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Development of Logical Thinking Skills Through Simple Science Activities in Early Childhood

Nur Halizah, nurhalizahlubis109@gmail.com, *UIN Syahada Padangsidimpuan, Indonesia*

Ahmad Nashir, ahmadnaashir@uinsyahada.ac.id, *UIN Syahada Padangsidimpuan, Indonesia*

Abstract: Logical thinking ability is one of the important aspects of cognitive development that should be fostered in early childhood. This ability helps children understand cause-and-effect relationships, classify objects, make predictions, and solve simple problems encountered in daily life. One of the effective ways to develop logical thinking skills is through simple science activities. This article aims to examine the role of simple science activities in developing logical thinking abilities among early childhood learners. The method used in this article is a literature study by reviewing various relevant sources, including books, scientific journals, and scholarly articles related to science learning and early childhood cognitive development. The findings indicate that simple science activities provide children with direct learning experiences that enhance their ability to observe, classify, compare, predict, and understand cause-and-effect relationships. Activities such as floating and sinking experiments, color mixing, and plant growth observation can effectively support the development of logical thinking skills. Although several challenges exist in their implementation, including limited facilities and teachers' understanding of science-based learning, simple science activities can still be carried out effectively by utilizing materials available in the surrounding environment. Therefore, simple science activities can serve as an effective learning alternative to support the development of logical thinking abilities in early childhood.

Keywords: Logical Thinking Skills, Simple Science Activities, Early Childhood, Cognitive Development, Science Learning.

INTRODUCTION

Early Childhood Education (ECE) is a crucial stage of education because it serves as the foundation for the development of various aspects of children's abilities, including physical, social-emotional, language, and cognitive development. During early childhood, children experience a period of rapid growth and development, making appropriate stimulation essential for optimizing their full potential. One of the cognitive abilities that should be developed from an early age is logical thinking. Logical thinking helps children understand cause-and-effect relationships, recognize patterns, classify objects based on specific characteristics, and solve simple problems encountered in everyday life (Ariyanti, 2016).

Logical thinking is an important component of children's intellectual development. Children who possess strong logical thinking skills tend to be more capable of understanding new information, making simple decisions, and finding solutions to the problems they encounter (Mutoharoh et al., 2023). Therefore, teachers need to provide a variety of learning activities that actively and enjoyably stimulate children's logical thinking abilities. Learning approaches that are primarily teacher-centered often provide limited opportunities for children to explore their environment and construct knowledge independently.

One activity that can be used to develop logical thinking skills in early childhood is simple science activities. Simple science activities are learning experiences that encourage children to observe, experiment, compare, predict, and draw conclusions about events or phenomena occurring in their surroundings. Through these activities, children gain direct learning experiences that make abstract concepts easier to understand. Furthermore, science activities can enhance children's curiosity, creativity, and problem-solving abilities (Gamcut, 2024a).

The implementation of simple science activities in early childhood education can be carried out using materials that are easily found in the surrounding environment, such as water, sand, stones, leaves, and various household objects. For example, children may be invited to observe which objects float or sink, mix different colors, or monitor the growth of plants. Such activities help children understand cause-and-effect relationships while simultaneously developing logical thinking skills through direct observation and experimentation (Lina et al., 2025).

Through hands-on experiences, children learn to ask questions, make predictions, test their ideas, and evaluate the results of their observations. These processes encourage children to think systematically and logically while fostering a deeper understanding of the world around them. As a result, science activities provide valuable opportunities for cognitive development during the early years of life.

Several studies have demonstrated the positive influence of science activities on the cognitive development of young children. Research conducted by Salamah et al. (2024) found that simple experimental activities significantly improved children's critical thinking and problem-solving skills. Experiment-based science learning enables children to understand cause-and-effect concepts in a more concrete and meaningful manner. In addition, simple science activities provide opportunities for children to learn through real-life experiences, thereby promoting

the optimal development of logical thinking abilities.

Science activities also support children's natural curiosity and encourage them to become active participants in the learning process. Rather than passively receiving information, children are actively engaged in exploring, questioning, and discovering knowledge for themselves. This active involvement enhances both their motivation to learn and their ability to develop higher-order thinking skills.

