



ASEAN Journal of Science and Engineering Education



Journal homepage: <http://ejournal.upi.edu/index.php/AJSEE/>

Simple Experiments for Introducing Science to Elementary School Students

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ABSTRACTS

The purpose of this paper is to introduce some simple experiments that can be used to explain science to elementary school students. This study explained about seven experiments that can be done easily and used simple materials (found in daily life). This paper also explains the scientific reasons for the phenomena happening during the teaching and learning process.

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ARTICLE INFO

Article History:

Received 05 Jan 2021

Revised 16 Feb 2xxx

Accepted 25 Feb 2021

Available online 01 March 2021

Keyword:

*Elementary school,
Experiments,
Science education,
Students.*

1. INTRODUCTION

Science education is one of the education parts, which involves the teaching and learning of science to non-scientists, such as school children, college students, or adults within the general public. This education is relatively difficult, especially when it relates to elementary school students (Haristiani et al., 2017).

Many reports have shown the way how to conduct experiments (Maryanti et al., 2020; Nandiyanto et al., 2018; Nandiyanto et al., 2020; Horton et al., 2011). Even, it is available in online news (such as <https://www.liputan6.com/health/read/4205272/5-percobaan-sains-seru-yang-bisa-dicoba-bareng-anak-di-rumah> and <https://id.theasianparent.com/tahapan-metamorfosis-kupu-kupu>)

Therefore, the purpose of this paper is to introduce some simple experiments that can be used to explain science to elementary school students. The experiments must be designed attractively. Thus, students can pay attention when the teaching and learning process is conducted. Apart from the experiments, this paper also explained the scientific reasons for the phenomena happening during the teaching and learning process.

2. METHODS

This paper explained step by step some experiments that can be used to teach elementary school students. This study also added explanations to support the discussion facing the phenomena during the teaching and learning process. Experiments that are explained in this study were adopted from several websites (such as <https://www.liputan6.com/health/read/4205272/5-percobaan-sains-seru-yang-bisa-dicoba-bareng-anak-di-rumah> and <https://id.theasianparent.com/tahapan-metamorfosis-kupu-kupu>), and this study makes the experimental procedure short and simple, completed with the explanation.

3. RESULTS AND DISCUSSION

Some of the experiments that can be used are described in several sections.

3.1. Mixing Oil and Water (Teaching concept of density)

No matter how hard students try to stir or shake the water with the oil, they will never stick together. However, there is one way that the two can become friends (it can also help clean the grease off dirty dishes).

Instructions:

- (i) Add a few drops of food coloring to the water.
- (ii) Pour about 2 tablespoons of colored water along with 2 tablespoons of cooking oil into a small soft drink bottle.
- (iii) Close the cap tightly and shake the bottle as hard as possible.
- (iv) Put the bottle back and watch as the liquid appears mixed, but the oil will float back to the top.
- (v) Put water and oil in different empty bottles in the same volume (about half bottle). Use simple balance to find out the mass or weight of the solution. The mass of water is higher than that of oil.

Explanation:

Water is often mixed with other liquids to form a solution. Water molecules are very attracted to each other. And, it is the same with oil. They are more attracted to their molecules, which is what keeps them from sticking together. They separate and the oil floats on the water because it has a lower density. The measurement of the mass/weight of the water and the oil confirms that the mass of water is higher than that of oil.

3.2. Teaching the Concept of Soap or Detergent

As discussed before, water and oil cannot be combined. There is one way to make them combine. We can use soap or detergent.

Instructions:

- (i) Add a few drops of food coloring to the water in the small soft drink bottle.
- (ii) Pour colored water until one-third of the bottle
- (iii) Pour cooking oil about the same volume with water.
- (iv) Pour 1 tablespoon of liquid soap or detergent.
- (v) Close the cap tightly and shake the bottle slowly.
- (vi) Put the bottle back and watch as the liquid appears mixed.

Explanation:

The only factor that holds oil and water together is soap or detergent. Detergents are attracted to water and oil to help them stick together and form something called an emulsion. This is especially useful when washing greasy dishes.

3.3. Surface Tension in Pepper and Water

Instruction:

- (i) Fill the container with half the volume of water.
- (ii) Sprinkle the surface of the water with pepper.
- (iii) Ask students to dip their fingers in the pepper-covered water.
- (iv) Ask students to observe what happens.
- (v) Ask students to dip another finger in the liquid soap and then dip it in the pepper-covered surface of the water.
- (vi) Ask children to observe what they see.

