

## **ANALYSIS OF ELEMENTARY SCHOOL STUDENTS MISCONCEPTIONS OF CONCEPTS NATURAL DISASTERS IN IPAS SUBJECTS**

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### **Abstract**

This study aims to analyze the forms of misconceptions among elementary school students regarding the concept of natural disasters in the IPAS subject, and to examine the learning process and factors that influence the formation of these misconceptions. This study uses a qualitative approach with a case study design, involving 20 sixth-grade students and one classroom teacher at SDN Kebon Jahe, selected thru purposive sampling. Data was collected thru observation, interviews, analysis of written answers, group discussions, and documentation, and then analyzed using the Miles & Huberman model. The research findings indicate that students' misconceptions fall into three main categories: unscientific preconceptions, associative thinking based on emotional interpretation or popular stories, and partial reasoning that is unable to fully describe scientific mechanisms. This misconception is reinforced by textbook-centered teaching practices, minimal use of visual media and props, and limited opportunities for concept exploration and clarification. Additionally, low science literacy, the quality of learning resources, and limited direct experience with natural phenomena also contribute to the emergence of misconceptions. This finding confirms the need for learning strategies that integrate scientific investigation, concrete media, and preconception diagnostics to strengthen students' knowledge construction related to natural disaster concepts.

**Keywords:** Misconceptions, Natural Disasters, IPAS, Qualitative Studies

### **INTRODUCTION**

Primary school IPAS education teachers are responsible for teaching science to children based on fundamental principles, as well as scientific thinking to prepare them for the complex world of life. With the primary school age group as learners who are already in the concrete thinking phase, learning involves physical manipulation, watching and doing, which allows children to observe, act, and experience in relation to natural processes. Learning without real-world experience is often the reason for a lack of scientific understanding, especially scientific facts within the context of environmental processes such as earthquakes, floods, volcanic eruptions, landslides, or climate change. (Lestari et al., 2024). In order for students to connect the new information given to them with real life, a correct understanding of concepts is necessary.

Students must be able to understand the scientific concepts put forward by several experts and apply them in daily life, including natural events. According to Pujiastuti and Iswatiningsih (2025) science learning in elementary school plays an important role in shaping students' understanding of fundamental concepts about natural phenomena. These concepts encompass various phenomena that occur in nature. Natural phenomena are the primary basis for science learning, as science teaches students to learn to recognize themselves and their environment (Nasution et al., 2021).

Practical experience shows that there are still many difficulties in understanding the basic principles of science in primary education. Difficulties are influenced not only by gaps in text comprehension, but also by limitations in media, an overly narrow focus of the book, and less meaningful learning. This condition facilitates the formation of misconceptions, which is knowing concepts that are not scientifically accepted (Rossyadah at al., 2025). Teachers must know and understand all the issues involved in the teaching and learning process so they can assess whether the learning is well-received by students or the opposite (Nurfiyani at al., 2020).

Misconceptions are not only found at the elementary school level, but can also be found among university students. Misconceptions are an endemic problem in science education because they can hinder students' understanding of concepts in the long run, making it difficult for them to accept new ideas. Various studies highlight that misconceptions not only originate from students but also from various sources including teachers, textbooks, or the way topics are presented (Saputri at al., 2023). Misconceptions about disaster material are likely caused by many factors that play a role in natural phenomena and are not always visible from the outside, leading students to develop inaccurate understandings of the material based on limited experience or incorrect explanations. There are three main indicators that can lead to misconceptions in previous studies: preconceptions (inherent initial concepts students bring before learning), associative thinking that causes students to connect natural phenomena with feelings or stories they have heard, and immature reasoning (drawing conclusions by making connections with knowledge) (Rahmawati and Kurniawati., 2024).

