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Review Article

Beyond Temporary Learning Spaces: Designing Sustainable, Empowering Container-Based Schools in Conflict Contexts

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Abstract
Education in conflict-affected regions remains one of the most urgent global challenges, as millions of children are deprived of safe and continuous learning opportunities. Conventional brick-and-mortar construction is too costly and slow to meet the immediate educational needs that arise in emergencies. This paper develops a conceptual framework for the Cuick School, a modular, container-based model designed for rapid deployment, climatic adaptability, and community participation. Building upon the literature on education in emergencies, temporary learning spaces, and modular architecture, the study reimagines how learning environments can evolve from short-term relief measures into sustainable and psychosocially safe infrastructures. Using Sudan's ongoing displacement crisis as an illustrative case, it synthesizes research on humanitarian architecture and emergency education to propose three interlinked dimensions-technical adaptability, socio-cultural embeddedness, and psychosocial functionality-that underpin the Cuick School framework. The analysis highlights how modular, culturally sensitive design can bridge the divide between emergency response and long-term development, offering policy and design pathways for integrating psychosocial safety, community participation, and environmental sustainability in education under crisis conditions.
Keywords: Education in Emergencies, Container Schools, Modular School Design, Sustainable Learning Infrastructure, Sudan.

1. Introduction

Armed conflict continues to disrupt education for children across the world, dismantling not only physical school infrastructure but also the sense of safety, stability, and community that schools provide. In Sudan, since the outbreak of war in April 2023, over ten million people have been displaced, including 3.5 million children-rendering the country the site of the world's largest displacement crisis (UNHCR, 2024). More than 10,400 schools have been destroyed or forced to close, leaving nearly nineteen million children without access to education (UNESCO, 2024). Such lack of access to education places children at increased risk of recruitment by armed groups, early marriage, and gender-based violence.

Within such humanitarian emergencies, education performs functions that extend far beyond academic instruction. In contexts of armed conflict, schools serve as critical spaces that provide not only learning but also protection, stability, and psychosocial support for children. As UN Special Rapporteur on the right to education Farida Shaheed recently emphasized, "education during armed conflict offers a lifeline, protection, stability and hope," underscoring its humanitarian, legal, and moral dimensions (UN, 2025). The emergence of the field of education in emergencies (EiE) and the expansion of global initiatives for EiE (UNICEF, 2024) and Education Cannot Wait, a global fund that mobilizes resources and provides funding to ensure education for children and youth affected by emergencies (Wait, 2021), reflects a growing recognition that safeguarding education amid war is essential to breaking the self-perpetuating cycles of vulnerability and disrupted futures (Burde *et al.,* 2019). Structured learning environments help maintain a sense of belonging and normalcy amid chaos and serve as protective spaces that mitigate trauma.

Despite such growing global recognition and efforts, there remains limited empirical and conceptual understanding of how education is effectively maintained during ongoing conflicts (Salha *et al.,* 2024). An abundance of prior research highlights the destructive consequences of war, such as disrupted schooling,

trauma, and enrollment decline, rather than offering concrete ways to ensure continued learning amidst conflict (Poirier, 2011; Abou Khashabh, 2021). While studies have addressed policy responses and psychosocial interventions for displaced learners (Arar, 2020; Crawford, 2023), scant attention has been given to the spatial and material dimensions of emergency education, including the ways in which design, construction, and environmental adaptability shape safety, inclusivity, and psychosocial well-being. The post-COVID acceleration of digital learning (Crompton *et al.,* 2021; Imran *et al.,* 2025) has also reignited debates over whether costly physical school spaces remain essential in contexts facing multiple resource constraints. Yet such discussions often overlook the lived realities of protracted crises, where schools serve as physical sanctuaries offering routine, identity, and emotional security in addition to cognitive learning.

