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INCREASING THE ABILITY TO DESCRIBE HEAT AND SOUND ENERGY IN THE ENVIRONMENT USING EXPERIMENTAL METHOD IN CLASS IV STUDENTS OF SDN 1 SOMBRON

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ABSTRACT

The aims of this study were (1) to determine the improvement of experimentation skills in studying heat and sound energy with the experimental method of fourth grade students at SDN Bagsongan, Kayenkidul District, Kediri Regency, (2) to determine the improvement of the ability to describe heat and sound energy with experimental methods in class students. IV SDN Bangsongan 1, Kayenkidul District, Kediri Regency. This study uses a Classroom Action Research (CAR) approach with the research subjects being fourth graders at SDN Bangsongan 1. The study was conducted in two cycles. Data was collected by using teacher activity observations, student activity observations, performance observations and tests. The data analysis technique used is the average percentage analysis. The results of this study can be concluded that: (1) learning with the experimental method can improve experimenting skills when studying heat and sound energy of fourth grade students of SDN Bangsongan I in the first cycle the student performance results obtained an average of 58.5% and in the second cycle increased to 88%. This is supported by an increase in teacher activity with an average of 66.1% increasing to 89.6% and an increase in student attitudes from 58.3% to 88.7%; and (2) learning with the experimental method can improve the ability to describe heat and sound energy based on the assessment of student test results which is indicated by an increase in the average score of students is 68.61 with a learning mastery percentage of 51.6% in the first cycle and in the second cycle the average the average becomes 79.55 with the percentage of learning completeness 87.1%.

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1. INTRODUCTION

Elementary school is the most basic level of formal education in Indonesia. Elementary school is taken in 6 years, starting from grade 1 to grade 6. One of the subjects in Elementary School is Natural Sciences (IPA). Natural Science is the result of human activities in the form of knowledge, ideas and concepts that are logically organized systematically about the natural surroundings, which are obtained from experience through a series of scientific processes such as: observation, investigation, formulation of hypotheses (temporary guesses) followed by testing of ideas (Duflo & Kiessel, 2014). Therefore, elementary school students' understanding of the basic concepts of Natural Sciences is important, because it becomes the foundation for understanding science

concepts at higher education levels (Subali, Kumaidi, Aminah, & Sumintono, 2019).

One of the Basic Competencies (KD) contained in class IV is: To describe the heat and sound energy found in the surrounding environment and its properties. For the achievement of these Basic Competencies, several indicators are obtained, namely students can: 1) mention the various sources of heat energy that exist in the surrounding environment; 2) mentioning how heat is propagated in the surrounding environment; 3) explain the differences in heat propagation through conduction, convection, and radiation; 4) mention the various sources of sound energy in the surrounding environment; 5) explain that sound is produced by vibrating objects; 6) explain the difference in sound, pitch, frequency, and amplitude; 7) explain the difference between infrasound, audiosonic, and ultrasonic sound; explain the propagation of sound through solid, liquid, and gas media; and 9) explains that sound can be reflected. With these indicators, students are expected to understand heat energy and sound energy can occur in their daily lives (Mahardika, Chusni, & Istiningsih, 2017). With these indicators, students are expected to understand heat energy and sound energy and their properties that occur in their daily lives (Saripah & Mulyani, 2015). The fact is that the heat and sound energy material in science lessons is not liked by the Bangsongan 1 elementary school students, even students think that the heat and sound energy material is difficult to learn and understand. As a result, the average student learning outcomes tend to be lower than other subjects. This can be seen from the learning outcomes of fourth grade students at SDN 1 Sombron in that the Heat and Sound Energy material is still relatively low because it does not meet the minimum completeness criteria (KKM) that have been determined (Anggraini & Perdana, 2019).

The proof is that the learning outcomes of students who reached the KKM in the 2013/2014 Academic Year were only 52% (12 of 23 students) with an average grade of 61 and in the 2014/2015 Academic Year 58% (14 of 24 students) with an average grade of 66. This is due to the process. Teacher learning still uses traditional teacher-centered learning. Teachers function more as instructors who are very active in delivering material and students as passive recipients of knowledge (Radity, 2016).

