

EFFECTIVENESS OF STUDENTS ACTIVITY WORKSHEET BASED ON *CONTEXTUAL TEACHING AND LEARNING* TO IMPROVE STUDENT'S ABILITY IN CONCEPT UNDERSTANDING

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Abstract

This study aims to analyze the effectiveness of Student Activity Worksheets to improve students' ability in concept understanding in the Earth Layer Material. This research was conducted using One Group Pre-test and Post-test Design. The developed worksheet consists of three sub-layers of the earth's layers, namely the atmosphere, lithosphere, and hydrosphere. The results of effectiveness Student Activity Worksheets in improving student's understanding ability can be seen through increasing student n-gain and n-gain cognitive processes of understanding ability used. The results showed that 22 students obtained n-gain in the highest category and 9 students obtained n-gain in the low category. There are five cognitive processes of the understanding ability got n-gain with a high category, namely interpretation, exemplifying, classifying, summarizing, and comparing. The two cognitive processes of understanding ability got n-gain with the moderate category are inference and explanation. Based on the results of the study it can be concluded that Student Activity Worksheets (LKS) based on Contextual Teaching and Learning was effective to improve students' ability in concept understanding in the Earth Layer Material.

Key Words: Students Activity Worksheet, Contextual Teaching and Learning, Concept Understanding

INTRODUCTION

The 21st century is an era of science and technology where scientific knowledge has grown exponentially and technology has grown rapidly. The effect can be seen clearly in all aspects of life. Science education plays a key role for the future of society. Globally, countries continue to strive to improve the quality of science education, especially developing countries

Law Number 20 of 2003 about National Education System states that the purpose of education is to develop and shape dignified character and national civilization in order to educate the nation's life, aiming at developing potential students to become human believers and devoted to the Almighty God, having noble character, being healthy, knowledgeable, capable, creative, independent, and being a democratic and responsible citizen. Based on the law, it can be understood that education is intended to develop the potential of students and skills that can be used in living

life in society, nation and state. The government continues to make efforts to improve the quality of education in Indonesia, one of the ways is through improving the curriculum

The curriculum applied in Indonesia today is Kurikulum 2013. Learning process in the Kurikulum 2013 emphasizes learning that is able to develop student creativity and student-centered. In addition, the Ministry of Education and Culture (Kemendikbud) emphasizes that the Kurikulum 2013 also mandates to encourage students to be better able to make observations, ask questions, reason, and communicate about what they get or know after receiving learning material (Kemendikbud, 2014).

Students' abilities related to aspects of knowledge, reason or mind entered into the cognitive domain. Bloom (in Dimiyati, 2009) divided the cognitive domain into six levels or categories, namely knowledge, understanding, application, analysis, synthesis, and evaluation. The ability to understand certain material learned is included

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in the understanding category. At the level of understanding, students are required to be able to answer questions in their own words and by giving examples related to principles or concepts. In science learning there are many concepts that must be learned, but these concepts should not be a problem for students because science is very much found in everyday life. According to Wollfold & Nicolish (2004) understanding concepts is the ability of students which not only understand, but also can apply the concepts given in solving problems, even to understand new concepts

Based on the results of interviews with the science teacher of grade VII A at SMP 2 Menganti Gresik said that the level of concepts understanding of VII A students was considered to be lacking. Middle Exam Results showed that 70% of students in VII A class have not reached the completion limit. Observations made by researchers to determine the level of student's ability in conceptual understanding in VII A class gave the results that students' abilities in interpretation aspects (interpreting) is 7%, students' abilities in exemplifying aspects were 26%, students' abilities in classifying aspects is 16%, students' ability in summarizing aspects is 40%, students' abilities in inferring aspects is 35%, students' ability in comparing aspects is 11%, and students' abilities in explained (explaining) aspects is 25%. Based on the results of observation data, it can be seen that the students' ability in concept understanding in class VII-A is still very low.