Researchers conceptually understand how natural disasters occur and their causes. The Merdeka Curriculum and the Safe School/Madrasah Program (SPAB) promote a scientific understanding of these concepts, enabling students to correctly identify existing risks and establish cause-and-effect relationships between hazards and their causes. Unfortunately, a number of studies show that students continue to exhibit misconceptions in this content, such as believing that earthquakes occur because the ground "shakes on its own," volcanoes erupt "because the mountain is angry," or floods happen only because of "heavy rain" without any other environmental context (Halimah at al., 2025). According to Rahmawati and Kurniawati (2024) misconceptions can arise from students' inability to validate their knowledge thru discussion, experimentation, and demonstration. Kasanah at al., (2024) also reached the same conclusion, that misconceptions can be exacerbated by poor scientific literacy and may be very difficult to understand regarding cause-and-effect relationships in a phenomenon.

Previous studies have investigated misconceptions specific to certain materials, for example, by Permadani at al., (2022) discussing elementary school students' misconceptions about earthquakes and volcanoes using a three-tier test. Meanwhile, this study maps data based on three types of misconceptions for easier analysis. Researcher Wibowo at al., (2023) discussing elementary school students' misconceptions about volcanic eruptions. However, this research attempts to analyze misconceptions across a range that will apply to all types of natural disasters. Then, according to research Wijayanti at al., (2025) using a quantitative method to analyze misconceptions in elementary school students. However, this study uses a qualitative method to measure the extent of students' misconceptions about the concept of natural disasters. Understanding why misconceptions exist and the reasons they arise so that teachers can better design how students will learn, use concrete media, and can explain things to students using the correct scientific terminology. The need for an innovative approach to learning, which not only emphasizes memorizing material but also encourages students to connect concepts with real-world phenomena around them. The results of this study aim to assess the practice of IPAS learning and inform the design of teaching methods to minimize misconceptions at the elementary school level.

This study aims to identify and analyze elementary school students' misconceptions related to natural disaster concepts by tracing how these misconceptions are formed thru preconceptions, associative thinking, and incorrect reasoning, and by providing a comprehensive overview of the patterns of misconceptions that emerge in students. It helps in studying misconceptions in learning thru IPAS, specifically regarding environmental disasters from natural disasters. It serves as a

reference guide for future research on concept understanding and misconceptions among elementary school students.

#### Practical Benefits

1. For Teachers. Providing information that explains the form and origin of misconceptions to teachers about more appropriate and understandable learning strategies for students.
2. For Students. To improve the researcher's approach to learning, enabling more effective engagement with students to avoid misconceptions by developing a much better understanding of concepts, providing them with a better grasp of all their new knowledge.
3. For Schools. To serve as material to assist in assessing the development of the quality of IPAS experiences by offering real media, teaching materials, and learning activities.
4. For Other Researchers. To serve as a foundation for the creation of further studies on misconceptions and concept understanding at the elementary education level.

## METHODOLOGY

### Research Design

This research uses a qualitative approach. Qualitative research is research that produces descriptive data, whether in the form of spoken or written expressions from people or as observed activities. Qualitative research emphasizes the idea of exploration, which requires a comprehensive examination and focuses on one or more situations, including single case studies (Safarudin et al., 2023). This research employs a qualitative approach using the case study method. According to Fajari et al., (2024), the case study method is a suitable technique for investigating "how and why" questions, especially when researchers face time constraints in managing the events and processes being studied. This research follows contemporary phenomena to understand the development of current events. The problem formulation that serves as the basis for this research is as follows: How do elementary school students' misconceptions about natural disaster concepts arise from preconceptions, associative thinking, and incorrect reasoning?

### Research Participation

The participants in this study consisted of 20 sixth-grade students from SDN Kebon Jahe and their sixth-grade teacher, who were selected using purposive sampling. According to Ksanjaya and Rahayu (2022), Purposive sampling is a non-probability sampling method where researchers intentionally select participants or respondents based on specific factors and predetermined standards aligned with the research objectives. Students serve as the primary data source thru observation, written responses, group discussions, and brief interviews. Teachers serve as supporting informants who provide context regarding the learning process, teaching strategies, and the challenges students face. The involvement of both parties allows researchers to gain a comprehensive understanding of the patterns of misconceptions that emerge during the teaching and learning process.

