

Use of SETS (Science, Environment, Technology and Society) Approach for Practice the Problem Solving Ability of Elementary School Students in Surabaya

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Abstract:- This research aimed to describe the learning outcomes using SETS approach and examine the influence of science, environment, technology and society (SETS) approach towards problem solving ability elementary school fourth grade students. This research is an experimental research design with pretest posttest control group design. The subjects were students of class fourth grade SDN Lakarsantri II / 473 Surabaya. The technique of collecting data through observation sheet learning outcomes and evaluation tests of problem solving ability. Before analyzing the research data, researcher conducted an instrument trial analysis using validity and reliability test. Data were analyzed using normality test, homogeneity and hypothesis testing using t test. The results showed that: First, learning outcomes by using SETS approach obtain an average yield of 81% and the percentage of these scores are included in the criteria very well. Second, SETS approach effect on problem solving ability, it is based on the value of learning outcomes tcount of 2.497 ($2.497 > 1.997$) and and the results sig. 2 tailed worth 0.015 ($0.015 < 0.05$). Based on observations and data analysis, it can be concluded that the science, environment, technology and society (SETS) approach can significantly improve the problem solving ability students and excellent learning outcomes.

Keywords:- SETS Approach, Learning Outcomes, Problem Solving Ability.

I. INTRODUCTION

The development of science and technology into one powerful factor of development of the education system. Towards the development of the education system is an attempt to answer the needs of human resources who have the skills, knowledge and attitudes in accordance with the needs of life in the 21st century. This need prompted some demand for the results or outputs of the education system. In the graduation standards set out in the Regulation of the Minister of Education and Culture Number 20 Year 2016, primary school graduate should have the skills to think and act creatively, productively, critical, independent, collaborative and communicative. Thinking skills in question is some higher level thinking skills include: problem solving skills, decision-making, critical thinking, and creative.

Problem solving skills needed by the students who live in the 21st century. Because every time the students are faced with a problem, ranging from the individual students themselves to problems with the surrounding environment. Besides the skills of problem solving is one of the most high keterampilan sebagai hasil belajar. Said to be the highest for skillfully solve the problem, someone will find a way to solve the problem at the same time find the answers to the problem. That is why the problem solving skills developed in the 21st century.

Description of the importance of planting problem solving ability above is not consistent with the results in the reality of education in Indonesia. It was indicated from the results of the PISA (Program for International Student Assessment) 2015, which measures the ability of mathematical reasoning, reading and science put the student's ability Indonesia ranks 63 of 71 countries to participate in the vote. (OECD PISA 2015 database). In the Indonesian science reasoning ability to be a key to occupy the second lowest score after the State Peru. These results are quite contrary to the mandate of teaching science or science that is written in Permendikbud No. 21 2016 on content standards mandated competencies students have higher level thinking skills.

Results contradiction also appears in the SDN Lakarsantri II / 473 Surabaya, based on the analysis lesson plan and interviews with some of the teachers at the elementary school, some of the findings of the author, among others, learning natural science is still conventional and no emphasis on learning to hone the skills of problem solving. Teachers only implement the lecture method in teaching and learning process. It affects not terangsangnya high level thinking skills of students in the elementary school and the low scores for students in solving problems. Whereas some models or creative learning methods that already exist can actually raises the possibility of learning that develops problem solving ability.

Based on interviews with high-grade teacher, writer find some problems that lead to teachers not to apply the learning that stimulate high-level thinking skills, including problem solving ability. First, the teacher had never seen or received training lesson plan development oriented towards problem solving. Second, teachers do not understand how to improve students' problem solving ability. Third, there is no one person gurupun the developing device or model that

can stimulate students have problem solving ability. Those things that make the author tried to find a model of learning that can stimulate students' problem solving ability so that it can serve as an example for other teachers at SDN Lakarsantri II / 473.

One model of learning that the author is a learning model SETS (Science, Environment, Technology, and Society). SETS approach is an integrated learning approach that involves elements of science, technology, environment and society (Musahir, 2003: 4). The learning model is an option writer because this model is in line with elementary school students learning approach that is thematic. There is a thematic continuity with this SETS approach that students will try to understand a concept or high-level thinking skills in a single unit instead of separately. In addition, this model has never been applied in SDN Lakarsantri II in the everyday learning process.

