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# Enhancing Disaster Risk Management in Educational Institutions: A Comprehensive Review of Strategies, Challenges, and Best Practices

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**ABSTRACT**

This scoping review synthesizes literature on disaster risk management (DRM) in educational settings, highlighting the critical role of schools and universities in fostering community resilience and ensuring continuous education. This aligns with UN Sustainable Development Goals 4 and 11. The review identifies key strategies for DRM, including infrastructure protection, disaster education and training, planning, policy development, and emergency preparedness. These measures help safeguard educational infrastructure and lives, creating resilient learning environments. However, challenges persist, such as insufficient evaluation of Disaster Risk Reduction Education programs, socio-economic disparities, governance and resource limitations, and infrastructure vulnerabilities. These obstacles hinder DRM implementation and progress towards SDG 13 by limiting adaptive capacities. On the other hand, best practices emphasize the integration of DRR education, investment in resilient infrastructure, community-led initiatives, safety frameworks, and collaboration among educational institutions, local governments, and emergency services. These strategies advocate for a holistic DRM approach, strengthening institutional capabilities and promoting effective disaster governance, in line with SDG 16. By addressing challenges and adopting best practices, educational institutions can enhance their protective role, becoming powerful catalysts for societal resilience and sustainable development. This review aims to inform policy, refine practice, and guide future research toward building resilient educational ecosystems globally.

**Keywords:** *Disaster Risk Management, Educational Institutions, Strategies, Challenges, Best Practices*

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## INTRODUCTION

Educational institutions, spanning from primary schools to tertiary establishments, are foundational community pillars and indispensable for societal advancement. These entities not only drive intellectual and social progress but also cultivate resilience during crises, embodying the spirit of UN Sustainable Development Goal 11 by promoting inclusive, safe, resilient, and sustainable human settlements (Edmeade&Buzinde, 2021; Sakurai&Shaw, 2022; Shaw et al., 2021). Nevertheless, they confront increasing vulnerabilities from both natural and human-induced disasters, including floods, earthquakes, pandemics, and conflicts. Such events can severely compromise infrastructure, interrupt academic continuity, and endanger the well-being of students, faculty, and staff (Opabola&Galasso, 2024; Yang et al., 2025). Given the accelerating frequency and intensity of global disasters, further exacerbated by climate change and other complex factors, a pressing need exists for comprehensive disaster risk management that directly addresses SDG 13's targets for strengthening resilience and adaptive capacity to climate-related hazards (Musarandega&Masocha, 2023).

Effective DRM within educational institutions is paramount, not solely for the protection of lives and property, but also for ensuring the sustained delivery of quality education, a mandate explicitly articulated in UN Sustainable Development Goal 4 (Opabola&Galasso, 2024; Sharma&Garg, 2021). Furthermore, the establishment of robust institutions and collaborative governance mechanisms, as championed by SDG 16, is fundamental to the successful execution of DRM policies and practices in these crucial settings.

While disaster risk reduction education has garnered significant international attention since the 1990s, generating substantial research, a gap persists in comprehensively understanding the precise strategies, critical challenges, and exemplary best practices essential for effective DRM implementation within educational contexts (Marzban et al., 2026). This scoping review endeavors to systematically synthesize the existing body of knowledge on DRM in educational institutions. Its objectives are to delineate effective strategies, identify prevalent challenges, and highlight exemplary best practices.

Ultimately, this review aims to inform policy, guide professional practice, and steer future research, thereby contributing to the development of resilient educational systems globally that actively align with and advance the broader objectives of sustainable development

## METHODS

This scoping review adhered to a systematic methodology for identifying, selecting, and synthesizing pertinent literature on disaster risk management in educational institutions (Abdalla, 2025; Fu&Zhang, 2024; Reinhardt&Chatsiou, 2019; Urata et al., 2022). The search strategy incorporated external academic databases to ensure a comprehensive overview of the subject matter.

### Search Strategy

A multi-faceted search strategy was employed, utilizing a diverse range of keywords and phrases relevant to disaster risk management, educational institutions, strategies, challenges, and best practices. The search queries were designed to capture a wide array of relevant academic works across various disciplines, including education and environmental studies (Sakurai&Shaw, 2022; Shaw et al., 2021).

