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FIELD-BASED LEARNING FOR CHILDREN'S UNDERSTANDING OF FLOOD DISASTERS

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ABSTRACT
Early childhood education requires concrete and contextual learning to help children understand the phenomena that occur in their environment, including natural disasters such as floods. This study aims to describe the process of learning earth science with the theme of natural disasters such as floods in fostering children's understanding of the causes and effects of floods in Dharma Bakti II Kindergarten. The study used a descriptive qualitative approach with children aged 4–5 years and class teachers as subjects. Data collection techniques were carried out through observation, interviews, and documentation. Data were analyzed using the stages of data reduction, data presentation, and drawing conclusions. The results of the study indicate that field learning and simple experiments using concrete media can help children understand the causes of floods, such as littering and clogged drains, as well as the impact of floods on the environment and daily life. Children showed high enthusiasm during the learning activities and were able to connect human behavior with the occurrence of floods. This study concludes that learning earth science through direct learning experiences is effective in fostering early childhood understanding of the causes and effects of natural disasters such as floods.

Keywords: Early Childhood Education; Cognitive Development; Flood Experiment

ABSTRAK
Pendidikan anak usia dini membutuhkan pembelajaran konkret dan kontekstual untuk membantu anak memahami fenomena yang terjadi di lingkungan mereka, termasuk bencana alam seperti banjir. Penelitian ini bertujuan untuk mendeskripsikan proses pembelajaran ilmu bumi dengan tema bencana alam seperti banjir dalam menumbuhkan pemahaman anak tentang penyebab dan dampak banjir di TK Dharma Bakti II. Penelitian ini menggunakan pendekatan kualitatif deskriptif dengan anak usia 4-5 tahun dan guru kelas sebagai subjek. Teknik pengumpulan data dilakukan melalui observasi, wawancara, dan dokumentasi. Data dianalisis menggunakan tahapan reduksi data, penyajian data, dan penarikan kesimpulan. Hasil penelitian menunjukkan bahwa pembelajaran lapangan dan eksperimen sederhana menggunakan media konkret dapat membantu anak memahami penyebab banjir, seperti pembuangan sampah sembarangan dan saluran air tersumbat, serta dampak banjir terhadap lingkungan dan kehidupan sehari-hari. Anak-anak menunjukkan antusiasme yang tinggi selama kegiatan pembelajaran dan mampu menghubungkan perilaku manusia dengan terjadinya banjir. Penelitian ini menyimpulkan bahwa pembelajaran ilmu bumi melalui pengalaman belajar

langsung efektif dalam menumbuhkan pemahaman anak usia dini tentang penyebab dan dampak bencana alam seperti banjir.

Kata kunci: Pendidikan Anak Usia Dini; Perkembangan Kognitif; Eksperimen Banjir

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INTRODUCTION

Early childhood education plays an important role in optimizing all aspects of a child's development, including cognitive development. Early childhood is known as the golden age because brain development during this period is extremely rapid, so children need appropriate, concrete, and meaningful stimulation to support their ability to think, understand, and solve problems (Zulfa & Tajib, 2025). In the learning process, young children tend to understand a concept more easily through direct experience than through abstract explanations. Therefore, learning for young children needs to be designed to be active and contextual, and to involve the child's interaction with the surrounding environment.

Cognitive development in early childhood relates to a child's ability to recognize, remember, understand, and connect various pieces of information obtained through learning experiences. Children learn through exploration, observation, play, and social interaction. Learning that is teacher-centered and delivered verbally tends to make it difficult for children to understand concepts in depth. This condition means that children's critical thinking skills and their understanding of phenomena in their surroundings are not yet developed optimally (Rosita & Utami, 2022).

Current phenomena show that learning in several early childhood education institutions is still dominated by academic activities such as reading, writing, and arithmetic, without being balanced by concrete learning experiences. In addition, the development of digital technology has led children to interact more with gadgets than with the real environment. As a result, children have fewer opportunities to explore their surroundings directly. This condition contributes to children's low ability to understand cause-and-effect relationships in events occurring in their environment, including natural disasters such as floods(Husain & Kaharu, 2021).