However, despite the recognized benefits of science activities, many early childhood education institutions have not yet utilized them to their full potential. In practice, classroom instruction often remains focused on worksheets, routine assignments, and memorization-based activities. Such approaches may limit children's opportunities to explore, experiment, and construct knowledge independently, thereby restricting the development of logical thinking skills.

This situation highlights the need for more active, engaging, and developmentally appropriate learning experiences in early childhood education. Teachers should be encouraged to integrate simple science activities into daily classroom routines in order to create learning environments that promote exploration, inquiry, and critical thinking.

Based on the discussion above, simple science activities can be considered an effective alternative instructional strategy for developing logical thinking skills in young children. Through direct experiences involving observation, experimentation, prediction, and conclusion-making, children can develop a deeper understanding of their environment and strengthen their cognitive abilities.

Therefore, this study aims to examine the development of logical thinking skills through simple science activities in early childhood education. It is expected that the findings of this study will provide valuable insights for educators and contribute to the improvement of learning practices that support children's cognitive and intellectual development during the early years.

METHODS

This article was prepared using a library research method by collecting various relevant sources related to the development of logical thinking skills in early childhood through simple science activities. The data sources used in this study consisted of books, scientific journals, research articles, and various academic documents related to early childhood education and science learning. The use of a literature review approach enabled the author to obtain comprehensive information regarding the concept of logical thinking, the characteristics of simple science activities, and the relationship between these two aspects within the early childhood learning process.

The preparation of this article was carried out through several stages, including literature collection, selection of relevant sources, content analysis, and the organization of review findings. The collected literature was selected based on its relevance to the topic under discussion. Subsequently, the information obtained from various sources was analyzed and classified according to specific themes, such as the concept of logical thinking, the importance of science learning in early

childhood education, forms of simple science activities, and the benefits of these activities for the development of children's thinking abilities.

The analysis was conducted by comparing, relating, and interpreting various opinions and findings from previously published studies. Through this process, a clearer understanding was obtained regarding the role of simple science activities in supporting the development of logical thinking skills among young children. The results of the analysis were then organized systematically in a descriptive format to provide a comprehensive understanding of the topic being discussed.

The literature review method was chosen because it aligns with the objective of this article, which focuses on examining theories and previous research findings concerning the development of logical thinking skills through simple science activities. Through this approach, the discussion is expected to provide in-depth, systematic, and easily understandable information regarding the importance of implementing simple science activities in early childhood education. Furthermore, this method allows for the synthesis of diverse scholarly perspectives, thereby offering a broader understanding of how science-based learning experiences can contribute to children's cognitive growth and logical reasoning development.

RESULTS & DISCUSSION

The Role of Simple Science Activities in Developing Logical Thinking Skills

Simple science activities play a significant role in developing logical thinking skills among young children. These activities provide children with opportunities to interact directly with their surrounding environment, enabling them to gain meaningful and authentic learning experiences. Through hands-on exploration, children are able to observe natural phenomena, manipulate objects, and discover relationships between events. Such experiences help children construct knowledge actively rather than passively receiving information from adults. As a result, learning becomes more meaningful and easier for children to understand and retain (Kadir et al., 2024).

In early childhood education, logical thinking develops gradually through direct experiences and interactions with the environment. Children learn best when they are actively involved in the learning process and are encouraged to investigate the world around them. Simple science activities facilitate this process by allowing children to observe, experiment, compare, classify, and draw conclusions based on their own observations. These activities create opportunities for children to develop reasoning skills while satisfying their natural curiosity about how things work.

One of the most important contributions of science activities to logical thinking development is helping children understand cause-and-effect relationships. Logical thinking begins to emerge when children recognize that certain events occur because of specific reasons. Through science-based experiences, children are not merely presented with final outcomes; instead, they are actively involved in observing the processes that lead to those outcomes. This involvement helps them understand how actions and conditions influence results.

For example, when children observe ice melting, they learn that changes in temperature can cause changes in the physical state of an object. As they watch the ice gradually transform into water, they begin to understand that heat affects

matter. Through this experience, children develop a basic understanding of cause and effect and learn to connect observable events with underlying explanations appropriate to their developmental level (Ratnaningsih et al., 2025).

In addition to promoting an understanding of cause-and-effect relationships, science activities help children develop classification skills. During science exploration, children are often encouraged to sort and group objects according to specific characteristics such as color, size, shape, texture, weight, or material composition. This process of categorization is an essential component of logical thinking because it enables children to recognize similarities and differences among objects and organize information systematically.

