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Integrating Disaster Education into School Curriculum in Indonesia: A Scoping Review

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Abstract

Despite being one of the most disaster prone countries in the world, disaster education is not mandatory in Indonesia. Existing research suggest that predictors of schools' adoption of disaster education into their curriculum have been subject to school leadership, discretion of teachers, incentives and nudges, among others. This systematic literature review aims to understand how schools integrate disaster education into the the curriculum in Indonesia. Key research questions include: i) How has disaster education is integrated into the school curriculum in Indonesia?; ii) What content informs the curriculum in the case where disaster education integration exist in by the early adopters?; iii) What model or approach is used to integrate disaster education into the school curriculum?; iv) How effective such a disaster education in increasing students' knowledge, attitudes, and behavior? and v) What are the challenges in integrating disaster education into the school curriculum? The study also identified gaps in disaster education within the Indonesian curriculum to set an agenda for future research. Relevant literature in both English and Bahasa Indonesia from online sources, specifically Google Scholar and Science Direct databases, have been included for further analysis to explore the latest conditions and complexities in integrating disaster education into the curriculum in Indonesia. Search terms included 'disaster education', 'disaster preparedness schools', 'safe schools, curriculum', 'DRR education' 'comprehensive school safety', SPAB and other relevant keywords. The findings contribute to bridging the gap between research outcomes and practical implementation, providing recommendations for future integration practices. This research is expected to strengthen disaster education in Indonesia, enhance preparedness, and contribute to the broader field of disaster risk reduction.

Keywords: disaster education; school safety; school preparedness; disaster curriculum; resilience and safety education.

Introduction

The National database owned by the National Disaster Management Agency (BNPB) shows that 250,000 out of 272,000 Indonesian elementary and middle schools are located in disaster-prone zones. Despite being one of the world's most disaster-prone countries, disaster education is not mandatory in Indonesia. Therefore, implementing a comprehensive school safety (CSS) policy, including disaster education, is imperative because of the high number of disaster incidents affecting students and teachers. Unfortunately, only 10 per cent of the schools (elementary and middle schools combined) adopted CSS (Amri et al., 2022).

Disaster education aims to introduce a culture of safety and disaster awareness to students, teachers and parents. Pathways to integrating disaster education include curriculum design and intervention from elementary to middle and senior high schools. Developing a culture of disaster preparedness in everyday schooling is necessary to achieve the goals of disaster education (Shiwaku, 2008).

The Hyogo Framework for Action (HFA) placed education as a top priority to support disaster risk reduction as a global agenda in 2005 (Amri et al., 2022). In Indonesia, the development of a national curriculum related to disaster education is supported by the Ministry of Education and Culture (*Kemendikbud*). This reduces criticism that disaster education in Indonesia was initially led by NGOs lacking coordination with governmental agencies. Disaster education in Indonesia is conducted with a measured approach, supported by the United Nations and some Non-Governmental Organizations (NGOs). The Ministry of Education (*Kemendikbud*) launched disaster education in schools at all levels to support disaster risk reduction and resilience education (Green et al., 2020).



The history of the adoption of the comprehensive school safety (CSS or SPAB) framework into the Indonesian National Curriculum, namely Curriculum 13 (K-13), in the last ten years includes several regulations and decisions, such as Ministerial Regulation 72/2013 on Special Education Services by *Kemendikbud* 2013, Ministerial Regulation 8/2014 regarding Disaster-Safe Schools and Madrasah by *Permenag* PP 2014, Secretary-General's Decree on Disaster-Safe School and Madrasah Secretariat by *Kemendikbud*, 2014, Disability Law in August 2016 by (DPR, 2016), Establishment of a National SPAB Secretariat by (*Kemendikbud* 2017), and Ministerial Regulation related to the Implementation of CSS (SPAB) by *Kemendikbud*, 2019 (Amri et al., 2022).

Literally, there is no official disaster education in K-13. The disaster education integration in K-13 employs a nested paradigm that incorporates disaster education into the school context (Amri et al., 2022). We argue that the most cost-effective pathway for disaster education in schools is to adopt and implement disaster education independently. Unfortunately, research on disaster education does not examine detailed processes on how integration is understood and implemented.

Therefore, this research aims to analyze the implementation of disaster education integration into the existing curriculum at four levels: 1) The learning and teaching contents; 2) The models/approaches of integration; 3) The effectiveness of the models in improving students' knowledge, attitude and practice, and; 4) The challenges and obstacles in integrating disaster education into the existing curriculum. The scope of the study includes a literature analysis using a Scoping Review of Disaster Education Studies in the Indonesian National Curriculum from publications within the last five years (2018-2023). The research sources were searched in databases such as ScienceDirect and Google Scholar. The inclusion criteria for literature sources were journal articles related to disaster education integration, disaster-safe schools, CSS (SPAB), and disaster risk reduction in schools, with full accessibility. The selected articles were analyzed using the Mendeley software.

This research is expected to provide insights into disaster education in Indonesia, anticipating the implementation of the relatively new (and emerging) Merdeka Curriculum.

