



Exploring Needs for Integrated Website-Based E-Learning Platform Strengthening School Disaster Preparedness in Tsunami-Prone Schools

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Abstract

Schools play a critical role in disaster risk reduction; however, disaster preparedness education remains inadequately implemented in many disaster-prone regions, particularly due to limited learning media and weak preparedness systems. This study aimed to explore the needs and key components required for developing a website-based e-learning platform to support school disaster preparedness. A qualitative exploratory design was employed. Data were collected through four Focus Group Discussions involving 30 participants, including students, teachers, school administrators, community representatives, village officials, and members of the Village Disaster Preparedness Team. The study was conducted in tsunami-prone schools located in Kuta Village, Central Lombok, Indonesia. The data were analyzed using thematic analysis. Five major themes emerged: limited procedural knowledge of disaster preparedness, low internalization of preparedness attitudes, inadequate resources and evacuation capacity, weak organizational systems and standard operating procedures, and the need for a website-based e-learning platform. Participants emphasized that a digital platform could provide accessible preparedness information, standardized learning materials, and integration with early warning systems. These qualitative findings suggest that an integrated website-based e-learning platform may serve as a practical strategy to support school disaster preparedness through accessible learning resources, standardized preparedness procedures, and strengthened coordination among stakeholders.

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1. INTRODUCTION

Recent national reports have indicated an increasing trend in disaster occurrences across Indonesia. Data from the National Disaster Management Agency reveal that more than 60% of the country's regions are categorized as having moderate to high disaster risk levels. Hydrometeorological disasters consistently dominate annual disaster events, while geological hazards, particularly earthquakes, continue to pose significant threats with substantial impacts on human safety and infrastructure (Haris et al., 2023; Ramadhan et al., 2022). These trends underscore the urgent need for effective disaster risk reduction strategies that emphasize preparedness and resilience at multiple societal levels.

At the regional level, West Nusa Tenggara Province is characterized by high vulnerability to geological hazards. Central Lombok Regency, particularly coastal areas such as Kuta Village, has been identified as a tsunami-prone zone based on the national tsunami hazard map. Furthermore, the 2018 Lombok earthquake resulted in extensive infrastructure damage and caused profound social, economic, and psychological consequences for affected communities. These conditions highlight the persistent gaps in community preparedness and emphasize the necessity for systematic and sustainable capacity-building interventions (Felix et al., 2022).

Evidence from prior studies suggests that disaster impacts, including casualty rates, are not solely determined by hazard magnitude but are also strongly influenced by the level of community knowledge, preparedness, and response capacity (Shah et al., 2020; Torani et al., 2019). In this context, schools represent critical yet vulnerable institutions in disaster risk reduction frameworks. To address this issue, the Indonesian government has introduced the Disaster Preparedness School program as part of an education-based disaster risk reduction initiative. This program aims to strengthen school capacity through improvements in knowledge, preparedness, and disaster management systems. Its implementation includes the establishment of school disaster response teams, the development of standard operating procedures, the provision of evacuation routes and hazard maps, and the regular conduct of simulation exercises (Astuti et al., 2025; Mustikasari et al., 2023).

Despite these efforts, existing literature indicates that the implementation of the SSB program remains suboptimal. Several schools face constraints related to limited resources, inadequate access to disaster-related information, and a lack of sustainable learning media to support preparedness initiatives. Moreover, there is a notable absence of digital platforms specifically designed to facilitate structured and continuous disaster education within school settings (Johnson, Johnston, et al., 2014). This limitation reduces the effectiveness and scalability of current disaster education programs.

In line with the rapid advancement of information technology, disaster education has increasingly shifted toward digital-based approaches. E-learning systems, in particular, have emerged as flexible and interactive platforms capable of delivering educational content through multimedia formats such as videos, animations, simulations, and interactive modules. These features have been shown to enhance learners' comprehension of disaster-related concepts and improve preparedness outcomes. Additionally, e-learning facilitates self-directed and continuous learning beyond conventional classroom environments (Haryati et al., 2025; Humaedi et al., 2025).