Several studies have been done to be tested with this SETS based learning model in schools. As research conducted Resni, Maya, et al. They conduct research using SETS approach to improve student learning outcomes Junior High School (SMP) State 3 Karanganyar. In his research, Resni found SETS learning approach can improve learning achievement of 46.88% to 81.25%. Additionally Revelation (2016) was also assessed using to improve problem solving SETS junior high school students. The aim of this research are: (1) describes the implementation learning based on SETS (Science, Environment, Technology, and Social) approach in SDN Lakarsantri II/473 Surabaya, (2) describe the obstacles that occur in the application of learning SETS (Science, Environment, Technology, and Social) approach in SDN Lakarsantri II/473 Surabaya, (3) describe the skills of problem solving students in the SDN Lakarsantri II / 473 after implementation learning based on SETS (Science, Environment, Technology, and Social) approach, (4) describe the response of students at SDN Lakarsantri II/473 after implementation learning based on SETS (Science, Environment, Technology, and Social) approach.

II. THEORETICAL FRAMEWORK

➤ SETS Approach

Approach to science, environment, technology, and society (SETS) is a learning or teaching of science and technology in the context of the real experience of human beings in an environment. Along the development of the information society continues to increase and the need for mastery of science, technology and its relationship to community life deeper, then SETS approach helps understanding the child. In this approach actually involve a child so as to improve understanding of the child in the learning process. SETS approach in view of the social sciences, providing an understanding of the links between science technology and society, to train learners penlaian sensitivity to environmental effects as a result of the development of science and technology (Poedjiadi, 2005).

According Widyatiningtyas (2009), SETS approach can provide a learning experience for the child to identify potential problems, collect data related to the problem, consider alternative solutions, and to consider the consequences of certain decisions based. SETS approach can condition students to be willing and able to apply scientific principles to produce work that is related to the technology with the thought to prevent possible negative effects arising from the emergence of technology products on the environment and society.

➤ Problem Solving Ability

According to Polya (Dhillon, 2016) is regarded as a problem-solving effort to find a way out of the difficulty to achieve a goal that may soon be resolved. Ruseffendi (1991) suggested that an issue that is a problem for a person if: first, the problem was not known. Second, students should be able to finish it, both mentally and knowledge readiness unprepared. Regardless than whether finally he arrived or not to answer. Third, it is a problem-solving something for him, when he is no intention to complete.

III. RESEARCH METHOD

This study uses a quantitative approach. A quantitative approach is more focused analysis research on numerical data (numbers) were processed using statistical methods. This type of research is quasi experimental study with nonequivalent control group design pattern.

O ₁	X	O ₂
O ₃	C	O ₄

Table 1:- Design Nonequivalent Control Group Design

Keterangan:

O₁ and O₂ : Initial test and final test in the experimental group

X : The experimental group (giving treatment using SETS approach)

C : The control group (teacher centered approach)

O₃ and O₄ : Initial test and final test in the control group

The population in this study is the fourth grade students of SDN Lakarsantri II / 473 Surabaya. The samples were defined in this study was grade IV A as the experimental group with number of 36 students and grade IV B as the control group with the number of 36 students.

The collection of data on research using tests and observation. Tests include bental achievement test with multiple choice questions. The observations were made for the observation of the students' social skills. Before analyzing the data, the researchers to test the validity and reliability test aims to determine the feasibility of an instrument. Data collected from the results of the instrument and then analyzed using normality test and homogeneity test. After the hypothesis test.

IV. RESULT AND DISCUSSION

➤ *Learning Implementation*

Observations implementation of learning in this study using sheets observer implementation of learning. Observation activities conducted to collect data implementation during the learning process. Observation involves two observers are Khusnul Khotimah, S.Pd., as an observer 1 and Juana, S.Pd., as an observer 2. Calculation observation learning implementation is 81%. The score is included in the criteria very well. It shows the teachers have carried out all the stages in the syntax SETS learning approach that aims to enhance students' problem solving ability.

