

THE EFFECT OF DISASTER EDUCATION RESILIENCE AMONG STUDENTS IN INDONESIA: *A SYSTEMATIC REVIEW*

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ABSTRACT: Background: Indonesia is highly prone to natural disasters, including floods, landslides, and earthquakes. Among the most vulnerable are children, particularly elementary school students. Disaster education is essential for enhancing their resilience and preparedness. Objective: This systematic review examines the impact of disaster education on the strength of elementary school students in Indonesia, focusing on how educational interventions improve disaster preparedness and psychological recovery. Methods: Following PRISMA guidelines, studies published between 2019 and 2024 were analyzed. Data were collected from ProQuest and EBSCO databases using keywords related to disaster education in Indonesian elementary schools. Studies evaluated disaster education programs and their effects on students' resilience and preparedness. Results: Three studies met the inclusion criteria. Interventions, including 3D virtual simulations, moral comics, and traditional games, effectively enhanced disaster awareness and resilience. The review also highlights the importance of culturally relevant approaches to trauma recovery and emphasizes the need for a child-centered focus in disaster education. Conclusion: Disaster education significantly enhances the preparedness and resilience of Indonesian elementary school students. Integrating disaster education into school curricula and employing culturally appropriate methods are critical for building a more disaster-resilient generation. Broader implementation of these programs is necessary within Indonesia's education system.

Keywords: *Disaster education, resilience, elementary school, Indonesia, preparedness,*

1. INTRODUCTION

Indonesia is recognized as a disaster-prone country due to its geographic conditions. In 2023, the country experienced many natural disasters, including floods, landslides, and earthquakes. According to the National Disaster Management Agency (BNPB), 5,400 disaster events were recorded, with floods being the most frequent, followed by landslides and tornadoes. These disasters caused significant damage, resulting in 275 deaths, 33 missing persons, 5,795 injuries, and the displacement of 8,491,288 people. Additionally, they inflicted considerable material losses and psychological impacts, particularly affecting children, who historically made up approximately 30-31% of disaster victims in Indonesia [1-3].

The devastating effects of these natural disasters underscored the need for disaster risk management, which involved educational strategies and practical actions [4-5]. One crucial step was educating students about disasters to foster preparedness. The

Disaster Safe Education Unit, launched by the Ministry of Education and Culture in 2019, aimed to promote school disaster prevention and management education. This child-centered approach emphasized equipping children with the knowledge and skills to respond effectively to emergencies, reducing their vulnerability and enhancing their resilience [6-7].

According to Law No. 24 of 2007 on Disaster Management, children were categorized as vulnerable. Therefore, prioritizing disaster risk reduction in education became essential to developing a disaster-resilient generation. Early disaster education, particularly for elementary school students, was vital in teaching disaster mitigation, including evacuation procedures and identifying safe zones during emergencies. Japan, for example, placed significant emphasis on early disaster education for children, conducting regular disaster prevention training, classroom instruction, and practical drills. This approach served as a model for other countries aiming to build a resilient society

capable of responding effectively to natural disasters [8-12].

This study aimed to systematically review the impact of disaster education on the resilience of elementary school students in disaster-prone areas of Indonesia. By reviewing existing literature, it identified effective strategies and practices that contributed to enhancing students' resilience. It also analyzed gaps in current disaster education practices and policies in Indonesia to suggest improvements for better-equipping students in disaster situations.

2. RESEARCH METHODS

2.1 Study desain and sample

This comprehensive systematic review aimed to evaluate the relationship between disaster education and disaster resilience among students in Indonesia. The study followed the guidelines of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) [13-17]. Data were collected from the ProQuest and EBSCO databases, focusing on studies published between September 2019 and September 2024.

2.2 Study selection

The outcome variable in this study was disaster resilience, while the exposure variable was disaster education. The search used keywords such as "natural disaster," "disaster education," "elementary school," and "Indonesia" to identify relevant articles from September 2022 to September 2024. The exact keywords were applied to both ProQuest and EBSCO databases. Inclusion criteria included studies that involved elementary school students (ages 6-12) as research subjects, studies that included teachers or educational staff as part of the intervention, articles published in English, and research that evaluated structured disaster education programs, including curricula, training, and simulations. These studies also provided practical training in disaster preparedness skills. The outcomes reported included improvements in knowledge, skills, preparedness behaviors, and emotional resilience among students. Exclusion criteria included studies that did not focus on elementary school students (e.g., studies involving college students or adults), research conducted outside the educational context, studies that did not involve disaster education or preparedness programs, and studies that did not report outcomes related to knowledge, behavior, or disaster resilience. Articles written in languages not understood by the researchers were also excluded.

2.3 Data extraction and quality assessment

Data were collected and organized into a table that included the authors' names, research titles, study designs, sample sizes, types of intervention, and key findings. A PRISMA flowchart was used to illustrate the data extraction process.

