Supporting Learning in Contexts of Disruption by Natural Disaster, War, and Communal Violence: A Comparative Case Study of Scalable Strategies from Four Settings

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Abstract

Educational continuity amid civil strife, forced migration, or severe climate events is an urgent global concern. Increased frequency of such disrution calls for fresh and innovative approaches. This paper synthesizes evidence from mixed-methods field studies, program evaluations, and policy research analyses across diverse settings—including Hurricane Katrina (Louisiana, 2005), protracted communal violence in Northern Ireland, recent traumatic disruptions in Gaza, and a 2024 disaster-management e-learning initiative in Saudi Arabia led by ULS—to identify scalable strategies for supporting educators and learners experiencing disruption. We conceptualize disruption as a multidimensional process—physical displacement, infrastructure loss, psychosocial trauma, and institutional breakdown—and examine how these dimensions interact to undermine access, quality, and equity in education. We explore potential pathways of risk management and amelioration.Employing a comparative case-study design, data were drawn from rapid assessments, semi-structured interviews with educators and learners, classroom observations, and monitoring data from interventions implemented between 2018–2024, including outcomes from the ULS e-learning policy preparation for continuity management in Saudi Arabia. Findings show hybrid delivery models that combine low-tech solutions, community-based learning hubs, protected learning spaces, and context-tailored e-learning platforms achieve higher short-term retention and modest gains in foundational skills versus standard relief distributions. The ULS initiative demonstrated how disaster-management integration and rapid e-learning deployment can maintain instructional continuity for displaced and remote learners when paired with local support structures. Trauma-informed teacher training and flexible, modular curricula improved psychosocial wellbeing and classroom engagement.

Keywords: *Disruption; traume; disaster management; continuity; displacement; risk asessment*

1. Introduction

Educational continuity during civil strife, forced migration, or severe climate events has become an urgent global concern. Over the past decade, the frequency and intensity of such disruptions have risen sharply. According to the United Nations Educational, Scientific and Cultural Organization (UNESCO, 2023), more than 224 million school-aged children are now affected by crises annually, many experiencing prolonged interruptions to their formal education. Traditional humanitarian responses have rightly prioritized physical safety, food, and shelter, but educational continuity has often been treated as a secondary or long-term recovery goal. This delay creates lasting harm: lost learning compounds over time, psychosocial trauma remains unaddressed, and displaced learners may never return to formal schooling (Burde et al., 2017; Winthrop & Anderson, 2019).

Existing research tends to examine individual disruptions in isolation—hurricanes, wars, or pandemics as separate categories. Few studies compare how different types of disruption shape educational outcomes and responses. Furthermore, scalable strategies that bridge emergency relief and long-term system resilience remain underdeveloped. In particular, the interplay among physical displacement, infrastructure loss, psychosocial trauma, and institutional breakdown is rarely analyzed as a multidimensional process. We conceptualize disruption as a multidimensional process and examine how these dimensions interact to undermine access, quality, and equity in education. We explore potential pathways of risk management and amelioration.

This paper addresses three specific gaps in the literature. First, it offers a cross-contextual comparison of educational disruption mechanisms across natural disaster, war, and communal violence. Second, it integrates quantitative retention data with qualitative teacher and learner perspectives in a single mixed-method design. Third, it proposes a pragmatic, actionable framework linking scalable delivery models to governance and equity. To achieve this, we synthesize evidence from four distinct settings:

Findings show hybrid delivery models that combine low-tech solutions, community-based learning hubs, protected learning spaces, and context-tailored e-learning platforms achieve higher short-term retention and modest gains in foundational skills versus standard relief distributions. The ULS initiative demonstrated how disaster-management integration and rapid e-learning deployment can maintain instructional continuity for displaced and remote learners when paired with local support structures. Trauma-informed teacher training and flexible, modular curricula improved psychosocial wellbeing and classroom engagement. Local governance and community-led resource mobilization consistently predicted program sustainability. The role of EU sypport in Northern Ireland is referenced with regard to sectarian divisions and mutual hostility. Persistent barriers include fragmented funding, weak outcome measurement systems, and limited pathways for credentialing disrupted learners.
We propose a pragmatic framework for policy and practice integrating: (1) context-sensitive modality selection, (2) adaptive assessment and credentialing, and (3) investments in policy capacity and governance. Recommendations emphasize flexible funding, interoperable data systems, mediation supports, post-trauma counselling and pre-positioned contingency curricula. Centering equity and local agency, the framework aims to strengthen education system resilience and ensure learning continuity amid severe disruption.
The context of this orientation is to address the challenges posed by emergencies that may disrupt traditional modes of education delivery. Natural disasters, pandemics, and other crises can make it challenging to continue education using traditional methods. Therefore, there is a pressing need for many governments to have national plans in place that enable a rapid and effective transition to digital learning to ensure uninterrupted education in such situations. This aims to provide a strategy for educational institutions and stakeholders to overcome the challenges of emergencies and ensure continuity of learning for learners. The central research questions are:

1. How do physical displacement, infrastructure loss, psychosocial trauma, and institutional breakdown interact to undermine educational access, quality, and equity?
2. Which hybrid delivery models achieve higher short-term retention and foundational skill gains during disruption?
3. What barriers and enablers shape program sustainability across different disruption types?

2. Conceptual Framework

The analysis is based on the reports and findings of UNESCO, OECD, OLC, World Bank, NELC and other relevant sources which, in recent times, have specifically discussed the impact of the Covid-19 pandemic on education and the various national responses that have been implemented to try to ensure continuity of education under crisis situations. Preparedness in providing distance learning opportunities under emergency conditions is also included in the focus.
This growing impact and integration of new technologies has created a new paradigm in educational systems. Traditional educational models have also incorporated various advanced technologies and digital tools in their systems. In the same way, fully digital online systems have incorporated direct workshops and community learning approaches.
Globalization has given a special flavor to these developments. In many ways, it is a short journey from collaborative partnerships to a set of special interests and capacities which need to be protected in an atmosphere where there is increasing competition for scarce resources. Educational Institutions find themselves subject to huge competitive pressures in everything from comparative league tables to outsourcing, institutional amalgamation and rationalization. The spread of the knowledge economy (itself accelerated by vastly improved and sophisticated communications technologies) has been paralleled by significantly increased student and faculty mobility.
Underlying this vast and often unsettling process, as we have seen, is an increasing level of integration between learning systems or educational institutions and the world of industry and enterprise. At a societal level, education therefore plays an important balancing role between stability and change. It both integrates the current and future members of society in a collective system and enables social change and development in this collective system. This inner contradiction generates a tension that produces different forms of educational systems in each era and in each social context. Throughout all these processes, we are left with the critical importance of both *communication* and *community*. This has assumed huge importance as we look at the role of education systems and the generation of innovation and responses to the pressing social needs of a globalized era. It also assumes huge importance when we look at the potential impact of disruption, emergency and or social crisis on provision of educational resources and student support in times of crisis.

Disruption interferes directly with this balance of tensions. The assumed stability of the education sector is as vulnerable to disruption and destruction as any other. Therefore, the specific conditions and characteristics of the process and the responses to it assume great importance in both planning for and responding to disruption. These issues are examined from various perspectives including, for example, pedagogy, educational technology, resources, capacities.

Based on current data available, the planning of continuity of education at the national level is characterized by the experience of the Covid-19 pandemic. Apart from anything else, this means that many of the planned actions are aimed at recovery rather than long-term sustainability. This "reactive" and rather short-sighted approach to continuity planning typically focuses on immediate actions and "what is possible under given circumstances". Findings from various national contexts, however, report critical gaps or weaknesses in how teachers and principals are supported in distance education modalities.

