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BUILDING BASIC SCIENCE CONCEPTS THROUGH SIMPLE EXPERIMENTS AT AISYIYAH BUSTANUL ATHFAL 2 KINDERGARTEN

Iin Zaitun
Universitas Muhammadiyah Malang, Indonesia
iinzaitun95@gmail.com

Moh Rofiq
Universitas Muhammadiyah Malang, Indonesia
rafiq047@gmail.com

Siti Inganah
Universitas Muhammadiyah Malang, Indonesia
inganah@umm.ac.id

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Abstract

Introduction of basic science concepts to early childhood is very important to stimulate curiosity, develop critical thinking skills, and build an initial understanding of natural phenomena. This article aims to explore the use of simple experimental methods as a means to build basic science concepts in Aisyiyah Bustanul Athfal 2 Kindergarten. The study used a descriptive qualitative approach with data collection techniques through observation, interviews, and documentation of experimental activities, such as mixing colors and observing the properties of objects. The results showed that simple experiments that were designed in a safe, interesting, and easy-to-understand way were able to increase children's engagement, strengthen their understanding of basic science concepts, and encourage questioning and experimenting activities. In conclusion, simple experiments are an effective learning strategy in supporting the cognitive development and curiosity of early childhood. These findings can be adapted by other PAUD educators by adjusting the context and characteristics of children in each learning environment. In addition, this approach is relevant to the principles of active and constructivist learning in early childhood education, so that it can enrich pedagogical practices at the national and global levels.

Keyword: Simple Experiments, Basic Concepts of Science, Early Childhood Education, Aisyiyah Bustanul Athfal Kindergarten, Play-Based Learning

Abstrak

Pengenalan konsep dasar sains pada anak usia dini sangat penting untuk merangsang rasa ingin tahu, mengembangkan keterampilan berpikir kritis, serta membangun pemahaman awal terhadap fenomena alam. Artikel ini bertujuan mengeksplorasi penggunaan metode eksperimen sederhana sebagai sarana untuk membangun konsep

dasar sains di TK Aisyiyah Bustanul Athfal 2. Penelitian menggunakan pendekatan kualitatif deskriptif dengan teknik pengumpulan data melalui observasi, wawancara, dan dokumentasi aktivitas eksperimen, seperti pencampuran warna dan pengamatan sifat benda. Hasil penelitian menunjukkan bahwa eksperimen sederhana yang dirancang secara aman, menarik, dan mudah dipahami mampu meningkatkan keterlibatan anak, memperkuat pemahaman mereka terhadap konsep sains dasar, serta mendorong aktivitas bertanya dan bereksperimen. Kesimpulannya, eksperimen sederhana merupakan strategi pembelajaran yang efektif dalam mendukung perkembangan kognitif dan rasa ingin tahu anak usia dini. Temuan ini dapat diadaptasi oleh pendidik PAUD lainnya dengan menyesuaikan konteks dan karakteristik anak di masing-masing lingkungan belajar. Selain itu, pendekatan ini relevan dengan prinsip pembelajaran aktif dan konstruktivistik dalam pendidikan anak usia dini, sehingga dapat memperkaya praktik pedagogi di tingkat nasional maupun global.

Kata Kunci: Eksperimen Sederhana, Konsep Dasar Sains, Pendidikan Anak Usia Dini, TK Aisyiyah Bustanul Athfal, Pembelajaran Berbasis Bermain

INTRODUCTION

Early childhood education (PAUD) plays an important role in laying the foundation for child development, especially in introducing scientific concepts. At an early age, children have great curiosity, active exploration abilities, and a passion for learning through direct experience, exploration and play (Kasmiati, 2024). Therefore, education at this level needs to be designed in such a way as to facilitate exploration and development of children's potential optimally, including in the field of science.

Science at the PAUD level does not aim to form complex theoretical understanding, but rather to build basic concepts through concrete experiences that are relevant to everyday life. Simple experiments provide opportunities for children to learn directly through observation and experience. Involving children in science helps develop important skills such as observation, reasoning, and communication, which are essential for cognitive growth (Wikaningtyas & Nasir, 2024).

Previous studies have shown that exploration-based learning methods, such as simple experiments, are effective in improving children's understanding of basic science concepts (Nofiyanti et al., 2022). For example, floating and sinking experiments have been used to introduce the concept of density, while color mixing helps children understand primary and secondary colors (Mulyani, 2024). These methods are considered to be able to increase children's engagement, provide direct learning experiences, and help children understand natural phenomena in a concrete way. However, these studies often only focus on the effectiveness of certain activities without looking at how the simple experiment approach can be systematically integrated into the PAUD curriculum. In addition, obstacles such as limited interesting learning media and teachers' difficulties in designing safe and age-appropriate simple experiment activities are still major challenges in implementation in the field. However, many studies have not specifically highlighted the integration of simple experiments with the PAUD curriculum, as well as their impact on children's engagement and cognitive development.

