
| RESEARCH ARTICLE

Student Activities on the Topic of Light Properties through Experimental Methods in Elementary School in Gorontalo Province

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| ABSTRACT

The present study aimed to identify student activities on the topic of properties of light. This study employed classroom action research to increase the students' activity. The subjects comprised 30 fifth-grade students 14 males and 16 females of SD 19 State Elementary School in Limboto, Gorontalo Regency. It was conducted in two cycles; each cycle consisted of several stages, including planning, implementation, observation, evaluation, and reflection. Further, the data was collected using two instruments, i.e., student observation sheets, and learning outcomes tests on science subjects to measure student activity and learning outcomes. The results showed that students' learning activities in the first cycle have an average of 65.51% for visual activities, 53.44% for motor activities, 17.24% on writing activities, 44.30% on oral activities, 31.03% on mental activities, 58.61% on listening activities, 62.06% on emotional activities. Moreover, in the second cycle, the percentages increased for visual activities by 79.31%, motor activities by 74.13 %, writing activities by 75.86%, oral activities by 70.68%, mental activities by 70.88%, listening activities by 77.58%, and emotional activities by 72.41%.

| KEYWORDS

Students' activities, light properties, experimental method

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1. Introduction

Student activity in the learning process is one of the keys to the creation of learning objectives. Further, effective learning provides opportunities for self-study or doing activities on their own (Imelda, 2019). Learning activities are all activities carried out in the process of interaction between teachers and students in learning that involves physical and mental activities. This is in line with Sardiman (2011) who claim that learning activities are physical as well as mental activities so that in the learning process, the two must always be related. In the learning process, students not only accept the concepts conveyed by the teacher but also have direct activities. These direct activities provide direct experience to students so that they will be able to gain and develop their knowledge about science material through experimental methods. The experimental method is a way of teaching in which students conduct an experiment about something, observe the process, and write down the results of the experiment. Then, the results of the observations are conveyed to the class and evaluated by the teacher (Juita, 2019). Through the experimental method, student learning activities in class can increase their learning outcomes.

However, science learning is currently more oriented to memorizing concepts and recording all material. As a result, the learning experience obtained in class is not optimal and is not oriented towards achieving competency standards and basic competencies. Thus, teachers must create situations that lead to learning activities so that students are able to learn the lesson which is reflected in the learning outcomes. The results of observations on February 20, 2017, in fifth-grade students at SD 19 State Elementary School in Limboto, Gorontalo Regency showed that student activities in the learning process, especially on the topic of properties of light, are not optimal. This condition is due to the following things. 1) The learning process is relatively teacher-centred which makes students passive as the teacher dominates learning and only involves certain active students in learning. 2) The lack of variety of learning methods makes some students tend to be silent and pay less attention to the subject matter. This can be seen

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when the teacher gives the opportunity for students to ask questions that no one wants to ask. 3) Limited textbooks are used when the teacher gives the assignment to summarize the subject matter. 4) Some students do not focus on their tasks and only disturb friends who are summarizing the subject matter. Such learning situations need to be avoided as they could impact student learning outcomes. The scores of 30 fifth-grade students on the daily test show that the average learning outcomes on the topic of properties of light are still low as it is below the minimum completeness criteria (KKM) standard of 70. Of the total 30 students, only 11 students (36.66%) reach KKM. Based on these data, the teacher must create a learning atmosphere that can increase activity so that students will have good knowledge if they actively participate in the learning process. The involvement is expected to increase student activity and student understanding of the topic presented by the teacher. Thus, student activities can be analyzed on the topic of properties of light.

2. Literature Review

In the activities of daily human life, it is almost impossible to separate from learning activities, both when a person performs his own activities or in a certain group. In fact, most of the activities in our daily lives are learning activities (Aunurrahman, 2009). Student learning activities affect student learning outcomes (Ningsih et al., 2017). The activities of students in the class determine their success in the learning process. Kaswul and Harmi (2011) suggest that student activities in the learning process are actively asking, questioning, and expressing ideas. The teacher acts as a facilitator to guide and direct students in an effort to achieve goals. Learning is not only limited to the transfer of knowledge but requires the active role of students to build their own knowledge. According to Yamin (2007), student activities in the learning process can stimulate and develop their talents, ability to do critical thinking and ability to problem-solving in everyday life. Thus, teachers need to design a learning system systematically to stimulate student activity in the learning process through the experimental method.

The experimental method is a way of presenting teaching materials, in which students conduct experiments to prove for themselves what they are learning (Hurit & Wati, 2020). This method can prepare material for students to conduct trials in proving the teacher to students themselves. The experimental method is one way of teaching, in which students experiment about something, observe the process, and write down the results of the experiment. Then, the results of the observations are presented in front of the class and evaluated by the teacher (Fitriyah et al., 2020). Further, the experimental method is a way of presenting lesson material where students conduct experiments by experiencing to prove a question or hypothesis being studied (Andiasari., 2015). Experimental methods are carried out in learning to test and prove the questions learned in school.