Previous studies have explored the development of digital-based disaster education tools, including mobile applications, e-learning modules, and web-based platforms. These studies generally report positive outcomes in improving knowledge and preparedness among learners (Bacus, 2025; Wahyuningtyas et al., 2021). Unlike previous studies that primarily focused on developing standalone disaster education applications or digital learning modules, this study explores the need for an integrated website-based platform

that combines disaster education, preparedness management, evacuation planning, early warning information, and coordination among school and community stakeholders. This integrated systems perspective represents the primary novelty of the present study. Therefore, this study aims to address this gap by identifying the needs, potentials, challenges, and key components required for the development of an integrated disaster preparedness website tailored to school environments.

2. METHODS

This study employed a qualitative descriptive design with an exploratory approach to obtain an in-depth understanding of the experiences, perceptions, and needs of the school community regarding disaster preparedness and the development of technology-based educational media. The study was conducted in Kuta Village, Central Lombok Regency, West Nusa Tenggara, Indonesia, a coastal area characterized by a high risk of tsunami hazards.

A total of 30 participants were recruited using purposive sampling based on their relevance and involvement in disaster preparedness within school and community contexts. The participants comprised students actively involved in school organizations, teachers, educational staff, school administrators, information technology personnel, village officials, community representatives, and members of the Village Disaster Preparedness Team (*Tim Siaga Bencana Desa/TSBD*). Participants were required to have direct involvement in school disaster preparedness activities or community disaster management and to be willing to participate voluntarily.

Data were collected through four Focus Group Discussion (FGD) sessions facilitated by the researchers using a semi-structured discussion guide. Four FGDs were conducted, involving 30 participants and lasting approximately 90–120 minutes. This approach enabled interactive exploration of participants' perspectives, experiences, and identified needs. All discussions were audio-recorded with participants' consent, and supplemented with field notes and documentation to ensure data completeness and accuracy.

Data were analyzed using thematic analysis. The analysis process involved several stages, including data familiarization, initial coding, category development, theme identification, and interpretation of findings. Audio recordings were transcribed verbatim. Two researchers independently performed open coding before discussing and refining categories to achieve consensus. Themes were subsequently generated through iterative comparison across transcripts. This systematic approach allowed for the generation of comprehensive and contextually relevant insights aligned with the research objectives.

To ensure the rigor and trustworthiness of the findings, this study applied source and method triangulation, as well as member checking. These strategies were used to validate the consistency of the data and to ensure that the findings accurately reflected participants' perspectives. To minimize researcher bias, all coding decisions were discussed among the research team. Researchers maintained reflexive notes throughout data collection and analysis to acknowledge and manage potential subjective interpretations.

This study was conducted in accordance with ethical research standards and received approval from the Health Research Ethics Committee of Poltekkes Kemenkes Mataram. The ethical clearance was granted under approval number DP.04.03/F.XL.26/467/2025. Informed consent was obtained from all participants prior to data collection, and confidentiality was strictly maintained throughout the study.

3. RESULTS AND DISCUSSION

This study identified five major themes representing the current state of disaster preparedness and the need for developing a website-based e-learning platform within the school community. These themes were derived from thematic analysis of Focus Group Discussion (FGD) data involving 30 participants, including students, teachers, school administrators, village officials, community representatives, and members of the Village Disaster Preparedness Team (TSBD).

Theme 1: Limited Procedural Knowledge of Disaster Preparedness

The findings indicated that participants were generally aware of potential hazards in their environment, such as earthquakes, floods, and landslides. However, this awareness remained superficial and was not accompanied by adequate procedural knowledge regarding appropriate preparedness actions.