Explanation:

At first, there was nothing special when the student dipped his finger in the water containing pepper. However, different things appear on the fingers that contain soapy water. The pepper on the surface of the water will stay away from the soapy finger. This experiment teaches students that soap affects surface tension.

3.4. Making Eggs Float on Water

Usually, if an egg is dropped in water, it will sink. However, what will happen if an egg is dipped in saltwater?

Instruction:

- (i) Pour water into the glass until it is half full.
- (ii) Mix water with salt (about 6 tablespoons).
- (iii) Carefully pour plain water until the glass is almost full (do not mix the saltwater with plain water).
- (iv) Put the eggs in the water and watch what happens.

Explanation:

Saltwater is denser than regular tap water. The denser liquid makes the easier for objects to float in the liquid. When students lower the egg into the liquid, the egg will continue to sink until it reaches the brine level. If the students are careful when pouring plain water over the brine, the previous brine water, and tap water will not mix, allowing the eggs to float in the center of the glass.

3.5. Melting Chocolate

If students hold the chocolate, over time the chocolate will melt in their hands. Then, at what temperature can chocolate melt from solid to liquid? Will it be different between white chocolate and dark chocolate?

Instructions:

- (i) Place a piece of chocolate on a paper plate and place it outside in the shade.
- (ii) Record how long it took for the chocolate to melt or if it wasn't hot enough to melt then note how soft it was after 10 minutes.
- (iii) Repeat this process with a piece of chocolate on a plate that students place outside in the sun. Record the results in the same way.
- (iv) Find a more interesting location to test the length of time for the chocolate chips to melt. Students can try their school bag, hot water, or even their mouth.
- (v) Compare the results, under what conditions does the chocolate melt? Students may also want to record the temperature with a thermometer in the location that is used. Thus, students can think about what temperature the chocolate has melted.

Explanation:

At a certain temperature, chocolate chunks undergo a physical change from solid to liquid (or between the two). On a hot day, the sun is usually enough to melt the chocolate. Students can also reverse the process by placing the melted chocolate in the fridge or freezer as it will turn from liquid to solid. Chocolate may melt quite quickly if it is put in the mouth. Indeed, this is due to body temperature.

For a further experiment, students could compare white chocolate and dark chocolate, which one melts first at the same temperature? What if students put a sheet of aluminum foil between a paper plate and a piece of chocolate in the sun?

3.6. Make Drifting Sand

This can be done on a scale that is safe for children.

Instructions:

- (i) Mix corn flour and water in a bowl.
- (ii) Stir gently and drip the liquid to show that it is a liquid.
- (iii) Stirring quickly will make it solid and allow students to punch or poke it quickly (this works better if students do it fast rather than hard).
- (iv) Because playing this experiment can be messy. Thus, the experiments must be done outside, and do not forget to stir it right before students use it. Always stir, just before students play it.

Explanation:

If students add the right amount of water to cornstarch, the structure becomes very thick. It is getting very thick when more students stir quickly. This happens because the cornstarch grains are mixed and cannot slide over each other due to a lack of water between them.

Stirring slowly allows more water between the cornstarch grains, allowing the cornstarch to slide more easily over each other.

3.7. Making Volcano Eruption

Instead of just watching an online video (such as YouTube) on how the volcano erupts, students can experiment with the eruption using baking soda and vinegar.

Instructions:

- (i) Pour a few spoonfuls of baking soda into the basin.
- (ii) Pour vinegar over it.
- (iii) Look what happened!

Explanation:

Baking soda (sodium bicarbonate) is a basic solution while vinegar is an acid solution. When the two solutions are combined, there will be a reaction of unstable carbonic acid. The reaction makes it split into water and carbon dioxide, which forms an eruption.

To make the experiment look like a volcanic eruption, students can use clay or cement to form a mountain and punch a hole in the center to add baking soda and vinegar. Students can add food coloring for a more dramatic visual.

4. CONCLUSION

This paper introduces some simple experiments that can be used to explain science to elementary school students. This paper also completed with the scientific reasons for the phenomena happening during the teaching and learning process.

5. 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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