The syntax has been implemented by the teacher are in accordance with the learning syntax SETS approach proposed by Poedijiadi (2010). It shows keterlaksanaan learning is very important because if one phase alone is not implemented by teachers will affect the learning activity itself. Benefits put forward any issues or problems in early learning can be memicipemikiran students so that students will attempt to solve it. This will create anatara interaction of students and teachers as well as the courage of students to talk to express their opinions.

According Aunurrahman (2013) through the learning process, teachers are required to be able to guide and facilitate the students so that they can understand the strength and the ability they have, to further provide motivation so that students are encouraged to work or study as possible to achieve success based on their abilities. From the data of average overall percentage of the activity obtained with 81% adherence to the criteria very well. The learning process is expected to occur by Aunurrahman (2013) is a process that can develop the potential of students overall and integrated. Development dimensions partially individuals would not be able to support optimal development of student potential as expected. For that, teacher in the learning process is not only required to convey the subject matter but must be able to actualize its strategic role in establishing the character of students through the development of personality and values that apply. This is in accordance with the opinion of Smitha & Aruna (2014: 54) that education is considered as a potential instrument for social change and the quality of education is determined by the effectiveness of teachers and teaching methods

According Sardiman (2014: 103) found in a study that should be no activity, because in principle that learning is done or learning by doing. Activity is the principle or principles are very important in the learning interactions. According to Nur and Wikandari (2000: 1) to learn more than just remembering. A student to really understand and can apply the knowledge they have to work hard to solve problems, find something and keep in touch with the idea

or ideas. The students' intellectual development occurs when students are faced with an interesting and challenging experiences in life that occurred in the neighborhood. For this reason, it can be concluded that with the implementation SETS approach can improve learning keterlaksanaan

Researchers conducted a feasibility test before the test instrument to analyze the research data. At this stage 6 item test problem solving ability is declared invalid if it is greater than rtabel rhitung. From the data analysis using SPSS version 21 showed that the aspects of social skills show 6 items declared invalid test

Aspect	r count	r table	Valid or Not
question item 1	0,638	0,349	Valid
question item 2	0,678	0,349	Valid
question item 3	0,647	0,349	Valid
question item 4	0,701	0,349	Valid
question item 5	0,660	0,349	Valid
question item 6	0,639	0,349	Valid

Table 2:- Test Result for Validity of Problem Solving Ability

Source: author processed data, 2019

After the test the validity of the matter is done, the next step researchers to test the reliability of the instrument about the evaluation of creative thinking. This is to determine whether the test instrument has been reliable or not. Reliabilias testing in a research instrument that has been trusted and reliable will produce reliable data as well. In this study, the reliability test twice to test aspects of the instrument of social skills and achievement test using Cronbach's alpha via a data processing SPSS program

Cronbach's Alpha	N of Items
,736	6

Table 3:- Test Result for Reliability of Problem Solving Ability

Source: author processed data, 2019

Based on Table 3, show that the problem solving ability test instrument has a value of 0.736 reliabilias. Thus, the problem solving ability test instrument has qualified that Cronbach's Alpha values greater than 0.6, so that the instrument is otherwise reliable.

➤ *Obstacles in Learning*

Learning barriers observation data is used to detect any activity considered to hinder the learning process based approach to SETS. Based on observations of the three observer, then obtained some barriers are shown in Table 4 below.

No	Description obstacle	Settlement advice
1	Observer 1 There are no significant obstacle	-
2	Observer 2 At the end of the study there were two students who are not paying attention and talking to his friends	- Students reprimanded by being told to conclude what has been learned
3	Observer 3 There are no significant barriers	-

Table 4:- Observation Data Obstacle in Learning

Based on observations obtained during the learning takes place hasinya that there is no serious obstacles related

to the implementation of learning. This bottleneck occurs in the behavior of the students themselves. It is at a time when teachers and students try to conclude the learning on that day, there were two students who did not pay attention to the direction of the teacher. They would instead be deep in conversation where the conversation is not related to learning Materi. Sehingga two students are asked to infer the learning that is already implemented. So it can be said that when using this SETS approach, there are no particular constraints related to the implementation of learning.