Meaningful learning needs to be applied to explore the potential of children to always be creative and develop, so that it becomes an impressive learning experience. The experience gained by students is more memorable if the learning process obtained is the result of their own understanding and discovery. As conveyed Wulandari (2012), that ”people can only know what they have constructed”. Therefore, in managing the teaching and learning process, teachers must choose appropriate learning methods, so that learning is more interesting and meaningful. This is because there are demands in education that the learning process is no longer just transferring knowledge from teachers to students (Sudarto, 2018). Learning educators are also required to be able to provide convenience for students with a learning process that is easy to understand and fun. Therefore, components are needed to support the learning process so that it is easy and fun for students. One of them is by using the experimental method (Purnamawati & Saliruddin, 2017).

In the experimental method, there are stages where students observe, ask questions, convey information, associate and communicate the results of the experiments carried out. With these stages students become more active and can build their own knowledge by honing their reasoning power, thinking power and creativity (Baro’ah, 2020). This is because elementary school students are aged between 7-12 years, where students are in the concrete operational stage, where children have started to build the ability to use logical thinking in dealing with real problems. The aims of this study were to: (1) determine the improvement of experimental skills in studying heat and sound energy with experimental methods in fourth grade students of SDN Bagsongan 1, Kayenkidul District, Kediri Regency; (2) determine the improvement of the ability to describe heat and sound energy with the experimental method in fourth grade students of SDN Bangsongan 1, Kayenkidul District, Kediri Regency.

2. RESEARCH METHOD

The subjects in this study were fourth grade students of SDN 1 Sombron in the 2016/2017 academic year. The number of fourth grade students is 31 students, consisting of 19 male students and 12 female students with various academic abilities. This research was conducted at Bangsongan 1 State Elementary School which is located at Jalan Embong Gede No. 56 Bangsongan Village, Kayenkidul District, Kediri Regency. This research is a classroom action research model of Kemmis and Taggart. This research was conducted in two cycles, in each cycle there are four stages, namely: planning, implementation, observation and reflection (Van Hoecke, 2016).

This research consists of two cycles, each includes one meeting with an allocation of 4 x 35 minutes.

At the end of each meeting a test is held which aims to determine the ability of heat and sound energy contained in the surrounding environment and its properties. After the implementation of learning in cycle I ended, researchers and collaborators analyzed the data from the observations and tests of students. Based on the results of the data analysis, a reflection is carried out which is used as a consideration in improving the design in the next cycle (Setyawan, Wedyawati, & Warkintin, 2018).

The instrument used in this research were:

1. Non-test Instruments. The non-test instruments are: performance assessment sheet, teacher activity observation sheet and student attitude assessment sheet. This instrument is used to determine students' skills in conducting experiments which are supported by the teacher's activities in applying the experimental method and students' attitudes in cooperating.
2. Test Instruments. The test instrument is in the form of limited description questions with complementary answer types. The test is given to measure the ability to describe the heat and sound energy contained in the surrounding environment and its properties.

Data analysis technique is a very important activity and requires accuracy. In this study, data analysis was carried out on data from observations and data from student tests. The steps of data analysis carried out:

1. Calculate the average percentage of observations on performance assessment, teacher activity assessment and student attitude assessment to determine student skills in conducting experiments;
2. Calculate student learning completeness and classical learning completeness based on student test results;
3. Comparing data from observations and data on student abilities in cycle I and cycle II. The criteria for the success of the action is an increase in data from cycle I to cycle II with the results of observations with an average score percentage of 75% and classical learning completeness in cycle II 75%.

3. RESULT AND DISCUSSION

The research was conducted in an effort to improve students' skills in conducting experiments and students' ability to describe heat and sound energy. Based on the data obtained from learning activities with experimental methods that have been carried out in cycles I and II include the results of observations of student performance, teacher activities, student attitudes in doing group work, and data on student test results. The results of data analysis in performing performance can be seen in the following table:

Table 1. Comparison of Student Performance Data

No	Observation Aspect	Score	
		Cycle I	Cycle II
1	Provide tools	59%	100%
2	Doing experiments according to instructions	57%	87%
3	Energy experiment heat generated by objects rubbing	65%	90%
4	Experiment way heat propagation	54%	83%
5	Sound experiment generated object shiver	65%	89%
6	Experiment sound propagation through the media	51%	77%
	Average	**58.5%**	**88%**

In the first cycle only some (59%) students provided experimental tools and materials, while in the first cycle all students (100%) were able to provide experimental tools and materials very well. When doing experiments, students have done according to the instructions given, it can be seen from the increase in the average score from 57% in the first cycle to 87% in the second cycle. The improvement of skills was also shown by students in the aspects of: conducting experiments on heat energy produced by rubbing objects from a score of 65% (Cycle I) to 90% (Cycle II); way of heat propagation from a score of 54% to 83%; the sound produced by a vibrating object was scored from 65% to 89%; and sound can propagate through solid, liquid and gas media from 51% to 77%. This shows that the assessment of student performance has increased in all aspects of the assessment. From the six aspects of student performance assessment, an average score of 58.5% was obtained with good criteria in the first cycle and increased to 88% with very good criteria in the second cycle.