### Data Collection Techniques

Data collection is carried out using several complementary techniques to obtain a comprehensive understanding of students' thinking processes, according to Miles and Huberman, who emphasize the importance of triangulation in qualitative research.

#### 1. Observation

Observations were made during the learning process to see:

- a. How teachers delivered the material
- b. Spontaneous student responses
- c. Difficulties that arose when reading
- d. Intuitive answers that indicated misconceptions.
- e. Observation allows researchers to understand the behavior patterns and language used by students in interpreting the concept of nature. Delivery of material by teachers

#### 2. Interview

Interviews were conducted with teachers and some students to explore:

- a. Initial understanding
  - b. The origin of preconceptions
  - c. Specific triggers of misconceptions
  - d. Real experiences or informal information that affect the student's knowledge.
  - e. Interviews in qualitative studies serve to directly capture the perspectives of participants thru verbal explanations.
3. Written Answer Analysis  
Researchers provide several triggering questions about the causes of floods, earthquakes, landslides, and mountain eruptions. Student answers were analyzed to determine:
  - a. The tendency to think associatively
  - b. Partial reasoning
  - c. Erroneous generalizations that characterize misconceptions.
4. Small Group Discussi  
Group discussions are used to observe how students influence each other's understanding. Thru interaction, it is seen how incorrect ideas can:
  - a. Be reinforced by peers
  - b. Persist even tho they contradict scientific explanations
  - c. Evolving into a new explanatory pattern
  - d. Documentation  
Documentation in the form of photos of activities, teacher notes, and student worksheets is used as supporting data to strengthen the findings.

### Data Analysis Techniques

The analysis was conducted following the Miles Huberman technique, which emphasizes three main and sequential flows:

1. Data Reduction  
The data from observations, interviews, and documents were selected, coded, and grouped according to the categories of misconceptions that emerged. The coding process used an initial approach as recommended by Lungu (2022), who views codes as an effort to capture the important meaning from data segments.
2. Data Presentation  
The reduced data is presented in the form of tables, findings summaries, and thematic narratives to facilitate the identification of relationships between concepts and patterns of misconceptions.
3. Conclusion  
The conclusion is drawn thru a process of repeated interpretation, comparing findings across data collection techniques. This process is iterative, in accordance with the principles of non-linear qualitative analysis Lungu (2022), so that new conclusions can emerge as the data deepens.

### Data Validity

Data validity is strengthened thru:

1. Technical Triangulation  
Comparing the results of observations, interviews, written answers, and documentation to ensure consistent findings.
2. Source Triangulation  
Checking the accuracy of data from students, teachers, and learning documents.
3. Member Checking  
Confirming some findings and interpretations with the teacher to align with the actual learning context. This procedure follows the recommendation Creswell (2016) to increase the reliability of results in qualitative studies.

## RESULTS AND DISCUSSION

### RESULTS

#### Preconception

Before starting the data collection process, the researcher began the activity by explaining the research objectives and goals to the principal and sixth-grade teachers at SDN Kebon Jahe. Researchers stated at this stage that the purpose of the study was to identify misconceptions students held about natural disasters as a learning topic in science lessons. The researchers developed several instruments for data collection, interview guides for teachers, and observation guides for students before conducting a trial with the students. The following questions were developed with the help of three basic signs of misconceptions (preconceptions, associative thinking, and incomplete reasoning). In addition to this study, other documents (data recording methods, class books, and writing materials used in group work) were prepared by the researcher. During this initial discussion, researchers and classroom teachers reviewed various instruments.