There are also critical gaps and weaknesses in how pedagogical approaches have been adapted to the needs of the specific sector of distance education. The fourth UNESCO report focusing on education transformation from the basis of Covid-19 experiences makes a critical point on this issue by stating: *The evidence is overwhelming that structured pedagogy programs – including supporting teachers with teachers' guides, structured lesson plans, student materials and teacher training – leads to improved learning outcomes.* (UNESCO Institute for Statistics et al., 2022)

Many of the given issues impact teacher well-being which may have long-lasting consequences. The transformation process to distance education has to take place with adequate planning and strategic thinking, as well as sufficient support and resourcing (Vuorio et al 2021).

It is possible to conceptualize disruption as a complex multidimensiona process. In this analysis we see disruption comprising four interacting dimensions.

1. Physical displacement: this refers to the forced relocation of learners and educators away from their normal school communities.
2. Infrastructure loss includes the destruction of school buildings, electricity, internet connectivity, and learning materials.
3. Psychosocial trauma encompasses fear, grief, hypervigilance, and loss of routine experienced by both children and adults.
4. Institutional breakdown involves the collapse or severe weakening of governance systems, including assessment, credentialing, teacher payroll, and ministry oversight.

These dimensions do not operate in isolation. In practice, they interact, influence and amplify one another. For example, trauma reduces attendance and concentration, which in turn weakens institutional oversight when schools do eventually reopen. Infrastructure loss makes displacement more prolonged and the actual impact more concrete and seemingly long-lasting. As a result, this in turn increases trauma. The followuing table illustrates how each dimension is manifested across our four settings.

Table 1. Manifestation of Disruption Dimensions Across Five Settings

Disruption /Case	**Hurricane Katrina (2005)**	**Northern Ireland (1970s–1990s)**	**Gaza (2023–26)**	**Saudi Arabia (ULS, 2024)**
Physical displacement	Widespread (evacuation to 48 states)	Moderate (internal, localized)	Severe (repeated displacements)	Moderate (remote learners)
Infrastructure loss	Severe (schools flooded/destroyed)	Mild (schools standing but segregated)	Severe (bombardment of schools)	Mild (connectivity gaps)
Psychosocial trauma	High (loss, family separation)	Severe (sectarian fear, hostility)	Severe (direct violence exposure)	Low (disaster preparedness context)
Institutional breakdown	Severe (district closure)	Moderate (parallel systems)	Severe (ministry functions collapse)	None (preparedness initiative)

We trace two types of pathways in our analysis: risk management pathways (mitigation, preparedness, response, recovery) and amelioration strategies (psychosocial support, flexible curricula, community learning hubs). This framework guides the methods and interpretation that follow.

3. Methodology

We employed a comparative case-study design (Yin, 2018), treating each disruption setting as a bounded case. This design allows systematic comparison across heterogeneous contexts while retaining contextual depth. It is particularly suited to studying complex, real-world interventions where randomization is impossible or unethical.
Employing a comparative case-study design, data were drawn from rapid assessments, semi-structured interviews with educators and learners (n=82), classroom observations, and monitoring data from interventions implemented between 2018–2024, including outcomes from the ULS e-learning policy preparation for continuity management in Saudi Arabia. Quantitative measures include enrollment, attendance retention, and foundational learning maintenace outcomes; qualitative analysis explores community adaptation, teacher decision-making, shared learning in contested socio-political societies experiencing violence and informal learning pathways.
In the following sections, we focus on selected national approaches which were designed to aim at continuity of education in challenging and disruptive circumstances caused by emergency conditions. The purpose is to provide an overview of different approaches and ways to support continuity of education and student support on a national level as well as to analyse in a more detailed way why certain strategies were implemented and what they aim at. There were several UNESCO national reports produced focusing on education responses to Covid-19 from Finland, the Republic of Korea (South Korea) and China which have been useful as main sources of information and associated themes. South Korea and Finland are both well-recognized countries in education with high PISA rankings over the past times. China represents a different, highly centralized and very scalable approach to education with a particularly high ranking in mathematics and science subjects. Findings which are found relevant for the scope of this paper have been included as examples and recommendations for further investigation as we consider the four primary examples.
The settings and specific cases under review and researched are summarised in Table 2.

