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Students Conceptual Understanding of Energy: Classroom Action Research with Contextual Learning

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ABSTRACT

This study aims to improve students' ability to understand the concept of Energy. This research is a classroom action research conducted in two cycles. The action is implemented by applying contextual learning. The research was conducted at SDN 144/V Betara Kiri with 29 students. The types of data in this study are quantitative data and qualitative data. Quantitative data were obtained from tests at the end of each lesson in each cycle, and qualitative data were obtained from observations in the implementation of actions. Quantitative data analysis was carried out by determining the average score of students' understanding of the concept of effort and energy. Qualitative data were analyzed with the aim of improving the implementation of the action. The learning results show that students' ability to understand the concept of Energy has increased with the application of contextual learning. This is indicated by the increased ability to understand concepts from 68.22 in cycle I to 81.63 in cycle II.

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1. INTRODUCTION

Natural sciences is essentially one of the subjects related to processes, attitudes, and scientific products. Natural sciences as science is structured systematically with a universal scope of application. As one of the subjects taught starting from the elementary school level, science plays an important role in the development of student's knowledge. The significance of teaching natural sciences as early as elementary school lies in its function of constructing a comprehensive understanding, critical thinking, and appreciation of the environment in children. It helps the learners to explain the natural events, which include the water cycle, the growth of plants, and the sustaining of ecosystems. Moreover, natural sciences also enhance curiosity, problem-solving, and group work through exploration and simple experiments. This basic knowledge also not only equips learners with knowledge that is more advanced in the subsequent level of education but also nurtures a responsible generation that is concerned with pressing issues facing the world, like the changing climate, as well as matters to do with the environment. This requires students to be able to master science concepts from an early age [1], [2].

Mastering the concept is important because these thinking skills are the basis for developing high-level thinking skills. We believe that children remember information and understand the interplay of concepts, making it possible for them to analyze situations, think of solutions, and apply their logic appropriately. This relational comprehension helps the learners solve different classes of problems, whether they are accustomed to ones or those that require invention. Moreover, concept mastery also helps to equip students to deal with problems that are presented in a novel context as they have grasped the essence of the learned material rather than the methods of problem-solving only. In this way, students not only attain academic success but also acquire thinking skills that will help them cope with challenges that are more sophisticated.

Students who experience problems in understanding concepts than other abilities such as critical thinking, creative thinking, problem-solving abilities, and other abilities will also experience problems. Conversely, with a strong, intact, and comprehensive understanding of concepts, students can develop their thinking skills well too. This is in accordance with the results of research from several researchers who have done it. For example, the research results of Alatas [3] and Wulandari [4] show a positive correlation between conceptual understanding and students' critical thinking skills. The realm of creative thinking also requires a good understanding of the concept. This is in accordance with the results of the study by Gunawan, Suraya, & Tryanasari [5], which shows that students who have good creative thinking skills will also achieve good learning achievement. In addition, in science learning, students' success in solving problems is also related to good concept security. Students who understand concepts that are relevant to the problems to be solved and are able to invoke an understanding of these concepts will be better at solving the problems they face [6]–[10].

The importance of understanding this concept contrasts with the findings in the field. Students actually experience many difficulties in understanding concepts correctly, especially in the concepts in science lessons. Students' conceptual understanding of science topics still tends to be low [11]. The low understanding of the concept is triggered by several causes. One of the causes of students' low understanding of science concepts is the existence of misconceptions in students [12]–[14]. Misconceptions are more common in science lessons because, generally, science phenomena are often found in everyday life [15]. From observing phenomena carried out by students, they often interpret an incident so that a knowledge is built. The knowledge they build sometimes has truth in a narrow scope but is often generalized in other irrelevant contexts. Misunderstandings that are built by students themselves are usually more retention to be changed.

In order for students' conceptual understanding in science learning to be well mastered, students must build an understanding of the problems that exist in everyday life but must be guided by the teacher so that the knowledge built is conceptually correct. One suitable method of learning for this purpose is contextual learning. Contextual learning is learning that emphasizes student involvement in the learning process and requires students to be able to relate any knowledge that is constructed from problems that exist in real life. This contextual learning is still rarely done by teachers in learning practices. Even though this contextual learning has a positive influence on the achievement of student learning outcomes, therefore in this study, efforts to reduce existing problems in the classroom were carried out by applying contextual learning.

2. METHOD

This research is a Class Action Research (CAR). This study follows the steps according to the method developed by Kemmis [16]. Each cycle consists of planning, implementing, observing, and reflecting. This research was conducted at SDN 144/V Betara Kiri. The research was conducted in class VI students with a total of 29 students consisting of 16 male students and 13 female students. The types of data in this study are quantitative data and qualitative data. Quantitative data were obtained from tests at the end of each lesson in each cycle. The number of questions consists of 14 multiple-choice questions for each cycle. As for the qualitative data obtained from the results of observations in the implementation of the action.