Disaster Education

Disaster education is a long-term activity aimed at reducing disaster risks, an integral part of sustainable development that utilizes knowledge and innovation to build a culture of disaster awareness and resilience, as stated in the HFA (Hyogo Framework for Action), and proposed in the SFDRR (Sendai Framework for Disaster Risk Reduction) 2015-2030. The key point is that disaster education should be prioritized in the educational curriculum at schools. Disaster education is also a component of lifelong learning for future sustainability and can become a goal of lifelong learning itself (UNESCO & UNICEF, 2021). The analysis of curriculum documents by UNESCO found that 50% of 100 countries did not include climate change materials (UNESCO & UNICEF, 2022). Lifelong learning is built on four aspects: 1) Access to quality education, 2) Curriculum orientation, 3) Public awareness, and 4) Training.

The results of UNESCO/UNICEF research in 30 countries show that the scope of disaster education integration in schools is limited, mainly confined to geography, natural science, and physics subjects. However, vertical integration of disaster education at the elementary and junior high school levels is less prominent. Disaster education enhances capacity, reduces vulnerability, and mitigates risks. It is a functional, operational, and cost-effective tool in disaster risk management (Torani et al., 2019). As a disaster management tool, the importance of disaster education for educational institutions lies in reducing disaster risks for children through information, resources, and participation. The benefits of these activities extend to the broader community (Boon, 2014)

Children are the most vulnerable group to the impacts of disasters due to their limited knowledge of disasters (PP No 21 2008). Various vulnerabilities to school disasters arise because children are not trained in disaster simulations and tend to panic easily (Widowati, 2021). The presence of children greatly helps communities and families during post-disaster and recovery periods, as observed in the case of the 2004 Thailand tsunami (Vanaspongse et al., 2007). These findings highlight the significance of disaster education for children and its effectiveness in enhancing community resilience to disasters. Trained individuals can make effective decisions to protect themselves and others. Disaster education is one of the goals of the third pillar of disaster risk reduction.

The Comprehensive School Safety (CSS) Framework 2020-2030 focuses on disaster risk reduction and resilience education. The targets of CSS include 1) Protecting students and educational institutions from death, injuries, and disaster hazards in the school environment; 2) Planning for the continuity of education resilience to hazards and

disaster threats; 3) Strengthening disaster risk reduction through disaster education; and 4) Protecting the continuity of investment in the education sector. These four CSS targets are developed through both formal curriculum-based education and non-formal approaches. CSS supports the priorities set in the fourth point of the Sendai Framework for Disaster Risk Reduction (SFDRR), which emphasizes understanding disaster risk and enhancing disaster preparedness for effective disaster response.

Understanding disaster can help minimize disaster risks, and the role of teachers in disaster education is crucial. However, a lack of willingness among teachers to promote disaster education for students to understand disaster risk reduction has resulted in lower disaster preparedness levels among students (Nipa et al., 2020). Schools play a significant role in shaping children's cognitive skills and behaviour. Schools can be the avenues to support disaster risk reduction and sustainable development goals (Pacheco et al., 2021). Variables for safe schools include 1) School commitment; Formal curriculum; 2) Exposure to information; 3) Facilities and infrastructure preparedness; and 4) Supervision and empowerment of school institutions (Widowati, 2021).

History of disaster education in Indonesia

Disaster education has been implemented in Indonesia for a long time, but significant progress in its development began after the 2004 Indian Ocean Tsunami. The milestone of disaster-safe schools in Indonesia can be seen in Table 1.

Table 1. Milestone of school safety regulations in Indonesia.

Year	Rules	Justification
2019	SPAB Implementation	<i>Permendikbud</i> 33/2019
2017	The formation of a national formation for Comprehensive School Safety	<i>Kepmendikbud</i> 110/P/2017
2016	Disability law	UU Agustus 2016
2014	Safety school and madrasah secretariat	SK <i>Sekjen Kemendikbud</i>
2013	The implementation of special education, including education in emergencies	<i>Permendikbud</i> 72/2013
2012	The implementation of guidelines for safe schools and madrasah	<i>Perka</i> BNPB April 2012
2010	Incorporating Disaster Risk Reduction (DRR) in Education in Indonesia	SE 70/MPN/SE/2010
2008	Establishment of the National Disaster Management Agency	<i>PerPres</i> Agustus 2008
2007	Standard rules for building and facilities in elementary and secondary schools	<i>Permendiknas</i> 24/2007
2007	Disaster management law	UU 24/2007

Source: Amri, 2022.

Table 1 explains that in the last 16 years, there have been 10 official regulations related to disaster education in Indonesia. SPAB is the latest program established in *Permendikbud* No 33 of 2019.

Integration of disaster education into the curriculum

Based on a narrow definition, the curriculum is understood as subjects or units taught in schools, while in a broader sense, it encompasses the total learning experiences of individuals, not only within the school but also within society (Bilbao et al., 2008). The curriculum should be contextualized to the societal context. According to UNESCO's curriculum document analysis, it was found that 50% of 100 countries did not include climate change topics in their curricula (UNESCO & UNICEF, 2022).

Disaster-Ready Schools (*Sekolah Siaga Bencana* or SSB) integrate disaster education into building schools' disaster readiness and resilience. The concept of SSB focuses on developing a disaster mindset to build a culture of safety, resilience, and security for all school members (Tyas, 2020).