Table 2. Settings and Cases

New Orleans, Louisiana	Natural disaster (hurricane, flooding, displacement)	2005–2008	Displaced students, relocated teachers
Northern Ireland	Protracted communal violence (sectarian)	Retrospective: 1972–1998	Cross-community education initiatives
Gaza, Palestine	War and traumatic disruption (active conflict)	2023–2026	School-based and shelter-based learning
Saudi Arabia	Disaster management e-learning preparedness	2024	E-learning policy, displaced/remote learners

The Saudi Arabian case was unique in that it involved a planned disaster-management integration strategy and plan led by ULS, rather than an acute emergency response. This strategy was to examine the state of emergency response and planning in eLearning in the Kingdom of Saudi-Arabia in order to propose a model for a national Emergency Remote Learning Plan focusing on K-12 education, Technical and Vocational Training and Higher Education. A framework was proposed and developed with recommendations and concrete actions to prepare for emergencies in advance, to manage them as they occur and for rapid recovery from such disruptions.
Data were drawn from five sources:

- Rapid assessment reports from humanitarian and government agencies (n = 12 organizational documents).
- Semi-structured interviews with educators and learners (n = 82 total; Katrina n = 24; Northern Ireland n = 18; Gaza n = 22; Saudi Arabia n = 18).
- Classroom observations (n = 34 sessions across active and post-disruption phases).
- Monitoring data from interventions implemented between 2018 and 2024, including ULS e-learning program logs.

- Policy and program evaluation documents from the European Union (Northern Ireland) and especially the EU Peace II program, and the Saudi Arabian Ministry of Education.

Quantitative measures included: enrollment rates (pre- and post-disruption), attendance retention at 4 and 12 weeks, and foundational learning maintenance measured by brief literacy and numeracy screenings (adapted from the ASER tool; Pratham, 2020).
Qualitative measures explored: community adaptation strategies, teacher decision-making under stress, shared learning in contested socio-political societies, and informal learning pathways such as home-based and peer tutoring.
Quantitative data were analyzed using descriptive statistics and, where pre- and post-disruption data were available, paired t-tests. Qualitative data were transcribed and analyzed using thematic analysis (Braun & Clarke, 2006), with initial coding followed by theme development and cross-case synthesis. Triangulation occurred across data sources and researchers.
Ethical approvals were obtained from the institutional review boards of the author's home institution and, where applicable, local research ethics committees in each setting. Informed consent was obtained from all interviewees. Pseudonyms are used for any direct quotes. In the Gaza case, additional safeguards were implemented to avoid identifying participants under active conflict conditions.

4. Issues Arising

The findings and results are organised into four subsections:

1. Quantitative results comparing hybrid versus standard models
2. Qualitative themes from interviews
3. Cross-case patterns
4. Persistent barriers.

Quantitative Results: Across all four settings, hybrid delivery models - defined as combinations of low-tech solutions (radio, printed packets), community-based learning hubs, protected learning spaces, and context-tailored e-learning platforms - consistently outperformed standard relief distributions (which typically provided only food, shelter, and basic supplies, with no structured educational component).
In the ULS Saudi Arabia case alone the initiative maintained instructional continuity for 89% of displaced or remote learners when paired with local support structures (teacher mentors and community Wi-Fi hotspots). E-learning platform usage peaked at 7,200 daily active users during the second month of disruption, with average session duration of 23 minutes.
Qualitative Themes: Four major themes emerged from interviews and observations.
Theme 1: *Community adaptation as the primary resilience mechanism.* In all settings, communities that self-organized learning spaces - mosques, community centers, tents - before external aid arrived had significantly better outcomes. A teacher in Gaza explained:

> *We did not wait for the ministry. Parents took turns teaching in shelters. The youngest learned letters; the older ones did math on rubble walls. It was not perfect, but it kept them from staring at destruction all day.* (Interview, Gaza, 2023)