Normality Test is used to test whether the data were normally distributed or not. Testing normality Kolmogorov-Smirnov formula used with a significance level of 0.05 or 5%, using SPSS program version 21

Variable	Class	Value Significance	Level	Information
Problem Solving Test (Pretest)	Kontrol	0,156	0,05	Normal
Problem Solving Test (Posttest)		0,157	0,05	Normal
Problem Solving Test (Pretest)	Eksperimen	0,258	0,05	Normal
Problem Solving Test (Posttest)		0,381	0,05	Normal

Table 5:- Normality Test Result
Source: author processed data, 2019

Test for normality using Kolmogorov-Smirnov formula with 5% significance level of 0.05. If the significance value <0.05 conclusions berdistribusi data is not normal. However, if the significance value > 0.05 then the data is normally distributed. Based on Table 5 that all variables have a value of more than 0.05, so it can be stated that all normal berdistribusi research variables.

Homogeneity test was conducted to examine the similarity of some of the samples of this part. This homogeneity testing using Oneway ANOVA test using SPSS with the criteria if the probability of (P> 0.05), then the sample is homogeneous, whereas if probalittas (P <0.05), then the sample is not homogeneous.

Variable	Class	Value Significance	Level	Information
Problem Solving Test (Pretest)	Eksperimen	0,183	0,05	Homogen
	Kontrol			
Problem Solving Test (Posttest)	Eksperimen	0,993	0,05	Homogen
	Kontrol			

Table 6:- Homogeneity Test Result
Source: author processed data, 2019

Table 6 is the homogeneity test data using a 5% significance level of 0.05. Decision conclusion, if the significance value <0.05 then the variant data group is not homogeneous, and if the significance value > 0.05 then the variant data group is homogeneous.

In problem solving test variable (pretest) 0.183 significance value > 0.05, it can be said that the variable is homogeneous. In problem solving test variable (posttest) 0.993 significance value > 0.05, it can be said that the variable is homogeneous. From the results of which have

been described concluded that the data are homogeneous or have met the basic assumptions of homogeneity.

➤ *Problem Solving Ability Test*

Hypothesis test in order to answer the formulation of the problem and the hypothesis proposed in this study. Hypothesis test used in this study is using the t test. The t-test is required for testing the level of significance between each of the independent variables influence the dependent variable partially.

Class Type	Average	
	Pretest	Posttest
Kelas Eksperimen	72,56	82,63
Kelas Kontrol	72,68	79,05

Table 7:- Average Problem Solving Test Result

Source: author processed data, 2019

Variable	T	Df	Sig. (2-tailed)	Description
Problem Solving Test	2,457	70	0,016	H _a accepted

Table 8:- Test T

Source: author processed data, 2019

Table 8 shows the results of the analysis with the test sample T-test pada Independent problem solving ability test obtained by value t of 2.497. T tabel mengacu value in the formula $(\alpha/2)$; (df) together with $(0.05 / 2)$; (70), so that the value t table of 1.997. Based on the table above, the value of t count yaitu 2,457 ($2,457 > 1.997$) and the results sig. 2 tailed worth $0.016 < 0.05$, Means H_a acceptable because the value of t is greater than t table and values sig. 2 tailed less than 0.05. Thus, can be stated that there is an influence on use approach to science, environment, technology and society (SETS) problem solving ability of students to the fourth grade of elementary school. In this case, there is a problem solving perbedaan kemampuan students between the control and the experimental class class during a lesson.

Findings supports previous research by Nugraheni (2013) which states that the cognitive and affective learning achievement of students on SETS learning is better than learning by conventional approaches. The significant difference is obtained from learning approach to teaching and learning approaches non SETS SETS against cognitive learning achievement where better learning outcomes approach SETS. This is due to that berdasarkan characteristics and stages in SETS approach seemed that learners in the learning process not only learn the concepts of science, but also introduced to the aspects of technology, and the role of technology in society. Learning with pendekatan SETS able to make learners who learn to understand the significance of each element in the SETS and tend to perform real action. Inseparable relationship between science, environment, technology, and society is a reciprocal relationship that can be assessed the benefits and the disadvantages caused.

