THE EFFECTIVENESS OF DEVELOPMENT OF SCIENCE TEACHING MATERIALS WITH VISION OF SCIENCE, ENVIRONMENT, TECHNOLOGY AND SOCIETY (SETS) IN THE NATURAL RESOURCE COMPETENCY CLASS IV OF ELEMENTARY SCHOOL

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ABSTRACT

The aim of this study was to develop science teaching material that feature Science, Environment, Technology, and Society (SETS) vision which covers some criteria namely effective. The study employed Research and Development (R&D) design. The R&D four steps were simplified in to three steps, those were define, design, and develop. The subject of this study was fourth grade Elementary School of SDN Kalibanteng Kidul 03. The techniques of data collections were interview, test, observation, and questionnaire. In analyzing data, the study used descriptive qualitative and quantitative. The result of the developed printed material was effective: 1). The result of study, 2). Increasing the result of study 3). Teacher's activity, 4). and Student's activity. Based on the result of this study the learning material has reflected the SETS vision and approach. As such, the science teaching material developed has been justified as effective. Therefore it can be used for extended study to produce a much better product as the supplement for learning science in the competency of natural resources.

Keywords: Effective, The development of science teaching material SD, SETS approach

Teaching materials are all the things that can be used to channel the teaching matarials, mind stimulation, thinking and feelings, attention and ability of learners, so that it can encourage the process of learning (Rusman, 2010). The highly technical training material with too many terms to memorize directly can make learners get tired quickly. teaching matarials links contextual learning. In other words, it should be linked between the concept of science and the environment beside that it should be supported by the drawing and attractive skills that is arranged for an effective learning process (Rosario, 2009). If the Collaboration between elements of the material with the environment will not be appropriate it will affect the meaningfulness of learning for learners. Collaboration that is incompatible with active elements in the environment can greatly affect the process of meaningfulness of learn in learning, affecting cognitive and metacognitive characteristics of proses itself (Viola, S 2007). Science studies in Elementary School aims to learners to have the following abilities; (1) To gain belief in God Almighty based on the existence, beauty and order of the nature of his creation, (2) To develop knowledge and understanding of useful and applicable IPA concepts in everyday life, (3) Developing curiosity, positive attitude and awareness of a mutually influencing relationship; between IPA, enviroment, technology and society (4) Develop process skills to investigate the environment, solve problems and make decisions, (5) increases awareness to participate in maintaining, preserving and preserving the nature and environment, (6) Increases awareness to respect nature and its regularity phenomena as one of God's creations, (7) Obtain knowledge of science concepts and skills as the basis for continuing education of junior high schools/ MTs (Depdiknas, 2006).

Teaching materials are a source of learning, which is everything that allows learners gain some in-formation of knowledge, experience, and skills in the process of learning and teaching. While the selection of teaching materials with SETS approach is based on the needed factor of teaching materials which is still very minimal to be developed and less varied, with using of teaching materials with SETS approach expected from learners to understand the concept that delivered and understand the impact of the process being studied both for the environment and her/his self. The compilation of this instructional material will affect the complexity of the non-teaching materials obtained by learners in each learning, thats why it is necessary to develop teaching materials in accordance with contents and contextual standards. This association is known as science learning Science, Environment, Technology, And Society (SETS). SETS provides the opportunity to learn about the nature of science, technology, and its interrelationship with the environment and society. Basically it can be said that through the SETS approach it is expected that learners will have the ability to see things in an integrated way by paying attention to the four elements of SETS, thus gaining a deep understanding of their knowledge (Binadja, 1999). Basically in human life, the elements of science, environment, technology, and society are related to each other. This reinforces the statement that learners learn as a provision to live in society. Learners must live sociel and as part of the community they must interact with nature. From learning, learners recognize the concept of nature which is known as science and used to fullfil the needs in the form of technology to gain easnies or usefulness in the process of life of individuals and society. Through this research, it is expected that teaching about natural resource materials can help learners to clarify their conceptual concepts in the real world, to really understand the phenomena that occur in the environment, be able to understand the living environment, useful for their life and apply the result of acquisition of knowledge which of course still be with teacher guidance. Through learning activities learners are expected to think critically, under any circumstances.

The effectiveness of printed materials is in one way with the research of Rusilowati (2009) draws the following conclusion: that the use of natural mindedness learning tools with the vision of SETS integrated in science is developed effectively to explore natural disaster and science. This can be seen from the completeness of learning at the end of lessons, as well as increased understanding of science and natural disaster.