The ability to classify objects helps children develop cognitive structures that support more advanced reasoning in later stages of development. By identifying patterns and relationships among objects, children learn to make comparisons, recognize categories, and form logical connections between different concepts. According to Purnamasari and Yusma (2021), classification activities provide an important foundation for the development of logical reasoning and problem-solving skills.

Simple science activities also encourage critical thinking through questioning and inquiry. Young children are naturally curious and often ask questions about the phenomena they observe. Science activities provide opportunities for children to investigate these questions and seek answers through exploration and experimentation. When children encounter something interesting or unexpected, they become motivated to discover why it happened and how it occurred.

This curiosity gradually develops into the ability to analyze information and draw conclusions based on evidence. Rather than accepting information without reflection, children learn to observe carefully, think about what they see, and formulate explanations. According to Nurjannah and Fitrianingtyas (2025), inquiry-based science activities promote analytical thinking and help children develop the ability to make simple conclusions from their observations and experiences.

Another important aspect of science activities is their role in developing prediction skills. Before conducting an experiment, children can be encouraged to predict what might happen. For instance, they may be asked whether a particular object will float or sink in water, or what will happen when two colors are mixed together. Making predictions requires children to use prior knowledge, reasoning, and imagination to anticipate possible outcomes.

After the experiment is completed, children compare their predictions with the actual results. This comparison process helps them evaluate their thinking, recognize mistakes, and refine their understanding. By repeatedly engaging in prediction and verification activities, children learn to think systematically and develop stronger reasoning abilities. These experiences also foster a scientific attitude characterized by curiosity, open-mindedness, and evidence-based thinking.

Furthermore, science activities support problem-solving skills by encouraging children to explore multiple possibilities and test different ideas. When faced with a challenge or question, children learn to gather information, consider alternatives, and determine the most reasonable explanation or solution. Such experiences strengthen their confidence in using logical thinking to address everyday situations.

Science-based learning also promotes active participation and engagement. Unlike passive learning approaches, science activities encourage children to become active explorers and investigators. Through direct involvement in experiments and observations, children develop a deeper understanding of concepts and become more motivated to learn. This active engagement enhances both cognitive

development and learning outcomes.

Moreover, simple science activities can be adapted to children's developmental levels and implemented using readily available materials found in everyday environments. Activities involving water, sand, plants, leaves, stones, and household objects allow children to explore scientific concepts without requiring expensive equipment. This accessibility makes science learning practical and effective in various early childhood education settings.

Overall, simple science activities provide much more than scientific knowledge. They serve as powerful tools for developing logical thinking skills, critical reasoning, problem-solving abilities, classification skills, and an understanding of cause-and-effect relationships. Through active, enjoyable, and meaningful learning experiences, children can develop the cognitive foundations necessary for future learning and everyday decision-making. Therefore, integrating simple science activities into early childhood education is highly beneficial for fostering logical thinking and supporting children's overall intellectual development.

Forms of Simple Science Activities That Can Be Implemented in Early Childhood Education

Simple science activities can be implemented through a variety of learning experiences that are appropriate for the characteristics and developmental stages of young children. These activities should utilize tools and materials that are easily found in the surrounding environment so that learning becomes closely connected to children's everyday lives. In addition to being easy to conduct, simple science activities provide engaging and meaningful learning experiences that encourage children to explore, investigate, and discover new knowledge through direct interaction with their environment.

The use of simple science activities in early childhood education is important because young children learn most effectively through hands-on experiences. Rather than merely receiving information from teachers, children are given opportunities to observe, experiment, ask questions, and draw conclusions based on their own experiences. Such activities promote active learning and support the development of cognitive skills, particularly logical thinking and problem-solving abilities.

One of the most common science activities for young children is the floating and sinking experiment. In this activity, children are invited to place various objects into a container filled with water to observe whether the objects float or sink. Through this experience, children learn to make observations, compare outcomes, and identify the characteristics of different objects based on their own discoveries. They also begin to understand basic scientific concepts related to weight, density, and material properties in a developmentally appropriate manner (Sagala et al., 2025).

This activity also encourages children to make predictions before testing the objects. They may be asked to guess whether a stone, leaf, plastic toy, or piece of wood will float or sink. After conducting the experiment, children compare their predictions with the actual results, which helps strengthen their reasoning and logical thinking skills.