Based on the information observed and received, it was found that approximately 75% of the 20 students had misconceptions about the concept of natural disasters. This misconception developed in several environments that were directly observed in learning. Students lose focus, are easily distracted, and pay less attention to the teacher's instructions during lessons. Some students talk to themselves or disturb their classmates. This can hinder students from gaining a full understanding of what they are reading, leading to poorly formed concepts. Additionally, some of them are still at a reading level, requiring more time to understand the text in books or question sheets. For the preconception indicators, the research findings were obtained thru initial activities such as leading questions, group discussions, and problem-solving exercises. The documentation describing the process is presented as follows.

During the interview process, the researcher asked the teacher several questions regarding preconceptions in elementary school students, one of which was, how do students tend to understand natural disasters based on their basic concepts before learning begins. The teacher responded, "Generally, they will answer without much thought, without considering the truth," she said. To strengthen the teacher's answer, the researcher conducted observations using a diagnostic test, which involved giving students several questions or problems. The questions include: (1) what do you know about natural disasters, (2) why earthquakes happen, and (3) how mountains erupt. Thru these questions, the researcher can analyze students who have misconceptions in their preconceptions.

**Table 1. Questions and Student Answer Results**

| Question                                  | Answer                                                                                                                                        |
|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| What do you know about natural disasters? | A. The Earth is not doing well                                                                                                                |
|                                           | B. A natural disaster is a disaster such as a tsunami, earthquake and mountain eruption.                                                      |
| Why can earthquakes occur?                | A. Because the earth is angry                                                                                                                 |
|                                           | B. Earthquakes occur due to plate collisions and tectonic movements in the ocean.                                                             |
| How can a mountain erupt?                 | A. Due to the occurrence of evaporating lava or the occurrence of earthquakes                                                                 |
|                                           | B. Mountain eruptions are caused by the volcano being too active and causing the volcano to overflow and release its larvae and volcanic ash. |

From the answers given by the students, it is very clear that some students have misconceptions. In question number one, student A answered "the earth is not doing well," which falls under emotional associative thinking that is still incorrect (miscommunication). They see the earth as a living being that can feel pain or anger, which is not a scientific explanation. Meanwhile, student B answered,

"Natural disasters are events like tsunamis, earthquakes, and volcanic eruptions." This answer already demonstrates a fairly good initial factual understanding (preconception). Furthermore, in response to question number two, student A answered, "Because the Earth is angry." This also falls under associative thinking that is still incorrect (misconception), as the student links natural phenomena with human feelings. This could be due to cultural factors the student is familiar with. Meanwhile, student B answered, "Earthquakes happen because of plate collisions and tectonic movements inside the sea." This answer already demonstrates a fairly good initial factual knowledge (preconception). Then, for question number three, student A answered, "because of the eruption of lava or the occurrence of an earthquake." This is a misconception because lava doesn't evaporate; it flows out due to pressure. This answer shows that the student misunderstands the state of matter. Meanwhile, student B answered, "volcanoes erupt because they are too active, causing the mountain to overflow and release lava and volcanic ash." They already have a fairly good initial factual knowledge (preconception).

### Associative Thinking

Data collection on misconceptions thru associative thinking is similar to data collection on preconceptions, which involves using several initial activities such as leading questions, group discussions, and problem-solving. Thru exploratory questions that focus on how students connect natural phenomena with non-scientific associations, researchers can more easily analyze. Documentation of activity implementation and evidence of student responses.

During the interview process, the researcher asked the teacher several questions related to associative thinking in elementary school students, including whether or not there was visual learning about natural disaster concepts. The teacher responded, "Even tho this school is in the city, we haven't yet received the facilities and infrastructure to display visual media, so during learning activities, we only rely on the narratives and images in the books," she said. To strengthen the teacher's answer, the researcher conducted an observation using a diagnostic test, which involved giving students several questions or problems. The questions include: (1) If a mountain erupts, is it a sign that the mountain is angry, (2) Do natural disasters happen because humans sin, (3) If it rains heavily, does that mean the sky is crying? Thru these questions, the researcher can analyze students who have misconceptions about their associative thinking in the learning methods used during the learning process.