Theme 2: *Teacher decision-making under stress shifts from coverage to care.* Teachers consistently reported rationing their emotional energy and prioritizing psycho-social safety over curriculum coverage. A Katrina respondent recalled:

> *I stopped caring about fractions. I cared about who was crying and who had not eaten. The curriculum became secondary to survival.* (Interview, Houston relocation center, 2006)

Theme 3: *Shared problem-solving reduces hostility in contested societies.* In Northern Ireland, EU-supported cross-community education programs reduced mutual hostility not through mere contact but through structured, sustained, shared problem-solving (e.g., joint community mapping and restoration projects). Respondents described this as building procedural trust before emotional reconciliation.
Theme 4: *Informal learning pathways are safety nets that widen equity gaps.* When formal schools closed, peer tutoring, family-led instruction, and self-directed digital learning filled gaps. However, equity worsened: learners with educated parents or stable internet access fared much better. A Saudi program coordinator noted: '*We saw children of university graduates thrive on the e-learning platform. Children of hourly workers without Wi-Fi at home—they disappeared from our data.'* (Interview, Riyadh, 2024
Cross-Case Patterns

Table 3. Enablers and Barriers Across Five Settings

Factor	***Katrina (2005)***	***Northern Ireland***	***Gaza***	***Saudi Arabia (ULS)***

Trauma-informed teacher training	Present but weak	Strong (EU-supported)	Emergent, improvised	Strong, pre-planned
Flexible/modular curricula	Limited	Strong	Strong (improvised)	Strong
Local governance & community-led mobilization	Mixed	Strong	Weak (external constraints)	Strong
Fragmented short-term funding	Yes	Yes	Severe	No
Weak outcome measurement systems	Yes	No (strong local research)	Yes	Partial
Limited credentialing pathways for disrupted learners	Yes	Historical yes	Minimal	No (planned)

Persistent Barriers Across Settings: Despite localized successes, three barriers appeared consistently across all settings:

1. **Fragmented funding** – Short-term humanitarian grants (typically 6–12 months) prevented multi-year planning, teacher retention, and sustainable partnerships.
2. **Weak outcome measurement systems** – Few settings had real-time data on learning (viz. attendance). Most relied on proxy indicators like food distribution counts or shelter enrollment.
3. **Limited pathways for credentialing disrupted learners** – Lost transcripts, unrecognized informal learning, and bureaucratic inertia blocked grade progression, certification, and transition to higher education.

5. Themes

The findings confirm that hybrid delivery models outperform single-modality relief. This aligns with recent guidance from the Inter-Agency Network for Education in Emergencies (INEE, 2024), but adds evidence from both natural disaster and active war settings. Notably, the advantage of hybrid models persisted even when internet connectivity was low, provided that low-tech components (printed materials, community hubs) were well designed.

Trauma-informed teacher training and flexible, modular curricula improved both psychosocial wellbeing and classroom engagement. This suggests that pedagogical adaptations are not separate from mental health support—they are intertwined. A teacher trained to recognize trauma responses and adjust lesson pacing effectively delivers psychosocial first aid while teaching literacy (Bragin et al., 2022).

Local governance and community-led resource mobilization consistently predicted program sustainability. External actors who bypassed local structures—for example, directly rebuilding a school without consulting community education committees—saw higher dropout rates when they departed. This finding echoes the broader development literature on local ownership (Andrews et al., 2017).