Another science activity that is highly suitable for young children is color

mixing. In this activity, children are given opportunities to combine two or more primary colors and observe the changes that occur. For example, they may mix red and yellow to create orange or blue and yellow to create green. This activity introduces children to the concept of transformation and change while encouraging observation and experimentation.

Color-mixing activities also stimulate children's curiosity and creativity. As they observe the emergence of new colors, children become excited to explore additional combinations and outcomes. Furthermore, they learn to make simple predictions about what color might result from combining specific colors, thereby strengthening their analytical and reasoning abilities. Planting seeds and observing plant growth is another valuable science activity for early childhood learners. Children can plant seeds in simple containers and monitor the changes that occur over time. By observing the growth process daily, children gain firsthand experience with the life cycle of plants and develop an understanding of how living things grow and change.

Through this activity, children learn about the factors that influence plant growth, such as water, soil, sunlight, and air. They also develop patience and responsibility as they care for the plants and observe gradual changes. This direct experience helps children build a deeper understanding of biological processes while fostering curiosity about the natural world.

Observing changes in the states of matter is another engaging science activity for young children. For example, children can observe ice cubes melting into water or water being frozen into ice. These activities introduce children to the concept that materials can change form under certain conditions. Through direct observation, children begin to understand that temperature can affect the physical properties of objects.

Such experiences also strengthen children's understanding of cause-and-effect relationships. When children see that ice melts because of heat or that water freezes because of cold temperatures, they begin to connect events with their causes. According to Ashari et al. (2022), activities involving observable physical changes are effective in helping young children develop scientific understanding and logical reasoning skills.

In addition to experimental activities, classifying objects based on color, size, shape, or texture can also be incorporated into simple science learning. Children may be asked to sort objects into groups according to shared characteristics. Through this process, they learn to identify similarities and differences among objects and organize information systematically. Classification activities are particularly beneficial for developing logical thinking because they require children to analyze object characteristics and determine appropriate categories. By comparing and contrasting objects, children strengthen their ability to recognize patterns, establish relationships, and make logical decisions based on observable evidence.

Other simple science activities may include exploring the properties of sand and water, investigating magnets, observing shadows, identifying different types of leaves, or examining insects and other small animals in the environment. These activities provide diverse opportunities for children to engage in scientific inquiry

while developing observation and reasoning skills.

The various forms of simple science activities described above can be implemented flexibly according to classroom needs, available resources, and children's developmental levels. Teachers can adapt activities to different themes and learning objectives while ensuring that children remain actively involved in the learning process.

Most importantly, science activities should be designed to encourage children to participate directly in observation, experimentation, exploration, and discovery. When children are actively engaged in these processes, they develop a deeper understanding of concepts and strengthen their logical thinking abilities. Through enjoyable and meaningful learning experiences, simple science activities become powerful tools for supporting cognitive development and fostering a lifelong interest in learning and scientific exploration.

Benefits of Simple Science Activities for Children's Logical Thinking Skills and Challenges in Their Implementation

Simple science activities provide numerous benefits for the development of logical thinking skills in early childhood. Through these activities, children gain direct learning experiences that allow them to understand concepts in a concrete and meaningful way rather than relying solely on verbal explanations. Hands-on experiences enable children to actively participate in the learning process, making it easier for them to construct knowledge and develop a deeper understanding of the world around them. According to Nadirah et al. (2026), active involvement in learning activities significantly contributes to children's cognitive development and enhances their ability to think logically.

One of the primary benefits of simple science activities is their ability to help children understand cause-and-effect relationships. During experiments and observations, children witness firsthand how specific actions lead to particular outcomes. For example, they may observe how adding water helps a plant grow or how heat causes ice to melt. These experiences allow children to recognize that events do not occur randomly but are connected through logical relationships. Understanding cause and effect forms an essential foundation for logical reasoning because it helps children explain events and make sense of their surroundings (Gamcut, 2024b).