To date, one of the most widely implemented responses to education disruption has been UNICEF's temporary learning spaces (TLS)-lightweight, easily assembled structures designed to restore access to learning in the aftermath of disaster or conflict. Although TLS interventions have proven vital for rapid response, they are inherently constrained by their impermanence, limited durability, and weak integration with local environmental and cultural contexts. Many fade once humanitarian operations withdraw, leaving communities without sustainable educational infrastructure. While recent experiments-from UNICEF's TLS interventions (UNICEF, 2024) to container-based education models in India and Egypt (Kamel *et al.,* 2025; Raju, 2025)-have expanded the landscape of emergency and sustainable schooling, few studies have synthesized how modular, digitally enabled, and psychosocially supportive designs could coalesce into a coherent educational infrastructure for conflict-affected contexts.

This study addresses this gap by proposing a modular, container-based learning model-the Cuick School-as an innovative alternative to conventional TLS designs. The Cuick School concept builds upon the principles of EiE by introducing modularity, durability, and adaptability as essential design features. Unlike tents or short-term shelters, container-based classrooms can be quickly deployed yet remain in operation for years, allowing communities to transition from emergency schooling to long-term educational stability. The central hypothesis is that container-based modular classrooms, when designed for rapid deployment, cultural sensitivity, and community co-ownership, can constitute an effective and sustainable model for education in conflict-affected areas. Three research questions guide this conceptual exploration:

1) How can modular, container-based classrooms function as scalable and contextually appropriate educational infrastructure in conflict-affected regions?
2) What (technical, cultural, and logistical) factors shape the feasibility and community acceptance of modular school systems?
3) How can modular schools contribute to children's safety, psychosocial recovery, and continuity of learning during and after emergencies?

By engaging these questions, the paper positions the Cuick School as both a humanitarian and developmental intervention-one that combines design innovation with child-centered and context-sensitive educational principles.

2. Methodology

This study adopts a qualitative and interpretive design grounded in a thematic literature review (Torraco, 2016). The objective is to synthesize and reinterpret scholarship on education in emergencies, temporary learning spaces, and modular or humanitarian architecture to conceptualize the Cuick School framework. The study employs abductive reasoning to generate theoretical insight through iterative interpretation, moving continuously between evidence and emerging conceptual ideas (Timmermans and Tavory, 2012). The review draws on peer-reviewed academic publications, policy analyses, and institutional reports produced by major international organizations concerned with education and development. The selection of materials was guided by relevance to conflict-affected education, attention to design and infrastructural innovation, inclusion of psychosocial and community dimensions, and applicability to Sub-Saharan Africa, with particular focus on Sudan. Preference was given to sources published after 2010 to ensure analytical currency and alignment with contemporary humanitarian and sustainability frameworks. Reports and datasets from agencies such as UNICEF, UNESCO, UNHCR, and the World Bank complemented scholarly sources by providing contextual and policy-oriented perspectives.

Following Torraco's (2016) model, analysis proceeded through:

1) Data Familiarization: Close reading and inductive coding for recurring concepts (protection, access, psychosocial well-being, sustainability).

2) Thematic Synthesis: Grouping of codes into overarching themes: education as protection; community participation; design and material constraints; transition from temporary to durable schooling.
3) Model Development: Integrating insights into a conceptual framework linking technical, socio-cultural, and psychosocial dimensions.

This iterative synthesis allowed theory building through interpretation rather than aggregation, consistent with abductive logic (Timmermans and Tavory, 2012). By engaging with diverse bodies of literature across education, humanitarian studies, and architecture, the analysis constructs a conceptual foundation for the Cuick School model as a context-responsive, psychosocially informed, and environmentally sustainable approach to educational recovery in conflict-affected settings such as Sudan.

3. Findings: Global Frameworks and Approaches to Education in Conflict Contexts

3.1. Education in Emergencies (EiE)

The concept of education in emergencies (EiE) is grounded in the recognition that education is not merely a developmental goal but a humanitarian necessity and a fundamental right, even in conditions of war, displacement, or disaster (Burde *et al.,* 2017; Badrasawi *et al.,* 2018). At its core, EiE represents an intersection between protection, psychosocial well-being, and human capability. It operates on the premise that denying education to children in crisis situations has consequences that extend beyond individual learning loss-it erodes the social fabric, weakens community resilience, and perpetuates cycles of poverty and violence.