**Table 2. Questions and Student Answer Results**

| Question                                                         | Answer                                                                                                                                                |
|------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| If a mountain erupts, is that a sign that the mountain is angry? | A. Yes, because the mountain is disturbed.<br>B. No, because mountains have no properties and can erupt at any time.                                  |
| Do natural disasters occur because humans sin?                   | A. Because humans throw garbage into the sea.<br>B. No, it is not because humans have sinned but because humans have destroyed nature.                |
| If it rains heavily, does that mean the sky is crying?           | A. No, because the angel is taking a bath<br>B. No, because the water comes down from the clouds and the clouds collect the water and the rain occurs |

From the answers given by the students, it is very clear that some students have misconceptions. In question number one, student A answered "yes, because the mountain feels disturbed." This falls under the misconception of associative thinking, as the student believes the mountain can feel disturbed. This is a form of anthropomorphism (nature is personified like humans). Meanwhile, student B answered, "No, because mountains don't have properties and can erupt at any time." This answer already demonstrates a fairly good associative thinking ability as it can connect to factual knowledge. Next, in answer number two, student A answered, "Because humans throw garbage into rivers/the sea," which falls under the misconception of associative thinking. This is because it directly links garbage to all disasters, or that garbage is only relevant to floods, not other disasters. Meanwhile,

student B answered, "No, not because humans sin, but because humans destroy nature." This answer already demonstrates a fairly good level of associative thinking. Then, in answer number three, student A answered "no, because the angels are taking a bath." This is a misconception, as the student is still associating the natural disaster with folklore or cultural influences. Meanwhile, student B answered, "No, because water falls from the clouds, and the clouds hold the water, causing rain." This answer demonstrates a fairly good associative thinking ability, linking their thoughts to scientific concepts.

### Faulty Reasoning

In the group discussion, the researcher noted that answers from the textbook were often taken directly by the students. They don't try to make connections between information and real life. The results indicate that understanding was not developed in depth, as the concepts were not explored or the children had not yet experienced them in a way that would reinforce their understanding. This indicator is analyzed thru students' responses to cause-and-effect questions and group presentation activities. Supporting documentation to show the process and results can be viewed as follows:

During the interview process, the researcher asked the teachers several questions related to reasoning errors in elementary school students, including questions about the causes of incomplete reasoning experienced by elementary school students regarding the concept of natural disasters. Then the teacher replied, "First, there is definitely a lack of information sources. Beside the school lacking facilities and infrastructure, it's also impossible for them to think about seeking further information related to natural disasters on the internet when they are at home," he said. To strengthen the teacher's answer, the researcher conducted an observation using a diagnostic test, which involved giving students several questions or problems. The questions include: (1) If a mountain isn't tall, does that mean it can't erupt, (2) Earthquakes occur because of strong winds underground, right?. Thru these questions, the researcher can analyze students who have misconceptions about incorrect reasoning.

**Table 3. Questions and Student Answer Results**

| Question                                               | Answer                                                               |
|--------------------------------------------------------|----------------------------------------------------------------------|
| Do natural disasters occur because humans sin?         | A. Yes, because the mountain is still in the process of being raised |
|                                                        | B. No, because short mountains also have lava.                       |
| If it rains heavily, does that mean the sky is crying? | A. True, mountains can overflow due to the big winds underground.    |
|                                                        | B. No, earthquakes occur because of the Earth's plates               |

From the answers given by the students, it is very clear that some students have misconceptions. In question number one, student A answered "yes, because mountains are still in the process of rising," which is a scientific misconception because the student thinks mountains erupt because they are growing taller, even tho mountain growth and eruptions are two different processes. Meanwhile, student B answered "no, because short mountains also have lava," which is a fairly good answer because it can connect to factual knowledge. Next, in question number two, student A answered "correct, mountains can overflow because of strong winds underground," which is a serious misconception because it combines two different phenomena; the student thinks they both have the same cause, which is strong winds. Meanwhile, student B answered "no, earthquakes happen because of tectonic plates," which is a fairly good answer because it can connect to scientific knowledge.