Simple science activities also strengthen children's observation skills. Throughout science explorations, children are encouraged to pay close attention to objects, identify changes, compare results, and notice details that might otherwise be overlooked. Careful observation enables children to gather accurate information and develop the habit of basing their conclusions on evidence rather than assumptions. As a result, children become more capable of making logical judgments and interpreting information critically. Another important benefit is the development of classification skills. Many science activities require children to sort and categorize objects according to specific characteristics such as color, size, shape, texture, weight, or function. Through these activities, children learn to identify similarities and differences among objects and organize information systematically. According to Gamcut (2024c), classification is a fundamental component of logical

thinking because it helps children understand relationships among objects and develop early reasoning abilities.

Science activities also enhance children's ability to make predictions. Before conducting an experiment, children are often encouraged to anticipate what might happen based on their prior knowledge and experiences. After the activity is completed, they compare their predictions with the actual outcomes. This process encourages children to use simple reasoning, evaluate evidence, and consider multiple possibilities before drawing conclusions. Such experiences contribute significantly to the development of systematic and analytical thinking.

In addition, simple science activities stimulate children's curiosity and encourage them to ask questions. Young children are naturally interested in understanding how things work, and science activities provide opportunities for them to investigate phenomena that capture their attention. When children encounter something unusual or unexpected, they become motivated to discover the reasons behind it. According to Rusawalsep et al. (2020), curiosity serves as a powerful driver of learning and encourages children to explore their environment while developing deeper thinking skills.

Science-based learning also promotes problem-solving abilities. During investigations, children are often faced with questions or challenges that require them to think carefully, test ideas, and evaluate results. Through these experiences, they learn how to approach problems systematically and identify possible solutions. Such skills are valuable not only in academic settings but also in everyday life situations.

Furthermore, science activities foster independence and self-confidence. When children successfully conduct experiments, make observations, and discover answers on their own, they develop confidence in their ability to learn and solve problems. This confidence encourages them to participate more actively in learning activities and become more willing to explore new ideas.

The benefits of simple science activities extend beyond cognitive development. They also support language development as children learn new vocabulary and communicate their observations and conclusions. Additionally, collaborative science activities encourage social interaction, cooperation, and the sharing of ideas among peers. Therefore, science learning contributes to multiple aspects of child development simultaneously.

Despite these numerous benefits, the implementation of simple science activities in early childhood education still faces various challenges. One of the most common challenges is the limited understanding among some teachers regarding science concepts and appropriate science-learning strategies for young children. Some educators continue to perceive science activities as requiring complex equipment and substantial financial resources, leading them to use such activities less frequently in classroom instruction.

Another challenge is the limited availability of facilities and learning resources in certain educational institutions. Not all schools possess adequate materials or equipment to support experimental activities. Consequently, teachers may prefer more conventional teaching methods that are easier to implement rather than activities involving observation, experimentation, and exploration (Yawan et al.,

2025).

Time constraints also present difficulties in implementing science-based learning. Science activities typically require sufficient time for preparation, experimentation, observation, reflection, and discussion. When instructional time is limited, teachers may struggle to complete all stages of the learning process effectively, reducing the potential benefits that children can gain from the activities.

Differences in children's characteristics and developmental abilities represent another important challenge. Every child has unique interests, learning styles, levels of understanding, and cognitive abilities. While some children quickly grasp scientific concepts, others may require additional guidance and support. According to Candra and Hidayati (2020), teachers must employ flexible and inclusive instructional strategies to ensure that all children can actively participate and benefit from science-learning experiences.

Safety considerations are equally important when conducting science activities with young children. Since early childhood learners require constant supervision, teachers must ensure that all materials and equipment used during activities are safe and age-appropriate. Selecting child-friendly materials and maintaining careful supervision are essential for creating a secure and comfortable learning environment.

In addition, family support significantly influences the success of science-based learning experiences. Not all parents fully understand the importance of exploration and experimentation in supporting children's cognitive development. As a result, opportunities for children to continue science-related learning experiences at home may be limited. Strengthening collaboration between teachers and parents can help extend learning beyond the classroom and provide children with more opportunities to explore scientific concepts in their daily lives.

Despite these challenges, simple science activities can still be implemented effectively when teachers demonstrate creativity and resourcefulness in utilizing available learning materials. Many meaningful science experiences can be conducted using inexpensive and easily accessible resources found in the local environment. With careful planning, appropriate instructional strategies, and support from schools and families, science activities can become powerful tools for fostering logical thinking skills among young children.

