



Learning of Objects, Elements, Compounds, and Mixtures in Daily Life's Elementary School Students

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ABSTRACTS

This study aims to grow elementary school students' knowledge of objects, elements, compounds, and mixtures that exist in everyday life. The learning approach used is scientific learning using two methods and two learning models. The first learning model is discovery-based learning with PowerPoint's lecture learning method. The second learning model is project-based learning with a practicum learning model. Students were given 14 pretest questions before learning and 14 posttest questions after learning. This study was conducted on 36 elementary school students in Bandung, Indonesia. This study indicates that students can identify objects, elements, compounds, and mixtures that exist in everyday life. This is evidenced by the increase in the class average score from the pretest and posttest results of 35.11%. Learning is done using interactive PowerPoint so that students can participate more actively. In addition, practical assignments for students also make students better understand and remember the material that has been taught. Learning objects, elements, compounds, and mixtures using discovery-based and project-based learning models shows good results.

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1. INTRODUCTION

All daily activities of course use objects, be solid objects, liquid objects, or gas objects. Objects that we use every day can also be referred to as matter. The matter is classified into elements, compounds, and mixtures. Elements are pure chemical substances that cannot be broken down into simpler ones using chemical reactions, or can also be called substances that are formed from one type of atom. A compound is an arrangement of several chemically mixed pure substances or substances formed from several types of atoms. A mixture is a material composed of several different types of substances where the mixture is classified into two parts, namely a homogeneous mixture and a heterogeneous mixture.

Elementary school students need to understand the material of objects, elements, compounds, and mixtures before entering Junior High School (SMP) education as a basis for understanding these materials in a more detailed discussion (Arifin & Sjaeful, 2016). Learning about objects, elements, compounds, and mixtures has been introduced to elementary school students from grade I to grade VI with different levels of material deepening. Learning is an activity that involves interaction between teachers and students in a learning environment where students gain knowledge and knowledge from educators so that there is an increase in student knowledge. Learning can be done using various approaches, models, and learning methods so that the objectives of the learning are achieved.

Several studies discuss learning and science models, namely research from Surya et al., (2018), entitled "Application of Project-Based Learning Models to Improve Learning Outcomes and Creativity of Class III Students at SDN Sidorejo Lor 01 Salatiga" where this model can improve student learning outcomes and creativity. Further research from Arisanti (2016), entitled "Analysis of Concept Mastery and Creative Thinking Skills of Elementary School Students through Project-Based Learning, where this research has a drawback, namely the results of the application of this learning use a small-time allocation so that the projects carried out must be improved. Research by Erita et al., (2018), entitled "Changes in Elementary School Science Learning in Integrated Learning Through the Discovery Learning Model" has drawbacks because the research was only conducted in fifth-grade elementary school. Entitled Development of Poster Learning Media on Theme III Objects Around Me for Class III Students at SDN Inpres Hidirasa there are shortcomings where the delivery of material using posters cannot contain sufficient information.

This research was conducted to increase the knowledge of elementary school students about objects, elements, compounds, and mixtures that exist in everyday life. This research uses a scientific learning approach with discovery learning and project project-based models. Students were given 14 pre-test questions before learning and 14 post-test questions after learning to determine the development of students' knowledge. This learning was carried out in one of the sixth-grade elementary schools in Bandung, Indonesia, totalling 36 people.

The novelty of this research is (i) the subjects used for research on learning objects, elements, compounds, and mixtures are sixth-grade elementary school students; (ii) finding the right learning model for objects, elements, compounds, and mixtures for elementary schools; (iii) using two learning methods at once for objects, elements, compounds, and mixtures.

2. METHODS

The subjects of this study were the sixth-grade elementary school students in the city of Bandung, Indonesia. To find out students' initial understanding of the material to be

delivered, students were given 14 pretest questions, starting from easy questions to difficult questions. The work on the pretest questions was carried out for 15 minutes.

When learning, students are given material about objects, elements, compounds, and mixtures with a discovery-based learning model using interesting and interactive powerpoints as shown in **Figure 1**. The use of interactive PowerPoint can foster student curiosity and increase student learning activities. Discovery learning is a type of learning where students experiment and cover a principle from the experiment so that students can build their knowledge. This learning is carried out for 1.5 hours of lessons.



