

Enhancing Children's Interest in Science through Fun and Interactive Learning: A Ramadan Pesantren Kilat Experience

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Abstract: The purpose of this community service is to introduce basic science concepts to children through a fun and interactive approach during the Ramadan *pesantren kilat* event. The method used involves two main types of activities: games that apply the principles of simple electrical circuits and chemistry experiments using household materials. These activities are designed so that children not only listen but also actively participate in the experiments, allowing them to directly understand the theory through practice. The results of the service show that the children were highly enthusiastic and actively participated in the activities, with a high level of engagement and a strong curiosity about science. This initiative also succeeded in changing the children's perception of science, which was previously seen as difficult, into something fun and interesting. The conclusion of this activity is that a fun approach to science can stimulate children's interest in the scientific world and enhance their understanding of basic science concepts. The implication of this activity is that a similar approach can be applied in various educational institutions, including *pesantren*, to foster children's interest and scientific skills from an early age.

Keywords: Active Learning, Chemistry Experiments, Electrical Circuits, *Pesantren Kilat*, Science Education.

Introduction

Fun science outreach is crucial for introducing children to the scientific world at an early age. A fun approach can enhance student engagement in learning and strengthen their understanding of complex scientific concepts (Gultom et al., 2024; Toli & Kallery, 2021; Warliani et al., 2025; Wong & Liem, 2022). Children who are involved in engaging learning activities, such as experiments or scientific games, tend to have a higher interest in science, which can influence their attitudes toward science in the future (Korkmaz et al., 2023; Paños & Ruiz-Gallardo, 2021). Activities like this are highly relevant in the context of Ramadan *pesantren kilat*, as they provide an opportunity to combine religious values with scientific knowledge in an enjoyable way.

The importance of conducting fun science activities aligns with the concept of active learning, which has been proven effective in children's education. Active learning, which emphasizes direct experiments, discussions, and exploration, allows children to build their knowledge independently, rather than simply receiving information from conventional teaching (Capone, 2022; Li et al., 2023; Lombardi et al., 2021). In the context of *pesantren kilat*, fun science activities not only add to children's

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knowledge but also strengthen their critical thinking skills in addressing everyday problems, while introducing scientific concepts that can be applied in their daily lives.

Social activities such as *pesantren kilat* provide an ideal opportunity to introduce science education that is relevant to children's lives, including through a fun approach. Previous research shows that enjoyable learning experiences can strengthen social skills and boost children's self-confidence, which is highly beneficial in fostering positive social interactions during *pesantren* activities (Naqiyah et al., 2024; Ningsih et al., 2024; Rohman et al., 2025). By integrating science into fun activities, *pesantren kilat* can serve as an effective platform to nurture children's curiosity about the world around them, which in turn will enhance the overall quality of education.

The purpose of this community service is to provide children with a deep understanding of science through a fun and interactive approach. A learning approach based on exploration and hands-on experiments can strengthen children's conceptual understanding, particularly in the field of science (Dahlan & Wibisono, 2021; Fakaruddin et al., 2024; Tessema et al., 2024). By utilizing engaging activities such as games or simple experiments, children not only learn scientific concepts but also develop a profound curiosity about the world around them. Activities like this aim to foster a love for science from an early age, which can serve as an important foundation for their future education.

This activity also aims to eliminate the negative stigma surrounding science learning, which is often perceived as difficult and boring. When children engage in enjoyable learning experiences, they are more likely to develop a greater interest in the topics they study (Alam, 2022; Liu et al., 2022; Malone & Lepper, 2021). Therefore, the fun science outreach at this *pesantren kilat* serves to introduce science in a way that is more easily accepted and liked by children, ensuring that they do not feel pressured by the material being taught.

Another goal is to introduce learning methods that can be adapted to daily life, strengthening children's critical and analytical thinking skills. In line with the concept of active learning, this activity aims to help children develop practical skills in problem-solving and scientific thinking. Enjoyable learning experiences that are relevant to children's lives can enhance their ability to face social and academic challenges, as well as build the self-confidence that is crucial for their personal development (Iksal et al., 2024; Khusnidakhon, 2021; Munir et al., 2023).