TK Aisyiyah Bustanul Athfal 2 as an educational institution based on Islamic values, is committed to supporting holistic learning for early childhood. The development of basic science concepts through simple experiments is one of the methods prioritized in the teaching and

learning process. The concept of science not only teaches children about natural phenomena, but also develops curiosity, critical thinking skills, and problem solving skills which are very important for their future development (Ismawaty, Q., 2024). The application of simple experiments in science learning in this kindergarten is expected to be able to foster curiosity, exploration skills, and a love of science from an early age. This activity is also in line with the principle of play-based learning, which is a characteristic of education at the PAUD level.

With an understanding of the previously mentioned context, the purpose of this study is to explore and analyze How effective simple experiments are in building basic science concepts in early childhood at TK Aisyiyah Bustanul Athfal 2, how is the level of enthusiasm and involvement of children in science learning through simple experiments, and How is the role of child-friendly media and experimental materials in supporting the understanding of science concepts in early childhood. Through a professional and systematic approach, it is hoped that a generation can be created that is not only academically intelligent, but also has a high curiosity and is able to think critically.

METHOD

This research method uses a descriptive qualitative approach to explore the application of simple experiments in building basic science concepts in PAUD. Data were collected through participatory observation of experimental activities in the classroom, interviews with teachers to understand the implementation and challenges faced, and documentation of experimental activities carried out during learning. The researcher chose this method because the data obtained is descriptive and can be analyzed and explained in words and language. (Cahyo et al., 2020).

The data collection techniques used in this study were interview, observation and documentation techniques to obtain a comprehensive understanding in building basic science concepts through simple experiments in early childhood education at TK Aisyiyah Bustanul Athfal 2. Interviews were conducted with two class teachers and several group B students. Observations were conducted twice, where the researcher directly observed the process of building basic science concepts through simple experiments in early childhood education at TK Aisyiyah Bustanul Athfal 2. This observation aims to capture class dynamics directly and ensure that the data obtained from the interview is valid.

Interviews were conducted with two class teachers and several group B students. The main questions in the teacher interviews focused on how teachers design and implement simple experiments, the challenges faced in the science learning process in the classroom, and their perceptions of the impact of experimental activities on children's interests and understanding. Meanwhile, documentation was carried out by recording learning activities and collecting children's work and photos of the experimental process. All data were then analyzed descriptively by identifying the main themes that emerged, to gain a comprehensive understanding of the contribution of simple experiments in building basic science concepts in early childhood.

RESULTS AND DISCUSSION

The implementation of simple experiments in learning at TK Aisyiyah Bustanul Athfal 2 has had a positive impact in building basic science concepts in early childhood. Through activities designed with a play-based approach, children can learn to understand natural phenomena in a concrete and enjoyable way. This learning also succeeded in increasing children's enthusiasm,

involving them actively, and providing meaningful learning experiences. In addition, the media and materials used in the experiments were designed to be child-friendly, so that they not only make it easier for children to learn, but also ensure their safety during the learning process. Overall, simple experimental activities not only support the development of scientific knowledge, but also critical thinking and problem-solving skills in early childhood.

Next, the results of this study will be discussed in detail in several main aspects, namely the effectiveness of simple experiments, children's enthusiasm and involvement, the role of child-friendly media, and the development of critical thinking and problem solving skills.

1. Effectiveness of Simple Experiments in Building Basic Science Concepts

Simple experiments at Aisyiyah Bustanul Athfal 2 Kindergarten have been proven effective in building basic science concepts in early childhood. This method is designed to introduce children to scientific concepts that are close to everyday life through direct experience (Silva-Núñez & Cáceres-Mesa, 2024). Children learn by observing, touching, mixing, and measuring, so that learning becomes more real and easier to understand (Tanjung et al., 2023), (Rodina, 2022).

One example of an experiment that is conducted is the introduction of the properties of liquids and solids. By mixing water with sand, children can see how two different substances interact. They not only understand the differences in the properties of objects, but also learn that not all objects can be mixed. Another example is the experiment of dropping objects of different weights to introduce the concept of gravity. This activity helps children observe that all objects fall down, although the speed varies depending on their shape and weight.