Quantitative data analysis was carried out by determining the average score of students' understanding of the concept of effort and energy. It aims to see changes in students' ability to understand concepts. Qualitative data obtained from the results of learning observations were analyzed with the aim of improving the implementation of the action. An indication of the successful implementation of the action is if the average student learning outcomes are above 70 and more than 70% of students are passed in learning. If this has not been achieved, improvement in the learning process will continue to be pursued.

3. RESULTS AND DISCUSSION

3.1. Implementation of Actions in Each CycleSub section 1

In cycle I, the action was implemented properly. As many as 29 students attended the learning process. The implementation of learning in cycle I has been carried out in accordance with the existing RPP design. Before learning, the teacher explains to students the learning objectives that must be achieved by students and the learning steps that must be passed; contextual learning is carried out by demonstrating and explaining with videos and pictures related to problems and events that are relevant to the topic of learning. In the concept of energy, for example, students are invited to identify what forms of energy exist around them after they understand the concept of energy. Students are not explained by reading books but by observing the surrounding environment to be able to observe forms of energy directly.

The most visible problem that occurred in cycle I was that there were some students who were less active and enthusiastic, so in cycle II, these students received more attention during the learning process. In cycle II, the teacher also led students more often to essential concepts through questions. It is intended for students to understand the concept in more depth. Directly observing natural events will make learning more

meaningful, and leading students through questions can build students' concepts to be more organized. This is important, considering that energy work is an abstract concept [17].

In the application of learning, the evaluation process is important for reflection activities. By observing the learning process, the teacher will know his strengths and weaknesses well. This is important to maximize the next learning process. In a wider organization known as a quality assurance system [18], but this can be adapted to the learning process in the classroom.

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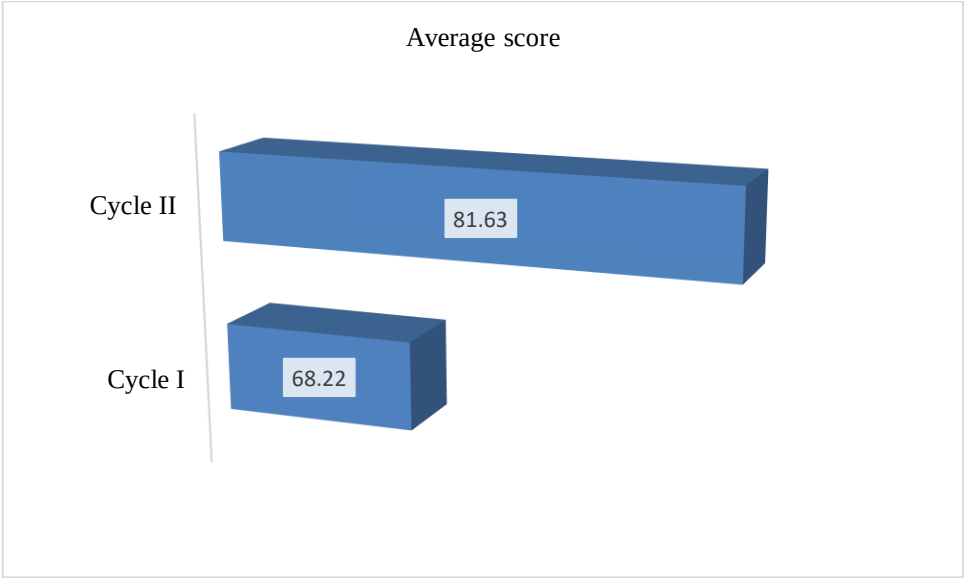
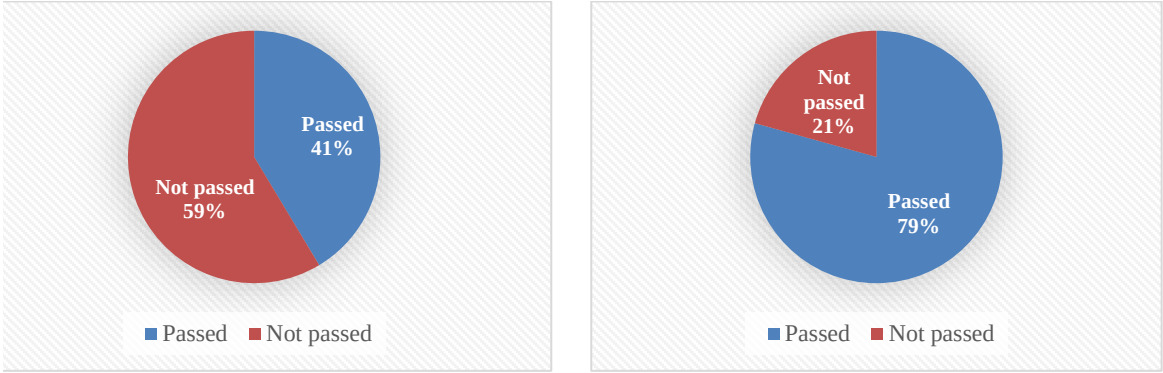