In Indonesia, the focus of disaster education in the curriculum began in 2006, related to the educational curriculum units and local content curriculum. Additionally, from 2007 to 2012, disaster risk reduction education was introduced into schools through various programs, such as the Indonesia-Germany government cooperation (2005-2008), Save the Children and *Kemendikbud* Curriculum Center (2009), and the UNDP's cooperation with

the Aceh Provincial Government (2009–2012) (Sakurai et al., 2018). Since 2015, research on disaster education has tended to be weakening. So far, school disaster education has been carried out with the support of external parties, including the government, NGOs, and private organizations. Improving student quality measures the success of the curriculum, and the same applies to the success of disaster education.

Methods

Scoping Review is a set of approaches to identify and synthesize the available or newly emerging literature on a specific topic (Mak, 2022). The Scoping Review process is conducted in five stages, utilizing the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for the Scoping Review (PRISMA ScR) framework. This approach is identified through significant scientific data-based search engines, namely ScienceDirect and Google Scholar. The selected literature is then sorted and categorized based on the main thematic areas related to disaster education: teaching materials, models and approaches, effectiveness in enhancing students' experiences and behaviours, and challenges and barriers in integrating disaster education. The selected literature is extracted and organized using the Mendeley software.

Study strategy: Identifying research questions and study relevance

Inclusion and exclusion criteria are established before the scoping review process. These criteria limit the research but do not restrict the study outcomes (JCU, 2022). Inclusion criteria include 1) Selecting accessible literature; 2) Ensuring relevance to current developments by choosing literature published within a specific timeframe, namely 2018-2023; 3) The peer-reviewed literature must focus on the integration of disaster education into the national curriculum in Indonesia; 4) Literature that discusses materials, models/approaches, effectiveness, student experiences, attitudes, and behaviours, as well as challenges and barriers in integrating disaster education into the curriculum. We excluded non-peer-reviewed literature such as editorials and opinions.

The literature search was conducted using both English and Indonesian with specific keywords, as shown in Table 2. The search categories are separated by "OR" and "AND," utilizing databases from ScienceDirect and Google Scholar. Different combinations of search terms and keywords are employed until the desired results are achieved.

Table 2. Keywords.

Group	Keywords	Justification
Group 1	"Disaster Education", Disaster Risk Reduction", Disaster Resilience", "Disaster Safety Education", 'Disaster Preparedness school" 'DRR Education"	To Identify literature related to disaster education.
Group 2	"School safety", "School Preparedness", Resilient School", "Comprehensive School safety", "School Mitigation"	To identify literature related to school safety.
Group 2	"Curriculum", "Study Integration", "Curriculum Integration", "Safety Curriculum", "Curriculum Preparedness", "Curriculum Resilience".	To identify literature related to school safety.

Source: Author Analysis, 2023.

Study screening: Selecting studies for review

The study screening stage utilizes the Mendeley software. After selected journals, citations are exported to reference management software for further review. This software is used to identify any duplications, assess the proportion of similar abstracts among journals, and document the inclusion and exclusion criteria. Journal screening is not solely based on reading the titles; abstracts also need to be reviewed. If the reviewing team consists of more than two individuals, the agreement level should reach 90% or higher in the 5% and 10% calibration (Mak, 2022).

The first step in the screening process is searching for keywords in the titles of the selected literature, including (DE, DSC, DRRSC, CSS, SRC, DES, and IDRR). Second, abstract screening is conducted for literature whose titles meet the selection criteria. Finally, full-text screening is conducted for abstracts that meet the inclusion and exclusion criteria. All three stages must be done carefully and correctly.