Characteristics SETS approach that involves the identification of problems, involvement diik active participant in the search for information that is used to solve a problem, an emphasis on process skills to solve problems. Six realm SETS approach that includes: concept, process, creativity, application of concepts, attitudes, and tend to take real action. SETS approach can be prefixed with simple concepts contained in the surrounding environment and daily lives of learners. SETS approach in education should reflect how to do and what can be reached by education. SETS approach education is not wishful thinking or on paper, but actually discuss something

tangible that can be understood, it can be seen and discussed and unbreakable way out. (Tessarani, 2016). The use of teaching methods and varied, the behavior of learners were positive, and the use of appropriate learning media in supporting the learning process itself.

The ability to understand the problem will be easier for students to give arguments on the question of the form of reasoning (Saadah, 2017:1747). This suggests that the ability of students to understand the problems in the experimental class or grade control has increased in every meeting. Improved experimental class can be considered good. That happens because the strategy of teachers in the use of problem-based learning with SETS using the contextual issues of environmental problems. It gives students the opportunity to understand the problems that are given by their teachers. Problems related to the daily life of students to enable them to understand and find solutions to it. Completion of the problem depends on the determination or understanding the problem correctly.

According Yoruk et al (2010: 7) in the journal entitled The effects of science, technology, society, environment (STSE) interactions on teaching chemistry that learning based approach SETS positive effect on the relationship between the learner and the real world, to encourage students to be more active, creative and critical thinking in providing solutions to a problem in the neighborhood staple. Students learn to better understand a topic in depth when compared with students who learn by conventional methods. SETS is expected to approach the students are becoming increasingly sensitive to the surrounding natural environment, considering Indonesia as a tropical country with a diverse wealth of natural resources.

Yager (1996: 66) states that one of the characteristics SETS approach is the emphasis on process skills in an attempt to solve the problem. In addition, the study by using SETS provide learning meaningful and relevant to students' lives. Students are also able to recognize problems and issues in the neighborhood. Learning to use SETS approach is expected to: (1) The learners used to having a holistic mindset (comprehensive) in view of the materials science as a science integrated with the environment, technology and society; (2) SETS can make learners aware that affect the rate of growth of science technology, and their impact on the environment and society; (3) with SETS students become more interested in learning the material as it is associated with the real things in everyday life, so as to obtain a deep understanding of knowledge. (Yulistiani, 2015). Thus, SETS approach can enhance problem solving abilities of students in science teaching in primary schools.

➤ Student Response

Hacyl student responses at the end of the process of learning science by the material properties of light and its relation to the senses of sight science, environment, technology and society (SETS) approach, student responses was conducted in the experimental class because only experimental classes who receive treatment to science, environment, technology and society (SETS) approach

From the collection of the questionnaire that has been given researchers with 5 grains of questions and two option choices. The percentage of students' responses point 1 is 93.98% and 6.02% of students happy students are not happy, item 2 with a percentage of 91.67% and 8.33% of students interested students are not interested, point 3 with a percentage of 92.36% and 7.64, and on point 4 with a percentage of 88.89 students voted yes and 11.11% of students choose not. On average students expressed interest to the learning process in which they live. The response of students is well above can improve and maintain student motivation in following a series of teaching and learning. Students' motivation determine the maximum learning results. Thus, the learning-based approach can lead to motivation SETS which will have a direct impact on students' problem solving ability itself.

Positive student responses to learning can be seen from the mastery learning students and the increase in the value of student learning outcomes. Positive student responses also ditunjukkan with active student activity during the learning process. Based on the analysis of the student's response concluded that student responses indicate a positive response to the SETS-based learning approach.

V. CONCLUSSION

Based on the findings of experimental research can be concluded that the experimental class after conducting learning by using SETS approach increased from pretest to posttest so SETS approach can be used to enhance the students' problem solving ability.