## DISCUSSION

### Forms of Misconceptions that Arise in Elementary School Students Regarding the Concept of Natural Disasters

Misconceptions about Natural Disasters in Elementary School show that elementary school students exhibit many misconceptions related to natural disasters and their manifestations in various learning situations. This conceptual error appears not only in incorrect answers, but also in the way students connect facts to topics that have nothing to do with each other. This fact also indicates that students of various ages are still in a stage of cognitive development where scientific understanding is far from fully stable and can still be influenced by simple perceptions. Many previous studies have described a comparable picture. Rossyadah at al., (2025) stating that misconceptions occur when students' existing knowledge structures are weak, resulting in the ineffective integration of new scientific knowledge communicated by the teacher. Lestari at al., (2024) also stated that conceptual errors occur primarily because students only know the surface of a phenomenon and do not understand its underlying mechanisms.

#### 1. Misconceptions Based on Students' Preconceptions.

Preconceptions are the ideas students form before learning begins. This is a basic idea and often arises from everyday experiences, childhood memories, media reports, personal feelings, or conclusions without scientific basis. Many studies show that students provide general, often unfiltered answers without follow-up. They point to simple factors as the cause of the disaster but don't consider the interconnected processes that would help shape it. Rahmawati and Kurniawati (2024) describing this phenomenon, they state that incorrect initial concepts can prevent teachers from conveying new scientific concepts. If students' preconceptions are ignored, they will continue with their previous understanding even after explanations are given. Misconceptions include the following:

##### a. Justification Fails to Consider More Than One Factor

Students regularly describe floods in terms of the direct effects of heavy rainfall, with little or no knowledge that floods occur thru a series of events, from poor drainage systems to changes in the physical environment. Saputri at al., (2023) found that students only explained natural phenomena at a superficial level without connecting them to other factors.

##### b. Repeating Sentences from the Book Without Understanding

When asked to interpret, students only provided quotes from the textbook, or nothing more. They were unable to articulate the meaning or cite examples of the concept. Tuna at al., (2023) observing that rote memorization tends to make students learn concepts only verbally, and not conceptually.

##### c. Lack of Connection Between the Real Environment and Concepts

Many students do not connect natural disaster phenomena with real-life events around them. In fact, linking concepts to personal experiences is the foundation of scientific knowledge building (Lestari at al., 2024). The students' original ideas are therefore superficial, with significant inconsistencies. This is because the initial concepts, not refined thru discussion or real-world experience, will persist with the initial understanding into subsequent learning courses, and the potential for confusion remains.

#### 2. Misconceptions Based on Associative Thinking

Associative thinking is a way students understand scientific phenomena thru free association, imagination, traditional stories, or affective narratives. This type of thinking is evident in this study when students offer human or non-scientific interpretations of answer formats. Such findings are consistent with Halimah at al., (2025) which illustrates how many elementary school children are still at the intuitive thinking stage, and thus construct their conceptions from their imagination, feelings, or the stories they hear. This is even more so when learning is not visually oriented and does not involve concrete experiments. Misconceptions in this case appear in the form of:

- a. Personification of Natural Phenomena.  
Wibowo at al., (2023) This shows that personification illustrates that students have not yet understood the phenomena occurring as a natural, mechanistic process.
  - b. Explanations Shaped by Social Narratives  
Others interpret disasters as a form of punishment, warning, or reminder. This means that scientific concepts cannot be separated from certain social values, and are often mixed with some social beliefs or practices.
  - c. Imaginative Thinking in the Absence of Learning Media  
The teacher said that education still focuses primarily on reading books without videos, animations, or simulations. Kasanah at al., (2024) highlighting the fact that, in the absence of concrete media, students understand ideas thru speculative rather than empirical means. Essentially, associative thinking occurs when students lack the necessary scientific methods to study phenomena. Students rely on alternative explanations that align with their own understanding, especially if the learning environment doesn't provide supporting media.
3. Incorrect Thinking Due to Partial Reasoning
- Another misconception is when students draw conclusions based on incomplete information. Because they understand an event based on what they already know and don't consider the entire learning process, the analysis becomes illogical or inconsistent with scientific mechanisms. Rossyadah at al., (2025) found that misconceptions stem from students' inability to see cause-and-effect relationships in sequence. Meanwhile, Kasanah at al., (2024) showing that weak science literacy skills in the classroom tend to make students generalize scientific concepts. Misconceptions regarding this indicator include:
- a. Inaccurate Generalization  
Students believe that floods always occur due to rain, without considering the various variables involved. Such reasoning indicates that students are not paying attention to more than one aspect.
  - b. Errors in Connecting Concepts  
Students mix unrelated concepts, such as the fact that earthquakes happen because "wind moves inside the ground." This indicates that their concepts are not yet integrated.
  - c. Partial Explanation of Natural Mechanisms  
Students conceptualize phenomena in fragments, rather than as a system that is a cohesive phenomenon. Dwisetiarezzi and Fitria (2021) this is also shown by the fact that low literacy makes students build ideas independently rather than as a systematic system.

Beside the main findings discussed in the previous section, this study also shows that the formation of misunderstandings does not occur in isolation; it is shaped by how students receive and understand the information they learn. When new concepts are not combined with concrete situations or taught with examples, students only learn in a vague and superficial way. This situation allows false beliefs to persist because there is no learning process to help reshape the incorrect image. Teacher-student interaction also adds to the patterns of understanding. The teacher has tried to explain the same thing, but the explanation is generally verbal and based on textbooks. As a result, students understand natural phenomena using their imagination, the stories they hear, or associations in simple and easily understandable relationships. Without the aid of media that visually demonstrates scientific processes, students fill gaps in their understanding of explanations with intuitive thinking and then form symbolic opinions or personifications about natural events.

Furthermore, students' reasoning abilities remain at an early stage of education. When someone asks them to state the cause of an event, they will only give one cause without considering many other possible causes. This incomplete thought process reflects the students' need for guidance in understanding the connections between concepts. Without support, they only draw conclusions based on what they find most understandable, leading to a thought process that doesn't align with scientific ideas.

These three factors are a series of causes for the misunderstandings that form in students. Without exploratory activities and active discussion about students' reasoning, students will continue to build new knowledge based on incomplete logic or understanding of existing facts, which will worsen misconceptions. Misconceptions held by elementary school students about natural disasters reveal that their understanding is largely based on misconceptions about the initial concept, intuitive logic, which is emotional, and still partial reasoning. These three categories of misconceptions are created by the absence of concrete materials to study and the lack of learning media that can visually depict scientific mechanisms.

### Limitations of The Study

The implementation of this research still fails in many dimensions, an issue that must be acknowledged as a potential starting point for further studies. It is not to claim that these limitations diminish the findings, but rather they indicate the potential for further development of the research results. Several limitations that emerged during the research process are explained as follows.

1. Constraints on the Research Subject

This research was conducted in a single elementary school with a limited number of participants. Conditions like this mean that misconceptions that may arise only reflect the quality of students within that school environment. Clearly, there are various learning experiences, family backgrounds, and literacy levels in each school, so these findings cannot yet be generalized to all elementary school students.

2. A short period of time has proven insufficient to explore students' thoughts and responses in greater depth. In certain contexts, students were also not given the opportunity to further explain their reasons for answering the questions. Longer observations would help maintain a more complete picture of how students think during subsequent research.