2.4 Data analysis

The analysis was conducted by synthesizing findings based on similarities in interventions and outcomes. This process involved coding the results to identify common themes.

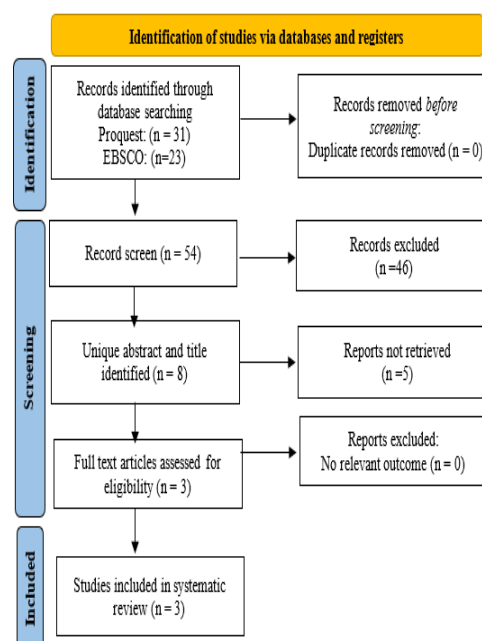


Figure 1. Prisma Flowchart

3. RESULTS AND DISCUSSION

Based on the journal search conducted through the ProQuest and EBSCO databases, 54 journals were identified using the specified search queries. After data extraction, only three journals met the inclusion criteria. These journals are as follows:

Table 1. Systematic Review of Disaster Education and Disaster Resilience in Elementary School Students in Indonesia

No	Author / Year	Article Title	Methodology	Sample Size	Type of intervention	Finding
1	Chadijah, Siti Hanjani, Tika Abdullah, Nazilah Kumoratih, Dewi (14), 2023	Identifying children's perception of interior space to the earthquake disaster: A case study of elementary school students in Jakarta	- Literature review and data collection from various sources to identify elements of spatial perception related to earthquake awareness - Simulation of 3D virtual models representing different interior spaces (light vs. dark colors, different window sizes) - Testing of the 3D models with 60 elementary school students in West Jakarta to measure their perceptions and preferences - Questionnaire to assess the students' comfort, interest, and preferences in the different simulated spaces	The sample size in this study was 60 fifth-grade students from elementary schools in West Jakarta, aged between 10 and 12 years. Most participants had experienced an earthquake at least once.	The intervention consisted of a presentation using a 3D simulation with variations in color and window size. This simulation was designed to evaluate participants' interest and comfort in different spaces, focusing on elements such as lighting and opening sizes.	The research findings indicated that the majority of students showed a greater interest in spaces with large openings and good lighting. Approximately 77% of the respondents had experienced an earthquake, and 83% of them could recall their feelings during the event. These results are expected to provide guidance for designers and decision-makers in creating safer and more comfortable spaces post-disaster, as well as to support sustainable development goals related to resilient infrastructure and communities.
2	Fitria, R Hakam, K Nurbayani, Supriatna, A (15), 2022	Disaster mitigation through comic moral dilemmas for elementary school students	- Mixed-methods design using both qualitative and quantitative approaches - Qualitative data collection through feedback and suggestions from experts, teachers, and students - Quantitative data collection through Likert scale questionnaires and product validation assessments - Qualitative data analysis by describing the comments and suggestions - Quantitative data analysis using scores from expert validations, product trials, and usage trials	This study involved five elementary schools in West Java as the sample to test the effectiveness of the intervention conducted.	The intervention conducted was the development of a picture storybook containing disaster mitigation materials. This book was designed to help students understand the actions that need to be taken when facing a disaster, specifically earthquakes. The creation process included idea exploration, sketching, illustration design, and text delivery	The findings of the study showed that introducing disaster mitigation through moral dilemmas in the form of comics yielded very positive results. Students demonstrated high enthusiasm and interest in learning disaster mitigation material. They found the subject more engaging because the illustrated story elements made it easier for them to understand the concepts of mitigation, enabling them to exhibit appropriate behavior in their daily lives.
3	Rusmana, Nandang Hafina, Anne Ruyadi, Yadi Riduwan, Muchamad (16), 2023	Trauma Healing Based on Local Wisdom: Traditional Games to Reduce Students Post-Traumatic Stress Disorder.	Quantitative approach and experimental method with a one-group pretest-posttest design	85	The intervention was conducted through several stages: Starting the Group, Group Transition, Working in Groups, and Ending the Group.	The results show that the instrument used to measure the intervention has excellent reliability and meets the unidimensionality requirements.

The data indicated that two out of three studies were conducted during the recovery phase following a disaster, while one focused on the preparedness phase. Khadijah et al.'s research contributed to disaster preparedness and child safety in educational settings. By prioritizing children's perspectives, the study emphasized the importance of creating structurally safe and

psychologically reassuring environments, contributing to a more comprehensive approach to disaster risk reduction in schools.