The above activities have been conducted by Saputro (2011) with the title Influence of POE approach with vision of SETS on the subject of redox reaction to learning outcomes of class X students at Home Schooling Kak Seto Semarang 2010/2011 academic year. The results concluded that the average learning outcomes of the experimental class were 89.9, while the control class was 75.3. The result of data analysis shows the influence of the use of POE with vision of SETS on chemistry lessons result. The concept of redox reaction of learners is shown by the correlation number of 0.602, with the influence of 36.24% for learning outcomes, while the psychomotor aspect of learners practicum is 9.85 affective aspects of learners is 140, 1825 and the aspect of the learners activities is 43, 175.

The effects of development also affect the way the natural science subjects are taught. Learning can be explained through science, technology, society and environmental education approaches (STSE). Lessons are not enough to be done in the classroom but

there is a need for time extension to complete the tasks related to the environment and society outside of study time (Yoruk, 2009).

Based on the observations made by researcher specailly at SDN Kalibanteng Kidul 03 Semarang, that SETS is a learning approach that connects the environment, technology, and society, this approach is well known but not fully implemented. Natural resource science teaching materials are materials related to nature and everyday life. Another problem is the priority of lessons on the target of completing all the materials of the subject without connecting it with daily life, eventually it cause the low result of learning of learners. The next problem is the lack of primary school teachers' efforts to develop good teaching materials.This becomes a classic problem, and it needs to endeavor the pursuit of encouragement and motivation from various parties. Because there is nothing wrong if the teacher tries to develop teaching materials that meet the criteria of teaching materials grade IV Primary School.

From the above problems, it needs solution in order to minimize problems that arise in the learning process, one of them is with the development of teaching materials IPA vision of SETS. The grade IV Primary School developed teaching materials will be an important source and reference for learners. Based on the above background, the writer is interested in conducting research entitled "Development of Science Teachings matariels based on SETS in Natural Resource Competence of Class IV Primary School". The purpose of this research is to produce effective printed science material of SETS in natural resource competence for class IV of elementary school.

METHOD

The research method used in this research is Research and Development (R & D). The product developed and examined in this research is a textbook of printed material that contains teaching material of science seminar SETS class IV of elementary school. The research procedure used a simplified 4-D model (Four D model) to 3-D (Three D model). The 3-D model consists of three stages.

RESULTS

The results of the 4-D model are to define, design, develope and disseminate but are simplified by only three stages. This research and development aims to produce printed IPA material with vision of SETS on effective natural resource material.

Define stage (Defining)

The results of the define stage based on the interviews indicate that the teaching materials used are just the handbook from the government and the teachers are very willing to develop teaching materials SETS approach because in SDN Kalibanteng Kidul 03 has never been development of teaching materials with vision of SETS so they don't know about this approach. The result of observation of requirement analysis toward the development of IPA printed science material with vision of SETS in grade 4 elementary school natural resource competence that the teacher has not used syllabus, RPP, LKPD and teaching materials with vision of SETS.

Design stage (Design)

The developed teaching material is a science-printed textual material SETS in the competence of natural resources. The design stage is derived from the initial information on the required analysis at the define stage. Steps of the design stage is to design learning strategies and develop research instruments. the developed Learning strategy useses SETS approach related to natural resource competence. Results of first analysis. There is no printed material that applies the SETS elements to the printed material. The steps in designing instructional materials are; 1) the definition of the title, 2) guidance on the content of the study, 3) the basic definition of the indicator material, 5) designing the support contents, 6) the exercises, 7) designing the work instruction, 8) arrange the glossary and 9) arrange evaluation.

The next step is to compile the data instruments of the effects of printed materials consisting of; a) test questions and b) observation sheet of learners activity and observation of teacher activity. Printed materials that have been designed in accordance with the validation sheet of printed materials, then the researchers determine the validator.

Develope stage (Development)

This development stage is obtained from the activities of learners, teachers activity, improvement of learning outcomes and learning outcomes of learners which is given at the end of lessons is in the form of a matter of posttest. Posttest is given after the discussion of the material.

Discussion

This study aims to produce printed teaching materials IPA Visionary SETS in Competence of Natural Resources Class IV of Primary School which is effective. The developed teaching materials are implementing SETS elements (science, environment, technology and society). Design stage researchers that contrive learning strategies and arrange the instruments needed in conducted research. The learning strategy used is a learning strategy that implement the SETS vision designed with Lets Plan Vegetable Movement. The next step is to design a printed teaching material that implements SETS. Printed teaching materials are prepared so that learners know and be able to apply in daily life. Information and content materials which are made interesting, are easy to understand and learners can learn.