In conclusion, simple science activities offer substantial benefits for the development of logical thinking skills by helping children understand cause-and-effect relationships, improve observation and classification abilities, make predictions, solve problems, and satisfy their natural curiosity. Although various challenges may arise during implementation, these obstacles can be overcome through effective planning, teacher creativity, adequate support, and the use of developmentally appropriate learning approaches. Consequently, simple science activities remain one of the most effective educational strategies for promoting logical thinking and cognitive development in early childhood education.

Efforts to Optimize the Development of Logical Thinking Skills Through Science Activities

The development of logical thinking skills in early childhood through science

activities should be carried out in a planned, systematic, and continuous manner. Science activities serve not only as a means of introducing children to simple scientific concepts but also as an effective medium for fostering observation, reasoning, analysis, and conclusion-drawing skills. Through meaningful science experiences, children learn to explore their environment, ask questions, seek explanations, and make connections between events and outcomes. Therefore, various efforts are needed to ensure that science activities provide maximum benefits for the development of children's logical thinking abilities.

One important strategy is to create a learning environment that encourages active exploration. Young children are naturally curious about the world around them and have a strong desire to investigate objects, events, and phenomena they encounter in their daily lives. A learning environment that provides opportunities for observation, experimentation, and discovery enables children to engage more deeply in the learning process. Teachers can introduce simple objects, natural materials, and everyday phenomena that are familiar to children, making scientific concepts easier to understand and more meaningful. According to Ayuni and Suryani (2026), exploration-rich environments significantly contribute to children's cognitive growth and support the development of logical reasoning skills.

In addition to providing a stimulating environment, teachers should implement child-centered learning approaches. Science activities are most effective when children are actively involved in every stage of the learning process rather than serving as passive recipients of information. Children should be encouraged to observe, ask questions, conduct simple experiments, and discuss their findings with peers and teachers. Active participation allows children to construct knowledge through firsthand experiences, which promotes deeper understanding and strengthens logical thinking skills. Handayani and Dewi (2023) emphasize that experiential learning enables children to develop reasoning abilities more effectively than traditional teacher-centered approaches.

Another effective effort is the use of thought-provoking questions that stimulate children's reasoning processes. Teachers can guide children's thinking by asking simple yet meaningful questions such as, “Why did this happen?”, “What do you think will happen if we add more water?”, or “Why does this object sink while another one floats?” Questions like these encourage children to observe carefully, analyze situations, formulate hypotheses, and seek explanations based on evidence gathered through their observations. Such questioning techniques help develop critical thinking and logical reasoning from an early age.

Furthermore, teachers should provide opportunities for children to make predictions before conducting experiments. Predicting outcomes encourages children to think ahead, use prior knowledge, and apply reasoning skills. After completing the activity, children can compare their predictions with the actual results and discuss any differences they observe. This process promotes reflective thinking and helps children understand the importance of evidence-based conclusions. Another important effort involves utilizing materials and tools that are easily available in the surrounding environment. The use of simple and familiar materials does not reduce the quality of learning; instead, it often enhances children's understanding because they can directly relate learning experiences to

their everyday lives. Activities such as mixing colors, observing plant growth, sorting objects, exploring the properties of water, or investigating floating and sinking objects can effectively support the development of logical thinking while remaining affordable and accessible. The integration of science activities into daily classroom routines can also enhance their effectiveness. Rather than treating science as an occasional activity, teachers can incorporate observation, inquiry, and experimentation into regular learning experiences. Continuous exposure to science-based exploration helps children develop habits of curiosity, critical thinking, and logical reasoning over time.

Teachers should also provide opportunities for children to communicate their observations, ideas, and conclusions. Storytelling, group discussions, presentations, and question-and-answer sessions following experiments allow children to verbalize their thinking processes. By explaining what they observed and how they arrived at certain conclusions, children strengthen both their language skills and their logical reasoning abilities. According to Nurjanah and Anggraini (2020), reflective discussions help children connect new experiences with existing knowledge, thereby deepening their understanding and enhancing cognitive development.

Moreover, collaborative learning experiences can further support the development of logical thinking skills. When children work together during science activities, they exchange ideas, compare observations, and discuss different viewpoints. These interactions encourage children to consider alternative explanations and refine their thinking through social learning experiences. Collaboration also promotes communication skills, teamwork, and mutual respect among peers. Providing positive reinforcement is another important aspect of optimizing logical thinking development. Teachers should appreciate children's efforts to observe, ask questions, and explore solutions, regardless of whether their answers are entirely correct. Encouragement and constructive feedback help build children's confidence and motivate them to continue engaging in inquiry-based learning activities.