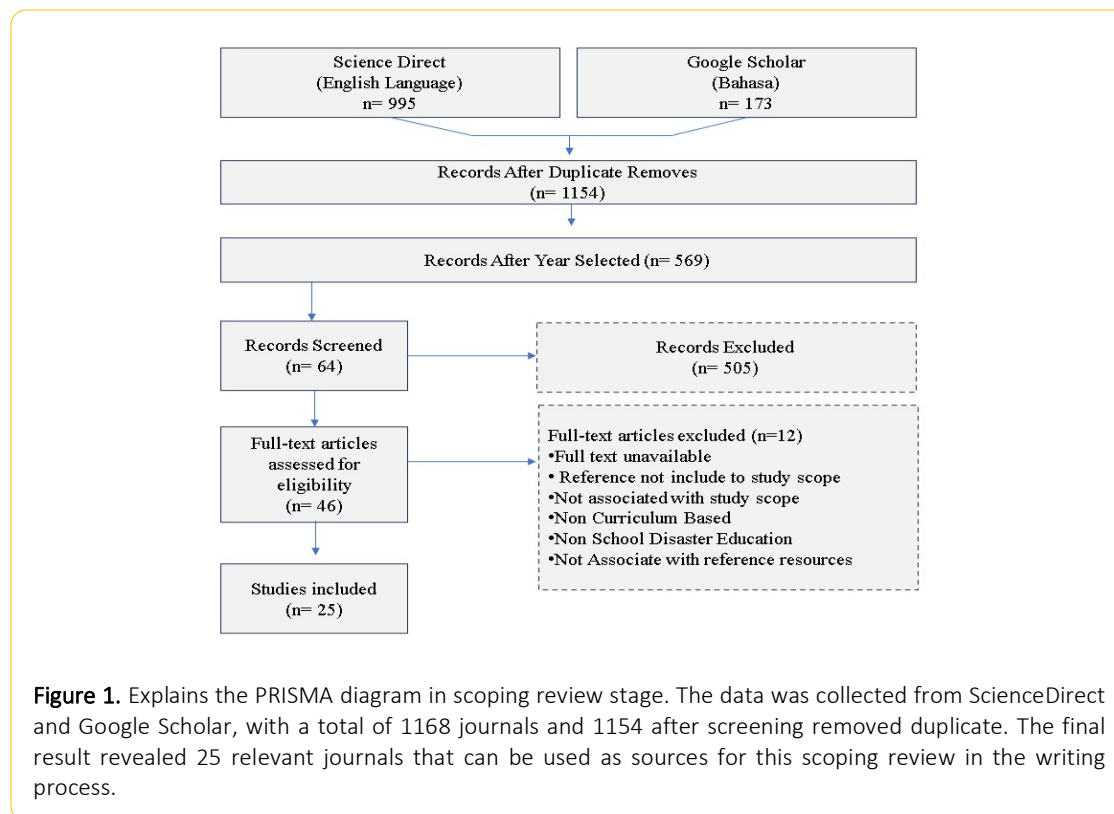
Data extraction and analysis

This stage is a continuation of the extraction process. After data extraction from all selected journals, numerical and thematic analysis is conducted. The Mendeley application is used for data extraction, focusing on two stages of data: 1) study characteristics, and 2) relevant study materials related to the research objective. Research articles included in the review are analyzed based on two main aspects: 1) Study characteristics, including author, title, year, DOI, and reference type; and 2) Findings are limited to Indonesia, teaching materials, approaches and models, the impact of disaster education, and challenges and barriers in disaster education. Reflectivity is crucial in the review and thematic analysis. Codes are refined through team discussions, and operational definitions, naming, and relationships between codes are discussed in detail. Themes are developed from the grouping of codes (Levac, 2010).

Results

Overview of scoping review literature selection

1154 articles were found based on the previously described search terms. After the filtration stage, several studies were inaccessible (unavailable), did not meet the specified reference criteria, were outside the 2018-2022 timeframe, and did not meet other exclusion criteria. The final conclusion was that 25 articles met the inclusion criteria and would be analyzed. Articles that were not selected did not cover discussions about disaster education in the national curriculum of schools in Indonesia and did not include studies on the direct influence of disaster education. The PRISMA diagram is depicted in Figure 1.



Disaster education in school curriculum

Despite being one of the most disaster-prone countries in the world, disaster education remains a challenge. There is no national curriculum that currently mandates disaster education in schools. After the Aceh Tsunami in 2004, the government supported the development of the School Safety regulations. Since 2005, 12 Disaster Risk Reduction and Education (DRRE) regulations have been created nationally. However, in the past 15 years, only 10 out of 500 schools in 34 provinces have actually implemented DRRE. Integration of disaster education improved

significantly after the Hyogo Framework for Action (HFA). However, the focus remains national, with rhetorical targets related to DRRE. Only 10% of all schools in Indonesia implement disaster education (Amri et al., 2022).

In 2009, a pilot project for disaster risk reduction was formed in schools through the School Disaster Preparedness (SDP) program. Then, in 2011, the Tsunami and Disaster Mitigation Research Center (TDMRC) initiated a similar program called School-Based Disaster Preparedness (SDP), focusing on the School Curriculum. In 2014, 20 schools were already certified under the Safe School Program (SGP). School disaster education is conducted through government programs like the Safe Schools Program (SPAB). Still, schools need policy and instructions from the Ministry of Education to implement SPAB (Amri et al., 2022). Schools that implement SPAB tend to be located in disaster-prone areas, outside safe zone boundaries, not meeting disaster preparedness pillars, and lacking supporting facilities such as evacuation directions and safety signs (Haikal, 2021).

In early childhood education, disaster education is integrated into the learning activities with two main aims: 1) To broaden educators' insight into managing and implementing Early Childhood Education activities within the scope of disasters; 2) To provide an overview to learners regarding the process of disaster education in Early Childhood Education. The orientation of SPAB is based on eight core values: 1) Change of paradigm and culture; 2) Empowerment-oriented; 3) Independence; 4) Sustainability; 5) Local wisdom; 6) Rights-based approach; 7) Partnership; 8) Inclusivity (Bustan, 2018).

Disaster education content in teaching materials

After the 2004 tsunami, Aceh inherited disaster teaching materials from collaboration between the Tsunami and Disaster Mitigation Research Center (TDMRC), UNESCO, and the Indonesian Institute of Sciences (LIPI). However, evaluating these teaching materials was lacking, leading to a decrease in the quality and effectiveness of adopting them, although they are essentially beneficial (Amri et al., 2022). The teaching materials cover various aspects, including those mentioned in Table 1. In early childhood education, teachers develop semester and annual programs, which are further detailed in Daily Learning Implementation Plans (RPPH) related to topics such as volcanic eruptions, floods, and landslides (Nuraeni, 2021). The differences in disasters in each region lead to differences in teaching contexts. In disaster-prone areas like Mount Merapi in Yogyakarta, the integration of disaster education optimizes community resilience in facing volcanic eruptions.