Figure 1. Learning using PowerPoint media is interesting and interactive.

To improve students' memory, students are given the task of doing a practicum in groups of 5-6 people. Students are asked to make several mixed solutions and group these solutions into homogeneous mixtures or heterogeneous mixtures. This practicum uses a project-based learning model. The project-based learning model is learning to build students' knowledge and understanding based on their experiences through presentations. For the learning objectives to be achieved and the practical activities to be successful, students are given a practice module to observe first, as shown in **Figure 2**. This practice module includes titles, objectives, tools and materials, work steps, and tables of observations.



Figure 2. Student practice module.

After the lesson ended, students were given 14 pretest questions with 15 minutes of processing time. After getting the percentage increase in the pretest and posttest scores,

researchers can measure how much students' knowledge of the material that has been taught. The pretest and post-test questions are shown in **Table 1**.

Table 1. Pretest and posttest questions.

No	Pretest and Posttest Questions	Answer Choice
1	Do you recognize the types of objects based on their shape?	Yes / No
2	Do you know what constitutes a solid and the properties of a solid?	Yes / No
3	Do you know what constitutes a liquid and the properties of a liquid?	Yes / No
4	Do you know the properties of liquids that can be used in everyday life?	Yes / No
5	Do you know what are gases and their properties of gases?	Yes / No
6	Do you know what the change of state of matter is?	Yes / No
7	Do you know what factors can affect the change in the shape of an object?	Yes / No
8	Do you know the meaning of elements, compounds, and mixtures?	Yes / No
9	Do you know what is included in the elements?	Yes / No
10	Do you know what changes in the physical and chemical properties of matter are?	Yes / No
11	Do you know what is a compound?	Yes / No
12	Do you know what are the classifications of mixed substances?	Yes / No
13	Do you know the benefits of mixing in our daily life?	Yes / No
14	Can you tell the difference between a homogeneous mixture and a heterogeneous mixture?	Yes / No

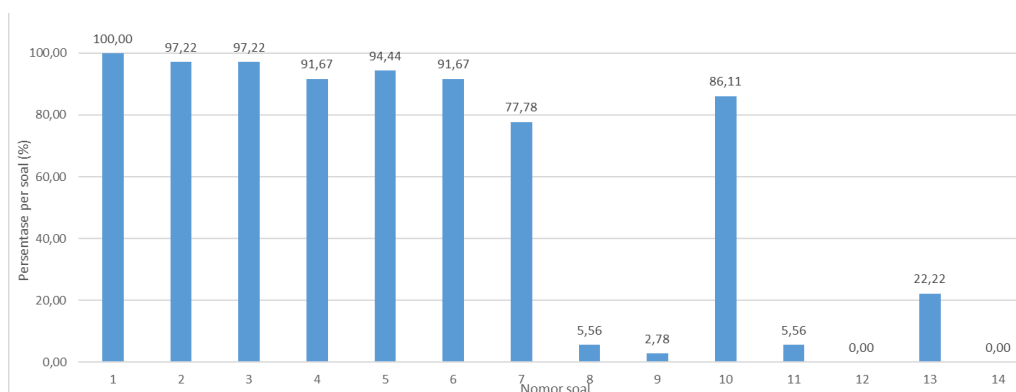
3. RESULTS AND DISCUSSION

Figure 3 shows the pretest scores of 36 elementary school students who were tested. Students are said to be good basic knowledge about objects, elements, compounds, and mixtures such as the properties of objects and changes in objects. **Figure 4** shows the posttest scores of 36 elementary school students who were tested. After learning using discovery-based learning and project-based learning methods on objects, compounds, elements, and mixtures, the average score of students increased by 35.11%.