Most participants relied on spontaneous responses without clear procedural guidance, as reflected in the following statements:

“...the important thing is to run to an open field...” (JS)

“Just run immediately and find an open space...” (RJ)

These findings suggested that participants' actions were primarily based on intuitive perceptions rather than structured Standard Operating Procedures (SOPs). In addition, participants identified other disaster risks, such as floods and landslides, which were perceived to be influenced by environmental changes:

“...flooding occurs because land is used for development...” (JWD)

“...the highest risk is landslides because many mountains are being destroyed...” (EH)

This indicated that although risk awareness existed, participants' technical knowledge and procedural capacity in disaster preparedness remained limited.

Theme 2: Low Internalization of Preparedness Awareness and Attitudes

Disaster preparedness awareness among the school community tended to be situational and reactive, increasing only during or immediately after disaster events. Once conditions returned to normal, the level of vigilance declined.

This pattern was reflected in participants' statements:

“Not fully... it only becomes a concern when a disaster occurs...” (EH)

Furthermore, there was a tendency toward low collective concern regarding long-term disaster risks:

“People tend to be less concerned once the danger has passed.” (EH)

This condition was exacerbated by the limited implementation of capacity-building activities, such as simulation exercises:

“There is a lack of direct training such as simulations.” (JWD)

These findings suggested that disaster preparedness had not yet been internalized as a sustained culture, but rather remained temporary and event-driven.

Theme 3: Limited Resources and Evacuation Response Capacity

Although some schools had open spaces that could potentially serve as evacuation assembly points, supporting facilities and infrastructure were found to be inadequate.

“There is an open field as a gathering point, but other equipment is not available.” (EH)

Moreover, a structured evacuation system, including designated evacuation routes, emergency equipment, and organized response teams, was largely absent:

“There are no clear evacuation routes, evacuation tools, or trauma kits...” (JP)

As a result, evacuation processes tended to be spontaneous and uncoordinated:

“We run to the field out of habit, but we are not sure if it is a safe point.” (SP)

These findings indicated that disaster response capacity remained at a basic level and was not yet supported by a comprehensive preparedness system.

Theme 4: Need for Strengthening Organizational Systems and SOPs

The absence of a formal disaster preparedness organizational structure and clear SOPs emerged as a key factor contributing to uncoordinated disaster responses within the school environment.

“We have conducted evacuation before, but there are no written SOPs...” (GU)

In addition, the complexity of the school environment, including the presence of dormitories, required a more integrated coordination system:

“SOPs should cover both the school and the dormitory...” (PP)

Participants also emphasized the importance of aligning school structures with the Village Disaster Preparedness Team to enhance coordination:

“The school structure should follow the TSBD to facilitate coordination.” (TSBD)

These findings highlighted the urgent need to establish a structured, coordinated, and standardized disaster preparedness management system within schools.

Theme 5: Need for Website Development as a Disaster Preparedness E-Learning Platform

All participant groups agreed that the development of a website would be a strategic solution to improve access to disaster-related information and education in a sustainable manner. The website was perceived as a platform capable of providing standardized, accessible, and integrated information.

“The website can be connected to the village early warning system...” (PD)

Participants identified key content requirements for the website, including: (1) SOPs for pre-, during-, and post-disaster phases; (2) evacuation routes and hazard maps; (3) educational videos; (4) first aid guidelines; and (5) emergency contact information. As stated by one participant:

“The website should at least include SOPs, evacuation routes, and educational videos...” (IT)

Furthermore, the website was considered advantageous in terms of accessibility and flexibility:

“Teachers can access it via gadgets, while students can use school computers...” (EH)

These findings underscored that the website would function not only as an information medium but also as an integrated platform for learning and disaster preparedness management within the school context.

Table 1. Themes and Categories of Disaster Preparedness Needs Identified from Participants.