In science education, disaster education is integrated to cultivate disaster preparedness thinking through the dimensions of science as a way of thinking, science as a way of investigating, and science as a body of knowledge. Science learning with practical application provides disaster applications directly to students, such as understanding the process of a volcanic eruption, comprehending patterns of Mount Merapi activities, and knowing the actions to take before and after such events (Tyas, 2020).

Islamic religious education integrates disaster education to create good knowledge and a conducive situation and enhance awareness and strong attitudes. The integration provides a balance between faith, Islamic principles, and moral excellence in emergencies related to disasters, based on the principles of human relations (*habluminannas*), human relations with God (*habluminallah*), and human relations with oneself and the Islamic mental adjustment in the students' personalities toward their surroundings and social environment. The development of teaching materials in Islamic religious education related to disaster education is conducted in two stages: 1) Analyzing the capabilities of Islamic religious education (faith, Islamic principles, moral excellence) in the perspective of disasters, which includes teaching materials, students, and learning outcomes; 2) Analyzing concepts related to disaster education, which are summarized in concept maps, and integrating them into the Daily Learning Implementation Plans (RPP) as a guide for classroom learning (Nurhayati, 2023).

For educators, workshops and training are the main sources of knowledge for the disaster education curriculum. Most educators use mass media as a source to obtain disaster-related information. Workshops are open to all teachers without exception (Astuti, 2021).

Table 3. Disaster Education Teaching Subject.

Integration Aspect	Strategy	Description
Subject (Amri et al., 2022)	Geography	Earthquake, Mount Merapi, Tsunami, Flood, Fire, and Erosion
	Civic Education	Safe school, enjoyable school, green school, healthy school, child-friendly school, and inclusive school
	Language, Religion, Social Studies	Integration of Disaster Risk Reduction (DRR) based on teachers' abilities and capacities
Local Content (Amri et al., 2022)	Adopted School	Training and coaching, local wisdom depicted in Figure. 2 Scheme (Amri et al., 2022), 25]; Integrated disaster in subject matters (Amri et al., 2022) (Amafiah, 2018)
Extracurricular Activities (Amri et al., 2022)	Separate extracurricular activities	Scouts, Indonesian Red Cross
	Intrinsic extracurricular activities	Integration in sports lessons
Early Childhood Education	Adjustment of RPPH (Early Childhood Education Learning Implementation Plan)	Early childhood teachers integrate disaster-related teaching materials, such as volcanic eruptions, floods, and landslides, into learning activities (Nuraeni, 2021).
Subject (Amri et al., 2022)	Geographic Civic Education	Earthquake, Mount Merapi, Tsunami, Flood, Fire, and Erosion Safe School, Enjoyable School, Green School, Healthy School, Child-Friendly School, and Inclusive School
	Language, Religion, Social Studies	Integration of Disaster Risk Reduction (DRR) based on teacher's abilities and capacities
Science	Physics	Climate change (Astuti, 2021)
	Biology	Viruses (Astuti, 2021)
Social	Geography	Human-environment relations in atmospheric and lithospheric dynamics, disaster mitigation and adaptation, environment and sustainable development, mapping and geographic information system development (Astuti, 2021)
Others	Indonesian Language	-
	English Language	Simple factual scientific texts, both oral and written about objects, animals, and natural phenomena/events, factual scientific texts both oral and written related to other subjects in Grade XII (Astuti, 2021)
	WASH (Safira, 2020)	WASH practices for related education, water, sanitation, and student hygiene
Religion	Islamic Religious Education	Adjustment with the basic curriculum (mulok), extracurricular activities, and lifelong education [Nurhayati, 2022; Rubaidi, 2018)

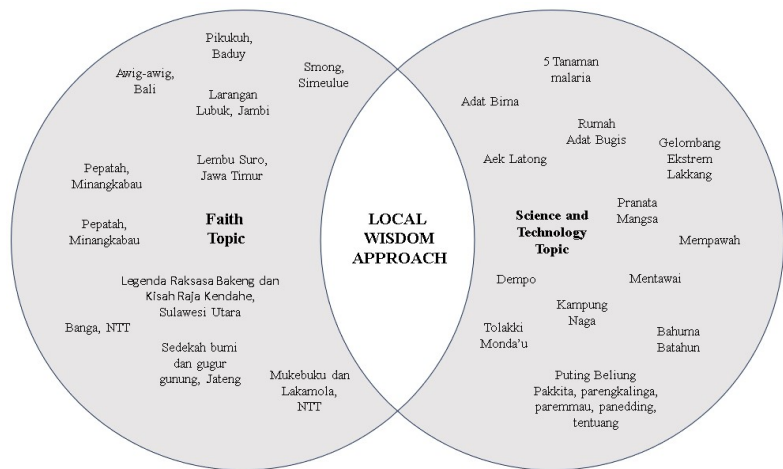


Figure 2. A disaster-based teaching material that educators can apply according to the conditions in their surroundings. Different natural conditions in each region have an impact on the needs and situation of the community. Disaster education based on local wisdom has been found to enhance community resilience and preparedness. Its implementation can be incorporated into school management, models and methods, teaching materials, and educational integration (Hidayat, 2023). Indigenous knowledge saves lives in Indonesia, drawing international interest for disaster risk reduction. For example, on Simeulue Island, only 7 lives were lost in the Tsunami 2004, compared to over 200.000 in Aceh. Preserving local knowledge and building practices are crucial factors (Kurnio, 2021).