External Search Terms:

- "Disaster risk management strategies in educational institutions"
- "Challenges in disaster preparedness for schools and universities"
- "Best practices for disaster resilience in educational settings"
- "Scoping review on disaster risk reduction in the education sector"
- "Frameworks for emergency management in educational facilities"

### Inclusion and Exclusion Criteria

Studies were included if their primary focus was on disaster risk management, encompassing reduction, preparedness, response, or recovery activities within educational institutions (such as schools and universities) (Jones et al., 2022; Opabola&Galasso, 2024; Sharma&Garg, 2021). Emphasis was placed on identifying content that discussed specific DRM strategies, elucidated challenges, or presented best practices. No explicit publication date filters were applied for this review; rather, relevant articles were incorporated based on their direct applicability and significance to the topic. This approach is consistent with the broader criteria often employed in scoping reviews to prevent an unduly narrow focus (Abdalla, 2025; Urata et al., 2022).

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### Data Extraction and Synthesis

Relevant information pertaining to strategies, challenges, and best practices was meticulously extracted from the selected literature (Banyas&Cloutier, 2021; Sharma&Garg, 2021). A qualitative synthesis approach was then utilized to categorize and present the findings thematically, concentrating on the three core areas: strategies, challenges, and best practices (Sakurai&Shaw, 2022; Shaw et al., 2021). The synthesis aimed to provide a comprehensive overview of the existing research, discern key patterns, identify existing gaps, and formulate recommendations for future DRM implementation within educational settings.

## RESULTS

The comprehensive review of the literature revealed a diverse array of strategies, significant challenges, and emergent best practices designed to enhance disaster risk management in educational institutions.

### Strategies

Several key strategies are either currently employed or advocated for to strengthen DRM in educational institutions:

- ***Infrastructure Protection and Safety*:** Protecting critical facilities, such as schools and universities, is paramount to ensuring service continuity during disasters. This includes fortifying infrastructure against seismic activity and securing vital services like electricity. For instance, Sendai City's initiative to install solar power generators and storage batteries in schools exemplifies proactive disaster risk management (Opabola et al., 2023; Opabola&Galasso, 2024). The rigorous enforcement of risk-sensitive building regulations, comprehensive construction codes, and judicious land-use planning is also crucial for minimizing disaster impacts (Opabola et al., 2023; Opabola&Galasso, 2024).
- ***Education and Training:*** A fundamental strategy involves integrating Disaster Risk Reduction into educational curricula. This encompasses raising awareness among both educators and learners regarding disaster prevention, essential safety precautions, and effective intervention plans. Public awareness campaigns that educate communities about specific hazards and associated risks are

indispensable for robust preparedness (Edmeade&Buzinde, 2021; Fu&Zhang, 2024). Furthermore, targeted educational interventions focused on enhancing students' digital resilience prepare them for the challenges posed by digital disruptions during and in the aftermath of disasters (Sakurai&Shaw, 2022; Shaw et al., 2021).

- ***Planning and Policy Development:*** Educational institutions must implement rigorous measures, including the development of comprehensive disaster response plans, clear policies, and resilient designs, to mitigate the effects of disasters. This necessitates integrating disaster risk analysis and reduction strategies into broader education sector development planning (Patel et al., 2023; Yang et al., 2025). National guidance for school disaster response, coupled with coordinated networks among educational institutions, is recommended to provide legal and ethical clarity, streamline resource sharing, and facilitate timely communication (Bartusevičienė et al., 2021; Jones et al., 2022).

- ***Emergency Preparedness and Response:*** Schools must prioritize thorough planning for disaster scenarios by judiciously avoiding construction in high-risk areas and ensuring the installation of critical safety features, such as grounding systems (Patel et al., 2023; Yang et al., 2025). Disaster preparedness also mandates maintaining strategic reserves of food, water, medical supplies, and other essential resources to ensure continuity during emergencies (Patel et al., 2023; Yang et al., 2025).

- ***Comprehensive Frameworks:*** The development and implementation of comprehensive frameworks for disaster risk management, including fire safety protocols and integrated building maintenance, are vital for effectively managing risks within educational facilities (Opabola et al., 2023; Opabola&Galasso, 2024). Additionally, senior university administrators are encouraged to actively collaborate with local emergency management agencies to enhance preparedness at both the institutional and community levels (Patel et al., 2023).

- ***Financial Mechanisms:*** The establishment of agile early response financing mechanisms has demonstrably proven effective in accelerating recovery efforts within educational sectors post-disaster (Opabola et al., 2023; Opabola&Galasso, 2024).