No	Main Theme	Sub-Theme	Category	Subcategory
1	Limited Procedural Knowledge of Disaster Preparedness	Disaster understanding remains general	Disaster knowledge	Awareness of different types of disasters (earthquakes, floods, landslides)
		Lack of understanding of preparedness SOPs	Disaster knowledge	Absence of understanding of systematic response procedures during disasters
		Spontaneous responses during disasters	Preparedness behavior	Evacuation conducted without procedural guidance
		Risk perception based on environmental experience	Risk perception	Perceived impact of development activities on disaster risk
2	Low Internalization of Disaster Awareness and Preparedness Attitudes	Situational awareness	Preparedness attitude	Awareness increases only during or after disasters
		Limited long-term concern	Social attitude	Lack of a disaster-aware culture
		Limited training and simulation	Capacity building	Absence of regular disaster preparedness drills
		Preparedness has not become part of school culture	Organizational culture	Not integrated into routine school activities
3	Limited Resources and Evacuation Response Capacity	Limited availability of assembly points	Infrastructure	Evacuation areas are not standardized
		Lack of clear evacuation routes	Evacuation system	Absence of evacuation signage and maps
		Limited emergency equipment	Disaster logistics	Trauma kits and evacuation equipment are unavailable

No	Main Theme	Sub-Theme	Category	Subcategory
		Uncoordinated evacuation processes	Response capacity	Evacuation practices based on habit rather than procedure
4	Need for Strengthening Organizational Systems and Preparedness SOPs	Absence of written SOPs	Disaster management system	Lack of operational guidelines
		Absence of a disaster response team structure	Disaster organization	School disaster response team has not been established
		Need for integration between school and dormitory systems	Internal coordination	System does not yet cover the entire school environment
		Need for synchronization with the Village Disaster Preparedness Team (TSBD)	External coordination	Integration with village-level disaster management systems
5	Need for Website Development as an E-Learning Platform for Disaster Preparedness	Website as a disaster information hub	Digital educational media	Fast and standardized access to disaster information
		Need for disaster education content	Learning content	SOPs, educational videos, evacuation maps, and first aid materials
		Integration with early warning systems	Information system	Connectivity with village early warning systems
		Flexible user access	Technological accessibility	Access through personal gadgets and school computers

The findings of this study indicate that disaster preparedness within the school community remains constrained by multiple dimensions, including knowledge, attitudes, response capacity, organizational systems, and the availability of educational media. These results are consistent with previous studies emphasizing that disaster preparedness is a multidimensional construct shaped by cognitive, social, structural, and technological factors (Al-Qbelat et al., 2022; Cong et al., 2023; Handoyo et al., 2024). Furthermore, these findings may reflect the limited continuity of disaster education

programs implemented in schools following the 2018 Lombok earthquake. Although various preparedness initiatives were introduced during the post-disaster recovery period, preparedness activities appear to decline once external support ends, indicating the absence of sustainable institutional mechanisms to maintain disaster education and preparedness efforts within schools.

Limited Procedural Knowledge as a Fundamental Issue in Preparedness

This study demonstrates that participants' knowledge of disaster preparedness remains at the level of basic awareness and has not progressed to procedural understanding. This gap reflects a disconnect between conceptual knowledge and the practical ability to respond effectively during emergencies. From a theoretical perspective, disaster preparedness education should not only focus on knowledge acquisition but also on the development of practical skills and decision-making abilities under emergency conditions. Global evidence suggests that effective disaster education must integrate three key components: knowledge, skills, and action readiness. In the absence of practical skills, individuals are more likely to experience confusion and panic during disaster events (Al-Qbelat et al., 2022; Guo et al., 2025; Torani et al., 2019).

In the Indonesian context, previous studies have shown that limited knowledge and lack of practical experience hinder individuals from responding optimally, even in potentially manageable situations. Furthermore, disaster literacy has been found to be significantly associated with improved individual preparedness levels (Hargono et al., 2023; Widianingtyas et al., 2024). These findings reinforce the argument that improving preparedness requires not only information dissemination but also skill-based and simulation-oriented approaches.