The role of parents and families is equally important in supporting the development of logical thinking skills. Parents can extend science learning experiences beyond the classroom by involving children in simple exploratory activities at home. Activities such as observing weather changes, planting seeds, cooking, sorting household objects, or discussing natural phenomena can reinforce concepts learned at school and provide additional opportunities for logical reasoning development. According to Maulina et al. (2025), consistent support from families enhances children's learning experiences and contributes significantly to their cognitive growth.

Strong collaboration between schools and families can create a more comprehensive learning environment that continuously stimulates children's thinking skills. When teachers and parents work together to provide meaningful exploration opportunities, children benefit from consistent learning experiences across different settings. This continuity strengthens the development of logical thinking and promotes lifelong learning habits.

In conclusion, optimizing the development of logical thinking skills through

science activities requires a combination of supportive learning environments, child-centered teaching approaches, meaningful questioning techniques, accessible learning materials, reflective discussions, collaborative experiences, positive reinforcement, and strong family involvement. By implementing these strategies consistently, science activities can become powerful tools for fostering logical reasoning, problem-solving abilities, and intellectual growth among young children. Through active, enjoyable, and developmentally appropriate learning experiences, children can build a strong foundation for future academic success and lifelong learning.

CONCLUSION

Logical thinking skills are one of the essential developmental aspects that should be nurtured from an early age. One effective way to foster these skills is through simple science activities. Science-based learning provides children with opportunities to observe, experiment, compare, and draw conclusions based on firsthand experiences. Through these active learning processes, children develop the ability to reason, analyze information, and understand the relationships between events in their surroundings.

Various simple science activities, such as color-mixing experiments, observing plant growth, and conducting floating and sinking experiments, can help children understand cause-and-effect relationships while strengthening their logical thinking abilities. Although several challenges may arise during implementation, including limitations in resources, time, and teacher preparation, science activities can still be carried out effectively with appropriate instructional support, a stimulating learning environment, and active parental involvement. Therefore, simple science activities can serve as an effective learning strategy for promoting the development of logical thinking skills in early childhood and preparing children for future learning experiences.

REFERENCES

Ariyanti, T. (2016). Pentingnya pendidikan anak usia dini bagi tumbuh kembang anak. *Dinamika Jurnal Ilmiah Pendidikan Dasar, 8*(1). https://doi.org/10.30595/dinamika.v8i1.943

Ashari, N., Lestari, T. A., Khaeriyah, U., Hukm, R., Aprianti, W., Anjani, S., Hasmiati, H., & Fatimah, N. (2022). Meningkatkan kognitif anak melalui eksperimen menanam tomat untuk anak kelompok B di PAUD Melati Binaan SKB Parepare. *Pedagogi: Jurnal Anak Usia Dini dan Pendidikan Anak Usia Dini, 8*(2), 159–166. https://doi.org/10.30651/pedagogi.v8i2.13135

Ayuni, H., & Suryani, N. Y. (2026). Implementasi strategi pembelajaran kreatif dalam meningkatkan minat belajar anak usia dini di RA Raudhatul Hasanah Muliorejo. *Jurnal Pendidikan Agama Islam Al-Maidah, 2*(1). https://jurnal.almaidah.or.id/index.php/TARBIYAH/article/view/161

Candra, R., & Hidayati, D. (2020). Penerapan praktikum dalam meningkatkan keterampilan proses dan kerja peserta didik di laboratorium IPA. *Edugama: Jurnal Kependidikan dan Sosial Keagamaan, 6*(1), 26–37. https://doi.org/10.32923/edugama.v6i1.1289

Gamcut, N. (2024). Pengembangan sains anak usia dini berbasis eksperimen. *Journal of Early Childhood Education Studies, 4*(2), 307–345. https://doi.org/10.54180/joeces.2024.4.2.307-345

Handayani, N. S., & Dewi, R. S. (2023). Penggunaan metode eksperimen dalam pembelajaran sains di TK As-Sunnah. *As-Sibyan: Jurnal Pendidikan Anak Usia Dini, 8*(2), 169–182. https://doi.org/10.32678/assibyan.v8i2.9428