The effectiveness of simple experiments is also supported by the design of activities that are appropriate to the developmental level of early childhood. Activities are designed to be short, fun, and involve direct participation of children. This makes children feel that they are an important part of the learning process, so they are more enthusiastic and eager to learn.

In addition, learning through simple experiments fosters children's ability to connect their experiences with the real world. For example, after an activity, children often bring their learning home, such as observing objects around them or retelling what they have learned to their parents. This shows that learning carried out at school does not only have a temporary impact, but also leaves a mark on children's memories.

Observations show that teachers use a variety of simple experiments such as water and floating objects experiments, color changes in mixing substances, and baking soda and vinegar reactions. These activities help children understand basic science concepts such as density, color changes, and simple chemical reactions. Overall, simple experiments make a significant contribution to building basic science concepts in early childhood. This approach not only makes learning fun, but is also effective in improving children's understanding of simple scientific concepts that are important as a basis for their future knowledge.

2. Children's Enthusiasm and Involvement in Learning

Simple experiments implemented in Aisyiyah Bustanul Athfal 2 Kindergarten have succeeded in increasing children's enthusiasm and involvement in learning. Through an interesting and play-based approach, children show a high interest in actively participating in activities. The learning process becomes more enjoyable, so that children feel motivated to be fully involved. . Play is a natural and important activity for children, serving as the primary means by which they learn and grow. Play is essential for early childhood development, as it engages children actively and dynamically. Fun and short activities foster enthusiasm and joy,

making children feel inseparable from the learning process, which supports their optimal growth and development through exploration and interaction. The level of early childhood development is significantly improved through interesting, short, and fun activities that actively engage children. Such participation fosters a sense of interest and enthusiasm for learning (Khan, 2020).

One of the main indicators of enthusiasm is the children's reaction when the experiment begins. When the teacher introduces the experiment with provocative questions such as, "What happens if we mix water with oil?" or "What if we blow up the balloon too big?", the children show great curiosity. They are encouraged to answer, pay attention, and even try to predict the results. This activity triggers curiosity that keeps them focused throughout the activity.

The children's active involvement is also seen from their direct participation in each stage of the experiment. For example, when asked to mix ingredients, stir liquids, or pour water, the children do it willingly while showing expressions of joy. In addition, they are also involved in discussions, both with peers and teachers, to discuss the results of their observations. For example, children often discuss in small groups about the differences they see when mixing two different materials.

Children's enthusiasm in this learning is also supported by the sense of achievement they experience (Bar-Matthews, 2022). When children successfully complete an experiment, they feel proud and often share their experiences with friends or parents. For example, children seem enthusiastic about telling their teachers or parents that oil does not mix with water because of their different properties. This feeling of success provides positive encouragement to continue learning and trying new things.

Teachers also play an important role in maintaining children's enthusiasm and engagement (Niwayama et al., 2020). Teachers provide appreciation in the form of simple praise, such as "Wow, you are very good at mixing it!" or "Good, you have observed very well!" This appreciation provides additional motivation for children to be more active. In addition, teachers ensure that each child gets the opportunity to be directly involved, so that they feel like they are an important part of the activity.

The success in increasing children's enthusiasm and engagement shows that simple experiments are an effective approach to creating a fun and meaningful learning atmosphere. With their curiosity continuously stimulated, children not only enjoy learning, but also naturally absorb basic science concepts better.

3. The Role of Child-Friendly Media and Experimental Materials

Child-friendly media and experimental materials play an important role in the success of science learning at TK Aisyiyah Bustanul Athfal 2. The media used not only support the achievement of learning objectives, but also ensure the safety, comfort, and convenience for children during the activities. With interesting media and materials, children can learn in a more enjoyable and effective way.

The materials used in the experiments were selected based on simple, safe, and easily accessible criteria and in line with the developmental stages of children, combining appropriate sizes, shapes, and colors to stimulate interest and participation (Fibriyanti, 2020). For example, water, oil, sand, plant seeds, balloons, and food coloring are often used in activities. These materials are not only safe for young children but also able to trigger their curiosity. Children can easily manipulate these materials, such as pouring water, mixing dyes, or blowing balloons, which makes them feel directly involved in the learning process.

Additional media such as transparent containers, small measuring cups, pipettes, and small spoons are also used to support experimental activities. These media allow children to observe the results of experiments more clearly, for example seeing layers of oil floating on water in transparent containers. The use of appropriate media makes the learning process more structured and attracts children's attention..