The increase in students' ability to conduct experiments is supported by an increase in teacher activity in applying experimental methods and student activities in collaboration with groups when conducting experiments. The results of data analysis on teacher activity when applying experimental methods in learning are obtained:

Table 2. Comparison of Activity Data Teacher

No	Observation Aspect	Score	
		Cycle I	Cycle II
1	Initial activity	75.0%	87.5%
2	Core activities	70.8%	89.6%
3	Closing activities	58.3%	91.7%
Average		**68.1%**	**89.6%**

Increased teacher activity is experienced in all learning activities. In the initial activity of the first cycle, the score was 75% and 87.5% in the second cycle, the core activity of the 70.8% score in the first cycle and increased to 89.6% in the second cycle, and the closing activities of the learning obtained a score of 58 .3% in the first cycle to 91.7% in the second cycle. Based on the score from the beginning to the end of the lesson, the average score in the first cycle was 68.1% and increased in the second cycle to 89.6%.

Students' attitudes during learning activities showed improvement in all aspects of the assessment. The aspect of working together to provide experimental tools and materials in the first cycle obtained a score of 57.3% to 100%, which means that all students brought experimental tools and materials according to their assignments. The aspect of cooperating in conducting experiments showed the acquisition of a score of 60.5% in the first cycle and increased to 84.7% in the second cycle, as well as an increase in students' attitudes when conducting group discussions from 57.3% to 81.5% in the second cycle. This is because during group discussions it is no longer dominated by smart students, but all students in the group participate in drawing conclusions. Based on the three aspects above, the average score in the first cycle was 58.3% (Good) and in the second cycle it increased to 88.7% (Very Good). Based on the results of the tests used to measure students' ability to describe heat and sound energy in the surrounding environment and their properties, the following results were obtained:

Table 3. Comparison of Activity Data Teacher

Value	Cycle I		Cycle II	
	Sum	Percentage Completeness	Sum	Percentage Completeness
30 – 69	15	48.4% Uncomplete	4	12.9% Uncomplete
70 – 100	16	51.6% Complete	27	87.1% Complete
Average		**68.61%**		**79.55%**

After learning with the method. After learning with the experimental method, in the first cycle there were 16 of 31 children (51.6%) who achieved learning completeness with a class average of 68.61. In contrast to what happened in cycle II, students' ability to describe heat and sound energy has increased. This is indicated by the ability of students to answer questions correctly, so that 27 of 31 children (87.1%) achieved complete learning with an average grade of 79.55 experiments, in the first cycle there were 16 of 31 children (51.6%). who achieved learning completeness with an average grade of 68.61. In contrast to what happened in cycle II, students' ability to describe heat and sound energy has increased. This is indicated by the ability of students to answer questions correctly, so that 27 of 31 children (87.1%) achieved complete learning with an average grade of 79.55.

4. CONCLUSION

The results of classroom action research carried out in two cycles in an effort to improve the ability to describe heat and sound energy contained in the surrounding environment and its properties in fourth grade students of SDN 1 Sombron with experimental methods can be concluded as follows:

1. Learning with the experimental method can improve experimentation skills when studying heat and sound energy for fourth grade students of SDN Bangsongan 1. This is shown from the results of the analysis of the assessment of student performance in each cycle which is supported by the results of the analysis of teacher activities and student attitudes. The results of the analysis of student performance assessment in the first cycle obtained an average of 58.5% and in the second cycle increased to 88%. The results of the analysis of teacher activities in the first cycle obtained an average of 66.1% and increased to 89.6% in the second

cycle. While the results of the analysis of student attitudes also experienced an increase from 58.3% in the first cycle to 88.7% in the second cycle; and

2. Learning with experimental methods can improve the ability to describe heat and sound energy based on the assessment of student test results. This is indicated by an increase in the ability of students in each cycle. In the first cycle, the average student score was 68.61, increasing to 79.55 in the second cycle, so that the increase also occurred in the percentage of student learning completeness from 51.6% (cycle I) to 87.1% (cycle II).

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