Flooding is one of the natural disasters that frequently occurs in Indonesia. Floods can be caused by high rainfall, drainage channels clogged with garbage, deforestation, and low public awareness of protecting the environment. Flooding not only damages the environment but also

affects people's daily lives. Therefore, introducing the natural disaster of flooding from an early age is important so that children have a basic understanding of its causes, impacts, and prevention efforts.

However, learning about natural disasters in kindergartens still needs to be developed so that children do not merely receive information through explanations but also gain meaningful learning experiences. Research by Nurani et al., (2022) shows that introducing flood disaster mitigation to young children can be done through learning activities adapted to children's characteristics. The results of that study indicate that using learning media about floods helps children understand flood disasters and their risk factors. This finding shows the importance of presenting disaster learning in ways that are easy to understand and close to children's experiences.

Several previous studies show that learning based on direct experience and the environment can support young children's cognitive development. Research by Yaswida et al. (2023) shows that science learning that makes use of the environment can improve young children's cognitive abilities because children have the opportunity to observe and interact directly with the environment being studied. Research by Ifyati & Inganah (2025) also shows that concrete exploratory activities involving direct experience can stimulate children's cognitive abilities, such as differentiating, classifying, and developing scientific thinking skills. In addition, research by Nasution et al. (2022) shows that learning about flood disaster mitigation can be used to increase the knowledge of children aged 5–6 years about floods and mitigation efforts. Research by Humairah et al. (2024) also shows that the use of a flood prevention model (maket) can increase flood disaster mitigation knowledge in children aged 4–5 years. These findings show that the use of concrete media and activities that provide direct learning experiences can help children understand flood phenomena occurring in their surroundings.

Nevertheless, previous studies have mostly focused on disaster mitigation learning in general and have not specifically examined field learning about flood disaster cases to foster young children's cognitive understanding in the kindergarten setting. Furthermore, earlier research has not often linked field learning with children's ability to understand the cause-and-effect relationships behind flooding through direct observation of the surrounding environment.

Based on this review, the scientific novelty of this study lies in the use of field learning as a strategy to foster young children's cognitive understanding of flood disaster cases through direct environmental observation at TK Dharma Bakti II. This study focuses not only on

introducing the concept of flooding but also on the process of understanding its causes, impacts, and prevention efforts through concrete experiences and exploratory activities.

The problem addressed in this study is how field learning can foster the cognitive understanding of children at TK Dharma Bakti II regarding flood disaster cases. Based on this problem, the study aims to describe the implementation of field learning in fostering young children's cognitive understanding of flood disasters, to identify children's responses during the learning activities, and to analyze the development of children's understanding of the causes and impacts of floods through direct learning experiences.

METHOD

The research method used in this study is a descriptive qualitative approach. This approach was chosen because the study aims to describe in depth the process of earth science learning on the theme of natural disasters, as well as young children's cognitive development during the learning activities. The study was conducted at TK Dharma Bakti II, with a focus on learning activities about floods through simple experiments and the use of concrete media. The research subjects were children aged 4–5 years who were directly involved in the learning activities.

Data were collected through observation, interviews, and documentation of the activities. Observation was carried out during the learning process to determine children's responses, engagement, and ability to understand simple concepts about floods and the environment. The researcher observed how children interacted with the learning media, conducted experiments, and understood the cause-and-effect relationships of flood phenomena. In addition, interviews were conducted with the classroom teacher to obtain information about children's cognitive development, the learning methods used, children's level of enthusiasm, and the obstacles encountered during the activities. Documentation in the form of photographs of the activities was used as supporting research data.