The success of the experiment is also supported by the creativity of teachers in utilizing simple materials into meaningful learning tools. Teachers can develop unconventional teaching materials (Edessa, 2020). For example, teachers use food coloring to show how liquids spread and mix in water, or use balloons to explain the concept of air and pressure. In this way, children can understand abstract science concepts through concrete visualization. Teachers also revealed that children who were usually less active in class activities became more involved when conducting experiments, indicating that this method can increase children's motivation and confidence in learning science.

Child-friendly media and materials also help reduce the potential for stress or boredom during learning. Because young children tend to have short attention spans, interesting and varied media can maintain their focus (Liana, 2024). In addition, safe materials ensure that children can experiment freely without worrying about the risk of danger.

Overall, choosing the right media and experimental materials plays a major role in supporting the creation of effective science learning. These media and materials not only make it easier for children to understand scientific concepts but also create a fun and meaningful learning experience, in accordance with the developmental stage of early childhood.

4. Development of Critical Thinking and Problem Solving Skills

Simple experiments implemented in Aisyiyah Bustanul Athfal 2 Kindergarten provide great opportunities for early childhood to develop critical thinking and problem solving skills (Hastuti et al., 2024). Experimental activities are designed so that children are not only passive participants, but also actively think, observe, predict, and draw conclusions based on the results of their observations. Children's critical thinking skills begin to develop when they are invited to observe phenomena and ask questions. For example, in an experiment mixing water and oil, children are asked to observe what happens and answer questions such as, "Why doesn't oil mix with water?" Through these questions, children learn to think logically and try to understand the reasons behind a phenomenon.

Problem-solving activities are also integrated into experiments, where children are faced with situations that require simple solutions. For example, when blowing up a balloon, children are asked to think about what will happen if the balloon continues to be blown up. They are asked to predict the possibility of the balloon bursting and find ways to prevent this from happening, such as stopping blowing before the balloon gets too big. This activity helps children practice their ability to analyze situations and find solutions independently. Experiments also provide opportunities for children to draw simple conclusions based on their observations. For example, after observing that heavy objects and light objects both fall to the ground, children are invited to conclude that all objects will fall because they are pulled by gravity. This process trains children to connect the facts they see with the concepts taught by the teacher.

In addition, teachers play an important role in guiding the development of these skills. Teachers ask open-ended questions to stimulate critical thinking, such as, “What do you see?” or “What would happen if we did this?” Teachers also provide feedback that encourages children to reflect on their observations. In this way, children feel supported to continue exploring and trying

different possibilities. Simple experimental activities also build children's confidence in thinking and acting. When children succeed in finding an answer or solution, they feel proud and confident to face the next challenge. This creates a learning experience that is not only fun, but also enriches their critical thinking and problem-solving skills.

Overall, developing critical thinking and problem-solving skills through simple experiments not only helps children understand basic science concepts, but also prepares them to become individuals who are able to think logically, creatively, and independently in the future.

CONCLUSION

Based on the results of the research that has been conducted, it can be concluded that simple experiments have proven effective in building basic science concepts in early childhood at Aisyiyah Bustanul Athfal 2 Kindergarten. Children find it easier to understand science concepts such as density, color changes, and simple chemical reactions through direct experience in experimental activities. This method also increases children's enthusiasm and active involvement in the learning process. Children show high curiosity, actively ask questions, discuss, and are able to re-explain the results of observations in simple language. These findings indicate that experiment-based learning not only strengthens the understanding of science concepts, but also develops children's communication and critical thinking skills from an early age.

The use of child-friendly materials and media plays an important role in supporting the success of this approach. Safe, easily obtained materials, and supporting media such as images and videos have been shown to help children understand science concepts better. Although there are obstacles such as limited tools and implementation time, teachers can overcome them by choosing alternative materials available in the surrounding environment and simplifying experimental activities so that they remain interesting and meaningful for children.

As a recommendation, teachers are advised to continue to develop variations of simple experiments that are appropriate to the child's developmental stage so that learning becomes more interactive and enjoyable. Schools are also expected to provide facilities and infrastructure that support children's exploratory activities in understanding science concepts. In addition, training for teachers is needed to improve understanding and skills in designing and implementing effective experiments in the classroom. For further development, it is recommended that further research explore more innovative experimental-based learning methods and their impact on the cognitive and social development of early childhood. Research can also be expanded with a quantitative approach or applied in various PAUD institutions to obtain more general and in-depth results. With the right approach, science learning in PAUD can be more fun, meaningful, and provide a rich learning experience for children.

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