Strengthening Disaster Preparedness Through Student Education: Global Insights and Implications for Odisha, India

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ABSTRACT

Disaster resilience means being able to handle and bounce back from disasters. It's about preparing before something danger happens, staying strong during the event, and recovering quickly afterward. A disaster-resilient community can keep important services running or restore them fast, even after being affected by floods, earthquakes, storms, or other hazards. Disaster resilience education has emerged as a critical dimension of global risk-reduction efforts, particularly for school-aged children who are among the most vulnerable in emergency contexts. This article reviews current educational strategies, resources, and institutional frameworks that support student resilience building. Drawing on guidance from the United Nations Office for Disaster Risk Reduction (UNDRR), UNICEF, and recent empirical literature, the paper examines curriculum integration, digital learning tools, community engagement, and teacher training as key components of effective disaster resilience education. Barriers such as resource inequity, limited policy implementation, and contextual challenges in low-income regions are also discussed. The review further explores the specific case of Odisha, India one of the most hazard-prone regions in the world to illustrate how subnational governments can operationalize resilience education. The analysis concludes that a multi-sectoral, culturally informed approach is necessary to ensure equitable access to disaster resilience resources and to empower students as active participants in risk reduction and recovery.

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1. Introduction

Disaster resilience is the ability of a community, system, or society to anticipate hazards, absorb shocks, cope with their impacts, recover effectively, and learn from experiences to enhance future preparedness. The increasing frequency and intensity of natural and human-induced hazards have heightened the need for comprehensive disaster resilience education (UNDRR, 2015). Students represent a priority population in disaster preparedness efforts because of their vulnerability and their potential to influence household and community safety behaviours (Peek et al., 2020). Schools serve as critical platforms for delivering structured resilience education, disseminating emergency information, and promoting psychosocial support during and after disasters.

Despite widespread acknowledgment of the importance of disaster resilience education, many education systems lack well-coordinated strategies and sustained resource allocation to implement relevant programs (Shaw et al., 2019). This article synthesizes global approaches to disaster resilience education and highlights key resources that support student learning and adaptation. It also examines how these global frameworks are reflected in the state of Odisha, India, which has become a recognized leader in disaster risk reduction (DRR).

2. Global Frameworks Guiding Disaster Resilience Education

2.1 The Sendai Framework

The Sendai Framework for Disaster Risk Reduction 2015–2030 identifies education as a priority for action, emphasizing capacity-building, knowledge dissemination, and community participation (UNDRR, 2015). It calls for integrating DRR concepts into school curricula and for enhancing access to educational materials that promote preparedness.

2.2 UNICEF and Child Cantered Approaches

UNICEF's Comprehensive School Safety Framework advocates for resilient education systems through three pillars: safe learning facilities, school disaster management, and risk reduction education (UNICEF, 2021). This framework guides governments and NGOs in designing resources and training programs that are both child cantered and culturally relevant.

2.3 UNESCO's Role in Policy Integration

UNESCO promotes the incorporation of environmental and climate literacy into national education policies, linking disaster resilience to sustainable development and climate action (UNESCO, 2020). These efforts reinforce the cross-sectoral importance of DRR in education.

2.4 Educational Resources for Student Disaster Resilience

Curriculum Integrated Disaster Education

Integrating DRR into existing curricula fosters continuous learning and builds conceptual understanding of hazards, risk, and preparedness. Studies show that thematic modules, simulation exercises, and project-based learning significantly improve students' response capacity and risk perception (Shiwaku and Shaw, 2020). Multidisciplinary approaches linking science, geography, health, and social studies—help reinforce resilience concepts across subjects.

Digital and Technology Based Learning Tools

Digital platforms provide flexible and accessible DRR resources, including videos, interactive simulations, and mobile applications. E-learning platforms such as Risk Reduction Education portals and open-access UN training modules allow students to explore disaster scenarios and practice decision making (Izumi et al., 2019). However, unequal access to technology in low-income settings remains a major barrier to digital DRR education.

Community and School-Based Programs

School based disaster drills, youth emergency brigades, and community mapping activities strengthen students' practical preparedness skills (Cox and Perry, 2021). Community-engaged approaches also enhance social cohesion, an essential component of resilience.

Teacher Training and Professional Development

Teachers play a central role in delivering disaster resilience content; however, most lack formal DRR training. Professional development programs, resource manuals, and capacity building workshops are essential to equip teachers with accurate knowledge and pedagogical strategies (Shaw et al., 2019).

3. Barriers to Effective Disaster Resilience Education

3.1 Resource Inequities

Low-income and rural communities may face shortages of trained educators, digital learning tools, and safe school infrastructure (Peek et al., 2020). These inequities limit students' access to resilience resources.