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**Challenges**

Despite concerted efforts to enhance DRM, several persistent challenges remain within educational institutions:

- ***Lack of Evaluation and Research Gaps:*** A significant lacuna in the literature is the absence of empirical studies rigorously evaluating the effectiveness of existing DRR strategies (Marzban et al., 2026). Moreover, limited academic output and insufficient integration of DRM into formal educational curricula, particularly concerning teacher training, remain pervasive issues.
- ***Socio-Economic and Policy Discrepancies:*** Challenges also stem from a dearth of focus on broader well-being, mental health, and gender considerations in DRR initiatives. Furthermore, the exacerbating effects of extreme poverty and the climate crisis complicate DRM efforts. Disparities between modern and traditional knowledge, alongside the ongoing debate between "top-down" versus "bottom-up" approaches, also present considerable obstacles.
- ***Governance and Resource Limitations:*** A critical challenge in DRM is the insufficient political will and leadership at both city and institutional levels. This issue is frequently compounded by financial and human resource constraints, inadequate awareness, and conflicting institutional priorities. Ambiguous roles and responsibilities, as well as unclear mandates for DRM, further impede effective implementation (Opabola et al., 2023; Opabola&Galasso, 2024). Budgetary limitations are particularly challenging for educational institutions in developing nations (Opabola et al., 2023; Opabola&Galasso, 2024).
- ***Infrastructure Vulnerabilities:*** Many countries, especially low- and lower-middle-income nations, confront substantial challenges due to the inherent vulnerability of school infrastructure to physical damage from natural hazards. Suboptimal construction practices, substandard materials, and inadequate building designs significantly amplify the risk of disaster impacts on educational facilities (Opabola et al., 2023; Opabola&Galasso, 2024; Patel et al., 2023; Yang et al., 2025).
- ***Individual Preparedness Deficiencies:*** Students often lack essential emergency preparedness kits and medical supplies, and they may not fully internalize personal responsibility for their safety during disasters (Patel et al., 2023). This gap in individual-level preparedness represents a critical area for improvement within educational communities.

- ***Implementation Difficulties:*** Collaborating effectively with local leaders for the development of university disaster preparedness courses frequently proves challenging (Patel et al., 2023). Additionally, the financial capacity of universities plays a substantial role in the development and delivery of technical disaster education (Patel et al., 2023).

- ***Broad Impacts of Disasters:*** Beyond the immediate physical damage to educational infrastructure, disasters can precipitate the loss of administrative and research data, the destruction of libraries and specimens, compromised computer systems, injuries to personnel, and increased insurance premiums. Students are particularly vulnerable to the wide-ranging impacts of disasters and often possess limited basic preparedness knowledge (Patel et al., 2023; Yang et al., 2025).

**Best Practices**

Several emergent best practices for significantly improving DRM in educational institutions were identified:

- ***Integrated DRR Education:*** One of the most effective strategies involves the seamless integration of DRR into education programs from an early stage. This approach, exemplified by Bolton Council's resilience program for children, should encompass formal curricula, co-curricular activities, and informal methods, alongside dedicated teacher training (Edmeade&Buzinde, 2021; Fu&Zhang, 2024; Reinhardt&Chatsiou, 2019).

- ***Resilient Infrastructure Development:*** Investing strategically in resilient infrastructure, such as earthquake-proof buildings and securing independent power sources, as demonstrated in Sendai City, represents a crucial best practice (Opabola et al., 2023; Opabola&Galasso, 2024). Adherence to risk-sensitive building regulations and stringent construction codes is also paramount (Opabola et al., 2023; Opabola&Galasso, 2024).

- ***Community-Led Initiatives:*** Community-managed school reconstruction projects have been shown to yield significantly faster recovery times compared to agency-managed initiatives. Actively engaging local communities in public awareness programs about hazards and risks constitutes a critical practice (Edmeade&Buzinde, 2021; Fu&Zhang, 2024; Reinhardt&Chatsiou, 2019).

- ***Comprehensive Safety Frameworks:*** Implementing robust frameworks for specific hazards, such as fire safety management in school facilities, is essential for enhancing overall safety (Opabola et al., 2023; Opabola&Galasso, 2024).

- ***Collaborative Partnerships:*** Collaborative endeavors between university administrators and local emergency management agencies have demonstrably improved preparedness (Patel et al., 2023). Establishing coordinated networks among educational institutions facilitates efficient resource sharing and communication during emergencies (Bartusevičienė et al., 2021; Jones et al., 2022).
- ***Targeted Education Programs:*** Developing comprehensive disaster education courses specifically tailored to university students, accounting for their unique perspectives and demographics, has been shown to enhance disaster resilience effectively (Patel et al., 2023).
- ***Focus on Service Continuity:*** Ensuring that vital facilities, such as power, water, and medical services, remain operational during disasters is critical for maintaining educational continuity and providing essential social services (Opabola et al., 2023; Opabola&Galasso, 2024).