This research, according with its objectives, produces printed teaching materials IPA Visionary SETS in competence Natural Resource class IV in Primary School which is efective. The developed teaching material make efforts to implement the SETS vision (science, environment, technology and society). Printed teaching materials structured so that learners know and be able to apply the science that learned in daily life. Information and material contents thst have been made interesting, are easy to understand and can be learned.also provided instructions for the use of the book so that learners get easy to use it. At the end print teaching materials are available in content glossary or a small dictionary that contains important terms. The size of printed teaching material is designed so that learners easily carry it and easily inserted into the bag. The teaching material is printed using B5 paper (17.6 cm x 25 cm) consisting of 73 pages.

The effectiveness of printed science teaching materials IPA in vision of SETS

The effectiveness of printed teaching materials can be seen from learning outcomes, improvements in learning outcomes, activity of teacher and students activity. The instrument which is used to measure learning outcomes and increase learning outcomes is a matter of test. Learning outcomes were analyzed using one sample t test while improvement of learning outcomes was analyzed using the N <gain> test. Success criteria if there are at least 23 students who completed or scored above the KKM, which is 70 and improvement of the results of learning in the medium category. Activity of teacher and activity of learners is obtained from observation sheet instrument of activity of teacher and learner. Teacher activity and learner activity were analyzed using descriptive statistic which then consulted with indicator on the mentioned instrument. Learners activity are said succeed if there are at least 23 students in the high category.

Analysis of learning outcomes of learners showed pretest value obtained there are 9 out of 30 learners who score> 70 . Complete learning outcomes pretest control class can be found it 8 out of 30 learners who score> 70. The result of pretest data test can be seen that the data is normal distributed, homogeneous and there is no difference between the experimental class, thus it can be known that both classes at the beginning of the research have the same ability. Normality test results show Significant value .control class and experimental class on column Kolmogorov-Smirnova is 0,200 and 0,82 if in consult with α = 0,05 then Significant value control class = 0,82> α = 0,05 and Significant value experiment class = 0,200> α = 0.05 so it can be concluded normal distributed data. The homogeneity test of pretest data shows acquisition significant value of 0.235> α = 0,05 which means both classes, that is experiment class and control class have equal or identical variance. The result of basic assumption test (normality and homogeneity test) is used as the basis for performing the test of average difference (independent sample test) to know the two classes have differences or not. T test done to know completeness of result of learning. The result of one sample t test shows that the price of t count is 6.74> t table = 1,729 thus H0 is accepted and Ha is rejected. So it can be concluded that the number of learners who scored 70 is true. The next analysis is the analysis of posttest data. The step of analysis to posttest data, that is determining both class have normal distribution and have the same variance with assumption test base normality test and homogeneity test, furthermore to know difference of result of study conducted by independent sample test . Normality test results show Significance value. control class and experimental class on column Kolmogorov-Smirnova is 0,165 and 0,158 if in consult with α = 0,05 then value Significant control class = 0,165> α = 0,05 and value Significant experiment class = 0,158> α = 0,05 so that it can be concluded normal distributed data. Homogeneity test showed significant value of 0.235> α = 0,05 which means that both classes, that is experiment class and control class have equal or identical variance. The results of the difference test in posttest data show acquisition significant . (2-tailed) 0.000 <0.05 so it can be concluded that the average difference test results in the posttest data shows that the ability of the control class learners are different or not the same with experimental classes . The exhaustiveness of the experimental class learning outcomes shows the lowest score of 57 highest score of 90 the average score 79 and the total number of learners completed (KKM 70) as many as 26 students.Completeness data of control class learning outcomes showed the lowest score 47 highest score 87 average score 70 and total number of learners complete (KKM 70) as many as 17 students. Complete analysis of learning outcomes can

be said to be complete because the number of students who completed the experiment class 26> 23. Exhaustive test of learning result using one sample t test. T test done to know completeness of learning outcomes. The result of one sample t test shows the price of t count 6.74> t table = 1.729 thus H0 is accepted and Ha is rejected. So it can be concluded that the number of learners who scored 70 is correct.

Increased learning outcomes of both classes were measured using the test n <gain>. The increase result of the experimental class learning result obtained score <g> = 0,40 in medium category and control class <g> = 0,15 in low category. Increased learning outcomes are said to be successful if the score is obtained at least in the medium category. The result of the effectiveness test printed learning materials can be concluded effective, can be seen from the test result of learning there are 23 learners complete, gain score 0,40 in medium category and test one sample t test show t count 6,74> t table = 1,729.

