, students are trained to think and work in accordance with the stages in the scientific literacy component. The hope is that if students have been trained to implement the stages in the scientific literacy component, students can have high scientific literacy skills.

Tamimiya (2017) education as expected can run well if supported by other factors such as the presence of teaching materials. Teaching materials needed are teaching materials that can improve affective, cognitive, psychomotor skills, and students' social skills which can be integrated into collaborative problem solving skills.

Duron (2006) states that the active role of students can make the learning process more enjoyable for teachers and students, and most importantly the active role of students can cause students to think critically. McCrae (2011) advises teachers that the learning done allows students to actively work through issues. These issues can be developed with SETS visionary learning where the teacher can invite students to discuss from various starting points. Nugraha (2013) states that teachers can start from the science aspect first and then be developed in other aspects namely environment, technology, society or vice versa.

When the SETS vision is integrated into learning, these characteristics cannot be lost. These characteristics can be used as directors as well as reinforcement for the development of problems with weak structures while allowing students to be invited to think comprehensively in finding alternative solutions to problems faced by them, so that they will get attitudes that can be applied in their lives (Akinoglu & Tandagon, 2007).

This is in line with the statement expressed by Yadav et al. (2011) that nowadays in learning it is required to use more student-centered learning approaches. In this case, knowledge originates from a single source, that is, it remains under the supervision of the teacher, but the learning target must achieve the same results, namely students get knowledge that comes from the learning process, which will then be associated with real life (Mello, 2012).

LK S contains a set of fundamental activities that must be carried out by students to maximize understanding in the effort to form basic abilities according to indicators of achievement of learning outcomes that must be taken (Trianto, 2010). Each LK S is arranged with certain materials and tasks that are packaged in such a way as to a specific goal. In SETS visionary worksheets created and applied in science learning, contains material on quantities and units and their connections in the SETS element.

The ranking of scientific literacy based on PISA assessment (OECD, 2013) is presented in Table5.

Table 5. Ranking of Science Literacy

Ranking	Area	Average score	Average level
	Shanghai-China	580	Level 4
	Hong Kong-China	555	Level 3
	Singapore	551	Level 3
	Japan	547	Level 3
	Finland	545	Level 3
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64.	Indonesia	382	Level 1
65.	Peru	373	Level 1

At Table 5, it is known that the average Indonesian student on the PISA test is still at level 1. At this level, new students can suggest appropriate sources of information about science topics.The average score of 382 is supposed to be able to remember scientific knowledge based on simple facts. Therefore, it needs a learning that can improve science literacy.

Dani (2009) scientific literacy means that a person can ask, find, or determine answers to questions derived from curiosity about everyday experiences. It means that a person has the

ability to describe, explain, and predict natural phenomena.

Science literacy is important because it can develop several abilities, one of which is to be able to make explanations about phenomena that occur based on concepts that have been understood, and can use scientific methods to solve problems in everyday life. Science literacy has the meaning of being able to apply scientific concepts to solve everyday problems (Riyadhin & Mitarlis, 2018). The statement is in line with SETS learning objectives, namely connecting scientific concepts with problems that occur in the community, the daily environment of students so that they can help students apply their learning outcomes in daily life so that learning in schools is beneficial to society by paying attention to their impact on for the environment.

Student-centered learning to conduct research, integrate theory and practice, and apply knowledge and skills to develop viable solutions to the problems specified. What is very important is that the teacher guides the learning process and conducts a thorough debriefing at the end of the learning experience (Savery, 2006).

Visionary learning and SETS approach form a positive impression in students. Positive impressions arising from visionary learning and SETS approaching have a positive effect on student learning outcomes by Binadja et al. (2008).

Based on the above LKS SETS vision needs to be applied to melatihkan kema m ladies scientific literacy of students.

Yuliyanti (2014) states that teaching books are a very important component of education in the learning process. The availability of quality textbooks will support the success of the learning process. However, the existing textbooks have emphasized the content dimension rather than the process and context dimensions as demanded by the Program for International Student Assessment (PISA). This condition is thought to cause a low level of Indonesian children's literacy.

Ekohariadi (2009) one of the factors causing low scientific literacy of students who are directly related to and close to students is a source of learning, both from textbooks and other sources. Therefore, there is a need for learning resources in the form of SETS Vision LKS as a means to assist students in the process of learning science.

Firman dalam (Rusdi et al., 2007) states that one of the causes of the low scientific literacy of Indonesian students is the lack of learning based on science processes. Science literacy is considered important because it can develop several self-abilities, one of which is to be able to make an explanation of the phenomena that occur based on understood concepts, and can use scientific methods to solve problems in daily life.

Based on the results of the study showed that there were differences in the improvement of students' scientific literacy skills between the experimental class and the control class, although the improvement was still in low criteria, but the improvement of both quality/statistics was a significant difference.

Students' scientific literacy skills in each aspect for the experimental class are higher than students' scientific literacy skills for the control class. Students' scientific literacy skills for each aspect are also in the low category. This needs to be trained in teachers and students to be able to develop students' scientific literacy skills, especially in science learning. The hope is that with the development of students' scientific literacy skills training, students' scientific literacy skills will increase.

The response of the experimental group students after being given science learning using SETS vision worksheets can be seen in the Table 6.

Based on information obtained table 6 presentation average of 89.9% and shows very good criteria. Students' responses to SETS visionary worksheets were applied to the experimental class after being given science learning, in the very good category. This SETS vision worksheet can be one of the supporting sources of learning in

science learning. This is because prior science learning has not used SETS visionary worksheets especially for material quantities and units.

Based on the results of the research that has been done, some suggestions can be submitted as follows. The application of SETS vision worksheets requires teacher creativity in an effort to improve students' scientific literacy. It is recommended that the teacher consider aspects of the ability to relate material to everyday life, so that students can apply the knowledge that has been obtained at school in their daily lives while still considering the aspects of benefits and the impact caused to the environment. The need for teaching materials in the form of SETS vision worksheets that can train students to think and work critically so that they can apply their observations and experiences gained in daily life. The need for articles or news related to students' scientific literacy skills in their development, and can be obtained from the internet or other relevant sources.

Table 6 . Student Experiment Group Response

Percent interval	Criteria	Frequency	Percentage (%)
84% <% Score≤ 100%	Very good	29	96.7
68% <% Score≤ 84%	Good	1	3.3
52% <% Score≤ 68%	Enough	0	0.0
36% <% Score ≤ 52%	Not good	0	0.0
20% ≤% Score ≤ 36%	Very bad	0	0.0
amount		30	100
Highest		96.7%	
Lowest		80.0%	
Average		89.9%	

CONCLUSION

In general it can be concluded that there are differences in the improvement of students' scientific literacy skills between the experimental class and the control class, with t count > t table = 2.312> 2.001. There was an increase in each aspect of scientific literacy after the SETS vision worksheet was applied. Student responses to SETS vision worksheets applied were included in the very good category (average percentage 89.9%).

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