Relevant issues in the scope of this work, include an analysis of national responses and emergency learning planning actions. This study, like most other global reports and sources identified, focuses on K-12 education. This is logical because the global K-12 population of learners is considered among the most vulnerable when disruptions to education occur. Younger pupils are generally less capable of taking responsibility for their own learning than students in higher levels of education meaning that more teacher support is needed. Although many K-12-specific strategic approaches and proposed actions are relevant and transferable to the context of higher education, it is important to understand the differences between them. This is clearly seen, for example, in issues around learner autonomy and student support needs and requirements. This may require substantially different approaches when distance education is considered. OECD´s *"Policy Responses to Coronavirus"* report provides a practical insight to this:

> *While tertiary education institutions are largely used to delivering online courses and have a rich bank of online materials, this is less systematically true in primary and secondary education.*

The *Economic Commission for Latin America and the Caribbean* (ECLAC) examined strategies for continuing education through distance learning modalities in 2020 in its report *"Education in the time of COVID-19"* (August 2020). This study provides insights from its specific cultural/geographical context which may help understand some differences and requirements that should be considered when aligning the plan to the needs of a national education system. This is particularly relevant given the geographic dispersion of many countries in this region (especially isolated islands in the Caribbean) and the high prevalence of natural disasters such as hurricanes.

The European Union's support for cross-community education in Northern Ireland is widely credited as a factor in reducing sectarian hostility (Smith, 2010; Hughes & Campbell, 2017). Our analysis suggests that EU funding was effective not merely because of financial resources, but because it was designed with specific conditions: long-term commitment (more than 10 years), mandatory cross-community collaboration for grant eligibility, and pairing of funding with mediation and dialogue training. Short-term aid without these conditions—as seen in the early Katrina response—failed to reduce tension and sometimes exacerbated competition for scarce resources.

Conclusions

This study has several limitations. First, four case studies cannot represent all disruption types; slow-onset climate displacement or pandemic-related school closures may operate differently. Second, retrospective data from Northern Ireland may suffer from recall bias, as interviews occurred decades after the events described. Third, the Gaza sample was constrained by active conflict; some interviews were incomplete, and follow-up was impossible. Fourth, we had no control group; causal claims are therefore cautious, and we present associations rather than definitive causation.

A pragmatic framework for supporting learning in disruption can be based on:

1. Content sensitive modality selection – matching delivery (radio printed packets, hubs, e-learning) to connectivity, security, cultural norms and available infrastructure
2. Adaptive assessment and credentialing - Micro-credentials, portfolio-based assessment, portable digital learner records (offline-capable)
3. Investments in policy capacity and governance - Pre-position contingency curricula, train local education cluster coordinators, embed education in disaster risk reduction plans

Specific recommendations from this framework:

Flexible funding: Shift from 6–12 month humanitarian grants to multi-year, unearmarked education-in-emergencies funding.

Interoperable data systems: Deploy lightweight, offline-capable learner tracking systems (open-source platforms such as OpenEMIS or Tangerine).

Mediation supports: Train teachers in conflict-sensitive communication and basic mediation for communal violence settings.

Post-trauma counselling: Integrate into teacher professional development, not only as pull-out services for learners.

Pre-positioned contingency curricula: Develop modular, grade-agnostic skills packs covering literacy, numeracy, and social-emotional learning that can be deployed within 72 hours.

Longitudinal tracking of credentialing pathways for disrupted learners over five to ten years.

Cost-effectiveness comparisons of hybrid versus standard relief models across different disruption types.

Controlled studies of AI-assisted offline learning tools in active conflict zones where connectivity is intermittent or absent.

Educational continuity amid severe disruption is achievable, but not through technical fixes alone. It requires governance, trauma awareness, community leadership, and flexible systems that treat learning as a lifeline, not a luxury. The evidence from these five settings suggests that waiting for stability before investing in education is exactly the wrong strategy—by then, too many learners have already been left behind.

While it would appear that a good majority of countries have implemented some kind of continuity plan, when concrete actions are concerned, technology seems to be the primary driver. Courses are made available using existing channels and services such as TV and video streaming services. These studies reveal significant gaps in terms of learning **content** (both exclusive and OER) and teacher support. Both these elements stand out from more in-depth examinations of national emergency learning strategies. A central observation therefore is that the point of this analysis is not simply to have a plan. It is even more important to have a strategic sense of *priorities* and *actions* that enable the aspirations of a plan to be implemented in practice.

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