Method

This activity is a community service program conducted by the Physics Education Student Association of Universitas Garut (HIMAFIGA). The fun science outreach activity combines two main types of activities: games involving the principles of simple electrical circuits and chemistry experiments using household materials. In the simple electrical circuit game, children are given the opportunity to assemble a circuit with a battery, wires, and a small light. Through this game, they can understand how electric current flows, as well as basic concepts of conductors and insulators. This activity is designed to allow children to directly interact with the tools they use, so they not only learn the theory but also practice the fundamental principles of physics in a hands-on way (Kotsis, 2024; Trevissoi, 2024).

In addition to the electrical circuit game, chemistry experiments also form an integral part of this activity. In the chemical reaction experiment, children are invited to mix vinegar and baking soda in a closed container with a balloon placed on top. The chemical reaction between vinegar and baking soda produces carbon dioxide gas, causing the balloon to inflate. This experiment provides a hands-on experience of how chemical reactions can lead to tangible physical changes, such as the formation of gas, while also introducing basic concepts of acids, bases, and chemical reactions.

The method used in this activity is highly interactive, where children are not only listening to explanations but also actively engaged in every step of the experiments and games. They are given the freedom to observe, ask questions, and try assembling the electrical circuits or conducting the chemistry experiments on their own. This approach aims to develop their observation skills, problem-solving abilities, and creativity. In this way, science, which might have previously seemed abstract and difficult, becomes easier to understand and enjoyable (Doroudi, 2023; Holtzman et al., 2025; Irvani et al., 2023).

This activity was conducted in two sessions, each carried out in a single meeting. The first session focused on the simple electrical circuit game, where children learned about the flow of electricity and

its components through hands-on experiments. The second session emphasized the chemical reaction experiment with vinegar, baking soda, and a balloon, providing a direct illustration of chemical reactions. Both activities were designed to allow children to see, feel, and understand scientific concepts firsthand, while also fostering their curiosity about science.

Result and Discussion

The results of this activity show a very high level of enthusiasm from the children, which was clearly evident from their active participation throughout the sessions. The children appeared excited and curious as they engaged in science experiments and games, as shown in Figure 1. They not only followed instructions but also actively asked questions and experimented on their own, trying different methods to observe how electrical circuits function or how chemical reactions lead to interesting changes, such as the balloon inflating due to the reaction between vinegar and baking soda. This high level of participation reflects their strong interest in science, which they may have previously perceived as difficult or boring (Dewaele et al., 2023; Lane et al., 2022; Smedsrud et al., 2022).



Figure 1. Buzz Wire Game with DC Electrical Circuit Principle

This activity successfully sparked the children's interest in science from an early age. Through the fun and hands-on approach, the children felt that science was not something difficult to understand, but rather something exciting and fascinating (Fernandez et al., 2023; Guntani et al., 2025; Karwasz & Wyborska, 2023). Some participants even expressed a desire to try the experiments at home or asked more questions about the topics they learned. This indicates that the activity not only provided temporary knowledge but also left a lasting impression, encouraging them to continue exploring the world of science further.

The positive feedback from both participants and instructors was also very encouraging. The children expressed their excitement enthusiastically after each experiment, with many stating how much fun the activity was. The instructors also praised the success of the program in motivating the children to become more interested in science. They noticed a shift in the children's attitudes, with the children becoming more confident in asking questions and completing the tasks assigned. The outcomes of this activity not only provided scientific knowledge to the children but also strengthened their desire to continue learning and exploring the scientific world (Aguayo & Eames, 2023; Darling-Hammond et al., 2024; Muhajir et al., 2025; Murphy et al., 2021).

Although this activity successfully captured the children's interest, some challenges arose during its implementation. One of the main challenges was managing the activity's schedule amidst the already packed timetable of the *pesantren kilat*. The participants had a very strict schedule for worship and religious studies, which limited the available time for science outreach. This made it somewhat difficult to balance the time between science lessons and other activities. To address this, we ensured that each science session was conducted efficiently without interfering with worship time or other *pesantren* activities. Each activity was designed to be completed within a short time frame, yet still effective in conveying the fundamental science concepts (Fahmi et al., 2022; Jiang et al., 2025).