Models and approaches to disaster education

In the Ministry of Education and Culture Regulation Number 33 of 2019, there are three main models for integrating disaster education in schools: 1) Extracurricular activities, 2) Community-based disaster education integration; and 3) Emphasizing the improvement of teacher quality in disaster education (Amri et al., 2022). However, it is also possible that disaster education is taught through various more diverse approaches, models, and methods, as described in Table 4.

Table 4. Development of Approaches, Models, and Methods of Disaster Education.

Variable	Type or Forms
Learning Approach	Contextual approach (Wibowo et al., 2023); Subjects, extracurricular activities, local content (Adopted School), extracurricular activities (Amri et al., 2022); Thematic SETS approach, collaborative learning, disaster mitigation curriculum (Suarmika et al., 2022); Collaborative SETS approach in Chemistry learning (Sari, 2018); Participatory action approach (Nuraeni, 2021); Blended Learning (Pandie, 2021)
Learning Models and Methods	EL Model for Elementary School (Mutasa, 2019); Purina Model (Nuraeni, 2021); SPAB Dissemination Model. Refer to Figure 3 (Haikal, 2021); Guided Inquiry Model (Sari, 2018); Family-based, Local wisdom-based as depicted in Figure 2. Problem-based, TIK-Based, Traditional Game-Based, Disaster Mitigation-Based, STAD model with video animation media (Suarmika et al., 2022, Safira, 2020), Role-Playing method, Simulation method, Training method, Counseling method, PBL with video media, Investigation group model assisted by comics, Peer tutoring method (Suarmika et al., 2022); Quantum teaching, School watching, group guidance, and self-efficacy for elementary school and junior high school participants, ADDIE model (Sari, 2019); Socialization (Sudrajat, 2023); E-Learning for high school (Ismail, 2021); Surrogate Experiential Learning (SEL) method (Wibowo, 2018); Junior High School Preparedness Model (Pandie, 2021).

Learning Media and Tools	Smart cards, multimedia, pop-up books, integrated disaster mitigation science textbooks, SETS teaching materials, local content teaching materials, Student Worksheets, Comics, games, dance, and songs (Suarmika et al., 2022); Geography learning modules for high school, mind mapping, e-learning, and pop-up books for high school, traditional Javanese musical instruments, evacuation, snakes and ladders, and alert boards for science and social studies subjects in elementary school, E-learning media for nursing students, Alert board game media (Sari, 2019); Newspaper media, real objects media, picture media, and random word disaster worksheet (Septikasari, 2018); E-Book (Anafiah, 2018).
Learning Assessment	Process design assessment tools (Suarmika et al., 2022); Cognitive, affective, and psychomotor assessment, Pre-test and Post-test (Sari, 2019); Non-test (Perception test) (Amelia, 2022).

Source: Author Analysis, 2023.

Final Remarks

Existing research suggests that predictors of schools' adoption of disaster education into their curriculum have been subject to school leadership, discretion of teachers, incentives and nudges, among others (Lassa et al., 2023). The study underscores the vital role of teachers in disaster education and highlights the need for innovative strategies to enhance their readiness and willingness to promote this education. Although many schools want to develop disaster curricula, this effort is limited to the knowledge of school principals and teachers (Septikasari, 2018). Opportunities from other related experiments, such as health education, suggest that disaster education can also be integrated through alternative pathways (Pascapurnama et al., 2018). This is particularly relevant after Covid-19.

The study emphasizes the potential impact of disaster education not only on students but on the entire community, particularly in post-disaster scenarios. It underscores the importance of teacher training and suggests future research should focus on incentivizing and empowering educators. Additionally, exploring technology and innovative teaching methods could make disaster education more engaging and compelling, aligning it with reducing disaster risks and enhancing community resilience. Combining disaster games and structured learning at schools might help in the integration question.

The integration of the third pillar of CSS activities requires clear regulations. It can be implemented through teacher training on disaster understanding, which can be inserted into 25 credit hours at the university level (Amri et al., 2022). With excellent results from the implementation of disaster education, it is recommended that government institutions and educational institutions, both formal and non-formal, plan and design structured and systematic disaster education curricula, as well as comprehensive education and training on disaster education. Nevertheless, there is a need for competency-based training and simulations and an improvement in implementing disaster education in schools to create a disaster education scheme with a shared vision and mission in supporting disaster risk reduction (Amelia, 2022).