From a theoretical standpoint, education in conflict settings serves three interrelated functions: protection, continuity, and transformation. First, education provides protection-both physical and psychological-by creating structured environments that shield children from recruitment into armed groups, exploitation, and trauma (Burde, 2014). Second, it ensures continuity of learning and routine, fostering a sense of stability and hope. Third, it has transformative potential, enabling individuals and communities to rebuild their lives and institutions after a crisis.

Burde (2014) articulates this multidimensional role of education by describing schools as mediating institutions between the state and its citizens. Schools function not only as sites of instruction but also as symbolic extensions of the state's presence-cultivating identity, citizenship, and social cohesion. In fragile contexts where state legitimacy is contested or fragmented, education becomes a powerful vehicle for peacebuilding or, conversely, for reproducing inequality and exclusion. Burde's analysis underscores that interventions in education during conflict can have "disproportionately large effects" on social outcomes precisely because schools constitute one of the few enduring interfaces between citizens and governance structures. In many developing countries, schools outnumber health clinics or administrative offices, making them the most visible and consistent institutional presence in local communities. This implies that educational interventions designed with sensitivity to local needs and social dynamics can play an outsized role in sustaining peace and rebuilding trust.

3.2. Temporary Learning Spaces

In response to the severe disruption of education during armed conflicts, a number of international organizations have developed innovative modalities to sustain learning under crisis conditions. UNICEF's education in emergencies (EiE) programs, for example, promote access to quality education through the establishment of temporary learning spaces (TLS), psychosocial support, and resource provision for children displaced by war or disaster (UNICEF, 2023; 2024a). Similarly, Education Cannot Wait (ECW) mobilizes global funds to ensure that children and youth in conflict-affected areas continue to learn despite instability (Wait, 2021). Complementary efforts by the Malala Fund have focused particularly on girls' education, investing in community-based initiatives and empowering local education activists (Ikrama and Qumer, 2023), while Save the Children has prioritized the establishment of TLS, provision of learning materials, and teacher training to sustain education during crises (Burde *et al.,* 2015).

In active conflict settings where schools are destroyed or unsafe, community-based learning spaces-including makeshift classrooms in shelters, tents, or open areas-have become crucial. Such spaces represent an extension of Paulo Freire's concept of popular education, in which communities collectively reclaim education as an act of resilience and social reconstruction. For example, in South Sudan, TLSs were erected in displacement camps and marginalized areas to provide safe environments for teaching at-risk children, ensuring educational continuity amid ongoing violence. Historical precedents can also be found in China during the Sino-Japanese War, where schools relocated to caves and underground shelters to protect

learners while sustaining instruction. Likewise, in the Democratic Republic of Congo (DRC), UNICEF has reported that over 2,100 schools in North Kivu and Ituri provinces ceased operation due to conflict between 2022 and 2023, disrupting education for approximately 750,000 children. In response, UNICEF supported the construction of TLS and distributed school materials to restore access to learning (UNICEF, 2024a).

Alternative models such as mobile schools have also emerged as adaptive strategies, particularly for nomadic and pastoralist populations. In South Sudan, a UNESCO–FAO project implemented mobile schools to serve pastoralist communities and displaced populations. Teachers and learning materials-including textbooks, chalkboards, and stationary-moved with these communities, ensuring continuity of education despite migration and conflict (OCHA, 2012). This modality, though effective in reaching highly mobile populations, faces logistical and sustainability challenges, including limited material durability, dependency on external aid, and lack of long-term infrastructure.

While TLS and mobile schools have been instrumental in re-establishing learning access in emergencies, their inherently temporary character limits their long-term viability. These structures often deteriorate rapidly due to harsh environmental conditions or inadequate materials, and their impermanence constrains the psychosocial sense of stability that children derive from consistent school environments. Moreover, they frequently fail to integrate with local architectural practices, climatic realities, and cultural aesthetics, reducing their acceptance and functionality at the community level (Badrasawi *et al.,* 2018).