The next effectiveness indicator is the activity of the learner. The activities of learners are the behaviors that appear to be observed when the research activities. The result of observation students activity that get score in high category at meeting I is 28, meeting II is 29 and meeting III is 29. The observation of learners' activity shows a very high score in line with the characteristics of learning visionary SETS. According to Binadja (2000:6) a number of characteristics of learning the vision of SETS is; (1) keep teaching science; (2) Learners are brought to a situation to utilize the concept of science to the form of technology for the benefit of society; (3) learners are asked to think about the possible consequences of the transfer science to technology; (4) learners are asked to explain the interrelationships between the elements of science discussed with other elements in the SETS that affect the interrelationship between the elements when changed in the form of related technology and (5) In the context of constructivism learners can be invited to talk about SETS of various the starting point depends on the basic knowledge held by the learners concerned.

The last effectiveness indicator is teacher activity. Teacher activity was observed through teacher activity observation sheets. Teacher activity observed from pre-activity, introduction, core activities, closing activities, approaches and learning strategies, use of learning resources, learning, process assessment and learning outcomes and language usage. The observation result of teacher activity during three meetings obtained scores in sequence, namely; 34; 35; 35 with an average score of 34.7 included in the range ($29 \leq Sa < 38$) with a very good category.

SETS visionary learning is a vision or perspective toward a problem. The vision of SETS is very suitable with the developed material, which is the material of natural resources. Teachers invite learners in solving problems based on the elements of science, technological environment and society. In addition, learners are facilitated and invited to practice it with movement activities lets plant vegetables. the movement activities of lets plant vegetable implemented in the environment around the school, learners are invited directly apply the elements of SETS, that is 1) learners learn what plants will be planted, 2) learners identify the impact and what prerequisites are required in accordance with environmental conditions, 3) learners identify the technology that used in cultivating and 4) the influence of vegetable growing activities on the school environment.

The above lessons are very suited for developing process skills in learners associated with SETS. Learning in the context of SETS as in STS learning begins with the discovery

of problems and then uses the environment and society as learning resources and active learners in solving problems (Yager, 2009).

Learning is not sufficiently implemented in the classroom, but requires new experiences in improving learning outcomes. Learning should be carried out with multiple senses as Howard Gardner points out in (Armstrong, 2005) eight basic intelligences are (1) linguistic smartness, (word smart) (2) logical-mathematical intelligence (numbering smart), (3) spatial intelligence (picture smart), (4) kinesthetic intelligence (body smart), (5) musical intelligence, (Musical smart) (6) personal intelligence (people smart), (7) intra personal intelligence (Self smart), (8) naturalist intelligence (naturalist smart). Learners need the facilitiy to express thier intelligence. The movement activities of let's plant vegetables by students in this research is a motor activity that can increase cognitive and affective values. Learners are asked to identify ways of farming and then take care of it and invited to have a caring attitude towards the environment. Vegetable planting activities along with their maintenance train students discipline. For example, students regularly watering and fertilize, cleaning plant weeds filling the maintenance table is an example of activities that build the character of discipline. GAMeS is an environment-based learning that is associated with SETS elements. Randall (1999) argues that environmental education focuses on helping learners in developing knowledge and skills and responsible attitudes.

CONCLUSION

Development of Instructional Materials Printed IPA Visionary SETS in Natural Resources Competency Class IV Primary School declared effective: 1) print teaching materials can be concluded effectively, can be seen from the test results of learning there are 23 learners are thorough. 2) The increase result of the experimental class learning result obtained score $<g> = 0,40$ in medium category and control class $<g> = 0,15$ in low category. Increased learning outcomes are said to be successful because the scores are obtained in the medium category. 3) The next effectiveness indicator is the activity of the learner. The result of observation students activity that get score in high category at meeting I is 28, at meeting II is 29 and meeting III is 29. Observation result of learners' activity showed very high score in line with the characteristics of learning visionary SETS. 4) The last effectiveness indicator is teacher activity. Teacher activity was observed through teacher activity observation sheets. Teacher activity observed from pre-activity, introduction, core activities, closing activities, approaches and learning strategies, use of learning resources, learning, process assessment and learning outcomes and language usage. The observation of teacher activity during three meetings obtained scores in sequence, namely; 34; 35; 35 with an average score of 34.7 included in the range ($29 \leq$ Sa <38) with a very good category.

CONCLUSION

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