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References

- Amri, A., Lassa, J. A., Tebe, Y., Hanifa, N. R., Kumar, J., & Sagala, S. (2022). Pathways to Disaster Risk Reduction Education integration in schools: Insights from SPAB evaluation in Indonesia. *International Journal of Disaster Risk Reduction*, 73, 1-13.
- Amelia, I., Lestari, D. S., Alghazy, G. T., & Wibowo, Y. A. (2022). Integrasi Materi Kebencanaan Pada Jenjang Sekolah Dasar Di Kecamatan Ngargoyoso, Jawa Tengah. *International Journal Environment and Disaster*, 1, 60-72.
- Anafiah, S., & Rezkitia, S. (2018). Memberdayakan Pembelajaran Mitigasi Bencana dengan E-Book di Sekolah Siaga Bencana (SSB) Yogyakarta. *ICSTI*, Yogyakarta, Indonesia.
- Astuti, N. I. W., Werdhiana, I. K., & Wahyono, U. (2021). Impacts of direct disaster experience on teachers' knowledge, attitudes and perceptions of disaster risk reduction curriculum implementation in Central Sulawesi, Indonesia. *International Journal of Disaster Risk Reduction*, 53, 1-9.
- Bilbao, P. P., Lucido, P. I., Iringan, T. C., & Javier, R. B. (2008). *Curriculum Development*. Quezon City: LORIMAR Publishing Co.
- Bustan, R. (2018). Pemahaman Tentang Manajemen Bencana Pada Siswa SDN Sempur Kaler Kota Bogor Sebagai Sekolah Aman Dari Bencana. Prosiding PIT Ke-5 Riset Kebencanaan IABI Universitas Andalas, Padang, 2-4 Mei 2018.
- Boon, H. J., & Pagliano, P. J. (2014). Disaster education in Australian schools. *Australian Journal of Environmental Education*, 30(2), 187-197.
- GADRRR-ES and WISS Ad Hoc Committee. (2015). CSS Targets and Indicators and Concept Note for Phase Two. Global Alliance for Disaster Risk Reduction and Resilience in the Education Sector. Hal. 2-32.
- Green, R. P., Varchetta, A., McFarlane, K., & Padmini L. Goyeneche, M. (2020). Comprehensive school safety policy: A global baseline survey. *International Journal of Disaster Risk Reduction*, 44, 1-11.
- Haikal, D. F., Hijri, Y. S., & Kamil, M. (2021). Mitigasi Bencana Melalui Program Sekolah Pendidikan Aman Bencana (SPAB) di Kota Malang. *Jurnal Tata Sejuta STIA Mataram*, 7, 86-108.
- Hidayat, Z., & Yatminiwati, M. (2023). The Role of Local Wisdom-Based Disaster Education and Training Through Education Levels in Disaster-Prone Areas. *International Journal of Accounting and Management Research*, 4, 1-8.
- Ismail, R., Mustika, F., & Akbari, M. (2021). Application of the E-Learning Model in Earthquake Learning to Improve Students' Understanding of Earthquake Disaster Preparedness. *Journal Geo Eco*, 7, 203-213.
- JCU. (2022). Scoping Review: Determine Inclusion and Exclusion Criteria. Last Update Nov, 2022. <https://libguides.jcu.edu.au/scoping>
- Kurnio, H., Fekete, A., Naz, F., Norf, C., & Jupner, R. (2021). Resilience Learning and Indigenous Knowledge of Earthquake Risk in Indonesia. *International Journal of Disaster Risk Reduction*, 62, 1-11.
- Rubaidi. (2018). Pengarusutamaan Pengurangan Risiko Bencana (PRB) Berbasis Kurikulum Pendidikan Agama Islam. *Al-Izzah: Jurnal Hasil-hasil Penelitian*, 13, 272-285.
- Lassa, J. A., Amri, A., Tebe, Y., Towers, B., & Haynes, K. (2023). Exploring NGOs-government collaboration strategies in institutionalising child-centred disaster resilience and climate change adaptation. *Progress in Disaster Science*, 18, 100284. <https://doi.org/10.1016/j.pdisas.2023.100284>
- Levac, D., Colquhoun, H., & O'Brien, K. K. (2010). Scoping studies: Advancing the methodology. *Implement Sci*, 5, 69.
- Mak, S., & Aliki, T. (2022). Steps for conducting scoping review. *Journal of Graduate Medical Education*, 14(5), 565-567.
- Mutasa, S., & Coetzee, C. (2019). Exploring the Use of Experiential Learning in Promoting the Integration of Disaster Risk Reduction into Primary School Curriculum: A Case of Botswana. *Journal Disaster Risk Studies*, 11, 1-8.