Besides doing observations by using students' understanding test, researchers also gave questionnaires to respondents regarding the process and learning media that used during science lessons. Based on the results of the questionnaire, it is known that students have never been given a learning device such as Student Activity Worksheet (LKS) by the teacher during the science learning process in the classroom, students also never do lab work and make presentations. The Science teacher in class VII-A said that so far the science learning process only used the 2013 Curriculum Science package.

There must be an effort made by the teacher so that the concepts accepted by students become even better. Based on the facts obtained in the field, there needs to be a learning tool that can help students to improve their understanding ability of science concepts, such as using an Student Activity Worksheet (LKS). According to the Ministry of National Education (2008) the purpose of providing LKS is to provide opportunities for students to play an active role and help students to develop and find concepts through science process skills, and also as a guide for teachers and students in the learning process. LKS can be used as a guide or steps in the activities of experiments, demonstrations and

discussions. In general, LKS is a translation or development that comes from student books. The results of the questionnaire distributed to respondents stated that 89% of students agreed that science learning uses LKS to improve their cognitive abilities.

The student activity sheet (LKS) to be used also requires a suitable approach to be able to improve students' cognitive abilities. One approach that can be used is the Contextual Teaching and Learning (CTL) approach. The CTL approach is a learning approach that links the conditions of everyday life with the concept of learning. According to Sanjaya (2006) with learning using the CTL approach, educators are expected to be able to associate the learning material they teach with real-world situations of students to encourage students to make a connection between their knowledge and application in their daily lives by using seven main components of CTL learning : (1) constructivism, (2) asking, (3) inquiry, (4) learning society, (5) modeling, (6) reflection, and (7) authentic assessment. Murdianti (2011) also revealed that contextual-oriented learning is expected by students to be able and accustomed to discovering their own concepts in the material being studied.

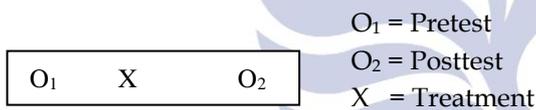
Based on the review of learning topics in Kurikulum 2013, one of the material that need learning resources like a Student Activity Worksheet (LKS) to help students' concepts understanding is the structure and layers of the earth topic. These topics are in VII class in Basic Competencies (KD) 3.10 Describe the earth layer, volcanoes, earthquakes, and risk reduction actions before, during, and post-disaster according to the threat of disasters in the area and KD 4.10 Communicate efforts to reduce disaster risk and impact nature and actions to save themselves in the event of a disaster in accordance with the type of disaster threat in their area. This topic was chosen because on this topic, students are required to understand the layers of the earth which consist of atmosphere, lithosphere and hydrosphere. The Concepts that students must understand in the earth layer material include Explaining the Earth's atmosphere, comparing the layers in the atmosphere, giving examples of activities that occur in the atmospheric layers, concluding the causes of holes in ozone, explaining the lithosphere's earth layer, summarizing tectonic theories plate, describes the process of recycling water, interpreting the evaporation and condensation process, classifying the water recycling cycle. This material can not be separated from the environment of students, through asking questions, learning communities, giving modeling, reflection, finding and constructivists as well as authentic assessments, students will be encouraged to find concepts on the topic by themselves.

Some of the research that has been carried out regarding the use of the Contextual Teaching and Learning approach in learning showed a positive impact on students, including the Research by Khaefiatunnisa (2015) showed that using modules based on CTL can improve students' reading skills. This can be seen from the calculation of the t-test in SPSS 17.0 for windows which shows that the experimental group's post-test score increased significantly than the control group's score. The results of the interviews also showed that students get many benefits through the use of CTL in classroom activities, including helping students get a better understanding of the material through various media used in the learning process; motivate students to learn because they can share knowledge and work together in completing assignments.

Based on the background, the researcher will conduct a study on earth layer material with the research title "Effectiveness of Student Activity Worksheets Based on Contextual Teaching Learning to Improve Students' ability in concept understanding".