Kadir, A., Thaba, A., Bandung, A. T., & Nursaadah, S. (2024). Meningkatkan kemampuan kognitif anak usia dini melalui kegiatan bermain sains. *Journal of Education Research, 5*(1), 380–388. https://doi.org/10.37985/jer.v5i1.828

Lina, H. H. 'Ulya, Sulaiman, S., & Faruq, A. (2025). Implementasi media daun bunga sepatu untuk mengembangkan keterampilan sains anak usia dini. *Atthiflah: Journal of Early Childhood Islamic Education, 12*(1), 1–17. https://doi.org/10.54069/atthiflah.v12i1.624

Maulina, I., Andriani, F., & Dona, D. (2025). Peran kolaboratif guru dan orang tua dalam mengembangkan kemampuan kognitif anak usia dini. *Innovative: Journal of Social Science Research, 5*(4), 3470–3479. https://doi.org/10.31004/innovative.v5i4.20266

Mutoharoh, M., Munawar, M., & Hariyanti, D. P. D. (2023). Kegiatan unplugged coding untuk meningkatkan kemampuan berpikir logis dan kritis anak usia dini. Dalam *Seminar Nasional Transisi PAUD ke SD yang Menyenangkan*.

Nadirah, Salam, A., & Yusuf, A. (2026). Implementasi kegiatan eksperimen sederhana untuk mengembangkan kemampuan berpikir logis anak. *ARMADA: Jurnal Penelitian Multidisiplin, 4*(5), 609–621. https://doi.org/10.55681/armada.v4i5.2108

Nurjanah, A. P., & Anggraini, G. (2020). Metode bercerita untuk meningkatkan kemampuan berbicara pada anak usia 5–6 tahun. *Jurnal Ilmiah Potensia, 5*(1), 1–7. https://doi.org/10.33369/jip.5.1.1-7

Nurjannah, H. A., & Fitrianingtyas, A. (2025). Peningkatan kemampuan berpikir kritis melalui kegiatan eksperimen sains anak usia 5–6 tahun. *Kumara Cendekia, 13*(2), 164–172. https://doi.org/10.20961/kc.v13i2.99917

Purnamasari, N. I., & Yusma, N. A. (2021). Mengembangkan kemampuan berpikir logis anak melalui kegiatan bermain warna. *Journal of Early*

Childhood Education Studies, 1(2), 37–71. https://doi.org/10.54180/joeces.2021.1.2.37-71

Ratnaningsih, H. A., Fitri, R., & Malaikosa, Y. M. L. (2025). Pembelajaran sains yang menyenangkan bagi anak usia dini berbasis eksperimen. *SELING: Jurnal Program Studi PGRA, 11*(1), 38–51. https://doi.org/10.29062/seling.v11i1.2717

Rusawalsep, E. R., Nasirun, M., & Ardina, M. (2020). Meningkatkan kemampuan mengenal sebab akibat anak melalui metode eksperimen pada anak kelompok B. *Jurnal Ilmiah Potensia, 5*(2), 163–172. https://doi.org/10.33369/jip.5.2

Sagala, C. S., Pane, M. Y., Situmorang, M., Sitanggang, S. O. B., Tarigan, S. N. B., Simatupang, F. P. M., Anjani, J. P., & Sitindaon, D. A. (2025). Strategi pengembangan kreativitas anak usia dini melalui eksplorasi eksperimen mengapung dan tenggelam di TK Petro. *Eduvation: Jurnal Ilmu Pendidikan dan Inovasi Kependidikan, 1*(1), 18–23.

Salamah, S., Hidayat, R., & Herniawati, A. (2024). Analisis pembelajaran STEAM terhadap kemampuan berpikir kritis (HOTS) anak usia 5–6 tahun. *Jurnal Intisabi, 1*(2), 50–61. https://doi.org/10.61580/itsb.v1i2.10

Yawan, D. J. R., Ponglimbong, M., Pattisiiana, M. S., & Bwarleli, K. (2025). Penerapan metode eksperimen pada pembelajaran sains anak usia dini di PAUD Tunas Harapan. *KHOMBO IME: Jurnal Pendidikan Anak Usia Dini, 1*(1), 50–63. https://doi.org/10.69748/ki.v1i1.334