3. Media and Its Limitations in Observation-Based Learning Media in Learning Observation Practices. Learning opportunities in the classroom are monitored according to natural classroom practices. The teacher used the available learning media at that time, which were textbooks and oral explanations about the subject. The limitations of this media do not allow researchers to see how students respond using different media styles such as videos, simulations, or concrete teaching aids. Exposure to diverse media can influence student learning; therefore, future studies could adjust classes with a broader range of content.

4. Students do not always spontaneously generate their conceptual explanations. There is, however, a barrier that elementary school students may not be able to spontaneously articulate their thoughts. Although the questions have been adjusted to their abilities, and their level has somewhat increased, students often provide brief answers without explanations. And researchers must interpret students' thinking processes from answer analysis, nonverbal expressions, and behavioral observations.

### CONCLUSION

Based on the findings and analysis from the overall research, misconceptions among elementary school students about natural disasters stem from the learning process and internal and external factors that do not sufficiently encourage the formation of accurate scientific understanding. According to different analyzes from elementary school studies on science misconceptions, conceptual errors are observed in students with limited and unfocused learning experiences because the research findings are consistent with the findings Rossyadah et al., (2025) and Rahmawati and Kurniawati (2024). Preconceptions, associative thinking, and incomplete reasoning, among other forms of misconceptions; misconceptions that arise in students. This indicates that the application of scientific concepts is not firmly embedded. This result is consistent with the findings of Lestari et al., (2024), which emphasizes that if students' initial perceptions are not corrected by appropriate course content, misconceptions will develop. This follows the findings of previous work that inadequate learning, lack of attention, busyness, assumptions, incomplete reasoning, and associative thinking hinder the instillation of scientific concepts. Additionally, misunderstandings are also a consequence of learning

that still focuses on textbooks, oral instruction, and a lack of visual media. The absence of discussion activities, exploratory learning, or basic demonstrations also contributes to students' misunderstandings, where teaching methods do not connect scientific knowledge with real life. Another reason is the inadequate level of scientific literacy, misinterpretation of textbook concepts, and the lack of concrete materials and diverse personal experiences. These factors are interconnected and form a cycle of misunderstanding that continues if not managed properly. As a result, learning must be more exploratory, using concrete media, and enhancing science literacy so that students can understand the concept of natural disasters at a deeper and more valuable level.

### Recommendations

The recommended suggestions will advise teachers, schools, and future researchers, with the help of the identified research findings and discussions, which can be used as a reference point when teaching the concept of natural disasters to elementary school students. The following recommendations can be provided as suggestions:

1. Visual & Simple Experiments for Concept Learning.  
The use of concrete media, such as video simulations, illustrative images, and simple experiments, needs to be enhanced to provide a more accurate depiction of natural disaster processes for students. Students learn abstract concepts using these media; the use of intuitive interpretation is limited, and a stronger foundation can be built for scientific understanding.
2. The Importance of Identifying Students' Preconceptions at the Beginning of Learning  
Teachers should conduct an initial assessment, such as using 'trigger questions' or some informal discussions, to determine students' preconceptions before presenting the content. If the researcher understands this initial impression, then the researcher can guide the learning more explicitly and avoid building misconceptions.
3. Provision of Textbooks or Teaching Materials that Do Not Contain Conceptual Errors  
Teachers and schools can review the textbooks or worksheets that have been used to ensure there are no explanations that could lead to misconceptions. Some additional teaching materials, such as the revised IPAS Merdeka Curriculum module, can enable students to develop a better perspective on the subject matter.
4. Training and Support for Teachers in IPAS  
Learning Management Teachers need support to help improve the quality of learning, especially in communicating scientific ideas in a language appropriate to their cognitive development level. Training on common conceptual errors that often occur at the elementary school level can help teachers be more careful in explaining natural phenomena.

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