Preparedness Not Yet Internalized as a Culture

The findings reveal that disaster preparedness within the school community remains reactive and temporary, indicating that it has not yet been internalized as part of the school's organizational culture.

Conceptually, disaster preparedness is an integral component of safety culture, which is developed through the internalization of values, norms, and repeated practices within a community. Global studies have demonstrated that the effectiveness of preparedness programs depends heavily on their integration into the social and cultural systems of the community (Duca & Gugg, 2023; Shaw et al., 2004).

Sustained disaster education, particularly through simulations and active learning approaches, has been shown to enhance risk perception and promote long-term preparedness behaviors. School-based approaches are especially effective, as schools function as primary agents of socialization within communities (Johnson, Ronan, et al., 2014; Tanaka, 2005).

However, without integration into formal curricula and routine activities, preparedness efforts tend to remain sporadic. This is further supported by studies indicating that program sustainability is a key determinant of successful disaster education initiatives (Shiwaku et al., 2007).

Structural Constraints: Limitations in Systems and Resources

The study identifies limitations in infrastructure and evacuation systems as major barriers to effective preparedness. These findings highlight that disaster preparedness is not solely determined by individual-level factors but is also strongly influenced by structural conditions.

According to disaster risk reduction (DRR) theory, preparedness emerges from the interaction between individual capacity and system capacity. Without adequate system support, individual competencies cannot be effectively operationalized. International evidence indicates that the availability of evacuation routes, early warning systems, and emergency equipment significantly enhances disaster response effectiveness. Moreover, school infrastructure readiness has been identified as a critical indicator in assessing disaster-prepared schools (Johnson, Ronan, et al., 2014).

In Indonesia, resource limitations remain a persistent challenge in the implementation of preparedness programs. This underscores the need for a system-based approach that extends beyond education to include institutional capacity strengthening (Yolanda et al., 2025).

The Role of Organizational Systems and SOPs in Strengthening Collective Response

The absence of clear Standard Operating Procedures (SOPs) and organizational structures contributes to uncoordinated disaster responses within the school environment. This finding underscores the importance of adopting a management-oriented approach to disaster preparedness.

Organizational-based disaster management theory emphasizes the importance of coordination, command structures, and role distribution during emergency situations. In the absence of clear systems, responses tend to be fragmented and less effective. Empirical studies have shown that schools equipped with well-defined SOPs and organizational structures demonstrate higher levels of preparedness compared to those without such systems (Evi Widowati et al., 2023; E. Widowati et al., 2021).

Furthermore, integration between schools and local communities commonly framed as community-based disaster risk reduction has been proven to enhance response effectiveness (Rahma et al., 2024). Cross-sectoral coordination is also identified as a key factor in strengthening community resilience to disasters. Therefore, strengthening organizational systems constitutes a critical component of school-based preparedness (Shah et al., 2020).

Digital Transformation in Disaster Preparedness Education

One of the key findings of this study is the identified need for developing a website-based e-learning platform. This aligns with global trends highlighting the increasing utilization of digital technologies in disaster education (Arikan et al., 2024). Considering that Kuta Village is located in a tsunami-prone coastal area with increasing tourism development, the integration of digital preparedness systems becomes particularly important to facilitate rapid dissemination of evacuation procedures among schools and surrounding communities. Systematic reviews have demonstrated that integrating digital technologies into disaster education improves learning effectiveness, participant engagement, and the reach of educational interventions. Digital platforms enable real-time, interactive, and multimedia-based information delivery (Bai et al., 2025).

Experimental studies further indicate that digital-based education significantly enhances disaster literacy and preparedness confidence among learners. The development of interactive e-modules has also been shown to improve students' understanding and preparedness, with significant gains in learning outcomes (Genç et al., 2025).

However, other studies suggest that the adoption of technology in disaster mitigation remains limited and has not been optimally integrated into educational systems. This

highlights a substantial opportunity for innovation through the development of integrated, technology-based disaster preparedness platforms (Wang et al., 2026).