Fitria et al.'s research introduced an engaging and effective method for teaching disaster preparedness to elementary school students through moral dilemmas presented in comic form. This approach combined creativity with educational

rigor, enhancing knowledge and fostering essential life skills in young learners. The implications of this study may have influenced future educational practices by promoting more interactive and meaningful learning experiences in disaster mitigation.

Rusmana et al.'s study highlighted the importance of culturally informed approaches to trauma healing among students. By utilizing traditional games, the study emphasized the potential of local wisdom in reducing PTSD symptoms and promoting emotional resilience. This research contributed to the field of trauma recovery while underscoring the value of integrating cultural practices into educational and psychological frameworks, ultimately fostering a more supportive environment for healing.

Disaster education plays a vital role in disaster resilience, which refers to the capacity of communities to withstand natural disasters. This can be understood through a location-based approach that considers a region's specific social, environmental, and economic contexts. This model emphasized the importance of measuring vulnerability and adaptive capacity at the local level to effectively respond to and recover from disasters. By understanding the factors that influence resilience at the community level, more effective mitigation and adaptation measures could be designed. As defined by experts, disaster resilience phases generally encompassed a cyclical process that included several key stages: prevention and mitigation, preparedness, response, recovery, adaptation, and learning [18-23].

Prevention and mitigation constitute the initial phase, where actions are taken to reduce disaster risk. This phase is achieved by identifying threats and implementing mitigation strategies, such as improving infrastructure and establishing land use policies. The preparedness phase emphasizes the importance of disaster readiness and is regarded as a crucial strategy. This phase includes community education, emergency response drills, and developing early warning systems. The response phase occurs when a disaster has already taken place. Rapid and accurate responses are crucial for minimizing the disaster's impact. Activities during this phase include rescuing victims, providing assistance, and protecting the community. The recovery phase follows the emergency response and involves rebuilding damaged infrastructure and assisting the community in recovering. This phase represents an opportunity to improve infrastructure, making it more resilient against future disasters. The adaptation and learning phase focuses on learning from past disaster experiences to enhance resilience against future incidents. It emphasizes revising policies and strategies based on these experiences and strengthening community disaster

resilience. The connection between these two concepts can be understood through several dimensions, including knowledge acquisition, preparedness, and community engagement. First, disaster education greatly enhances individuals' awareness and understanding of potential disasters, which is fundamental for building resilience. For example, Rachmawati et al. emphasize that disaster education covers multiple aspects, such as recognizing local disaster risks, understanding historical events, and learning effective response strategies. This foundational knowledge was essential for individuals and communities to adapt and respond effectively to disasters, enhancing their resilience. Similarly, Wang emphasized that disaster education aimed to raise students' risk awareness and promote individual protective actions, which were critical for fostering community resilience [17-18].

Integrating disaster education into curricula, as noted by Khaira, was shown to significantly improve preparedness scores among participants, indicating a direct correlation between education and readiness to face disasters. Additionally, Hu's research emphasized that educational interventions bolstered community social capital and adaptive capacities, essential for resilience in disaster-prone areas. Atmojo et al. supported this community-oriented approach, arguing that coordinated disaster risk reduction efforts enhanced community self-sufficiency and resilience. Disaster resilience refers to the capacity of communities to withstand natural disasters, which can be understood through a location-based approach that considers a region's specific social, environmental, and economic contexts. This model emphasized the importance of measuring vulnerability and adaptive capacity at the local level to effectively respond to and recover from disasters. By understanding the factors that influence resilience at the community level, more effective mitigation and adaptation measures could be designed. As defined by experts, disaster resilience phases generally encompassed a cyclical process that included several key stages: prevention and mitigation, preparedness, response, recovery, adaptation, and learning [19-23].

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4. CONCLUSION

This research evaluates the impact of disaster education on the resilience of elementary school students in Indonesia through a systematic review. The analysis of three studies found that disaster education played a crucial role in enhancing students' preparedness and resilience. Several methods, such as moral comics and virtual simulations, increased students' knowledge and disaster preparedness. The research also demonstrated the significance of culturally informed approaches in trauma recovery. However, despite the initiation of programs like The Disaster Safe Education Unit, the implementation of disaster education in Indonesia remains limited.

This research concluded that all three studies underscored the importance of an approach to disaster education that considered local contexts and children's perspectives in education and rehabilitation. The studies demonstrated that involving children's voices and employing culturally relevant methods enhanced students' safety, preparedness, and emotional well-being. Integrating this perspective into educational policies and psychological practices could significantly impact the creation of a safer and more supportive environment for children.

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The adaptation and learning phase focuses on learning from past disaster experiences to enhance resilience against future incidents. It emphasizes the importance of revising policies and strategies based on these experiences.

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