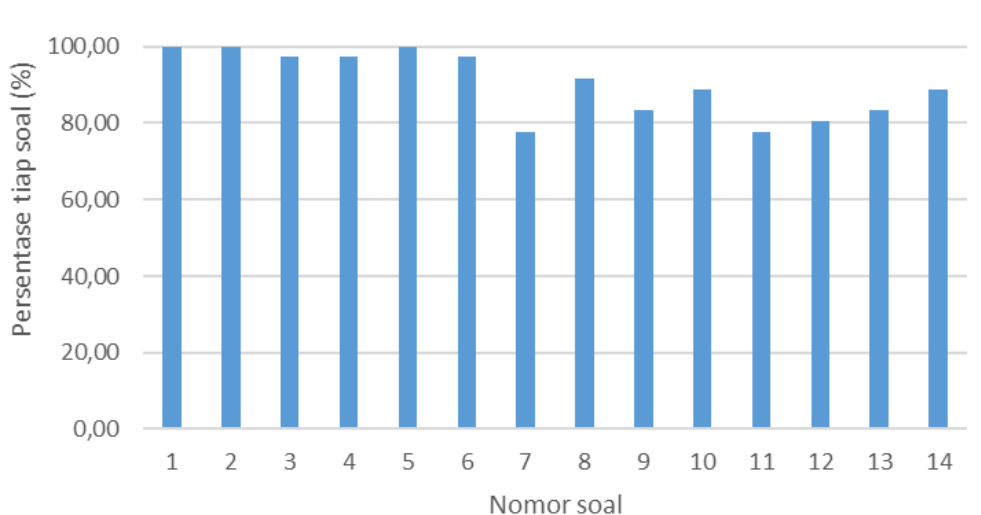
In the results of the study seen in **Table 2**, the value has increased. As for the discussion: For question number 1 about 'Food sources of energy are foods that can provide energy and stamina for the body,' the result is the same. This is because students consume food every day to get energy. For questions no. 2 and no. 10, the results increased by 2.77%. The properties of solids have been studied by students in the fourth and fifth grades of elementary school, but some students do not remember the material. After being reminded again when learning, the results of student knowledge increased. For question no. 3, the results did not increase because students still remembered the material properties of liquids that they had learned in the fourth grade of elementary school. For questions no. 4, no. 5, and question no. 6, the results increased by 5.56%. Some students do not remember the material that has been studied in the fourth and fifth grades of elementary school. After being given a review of the material, the percentage of student knowledge increases.

For question number 8, the results increased by 86.12%. This is due to learning the classification of elements, compounds, and mixtures through interactive power points. For question number 9, the result has increased by 80.52%. When learning using interactive PowerPoint, students are allowed to give examples of elements that exist in everyday life. This makes students better understand the material given. For question number 11, the result has increased by 72.21%. Students become more active during learning because learning uses interactive PowerPoint. This makes it easier for students to learn and the percentage of class knowledge increases.

For question no. 12 the results have increased by 80.25%, for question no. 13 the results have increased by 61.11%, and for question no. 14 the results have increased by 88.89%. Learning to group mixed substances, the benefits of mixtures, and differences in heterogeneous homogeneous mixtures is carried out in group practice using a project-based learning model. Students are asked to make several mixtures and group the mixtures into homogeneous or heterogeneous mixture groups. After practice, students present the results of the practice in front of the class. Learning using practice makes students more active and interactive during learning. Students' memory of the material presented also becomes stronger.



Figures 3. Pretest and posttest scores per question.



Figures 4. Pretest and posttest scores per question.

Details of the percentage scores for each pretest and posttest can be seen in **Table 2**.

Table 2. Results of Pretest and Posttest.

Question No.	Pretest score	Posttest score	Increase in value
1.	100	100	0.00
2.	97.23	100	2.77
3.	97.23	97.23	0.00
4.	91.67	97.23	5.56
5.	94.45	100	5.56
6.	91.67	97.23	5.56
7.	77.78	77.78	0.00

Table 2 (continue). Results of Pretest and Posttest.

Question No.	Pretest score	Posttest score	Increase in value
8.	5.56	91.67	86.12
9.	2.78	83.30	80.52
10.	86.12	88.89	2.77
11.	5.56	77.77	72.21
12.	0.00	80.50	80.5
13.	22.23	83.34	61.11
14.	0.00	88.89	88.89
Overall class pretest score (%)	Overall class posttest score (%)	Increase in value (%)	
55,16%	90,27%	35,11%	

Source: Data Processed

4. CONCLUSION

Learning objects, elements, compounds, and mixtures in everyday life using discovery-based learning and project-based learning methods to 36 grade 6 elementary school students showed good results. The success of students in the learning process is indicated by an increase in the posttest score of 35.11%. This learning is supported by appropriate methods and uses interesting media so that students are actively involved during learning. Practice assignments can also make students remember the material being studied better.

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6. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. Authors confirmed that the paper was free of plagiarism.

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