Therefore, the proposed platform should incorporate interactive learning modules, downloadable SOPs, evacuation maps, simulation schedules, self-assessment quizzes, emergency contact directories, and integration with village early warning systems. These features may support continuous preparedness activities beyond conventional classroom learning. Since the findings were derived from a single tsunami-prone village, they should be interpreted as context-specific insights rather than universally applicable evidence.

4. CONCLUSION

This study reveals that disaster preparedness within the school community remains constrained by multidimensional limitations, including insufficient procedural knowledge, reactive attitudes, limited response capacity, weak organizational systems, and suboptimal use of technology. This study has several limitations. It was conducted in a single tsunami-prone village using a qualitative design, which may limit the transferability of findings to different geographical and educational settings. However, this study provides an empirical basis for developing a website-based e-learning platform as an innovative strategy to enhance disaster preparedness and support the implementation of school-based disaster risk reduction programs. Future studies should develop and experimentally evaluate the proposed website-based platform to examine its effectiveness in improving disaster literacy, preparedness behavior, and school disaster resilience.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

Lale Wisnu Andrayani contributed to funding acquisition, conceptualization, study design, and final approval of the manuscript. Eka Rudy Purwana contributed to data collection and curation, as well as administrative, technical, and logistical support. Hamdan Hariawan contributed to formal analysis, data interpretation, manuscript drafting, critical revision of the manuscript for important intellectual content, and statistical analysis. All authors read and approved the final version of the manuscript.

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DECLARATION OF ARTIFICIAL INTELLIGENCE USE

The authors used generative artificial intelligence (AI)-assisted technology solely to improve the language quality, sentence structure, readability, and overall organization of this manuscript, including paraphrasing selected text to enhance clarity while preserving the original scientific meaning.