- Nipa, T. J., Kermanshachi, S., Patel, R., & Tafazzoli, M. (2020, September). Disaster Preparedness Education: Construction Curriculum Requirements to Increase Students Preparedness in Pre- and Post-disaster Activities. In Associated Schools of Construction (ASC) International Conference..
- Nuraeni, & Mujiburrahman. (2021). Integrasi Pendidikan Kebencanaan Dalam Kurikulum K13 Anak Usia Dini. *Jurnal Pengabdian Kepada Masyarakat Cahaya Mandalika*, 2, 223-231.
- Nurhayati, U., Muhajir., & Iman, F. (2022). Integrasi Wawasan Mitigasi dalam Pengembangan Materi Pendidikan Agama Islam: Studi Kasus Longitudinal pada Sekolah Menengah Kejuruan. *Jurnal Pendidikan Agama Islam Al-Thariqah*, 7(1), 40-60.
- Noviana, E., Syahza, A., Putra, Z. H., Hadriana, Yustina, Erlinda, S., Putri, D. R., Rusandi, M. A., Situmorang, D. D. B. (2023). Why is didactic transposition in disaster education needed by prospective elementary school teachers, *Journal of Heliyon*, 9,1-17
- Oktari, R. S., Shiwaku, K., Munadi, K., & Shaw, R. (2015). A Conceptual Model of a School–Community Collaborative Network in Enhancing Coastal Community Resilience in Banda Aceh, Indonesia. *International Journal of Disaster Risk Reduction*, 12, 300-310.
- Oktari, R. S., Shiwaku, K., Munadi, K., & Shaw, R. (2018). Enhancing Community Resilience Towards Disaster: The Contributing Factors of School-Community Collaborative Network in The Tsunami Affected Area in Aceh. *International Journal of Disaster Risk Reduction*, 29, 3-12.
- Pascapurnamaa, D. N., Murakam, A., Yasutan, H. C., Hattori, T., Sasaki, H., & Egawa, S. (2018). Integrated health education in disaster risk reduction: Lesson learned from disease outbreak following natural disasters in Indonesia. *International Journal of Disaster Risk Reduction*, 29, 94-102.
- Pacheco, E. M., Bisaga, I., Oktari, R. S., Parikh, P., & Joffe, H. (2021). Integrating Psychosocial and WASH School Interventions to Build Disaster Resilience. *International Journal of Risk Reduction*, 65, 1-12.
- Pandie, S. G., & Manapa, I. Y. H. (2021). Meningkatkan Prestasi Belajar Mahasiswa Menggunakan Model Pembelajaran Kolaboratif dengan Pendekatan Blended Learning. *Susunan Artikel Pendidikan*, 6, 45-52.
- Safira, N., & Saehana, S. (2020). The Development of Learning Video Media for Earthquake Themes Using Four-Step Teaching Materials Development (4S-TMD). *Jurnal Berkala Ilmiah Pendidikan Fisika*, 8, 211-219.
- Sakurai, A., Bisri, M. B. F., Oda, T., Oktari, R. S., Murayama, Y., & Affan, M. (2018). Exploring minimum essentials for sustainable school disaster preparedness: A case of elementary schools in Banda Aceh City, Indonesia. *International Journal of Disaster Risk Reduction*, 29, 73-83.
- Septikasari, Z., & Ayriza, Y. (2018). Strategi Integrasi Pendidikan Kebencanaan Dalam Optimalisasi Ketahanan Masyarakat Menghadapi Bencana Erupsi Gunung Merapi. *Jurnal Ketahanan Nasional*, 24, 47-59.
- Sari, S. A., & dkk. (2019). Integrasi Kurikulum Kebencanaan dan Perangkat Pembelajaran dalam Meningkatkan Kompetensi Kesiapsiagaan. *Talenta Conference Series. Universitas Sumatera Medan*, 260-269.
- Shiwaku, K., & Shaw, R. (2008). Proactive co-learning: a new paradigm in disaster education. *Journal of Disaster Prevention and Management*, 17, 183-198.
- Suarmika, P. A., Arnyana, I. B., Suastra, W., & Margunayasa, I. G. (2022). Reconstruction of disaster education: The role of indigenous disaster mitigation for learning in Indonesian elementary schools. *International Journal of Disaster Risk Reduction*, 72, 1-15.
- Sudrajat, B., Napitupulu, D., & Rhofiq, A. (2023). Sosialisasi Penggunaan Aplikasi InaRISK Personal Kepada Siswa Sekolah Menengah Atas Dalam Upaya Mewujudkan Satuan Pendidikan Aman Bencana (SPAB) di Jayapura. *Jurnal Altifani*, 3, 440-449.
- 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.
- Tyas, R. A., Pujiyanto., & Suyanta. (2020). Volcanoes Disaster Risk Reduction in Science Education Curriculum: A Systematic Review. *Advances in Social Science, Education and Humanities Research*, 528, 675-683.
- UNESCO and UNICEF. (2021). Disaster Risk Reduction in School Curricula: Case Studies from Thirty Countries. *Spain*.

- UNESCO dan UNICEF. (2022). Disaster Risk Reduction in School Curricula: Case Studies from Thirty Countries. *Spain*.
- Vanaspongse, C., Ratanachena, S., Rattanapan, J., Chutong, S., & Intraraksa, R. (2007). Training manual child-led disaster risk reduction in schools and communities. *Bangkok: Save the Children Sweden--Southeast Asia and The Pacific Regional Office*.
- 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, 1-14.
- Wibowo, W. S., Nurohman, S., & Maryanto, A. (2018). Surrogate Experiential Learning-Based Science Subject Specific Pedagogy (SSP) to Build Disaster Preparedness of Junior High School Students on Volcanic Eruption. *Journal of Science Education Research*, 2, 39-46.
- Wibowo, Y. A., Mardliyah, S., Setiowati, E., Pratama, Y. W., Ridho, M. R. (2023). Miskonsepsi Siswa terhadap Materi Bencana Gunung Merapi. *Jurnal Media Komunikasi FPIPS*, 22, 69-79.