The data obtained were then analyzed using descriptive qualitative analysis through the stages of data reduction, data display, and conclusion drawing. In the data reduction stage, the researcher selected and grouped data relevant to the research focus, such as children's engagement, learning stimulation, and children's understanding of earth science concepts. Next, the data were presented in the form of a narrative description so that the research findings would be easier to understand. The final stage involved drawing conclusions based on the results of

observation, interviews, and activity documentation in order to obtain a picture of the role of earth science learning in supporting young children's cognitive development.

RESULTS AND DISCUSSION

Based on observations of children aged 4–5 years at Dharma Bakti II Kindergarten, the learning activity focused on introducing earth science concepts on the theme of floods through simple experiments using concrete media and recycled materials. The activity aimed to introduce children to how floods occur, what causes them, and the importance of keeping the environment clean from an early age. Learning was carried out directly through simple experiments so that children could understand the concept in a tangible way, in line with the concrete thinking characteristics of young children (Yaswida et al., 2023). An approach based on direct experience is known to improve children's ability to understand simple science concepts because children are actively involved in the learning process(Dinta Ismaya Kurinci, Sakinah Siregar, 2022). This is consistent with Piaget's theory of cognitive development, which states that young children are in the preoperational stage, a stage in which children more easily understand concepts through real objects and direct experience than through abstract explanations (Juita & Woga, 2023).



Figure 1. Introduction to the Concept of Natural Phenomena

At the initial stage of the activity, children were introduced to the concept of natural phenomena as part of earth science learning. The material covered various natural phenomena commonly encountered in everyday life, such as rain, heat, wind, and floods. The explanation was delivered in simple language and linked to real experiences the children had had, so that the material would be easier to understand. The children appeared enthusiastic when they were told how floods occur as a result of heavy rain and drainage channels clogged with garbage. The introduction of natural phenomena was carried out interactively through question-and-

answer sessions and simple discussions, so that children could be actively involved in the learning process. Learning that is connected to the surrounding environment can help children understand science concepts in a more concrete and meaningful way (Yaswida et al., 2023). In addition, the use of visual media and direct experience can also increase children's attention and curiosity about the natural phenomena being studied (Sermila et al., 2024).



Figure 2. Introduction of Simple Experimental Tools

After the introduction to natural phenomena, the children were introduced to the tools and materials used in the experiment, such as used plastic bottles, water containers, buckets, and a simple drainage channel model. The use of recycled materials in the learning activity aimed to introduce the use of objects in the surrounding environment while also fostering children's concern for the environment. The children appeared interested when they were shown the experimental medium in the form of a simple drainage channel made from plastic bottles. The explanation of floods was delivered in simple language and linked to everyday experiences close to the children's lives, such as heavy rain, drainage channels clogged with garbage, and puddles on the road. The use of concrete media in science learning helps children understand concepts more clearly than abstract explanations (Nisa, 2024). The use of simple tools also makes the learning process more engaging and enjoyable, so that children are more focused during the activity (Sermila et al., 2024).



Figure 3. Children Directly Trying the Experiment

The experiment was carried out by pouring water into the drainage channel model that had been prepared. The children were asked to observe how water flows when the channel is clean and how it overflows when there is an obstruction in the channel. In addition to observing, the children were also given the opportunity to try pouring water into the bottles and the experimental channel themselves, taking turns. The children appeared very enthusiastic when trying the experiment on their own. Some children smiled and showed curiosity when they saw the water begin to overflow from the channel. Hands-on activities help children understand the process of flooding more easily because they experience the learning activity themselves (Damayanti et al., 2022). The children also began to understand the cause-and-effect relationship in the experiment, such as water overflowing because the channel was clogged with garbage. The ability to understand cause-and-effect relationships is an important part of early childhood cognitive development because it helps children think logically about events occurring in their surroundings (Martini, 2023).