METHODOLOGY OF RESEARCH

The research design used in the study was One Group Pretest-Posttest Design. The design is presented as the following:



Before the study about effectiveness Student Activity Worksheet based on CTL was conducted, the developed Student Activity Worksheet based on Contextual Teaching and Learning was declared valid by 3 expert validators. Effectiveness of Student Activity Sheets based on Contextual Teaching and Learning is done using the pretest and posttest. The object used in this study was VII-A class which amount to 31 students of 2 Junior High School Menganti Academic Year 2018/2019.

Data collection technique used to determine the effectiveness of Student Activity Worksheet is written test technique. This technique is used to obtain data on the results of the improvement in the students' understanding ability before and after participating in learning treatments using Student Activity Worksheet (LKS) based on Contextual Teaching and Learning. The test sheet consists of questions that contain 7 cognitive processes the concepts understanding ability namely interpreting, exemplifying, classifying, summarizing, inferring, comparing, and explaining.

The data analysis technique used is the analysis of the results test of the students' ability in understanding. The analysis of the results of the test to improve the students' ability in concept understandings was obtained from the results of the pretest and posttest. To calculate the value obtained by students, you can use the equation below:

$$\text{student scores} = \frac{\text{score obtained}}{\text{Maximum Score}} \times 100$$

The improvement in the students' ability in concept understanding was analyzed by the gain score <g> from the results of the pretest and posttest, then compared with the Gain criteria proposed by Hake (1999). The gain score <g> can be formulated as follows:

$$<g> = \frac{\text{posttest} - \text{pretest}}{100 - \text{pretest}}$$

Then do calculations using that equations, the scores obtained by students will be converted based on the following category:

Tabel 1. N-Gain Score Category

Skor	Category
0,0 < (<g>) ≤ 0,3	Low
0,3 < (<g>) ≤ 0,7	Medium
0,7 < (<g>) ≤ 1,0	High

Student Activity Worksheets based on Contextual Teaching and Learning are declared effective to improve students' ability in concept understanding when getting N-gain with a score of > 0.3 and with a medium or high category.

RESULTS AND DISCUSSION

The Effectiveness of Student Activity Worksheets based on Contextual Teaching and Learning in the Earth Layer material can be seen from the results of the students' ability in concept understanding in the earth layer material there is an increase or not. The results of the improvement in students' ability in concepts understanding are seen from the increase in students pretest scores before the learning process by using LKS based on CTL and the posttest scores given after the learning process using Student Activity Worksheet based on Contextual Teaching and Learning.

The learning process with student activity worksheets based on CTL using cooperative learning models. according to Arends (in Nurdyanto, 2017) the advantages of cooperative learning models are that students work in groups cooperatively to complete their learning material, groups are formed from students who

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have high, medium, and low abilities, and are more group oriented than individuals

The pretest and posttest questions given to students consist of 10 multiple choice questions and 5 essay questions. These questions include indicators of 7 cognitive processes of understanding. The data on pretest scores and posttest scores obtained can be seen in Table 2.

Tabel 2. Analysis Pretest-Posttest score

Siswa	Score		N-Gain	Category
	Pretest	Posttest		
S1	26	96	0.9	High
S2	48	96	0.9	High
S3	22	88	0.8	High
S4	22	92	0.9	High
S5	4	78	0.8	High
S6	24	68	0.6	Medium
S7	20	78	0.7	Medium
S8	26	80	0.7	Medium
S9	22	90	0.9	High
S10	30	84	0.8	High
S11	6	80	0.8	High
S12	16	78	0.7	Medium
S13	20	88	0.9	High
S14	26	96	0.9	High
S15	26	82	0.8	High
S16	20	88	0.9	High
S17	26	70	0.6	Medium
S18	14	96	1.0	High
S19	22	92	0.9	High
S20	22	84	0.8	High
S21	20	96	1.0	High
S22	20	94	0.9	High
S23	16	78	0.7	Medium
S24	30	92	0.9	High
S25	32	78	0.7	Medium
S26	20	74	0.7	Medium
S27	18	82	0.8	High
S28	34	98	1.0	High
S29	30	98	1.0	High
S30	40	96	0.9	High
S31	26	78	0.7	Medium

The students' concept understanding ability that will be improved using Student Activity Worksheet (LKS) based on Contextual Teaching and Learning consists of 7 cognitive processes understanding, namely interpreting, exemplifying, classifying, summarizing, drawing inference / inferring, comparing, and explaining. This is based on Anderson and Krathwohl (2010) who suggested that, "... understanding categories include

seven cognitive processes, including: interpreting, exemplifying, classifying, summarizing, drawing inference / inferring, comparing, and explaining.