REFERENCES

- Al-Qbelat, R. M., Subih, M. M., & Malak, M. Z. (2022). Effect of Educational Program on Knowledge, Skills, and Personal Preparedness for Disasters Among Emergency Nurses: A Quasi-Experimental Study. *Inquiry : A Journal of Medical Care Organization, Provision and Financing*, 59, 469580221130881. <https://doi.org/10.1177/00469580221130881>
- Arikan, A., Bilen, M., & Aladağ, E. (2024). Investigating the impact of technology-supported 3E learning model in disaster education. *Education and Information Technologies*, 29(16), 21379–21409. <https://doi.org/10.1007/s10639-024-12731-x>
- Astuti, M., Irsyad, & Setiawati, M. (2025). Analisis Risiko Sebagai Implementasi Sekolah Siaga Bencana Pada Sekolah Dasar. *Journal of Business Economics and Management*, 2(2), 1979–1983.
- Bacus, J. A. (2025). Disaster-Based Mobile Learning System Using Technology Acceptance Model. *Engineering Proceedings*, 103(1), 5.
- Bai, S., Zeng, H., Zhong, Q., Cao, L., & He, M. (2025). Effectiveness of Gamified Teaching in Disaster Nursing Education for Health Care Workers: Systematic Review. *Journal of Medical Internet Research*, 27, e74955. <https://doi.org/10.2196/74955>
- Cong, Z., Feng, G., & Chen, Z. (2023). Disaster exposure and patterns of disaster preparedness: A multilevel social vulnerability and engagement perspective. *Journal of Environmental Management*, 339, 117798. <https://doi.org/10.1016/j.jenvman.2023.117798>
- Duca, G., & Gugg, G. (2023). Safety Culture in the Disaster-Resilient Society Context: A Conceptual Exploration. *Sustainability*, 15(16), 12236. <https://doi.org/10.3390/su151612236>
- Felix, R. P., Hubbard, J. A., Bradley, K. E., Lythgoe, K. H., Li, L., & Switzer, A. D. (2022). Tsunami hazard in Lombok and Bali, Indonesia, due to the Flores back-arc thrust. *Natural Hazards and Earth System Sciences*, 22(5), 1665–1682. <https://doi.org/10.5194/nhess-22-1665-2022>
- Genç, F. Z., Yıldız, S., Erdal, A., & Bilgili, N. (2025). Effect of structured digital-based education given to nursing students on disaster literacy and disaster preparedness belief levels: A randomized controlled study. *Nurse Education Today*, 147, 106581. <https://doi.org/10.1016/j.nedt.2025.106581>
- Guo, L., Fang, M., Liu, L., Chong, H., Zeng, W., & Hu, X. (2025). The development of disaster preparedness education for public: a scoping review. *BMC Public Health*, 25(1), 645. <https://doi.org/10.1186/s12889-025-21664-0>
- Handoyo, B., Soekamto, H., Putra, A. K., Kamil, P. A., & Wulandari, F. (2024). Disaster preparedness: The role of spatial disaster learning using geospatial technology. *Jamba (Potchefstroom, South Africa)*, 16(1), 1576. <https://doi.org/10.4102/jamba.v16i1.1576>
- Hargono, A., Artanti, K. D., Astutik, E., Widodo, P. P., Trisnawati, A. N., Wardani, D. K., & Lioni, E. (2023). Relationship between disaster awareness and disaster preparedness: online survey of the community in Indonesia. *Journal of Public Health in Africa*, 14(9), 2376. <https://doi.org/10.4081/jphia.2023.2376>
- Haris, N., Furqan, A. C., Kahar, A., & Karim, F. (2023). Disaster risk index on disaster management budgeting: Indonesia's national data set. *Jamba (Potchefstroom, South Africa)*, 15(1), 1365. <https://doi.org/10.4102/jamba.v15i1.1365>
- Haryati, S., Atmojo, S. E., Anggriani, M. D., & Skotnicka, M. (2025). Integrating Digital Technology into Disaster Education and Its Impact on Elementary School Students' Literacy and Resilience. *Jurnal Pendidikan Progresif*, 15(03), 2147–2162. <https://doi.org/10.23960/jpp.v15i3.pp2147-2162>
- Humaedi, Nirmala, B., Annuar, H., Marwany, Agusniatih, A., & Rizal. (2025). Technology-