3. Methodology

This research was conducted in 2017 in Gorontalo Province. It is located at SD 19 State Elementary School in Limboto, Gorontalo Regency. It employed classroom action research to increase the students' activities. The subjects of this study were the fifth-grade students in the research site, totaling 30 people (14 males and 16 females). This research was conducted in 2 cycles; each cycle consisting of several stages, namely planning, implementation, observation and evaluation, and reflection. There were two instruments used to collect data to measure student activity and learning outcomes, namely student observation sheets and science learning outcomes tests. The indicator of success in this research was the teacher activity in the science learning process using the experimental method was said to be successful if the achievement of the activity is at least 70% of the number of students included in the high criteria ($\geq 70\%$).

4. Results

The implementation of the first cycle of action consists of two meetings. The material taught at the first meeting is rectilinear propagation of light with the following indicators: 1) mentioning objects based on whether or not they can emit light and transmit light; 2) mentioning examples of events that show light can propagate in a straight line in everyday life; 3) conducting experiments to investigate the nature of light traveling in a straight line. Further, the material taught in the second meeting is light can penetrate clear objects with several indicators: 1) classifying translucent and opaque objects; 2) mentioning examples of events that show light can penetrate clear objects in everyday life; 3) conducting experiments to prove light can penetrate clear objects. The learning implementation activities at the first meeting and the second meeting are carried out based on a learning scenario consisting of initial activities, core activities, and final activities. Based on the implementation of the first cycle of actions, students' activities and learning outcomes are presented in the following table.

Table 1. Average Student Activity Achievements in Cycle I

No	Types of Activities	Average Achievement
1	Visual activities	65,51%
2	Motor activities	53,44%
3	Writing activities	17,24%
4	Oral activities	44,30%,
5	Mental activities	31,03%
6	Listening activities	58,61%
7	Emotional activities	62,06%

Based on the table above, it can be concluded that the activity of students carrying out experiments is below the predetermined success indicators, namely, the minimum student activity using the experimental method reaches 70%. Based on the results of reflections carried out by researchers with partner teachers, it shows that the activities and student learning outcomes have not yet reached the indicators of success. Student activities when conducting experiments, there were 7 activities observed with 11 indicators assessed that there were still several activities that students had not carried out optimally, including:

- a) Motor activities: Only some students prepare tools and materials. Further, only involve certain students who have good performances while conducting the experiments.
- b) Writing activities: Only the group leader record the experimental results, while the other students in the group do not record the experimental results.
- c) Oral activities: Only group representatives (groups I, II, and III) present the results of the experiment. Due to the limited time allocation, not all groups explained the results of the experiment. Besides, there are still many students who do not ask questions when the teacher gives the opportunity to ask questions to the group who explains the results of the experiment.
- d) Mental activities: lack of student activities who are able to answer teacher questions and respond to presentations from other groups.

5. Discussion

The learning process in the first cycle shows that the activities of teachers and students have not shown an increase. Kaswul and Harmi (2011) suggest that student activities in the learning process are actively asking, questioning, and expressing ideas. The teacher acts as a facilitator and should guide and direct students in an effort to achieve goals. In relation to this theory, the activity that becomes the output variable in this study is student activity in learning by applying the experimental method. There are 7 activities with 11 indicators observed in the first cycle. The average visual activity percentage is only 65.51%, then it increases to 79.31% in the second cycle, the average motor activities in the first cycle is only 53.44%, then increases in the second cycle to 74.13%, writing activities is 17.24% in the first cycle, then increases in the second cycle with a percentage of 75.86%, oral activities in the first cycle was 44.30%, and increases in the second cycle with a percentage of 70.68%, mental activities was 31.03% and increases to 70.88% listening activities was 58.61% in the first cycle, then increases to 77.58% in the second cycle, and emotional activities were 62.06% in the first cycle and increases to 72.41% in the second cycle.

6. Conclusion

Students' learning activities in the first cycle have an average of 65.51% in visual activities, an average of 53.44% in motor activities, an average of 17.24% in writing activities, and an average of 44.30% in oral activities, an average of 31.03% in mental activities, an average of 58.61%, in listening activities, 62.06% in emotional activities. Then, the percentages are increased in the second cycle, which for visual activities by 79.31%, motor activities by 74.13 %, writing activities by 75.86%, oral activities by 70.68%, mental activities by 70.88%, listening activities by 77.58%, and emotional activities by 72.41%, Based on the conclusions and implications of the research, some suggestions are suggested as follows. (1) By applying the experimental method, students must have activities so that they can obtain maximum learning outcomes that meet the predetermined criteria for completeness. (2) Schools should facilitate the process of implementing learning in terms of facilities and infrastructure to support the learning activities.

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