The table below is an increase in n-gain in each cognitive process of the concept understanding ability:

Tabel 3. Analysis *N-Gain* In Each Cognitive Process

Proses Kognitif	Pretest	Posttest	N-Gain	Kategori
1. Interpreting	24%	89%	0,9	High
2. Exemplifying	26%	94%	0,9	High
3. Classifying	19%	94%	0,9	High
4. Summarizing	46%	88%	0,8	High
5. Inferring	42%	84%	0,7	Medium
6. Comparing	15%	88%	0,8	High
7. Explaining	16%	79%	0,7	Medium

According to Rustaman (2005) concepts understanding is very important in the learning process. Through concept understanding, students can improve their intellectual skills and help in solving existing problems and lead to meaningful learning. Based on research conducted by Susialita (2016) producing handouts in the form audio-visual worksheets based on Contextual Teaching and Learning effective to improve the understanding of fourth grade students in science lessons. The results of the effectiveness analysis of all subjects obtained t count (7,510) > t table (1,694).

Student Activity Worksheets developed to help improve students' ability to understand concepts are Student Activity Worksheets based on Contextual Teaching and Learning. According to Suprijono (2009) in essence CTL is a concept that helps teachers associate the material they teach with real world situations and encourage students to make connections between the knowledge they have and their application in their lives as family members and society. CTL learning as an approach has 7 principles or components that underlie the implementation of the learning process, namely constructivism, asking questions, modeling, finding, learning society, reflection, and authentic assessment (Sanjaya, 2016).

Constructivism emphasizes the building of one's own understanding actively, creatively, and productively based on prior knowledge and knowledge and from meaningful learning experiences (Muslich, 2011). Through the CTL constructivist principle, students are expected to be able to understand the material in the explained cognitive process, because students will learn more easily by finding their own knowledge, so that they can more easily understand and explain the knowledge

gained. Students can also relate knowledge gained with examples of application in daily life (exemplifying). Students will be facilitated in terms of exemplifying the existence of constructivist CTL principles, because students have found a lot in real life. According to M. Hosnan (2014) Learning activities are packaged into a process of constructing knowledge so that learning starts from what students know. It is expected that students are able to find new ideas and knowledge (concepts, principles), apply ideas, then learners look for effective learning strategies to achieve competence and provide satisfaction with discovery.

In learning process using student activity worksheets based on CTL that have been done, the teacher does not simply convey information but provokes students to find themselves. Through the principle of CTL, namely asking, helping students cognitive processes summarize because with these questions can help students to summarize the material obtained. Therefore, the role of asking is very important as a way for teachers to guide and direct students to find every material they learn (M. Hosnan, 2014)

Three Student Activity Worksheet based on Contextual Teaching and Learning used are equipped with CTL modeling components for students, namely in the form of an inquiry design, procedures for implementing activities and material tools needed to carry out finding activities. Through the activity of finding, students produce their own findings and then will compare ideas or observed objects. This is related to understanding students' indicators comparing

Students will also analyze the data obtained in groups after finding the results of the investigation. Through the principle of the learning community, students will conduct an analysis by answering questions to help understand the concept of earth layer material. Learning that is done in collaboration also makes it easier for students to solve problems and determine what belongs to the category (classifying). According to Muslich (2011) finding is a core part of learning activities based on CTL. This activity begins with observations of phenomena, followed by meaningful activities to produce findings obtained by students themselves. The knowledge and skills students acquire are not the result of remembering a set of facts, but the results of finding themselves.