During the experiment, the children appeared focused on the changes in the water flow and showed high curiosity about the results of the experiment. Some children began to offer simple opinions about the cause of the water overflowing and connected it to flood events they had seen around their homes. The children also began to understand that garbage piling up in drainage channels can block the water flow, causing the water to overflow and leading to floods. Through this activity, the children were taught not to litter and to keep the environment clean so that drainage channels remain clear and do not cause floods. Learning connected to everyday life in this way helps children understand the importance of protecting the environment from an early age (Nabila & Mushlih, 2024). Environment-based learning can also help children

gradually develop observation skills and concern for the condition of their surroundings (Yaswida et al., 2023).

Social interaction among the children was also evident during the learning process. The children paid attention to their peers' experiments, waited for their turn to use the tools, and shared opinions about the results they observed. Some children were seen having simple discussions about why water can overflow and how to keep water flowing properly. Learning activities that involve interaction and cooperation like this can support both the social and cognitive development of young children (Hidayah, 2023). The learning activity became more enjoyable because the children did not only listen to explanations but were also directly involved in the learning experience. According to Vygotsky's theory, children's cognitive development can grow optimally through social interaction and cooperation with peers and adults during the learning process (Noviana, 2025).

Research by Adatul'aisy et al. (2023) reported that experience-based and interactive learning has a positive impact on young children's cognitive abilities, particularly in problem-solving and creativity. This demonstrates that environment-based field learning can improve children's observation skills, critical and logical thinking, and memory of the phenomena being studied. This is supported by Camalia et al. (2025) and Nasution et al. (2022), who affirm that contextual disaster mitigation learning through environmental exploration helps children understand natural phenomena and cause-and-effect relationships, and increases their curiosity and communication skills.

The effectiveness of direct experience is also evident in science experiment methods using concrete media. Sembiring et al. (2025) reported that experimental activities, including flood experiments, improved Group B children's ability to recognize cause and effect, particularly in observing, predicting, and drawing conclusions. Nevertheless, previous studies still leave a gap because they focus mostly on disaster mitigation in general or on science experiments that are separate from the environmental context. Few studies have specifically examined the combination of field learning and direct experiments using recycled materials to help children understand the cause-and-effect relationships behind flooding (such as piles of garbage blocking drainage channels) in kindergarten, so this learning activity is intended to fill that gap.

The results of an interview with the classroom teacher of TK Dharma Bakti II, Mrs. Eni, S.E., show that learning about natural disasters had in fact been introduced to the children since the first semester through the school's collaboration with BMKG (the Meteorological, Climatological, and Geophysical Agency). The disaster mitigation material focused on

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earthquakes and was delivered through enjoyable activities and hands-on practice. The teacher explained that a learning method combining theory and simulation makes it easier for children to understand the material because they can directly experience the learning process. An approach based on direct experience is known to help children understand concepts in a more concrete and meaningful way (Anjarwati, 2023; Azlinda & Permatasari, 2026; Nurlisa et al., 2026).

The teacher also stated that after the disaster material was given, cognitive development was visible in the children. The children became quicker to understand what actions to take when facing an emergency, particularly during the earthquake simulation. The children began to be able to analyze simple situations and understand the cause-and-effect relationships of events explained during the learning activities. This is consistent with Piaget's theory of cognitive development, which states that young children are in the preoperational stage and therefore understand concepts more easily through real experiences than through abstract explanations (Hulu et al., 2025; Khotimah & Agustini, 2023; Pitriani et al., 2023).

In addition to cognitive development, the teacher explained that the children showed very high enthusiasm throughout the learning activities. Before the activities took place, the teacher first gave information about the material to be studied the following day in order to build the children's curiosity. This strategy made the children more prepared and eager to participate in learning, both during the theory sessions and the hands-on practice with BMKG. The children's high level of curiosity was seen in how actively they paid attention to explanations, asked questions, and tried the activities directly. Active learning that gives children direct experience has been shown to help them maintain attention for longer and participate more actively in learning activities (Nazha & Afrianingsih, 2026; Nurbadriyah et al., 2026).

