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Utilization of Tea Bags as Educational Media to Understand Air Convection Concepts

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ABSTRACT

This study aims to explore the use of tea bags as an educational medium to help students understand the concept of air convection. The research was conducted independently by the author through an experiment demonstrated in front of the class. The subjects of the study were students who observed the experimental process. The research employed a qualitative method with a descriptive approach, focusing on understanding phenomena through observation, description, and interpretation of the experimental results. Data were collected through direct observation and reflection on students' responses during the activity. The results indicate that using tea bags as an experimental medium can help students better understand the process of heat transfer through convection in a more concrete and engaging way. This medium also fosters curiosity, scientific thinking, and active participation in learning. Therefore, tea bags can serve as a simple, creative, and effective learning medium to explain the concept of air convection in the classroom.

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INTRODUCTION

Science learning has a strategic role in shaping scientific thinking skills, critical attitudes, and problem-solving skills in students. In the educational environment of prospective elementary school teachers, science learning is not only aimed at understanding scientific concepts, but also prepares students to be able to channel meaningful learning experiences to students in the future. Therefore, prospective teacher students must have a complete understanding of the basic concepts of science and the ability to relate theories to real phenomena that can be observed in daily life (Susanto, 2016).

One of the basic concepts in physics that is often difficult to understand is air convection, the process of transferring heat through the movement of air particles from hot to cold areas. This concept seems simple in theory, but in practice it is abstract and difficult to visualize by students and prospective teachers. Many students simply memorize the definition of convection without understanding the mechanism empirically. As a result, learning becomes less meaningful and fails to foster scientific thinking skills (Ariani, 2021).

The use of simple media like this is in line with the concepts of contextual teaching and learning and scientific inquiry. Contextual learning emphasizes the linkage between learning

experiences and real life, while the inquiry approach places learners as active researchers who discover knowledge through observation and experimentation (Suryani, 2022). Thus, experiments using tea bags can be a bridge between theory and practice, as well as foster the scientific curiosity of prospective teachers.

Some previous research has shown that simple experiments can improve students' understanding of concepts and motivation to learn. Waluyo and Dwika (2020) prove that the use of recycled materials as science media helps students understand the concepts of energy and heat faster. The use of simple tools such as candles and balloons can clarify the concept of heat transfer and encourage students' active involvement in the learning process. These results show that teachers' creativity in utilizing the surrounding materials has a big role in the success of science learning.

RESEARCH METHODS

This study uses a qualitative method with a descriptive approach, because it focuses on the observation and interpretation of phenomena that occur during experimental activities. The research was carried out in the classroom of the basic education study program by involving students as observation subjects. The author acts as an experimenter, while other students make direct observations of the process that occurs.

Data were obtained through direct observation of students' reactions during the experiment and through reflection after the activity was completed. The steps to implement the experiment include: preparing tools and materials (tea bags, matches, scissors, and heat-resistant mats), conducting a demonstration of the burning of the top of the tea bag, observing the process of flying the bags, and discussing the phenomenon with students. Data analysis is carried out qualitatively through data reduction, presentation of data in the form of narrative descriptions, and drawing conclusions on observation results.

RESULT AND DISCUSSION

Result

The experiment was carried out with simple materials, namely used tea bags, scissors, matches, and heat-resistant mats. The tea bag is emptied, then shaped into a cylinder and placed upright on a metal base. When the top is burned, the tea bag slowly burns away, and when the light bottom remains, it flies upwards as the hot air inside rises into the atmosphere. This event vividly illustrates the process of air convection, in which heat moves through an air stream that experiences differences in temperature and density.

From the observations, students showed high enthusiasm and great curiosity about the phenomenon. They were actively involved in the discussion, trying to explain why tea bags could fly, as well as relating the event to real examples such as the movement of smoke from the chimney, sea breezes and onshore winds, or the circulation of air in an enclosed room. This shows that the use of simple media such as tea bags can foster students' analytical and critical thinking skills.

Through this activity, students not only understand basic physics concepts but also experience meaningful learning that involves direct observation and reflective discussion. The use of media such as tea bags fosters scientific attitudes, such as curiosity, thoroughness, and the ability to draw conclusions based on empirical evidence. In addition, this experiment also teaches students as prospective teachers to be creative in creating simple learning media from everyday materials.

Discussion

Theoretically, air convection occurs because temperature differences cause differences in air density. Hot air has a smaller density so it moves up, while heavier cold air moves down in its place. This cycle creates a constant flow of air. In the context of the experiment, the heat from burning the tea causes the air inside the cylinder to become lighter and rise upwards, pushing the remaining burning tea bag to lift. This simple phenomenon is concrete evidence of the convection process that occurs in nature.

Scientifically, the event of the flying of tea bags can be explained through the principles of convection physics. When the tea bag is burned, the air inside the cylinder heats up so that its density decreases. The hot air moves upwards, pushing the rest of the very light pouch upwards. Meanwhile, the surrounding cold air moved down to replace the position of the hot air that rises. This process shows the occurrence of natural air circulation due to differences in temperature and density (Waluyo & Dwika, 2020).

This phenomenon can also be analogous to the process of formation of land winds and sea winds, where hot air above the surface of the land or sea rises into the atmosphere, while cold air from the surrounding moves in to fill empty space. Thus, this experiment helps students understand that convection is one of the main mechanisms of heat transfer in the atmosphere and daily life.

CONCLUSION

Based on the results of the research, it can be concluded that the use of tea bags as an educational medium can help students understand the concept of air convection in a more concrete and interesting way. Through this simple experimental activity, students can see firsthand the relationship between heat, air, and particle motion. The use of real media facilitates the scientific thinking process, strengthens the understanding of concepts, and increases active participation in learning.

In addition, this study shows that learning media does not always have to be expensive and complex. Creativity in using simple materials that are around can create a meaningful and enjoyable learning experience. Therefore, teachers and prospective teachers are advised to continue to develop simple experiment-based learning innovations so that science learning becomes more active, contextual, and oriented towards concept understanding.

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