Student Activity Worksheet based on Contextual Teaching and Learning that was developed has been completed with reflection activities at the end of the activity, namely reviewing the concepts that have been obtained during the learning process. According to Sanjaya (2016) reflection is the process of deposition of experiences that have been learned by reordering the

events or learning events that have been passed. In CTL learning, each end of the learning process, the teacher provides opportunities for students to reflect on or recall what they have obtained. Through reflection activities, students can improve understanding of material that has been studied with inference indicators or inferring.

Authentic assessment will be carried out by the teacher when the learning process is then used to give rewards or rewards to students based. During the learning process, each group will be assessed based on the learning assessment sheet as an authentic assessment. The purpose of giving rewards or awards so students are more enthusiastic to improve their achievements. Ngilim Purwanto (in Martha, 2016) explains the purpose of giving rewards is to educate children so they can feel happy because their deeds or work get an award. In addition, the purpose of giving rewards is also to increase students' willingness to improve or enhance their achievements.

Based on Table 2 the results of the N-Gain analysis for each student obtained results as many as 22 students included in the high category and 9 students included in the medium category. Through the results of the pretest and posttest it can also be seen that the ability to understand the concepts of each cognitive process as shown in Table 3. Five cognitive processes of concepts understanding improved obtain N-Gain with a high category, namely interpreting, modeling, classifying, summarizing, and comparing. The remaining two get the medium category, namely inference and explanation. This shows that LKS developed as a learning tool can help improve the students' ability in concepts understanding. Hake (in Fanani, 2018) states that the feasibility of LKS based on effectiveness can be said to be feasible if it gets an N-gain score of > 0.3 in the medium category.

Increasing the students' ability in concept understanding is supported by the learning process by using Student Activity Worksheet based on Contextual Teaching and Learning for 3 meetings. During the learning process, students are trained to use LKS based on Contextual Teaching and Learning so that the students' ability in concept understanding can increase than before. Based on data Table 3 the students' ability in concept understanding of material at 7 cognitive processes of understanding has increased during the learning process using LKS based on Contextual Teaching and Learning. The results of this LKS assessment indicate that students' cognitive abilities in the level of understanding have increased so that students do not experience difficulties and obtain high scores when working on the posttest. LKS developed also

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proved to be able to help students improve students' cognitive abilities at the level of understanding.

The percentage of N-gain indicators explains got the lowest score than the other concept understanding indicators in the posttest, as listed in Table 3. In the posttest question students are asked to explain the process of the earthquake and the process of entering sunlight into the earth using their own language. Some students have difficulty in composing words so that they give the wrong meaning in the answers written and result in the values obtained by students a little. According to Depdiknas (2004) cognitive processes explain takes place when students can create and use a causal model in a system. Reasoning, problem solving, redesign and prediction tasks can be used to assess a student's ability to explain. Students in grade VII of the school who are first 12-13 years old have different abilities to understand knowledge. According to Piaget in Arends (2013), students in this vulnerable age are at the stage of "formal operational" cognitive development. At this stage, students enter adulthood and are included in the final stages of the development of thinking structures. Students are able to think abstractly, compile hypotheses, draw conclusions and can work systematically. Some people do not fully reach development until this stage, so that they do not have the thinking skills as an adult and still use reasoning from the concrete operational stage. This makes students have different cognitive levels so that the results of the n-gain obtained are also different.

Student Activity Worksheets based on Contextual Teaching and Learning on earth layer material to improve students' ability to understand concepts are declared effective to use which are reviewed from the results of the analysis of pretest and posttest scores. From the results of the analysis, 22 children obtained N-gain in the high category and 9 children obtained N-gain in the moderate category. Each cognitive process in the category understands students' concepts, namely interpretations, summarizes, exemplifies, compares, categorizes, explains and concludes also gets an increase with the N-gain medium and high categories.

Saran

Based on the research that has been carried out, it is suggested that the learning process should make LKS based on Contextual Teaching and Learning as a companion in carrying out classroom learning so that the material or concept is more easily conveyed to students and the learning process can be oriented towards the student center.

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