To foster the children's curiosity, the teacher used a light discussion approach and hands-on practice. The teacher explained that if any child was less interested in the material, she would try to spark the child's curiosity through real activities that involve the child directly. Through practical activities, children who were previously passive became more interested in trying and exploring the learning activities. Learning activities that involve direct experience and active interaction are known to help increase young children's learning motivation and curiosity (Maulina & Elvry, 2025).

Nevertheless, the teacher revealed that there were challenges during the disaster learning activities, namely managing the children's enthusiasm so that they remained orderly and focused on following instructions. Some children were so excited that they tended to get ahead

of the directions given during the practice. Therefore, the teacher needed to provide more intensive guidance so that the children could follow the activity procedures in sequence and safely. This situation shows that hands-on practice does increase children's engagement, but it still requires good classroom management so that the learning objectives can be achieved optimally.

Overall, the results of the observations and interviews show that the earth science experiment on the theme of floods helped children understand simple concepts about the causes of flooding, the process of water flow, and the importance of protecting the environment from an early age. The use of simple tools made from recycled materials provided a learning experience that was engaging, enjoyable, and easy for the children to understand. Direct learning activities also helped increase the children's curiosity, observation skills, logical thinking, and active involvement during the learning process (Rajamuddin, 2025). Through direct learning experiences, children can build an understanding of flood phenomena gradually, as well as of the importance of not littering so that the environment stays clean and free from floods. Thus, learning based on simple experiments can be an effective method for fostering young children's cognitive understanding of natural phenomena in their surroundings.

CONCLUSION

This study demonstrates that earth science learning through direct learning experiences is highly effective in fostering and improving young children's cognitive understanding of the causes and effects of flood disasters. Through the implementation of a field learning strategy combined with simple experimental methods using concrete media and recycled materials at TK Dharma Bakti II, children aged 4-5 years were able to construct their knowledge of how floods occur in a tangible way. The concrete thinking characteristic of young children, who are still in the preoperational stage, could be well facilitated through the visualization of a water flow simulation model (maket). As a result, the children were able to understand cause-and-effect relationships logically, such as how the poor human behavior of littering can clog drainage channels, which ultimately triggers water overflow and results in flooding in the surrounding environment.

This child-centered hands-on activity proved successful in stimulating multiple aspects of children's development. The learning process significantly increased the children's enthusiasm, strong curiosity, sharpness of observation skills, and holistic active involvement during the science activity. In addition to its positive impact on the cognitive aspect, this

interactive, environment-based learning model was also able to stimulate the children's social-emotional development. This was evident in the cooperation, fair division of tasks, and simple discussions among peers as they tested the water flow together on the simple teaching aid.

Although the implementation faced its own challenge, in that some children showed overly excited emotional outbursts and tended to get ahead of the instructions or experimental procedures, this problem could be well mitigated through more intensive, focused, and persuasive teacher guidance. Overall, this earth science experiment did not stop at a merely cognitive-theoretical understanding of natural phenomena, but also succeeded in instilling basic character values, namely fostering ecological awareness and concern for environmental sustainability from an early age, especially the awareness to keep the environment clean by not littering.

AUTHOR CONTRIBUTION STATEMENT

The authors listed in this manuscript made real contributions and share joint responsibility for the manuscript at every stage of the research through to publication. Annisa Putri Larassati contributed to writing the introduction section and collecting data through field observation. The formulation of the research problem, the design of the qualitative study, complete field data collection (observation, interviews, and documentation), as well as the data analysis and drafting of the initial manuscript, were carried out collaboratively by Vita Listiani and Taskia Imani. Meanwhile, Nurcetta Barcha Rahmadhani contributed to reviewing the manuscript, providing critical input on the interpretation of results, and performing language editing and formatting in accordance with journal requirements. This entire academic process was carried out under the guidance and supervision of Nur Hayati as the supervising lecturer, who provided methodological direction, critical review, and final approval prior to submission.

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