## DISCUSSIONS

The findings from this review underscore the imperative for a comprehensive and integrated approach to disaster risk management within educational institutions. While a diverse array of strategies for disaster preparedness, mitigation, and response have been identified, their successful implementation is frequently impeded by a confluence of systemic and localized challenges. Notable obstacles include insufficient political commitment, constrained financial resources, and a conspicuous absence of systematic evaluation for existing disaster risk reduction and education programs. These challenges collectively highlight the urgent need for a more concerted effort from both governmental and institutional levels to prioritize disaster risk management in education (Marzban et al., 2026; Opabola et al., 2023; Opabola&Galasso, 2024).

A significant overarching theme emerging from the literature is the critical importance of embedding disaster risk reduction into the fundamental educational framework. Rather than relegating DRR to an isolated initiative, it should be seamlessly woven into school curricula and integrated into teacher training programs. This pedagogical approach ensures that DRR becomes an intrinsic component of the educational experience for both students and staff, thereby cultivating a pervasive culture of preparedness and resilience throughout educational institutions. Such integration aligns directly with the objectives of United Nations Sustainable Development Goal 4, which advocates for providing quality education that

equips students with the essential skills to address global challenges, including natural disasters, making this integration crucial for long-term success.

Educational institutions transcend their immediate function of protecting occupants; they are pivotal in fostering community resilience and providing invaluable support during post-disaster recovery efforts (Edmeade&Buzinde, 2021; Fu&Zhang, 2024; Reinhardt&Chatsiou, 2019). As stipulated in SDG 11, schools and universities are instrumental in driving the development of resilient and sustainable communities. By proactively adopting robust DRM strategies, educational institutions can contribute significantly to enhancing the safety and resilience of their communities, expanding their role from educational service providers to active, indispensable contributors to disaster resilience and recovery.

The best practices illuminated in this review emphasize the necessity of a multi-dimensional approach to DRM. Key constituents of successful strategies include the development of resilient infrastructure, meticulous disaster planning, continuous education and training, and cultivating robust collaborations with local communities and emergency services. The observed shift towards community-managed reconstruction projects and the establishment of responsive early financing mechanisms illustrate the profound importance of locally driven, adaptable, and well-supported interventions. These practices not only accelerate recovery but also fortify community self-reliance and overall resilience (Opabola et al., 2023; Opabola&Galasso, 2024). Such approaches are in harmony with SDG 17, underscoring the collaborative effort required to achieve sustainable development and enduring disaster resilience.

**Limitations**

While this scoping review offers valuable insights, it is predicated on an initial search strategy that may not have exhaustively encompassed the entire breadth of available literature. A more rigorous and iterative search process, potentially including grey literature, could expand the scope and yield a deeper understanding of the subject. Additionally, a more detailed critical evaluation of the included studies would undoubtedly enhance the reliability and applicability of the findings. The limitations of this review are also influenced by the current availability of indexed academic literature, particularly in developing countries, where DRM research may be underrepresented.

**Future Research**

Future research should prioritize the development of standardized evaluation frameworks for DRRE programs, enabling a robust assessment of their effectiveness across diverse educational contexts.

Such frameworks are indispensable for identifying successful strategies and pinpointing areas requiring improvement. Furthermore, investigation into innovative funding models for DRM in educational institutions, especially in low-resource settings, is imperative to surmount the financial barriers that frequently impede the implementation of effective DRM strategies. Exploring culturally relevant DRR approaches, including the integration of indigenous knowledge and community-based methods, could effectively address existing gaps in DRM practices. These approaches are fundamental for developing disaster-resilient educational systems that are both effective and adaptable to specific local conditions.

## CONCLUSION

Enhancing disaster risk management within educational institutions necessitates a concerted and collaborative endeavor to integrate proactive strategies, overcome systemic barriers, and implement proven best practices. By focusing strategically on resilient infrastructure, comprehensive education and training, robust policy frameworks, and impactful strategic partnerships, educational institutions can significantly bolster their capacity to mitigate disaster risks, respond effectively to emergencies, and ensure the continuity of learning and vital community support. Addressing the identified challenge.

particularly through heightened political commitment, adequate funding, and thorough evaluations will be pivotal in fostering truly disaster-resilient educational environments worldwide. Ultimately, the comprehensive integration of disaster risk management into educational institutions not only supports the attainment of the United Nations Sustainable Development Goals but also profoundly contributes to building safer, more sustainable communities on a global scale.

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