Figure 1. Average Score of Students in Cycles I and II



(a) **(b)**

Figure 2. Percentage of students reaching the minimum score (passed in learning) in (a) cycle I, and (b) cycle II

3.2. Results of Students' Conceptual Understanding

Learning outcomes in this classroom action research are represented by the average value. The following is the average value of students in the learning cycle I and cycle II. Based on the data in Figure 1, it appears that students' conceptual comprehension skills on the topic of energy have increased from 68.22 in cycle I to 81.63 in cycle II. These data indicate that students' ability to understand concepts has increased with contextual learning. Apart from increasing the average score, the ability of students to achieve learning objectives is shown by the percentage of students who achieve a minimum score of 70. Data on changes in the percentage of students who obtain this minimum score are shown in Figure 2. Based on Figure 2, it can be seen that efforts to increase students' understanding of the concept of Energy show positive results. The percentage of students who passed increased from 41% to 79%. This indicates the successful implementation of the action. Because the results of the percentage of students who passed were sufficient for more than 70% and the average score of students' understanding of the concept was above 70, the implementation of the action was sufficient in cycle II only.

It has been mentioned before that Energy is an abstract subject and cannot be seen directly by students. Even though the form of energy cannot be seen, students' thoughts can be directed to observe its symptoms. After all, Energy is a material whose application is close to students' daily lives [19]. This is where the role of this contextual learning. By observing direct events, students can understand the material better so that their understanding will become more complete. If students' understanding is incomplete, then students will have difficulty understanding the concept properly [20].

On the other hand, contextual learning is useful for changing students' understanding of wrong physics concepts. Basically, students present in class learning have brought knowledge that is often not in accordance with scientific concepts [21]. This must be resolved as soon as possible. Because students build knowledge from observing natural phenomena, students' conceptual change efforts should also be carried out in a similar way so that contextual learning is suitable for reducing these problems and improving students' conceptual understanding. Basically the goal of learning science is for students to be able to solve various existing problems and also explain various natural phenomena. To achieve this, students need to have a good understanding of the concept. This leads to a situation where understanding the concept is also one of the learning objectives that must be achieved by students [22].

The importance of contextual learning as being pleasurable in its share to improvement as offered to professional primary school teachers is enormous. This is because such learning relates the subject matter to real-life situations, which children encounter many times in their daily lives. For such a set of children, knowledge is not an abstract concept suitable only for the classroom but a real instrument that can be used in solving a particular problem, for example, within the three dimensions of time and space. Such changes increase curiosity and motivation to learn as students understand that what they study has practical use in their lives. Besides, contextual learning allows students to be engaged in the critical and creative thinking that is necessary to solve the given problems. Such real-life activities are also valuable for memory enhancement, as students experience ‘learning by doing’ rather than just ‘learning by reading’. Likewise, this approach makes it possible for students to engage in group activities, thereby enhancing their social skills, such as their ability to communicate and work in teams. So, life becomes not simply an academic exercise, and students endeavor to be better prepared for life, becoming more self-assured as they meet the challenges of the changing world. At the end of the entire process of learning, such students are not only learned people, but they are able to adapt to the society in which they live.

In the application of contextual learning, students seem not used to it. However, it appears that students are more enthusiastic in participating in learning. This is because, so far, learning has been carried out using the lecture method. With contextual learning, students become more interested in wanting to know. This is important because it is in accordance with educational goals which direct learning to be able to create changes in attitudes and knowledge in students.

4. CONCLUSION

The learning results show that students' ability to understand the concept of Energy has increased with the application of contextual learning. This is indicated by the increased ability to understand concepts from 68.22 in cycle I to 81.63 in cycle II. In addition, the percentage of students who passed has increased from 41% to 79% and more than 70%, and the average score for students' understanding of the concept is above 70. In the implementation of contextual learning, students seem not used to it because learning is more often done with the lecture method. However, it is recommended that contextual learning be used in learning, especially science topics so that students are more accustomed to new things. Besides that, contextual learning is also effective in improving students' abilities in several aspects.

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