3.2 Policy Gaps and Implementation Challenges

Even where DRR policies exist, implementation may be inconsistent due to limited funding, competing priorities, and weak coordination among government agencies (UNDRR, 2022).

3.3 Cultural and Contextual Factors

Disaster education must be context specific. Programmes that overlook local knowledge systems or fail to address community perceptions of risk may be less effective (Mercer et al., 2019).

4. Disaster Resilience Education in the Odisha State (India) Context

Odisha situated along the Bay of Bengal is among India's most hazard prone states, facing recurrent cyclones, floods, heatwaves, and lightning events. Over the last two decades, the state has been internationally recognized for its improvements in disaster preparedness, largely driven by strong institutional mechanisms and community engagement. Disaster resilience education has become a central part of the state's risk-reduction strategy.

5. Institutional Framework and Policy Integration

The Odisha State Disaster Management Authority (OSDMA, 2015, 2019) leads efforts to mainstream disaster education into school environments. Its School Safety Policy, aligned with national guidelines, prioritizes:

- development of school disaster management plans,
- school-level hazard mapping,
- annual multi-hazard mock drills,
- training School Safety Committees and student task forces.

The State Council of Educational Research and Training (SCERT) and the Board of Secondary Education (BSE) have incorporated DRR themes into curriculum areas such as environmental science, geography, and social studies, ensuring that hazard awareness is introduced early and reinforced progressively.

6. Community-Based and School-Level Programs

OSDMA collaborates with UNICEF, local NGOs, and the Fire Services Department to implement school-based preparedness programs, including:

- the Safer School Programme, which trains students in evacuation, first aid, and search and rescue;
- youth safety clubs in coastal districts such as Puri, Ganjam, Jagatsinghpur, and Kendrapara;
- annual mock drills for cyclones, floods, and earthquakes;
- community disaster committees that actively include adolescents.

These interventions help strengthen both school preparedness and household-level risk awareness.

7. Use of Technology and Learning Tools

Odisha has begun integrating digital tools to support DRR learning, including:

- school-targeted early warning messages,
- online disaster education materials hosted by OSDMA,
- animated IEC videos distributed through DIETs and SCERT.

However, significant digital divide challenges remain in remote tribal districts with limited connectivity and lower device availability.

8. Teacher Training and Capacity Building

Teacher training programs in Odisha emphasize multi-hazard awareness, inclusive education strategies, and psychosocial first aid. Despite progress, persistent challenges include:

- uneven access to refresher training,
- shortage of specialized DRR education modules,
- limited classroom time to integrate DRR concepts meaningfully.

9. Challenges and Opportunities

While Odisha has made substantial progress, gaps remain in infrastructure resilience, curriculum depth, and psychosocial support. Opportunities include expanding multilingual DRR materials for tribal learners, enhancing ICT infrastructure, and institutionalizing DRR certification for teachers.

10. Strategies for Strengthening Student Disaster Resilience

Developing locally relevant resources, expanding public–private partnerships, enhancing psychosocial resilience, and leveraging digital transformation remain critical strategies. These approaches should be adapted to specific regional contexts such as Odisha, where unique socio-cultural and infrastructural factors shape resilience outcomes.

11. Conclusion

Disaster resilience education for students is a vital component of global DRR efforts. A growing body of evidence highlights the value of curriculum integration, digital tools, community engagement, and teacher training in strengthening students' adaptive capacities. The Odisha case demonstrates how regional governments can align global frameworks with localized strategies to build stronger, safer learning environments. However, persistent inequities and implementation challenges underscore the need for sustained investment, policy strengthening, and culturally contextualized approaches. With strategic cross-sectoral collaboration, educational systems can equip new generations with the knowledge, skills, and resilience needed to navigate an increasingly hazard-prone world.

List of Abbreviations

AIDMI–All India Disaster Mitigation Institute
BSE–Board of Secondary Education (Odisha)
CCA–Climate Change Adaptation
DIET–District Institute of Education and Training
DRR–Disaster Risk Reduction
ESD–Education for Sustainable Development
IEC–Information, Education, and Communication
NDMA–National Disaster Management Authority (India)
NGO–Non-Governmental Organization
OSDMA–Odisha State Disaster Management Authority
SCERT–State Council of Educational Research and Training (Odisha)
ToT–Training of Trainers
UNDRR–United Nations Office for Disaster Risk Reduction
UNESCO–United Nations Educational, Scientific and Cultural Organization
UNICEF–United Nations International Children's Emergency Fund.

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