- Enhanced Disaster Education for Early Childhood: Interactive Media to Build Safety and Resilience. *JTP - Jurnal Teknologi Pendidikan*, 27(2), 649–665. <https://doi.org/10.21009/jtp.v27i2.58488>
- Johnson, V. A., Johnston, D. M., Ronan, K. R., & Peace, R. (2014). Evaluating Children's Learning of Adaptive Response Capacities from ShakeOut, an Earthquake and Tsunami Drill in Two Washington State School Districts. *Journal of Homeland Security and Emergency Management*, 11(3), 347–373. <https://doi.org/doi:10.1515/jhsem-2014-0012>
- Johnson, V. A., Ronan, K. R., Johnston, D. M., & Peace, R. (2014). Evaluations of disaster education programs for children: A methodological review. *International Journal of Disaster Risk Reduction*, 9, 107–123. <https://doi.org/10.1016/j.ijdr.2014.04.001>
- Mustikasari, S. R., Hasanah, R., Putri, N. A., Khusna, K. F., Firdaus, A. B., & Pranata, S. (2023). Disaster Preparedness School Development Through Disaster Training for Teachers and Students. *Jurnal Sinergi Kesehatan Indonesia*, 1(2), 40–48. <https://doi.org/10.55887/jski.v1i2.10>
- Rahma, A., Rizkiyani, F., Sari, D. Y., & Palupi, I. R. (2024). School Community Disaster Resilience: Promoting Geological Disaster Preparedness among Early Childhood Education Teachers. *Tadris: Jurnal Keguruan Dan Ilmu Tarbiyah*, 9(1), 165–180. <https://doi.org/10.24042/tadris.v9i1.18733>
- Ramadhan, R., Marzuki, M., Suryanto, W., Sholihun, S., Yusnaini, H., Muharsyah, R., & Hanif, M. (2022). Trends in rainfall and hydrometeorological disasters in new capital city of Indonesia from long-term satellite-based precipitation products. *Remote Sensing Applications: Society and Environment*, 28, 100827. <https://doi.org/10.1016/j.rsase.2022.100827>
- Shah, A. A., Gong, Z., Pal, I., Sun, R., Ullah, W., & Wani, G. F. (2020). Disaster risk management insight on school emergency preparedness – A case study of Khyber Pakhtunkhwa, Pakistan. *International Journal of Disaster Risk Reduction*, 51, 101805. <https://doi.org/10.1016/j.ijdr.2020.101805>
- Shaw, R., Shiwaku Hirohide Kobayashi, K., & Kobayashi, M. (2004). Linking experience, education, perception and earthquake preparedness. *Disaster Prevention and Management*, 13(1), 39–49. <https://doi.org/10.1108/09653560410521689>
- Shiwaku, K., Shaw, R., Chandra Kandel, R., Narayan Shrestha, S., & Mani Dixit, A. (2007). Future perspective of school disaster education in Nepal. *Disaster Prevention and Management*, 16(4), 576–587. <https://doi.org/10.1108/09653560710817057>
- Tanaka, K. (2005). The impact of disaster education on public preparation and mitigation for earthquakes: a cross-country comparison between Fukui, Japan and the San Francisco Bay Area, California, USA. *Applied Geography*, 25(3), 201–225. <https://doi.org/https://doi.org/10.1016/j.apgeog.2005.07.001>
- Torani, S., Majd, P. M., Maroufi, S. S., Dowlati, M., & Sheikhi, R. A. (2019). The importance of education on disasters and emergencies: A review article. *Journal of Education and Health Promotion*, 8, 85. https://doi.org/10.4103/jehp.jehp_262_18
- Wahyuningtyas, N., Ruja, I. N., Yahya, M. H., Wijaya, D. N., & Ibrahim, M. H. (2021). Developing of a Learning Media for Smartphones for Disaster Mitigation Education. *International Journal of Emerging Technologies in Learning (IJET)*, 16(7), 160–174. <https://doi.org/10.3991/ijet.v16i07.21195>
- Wang, J., Samarasinghe, D. A., Aquino, D. H. M., & Ying, F. (2026). A Systematic Review of Digital Technologies for Emergency Preparedness in Buildings. *Buildings*, 16(4), 856. <https://doi.org/10.3390/buildings16040856>
- Widianingtyas, S. I., Lontoh, M. G., & Kurniawaty, Y. (2024). Relationship between Health Behavior (Knowledge) and Earthquake and Tsunami Disaster Preparedness.

- Indonesian Journal of Kinanthropology (IJOK)*, 4(1), 15–22.
<https://doi.org/10.26740/ijok.v4n1.p15-22>
- Widowati, Evi, Koesyanto, Herry, Istiono, Wahyudi, Sutomo, Adi Heru, & Sugiharto. (2023). Disaster Preparedness and Safety School as a Conceptual Framework of Comprehensive School Safety. *Sage Open*, 13(4), 21582440231211210.
<https://doi.org/10.1177/21582440231211209>
- Widowati, E., Istiono, W., & Husodo, A. H. (2021). The development of Disaster Preparedness and Safety School model: A Confirmatory Factor Analysis. *International Journal of Disaster Risk Reduction*, 53, 102004.
<https://doi.org/10.1016/j.ijdr.2020.102004>
- Yolanda, Y., Oktari, R. S., Munawar, M., Lola, M. S., & Sofyan, H. (2025). Developing a Regional Framework for Disaster Risk Reduction Based on Disaster-Related Data from Aceh, Indonesia. *Infolitika Journal of Data Science*, 3(1), 1–11.
<https://doi.org/10.60084/ijds.v3i1.269>