Another challenge was ensuring that the material presented could be easily understood by the children. Most participants did not have a strong background in science, so it was important for us to simplify scientific concepts that might be difficult to grasp. The use of simple experiments and educational games proved to be an effective solution to bridge this understanding gap. Even though the material was simplified, some children still required further explanations or additional help in understanding certain concepts, especially those related to basic physics and chemistry principles. We also provided opportunities for the children to ask questions and directly engage in experiments, allowing them to gain a deeper understanding.

A significant challenge was maintaining the children's attention throughout the activity. Some children tended to lose focus when the science material presented was too long or complicated. To address this, we adopted a more interactive approach by involving the children directly in the experiments, so they were not just passive listeners but active participants who could experience firsthand what they were learning. This approach proved effective in keeping the children's attention and ensuring they remained engaged throughout the activity (Rahiem, 2021; Rahman, 2023).

This science outreach activity is strongly aligned with the science curriculum, particularly in terms of developing the fundamental skills needed by children to understand the scientific world. One of the main objectives of the science curriculum at the primary level is to introduce basic scientific concepts in a fun and applicable way. Through the experiments and games we conducted, the children not only learned basic science theories but were also directly involved in the process of exploring and applying these concepts (Nkadimeng & Ankiewicz, 2022). This approach is in line with the curriculum's goal of prioritizing active and practical learning, where children are encouraged to actively participate in the learning process, rather than simply receiving information.

This activity also supports the development of scientific skills in children, such as critical thinking, observation, and problem-solving. One key component of the science curriculum is to develop children's ability to ask questions, form hypotheses, and test their ideas through experiments. Activities like the chemical reaction experiment with vinegar, baking soda, and a balloon provide children with the opportunity to understand how experiments can be conducted systematically and observe the results critically. This helps them learn to think scientifically, which is a crucial skill for enhancing their understanding of science (Sutiani, 2021).

The relevance of this activity can also be seen in terms of introducing basic concepts in physics and chemistry that align with the content taught in the primary school science curriculum. For example, the simple electrical circuit experiment introduces children to the basic principles of electric current flow and conductors, which are part of the science curriculum on electricity and energy. Similarly, the chemistry experiment involving the reaction between vinegar and baking soda introduces them to the concepts of chemical reactions, physical and chemical changes, and the properties of materials. In this way, this activity not only provides fun but also lays a strong foundation for children to understand science more deeply in the future (Saadah et al., 2025; Sims, 2025).

Conclusion

The fun science outreach activity at the Ramadan *pesantren kilat* successfully sparked the children's interest in science in an interactive and enjoyable way. The children were highly enthusiastic and actively participated in the experiments and science games, which they had previously considered difficult and boring. Their involvement in assembling electrical circuits and conducting chemistry experiments demonstrated an increased curiosity about science and the scientific concepts being

taught. This activity successfully created a fun learning experience while also providing them with a better understanding of the fundamental principles of physics and chemistry.

The implication of this activity is that a fun approach to science education can be an effective method for overcoming negative perceptions of science. This active, experiment-based learning approach successfully stimulates children's interest in exploring the scientific world more deeply. Additionally, the activity also helps develop critical thinking and observation skills, which are essential for understanding scientific concepts and applying them in daily life.

Challenges in managing the activity's time and simplifying the material for children with limited knowledge still persist. Therefore, adjustments in time management and content are necessary to make it more accessible and understandable for all participants. Moving forward, activities like this could be expanded by adding more varied topics and a more flexible time structure, as well as providing space for discussions to further encourage children to explore the world of science in greater depth.

Conflicts of Interest

The authors declare that there are no conflicts of interest related to the research or publication of this article. All findings and conclusions presented in this work are based solely on the data and analysis conducted, and no financial or personal relationships influenced the research process or outcomes.

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