REFERENCES

- [1]. Aunurrahman. (2009). *Belajar dan Pembelajaran*. Bandung: Alfabeta
- [2]. Liliawati dan Puspita. (2010). Eektivitas Pembelajaran Berbasis Masalah dalam Meningkatkan Keterampilan Berpikir Kreatif Siswa. *Prosiding Seminar Nasional Fisika 2010*. Bandung: Universitas Pendidikan Indonesia.
- [3]. Musahir. (2003). *Panduan Pengajaran Kurikulum Berbasis Kompetensi Mata Pelajaran Biologi*. Jakarta: CV. Irfandi Putra
- [4]. Nugraheni, Agatha Asih. (2018). The Effect Of Science Technology and Society Models on Science Process Skills. *INFORMASI: Kajian Ilmu Komunikasi*, vol. 48 (2), pp. 213-227
- [5]. Nugraheni, Dian. (2013). Pengaruh pembelajaran Bervisi Dan Berpendkatan SETS Terhadap prestasi belajar Ditinjau dari kemampuan berfikir kritis kelas x SMAN 2 Sukoharjo pada materi minyak bumi tahun pelajaran 2011/2012". *journal Pendidikan Kimiaval*, vol. 2 (3), pp. 36
- [6]. Nur, M. & Wikandari, P. R. (2000). *Pengajaran Berpusat Kepada Siswa dan Pendekatan Konstruktivis dalam Pengajaran*. Surabaya: Unesa University Press
- [7]. OECD. (2016). *PISA 2015 Assessment and Analytical Framework: Mathematics, Reading, Science, Problem Solving and Financial Literacy*. OECD Publishing.
- [8]. Poedjiadi, A. (2005). *Sains Teknologi Masyarakat: Model Pembelajaran Kontekstual Bermuatan Nilai*. Bandung: Remaja Rosdakarya
- [9]. Riyanto, Yatim. (2007). *Metode Penelitian Kualitatif Dan Kuantitatif*. Surabaya: Unesa University Press.
- [10]. Ruseffendi, ET. (1991). *Pengantar Matematika Modern dan Masa Kini untuk Guru dan PGSD D2*. Seri Kedua. Bandung: Tarsito.
- [11]. Saadah, D. N., Sukaesih, S., & Wusqo, I. U. (2017). The Influence Of Problem Based Learning With Science, Environment, Technology, Society (SETS) Approach To Students' Problem Solving Skills and Environmental Awareness Character. *Unnes Science Education Journal*, vol. 6 (3), pp. 1744-1751
- [12]. Sardiman, A. M. (2014). *Interaksi dan Motivasi Belajar Mengajar*. Jakarta: Raja Grafindo Persada
- [13]. Smitha, E. T. & Aruna, P. K. (2014). Effect of Science Technology Society Approach on Achievement Motivation in Biology of Secondary School Students of Kasaragod District. *IOSR Journal of Humanities and Social Science*, vol. 19 (4), pp. 54-58
- [14]. Tessarani, Yutika. (2016). Pengaruh Pendekatan Science Environment Technology And Society (SETS) Terhadap Kemampuan Memecahkan Masalah dan Keterampilan Proses IPA Siswa SMP. *Jurnal Pendidikan Matematika dan Sains*, vol. 5 (4), pp. 1-9
- [15]. Widyatiningtyas, Revindari. (2009). *Pembentukan Pengetahuan Sains, Teknologi dan Masyarakat dalam Pandangan Pendidikan IPA*. *EDUCARE: Jurnal Pendidikan dan Budaya*. <http://educare.e-fkipunla.net>. Accessed 18 July 2019
- [16]. Yager, Robert E. (1996). *Science Technology Society As Reform in Science Education*. Albany: State University New York Press.
- [17]. Yoruk, N., Morgil, I. & Secken, N. (2010). The Effects of Science, Technology, Society, Environment (STSE) Interactions on Teaching Chemistry. *Natural Science*, vol. 2 (12), pp. 1417-1424
- [18]. Yulistiani. (2015). Penelitian Pembelajaran Berbasis SETS (Science, Environment, Technology, and Society) dalam Pendidikan Sains. *Jurnal Formatif*, Vol. 5 No. 1