3.3. From Temporary Spaces to Container-Based Models

To address these limitations, new architectural and technological models have emerged over the past two decades, focusing on repurposing shipping containers as educational spaces. These structures offer a promising alternative to conventional TLS models by combining rapid deployability with structural durability. Early applications of container-based education were seen in East Asia and Europe, including Japan, Germany, and the Netherlands, where surplus shipping containers were adapted into classrooms, libraries, or student dormitories (Uittenbroe and Macht, 2009; Levinson, 2016). Notably, the Keetwonen student complex in Amsterdam and the EBA15 dormitory in Berlin demonstrated how modular container systems can provide affordable, comfortable, and environmentally conscious living and learning environments (Sottosanti, 2018). These early efforts highlighted the potential of container reuse to bridge the gap between emergency response and sustainable infrastructure.

In the Global South, similar initiatives have been implemented to address educational access challenges in under-resourced or disaster-prone areas. In Cambodia, Lo *et al.,* (2016) designed a zero-carbon community learning centre from a recycled shipping container equipped with solar panels, computer devices, and offline digital content. Their findings emphasized that community ownership, local engagement, and self-contained digital resources were critical to sustainability. In India, Raju (2025) documents the state of Telangana's "container schools," launched under the Mana Ooru Mana Badi initiative, which transform shipping containers into mobile, digitally equipped classrooms. These schools integrate renewable energy systems, rainwater harvesting, and vocational training while remaining cost-effective (approximately ₹13.5 lakh per unit). They have proven particularly valuable in tribal and forested regions where permanent construction is restricted, promoting inclusivity, gender safety, and community participation (Telangana Today, 2024). Such examples demonstrate that container-based schools can deliver high-quality, technology-enhanced education while overcoming spatial and regulatory constraints.

Recent renewed interest in container-based learning environments reflects broader global efforts to ensure planetary sustainability. As Crompton *et al.,* (2021) and Imran *et al.,* (2025) observe, the pandemic accelerated the global adoption of digital and self-paced learning, sparking debate over whether costly, permanent school buildings remain indispensable. Architectural research has since underscored the need for modular systems that balance environmental efficiency with psychosocial safety (Smith and Quale, 2017; Megahed and Ghoneim, 2020). Within this trend, the reuse of shipping containers has gained recognition as a green construction practice due to their recyclability, mobility, and compatibility with renewable technologies.

Empirical studies support how repurposing containers can support environmental sustainability. In Egypt, Kamel *et al.,* (2025) compared insulated container classrooms with conventional school buildings and found comparable thermal performance and significantly lower environmental impact when landscaping and shading elements were incorporated. Similarly, Battaglia and Lee (2019) demonstrated through the "Campus in a Box" project that net-zero energy container schools can serve as scalable, technology-linked hubs for

STEM education globally. However, challenges remain: Kaveh's (2013) comparative study of container and traditional classrooms in Austria revealed issues of ventilation and temperature regulation, underscoring the need for improved insulation, adaptive ventilation systems, and material optimization in future designs.

Taken together, these developments represent a conceptual evolution from temporary learning spaces to modular learning systems-educational architectures that retain the speed and flexibility of TLS while enhancing their durability, sustainability, and psychosocial functionality. The Cuick School model proposed in this study builds upon this trajectory by integrating the modularity of container architecture with the pedagogical and protective imperatives emphasized by EiE. It aims to operationalize a design framework where rapid deployment, cultural adaptability, and environmental sustainability coexist to ensure educational continuity and psychosocial resilience in conflict-affected regions such as Sudan.

4. Sudan as a Case Context

4.1. Conflict, Displacement, and Educational Disruption

Sudan exemplifies the urgency of developing sustainable education solutions for conflict-affected regions. Since the 2023 outbreak of war between the Sudanese Armed Forces and the Rapid Support Forces, mass displacement has dismantled the education system. UNHCR (2024) reports that more than ten million people have fled their homes, with 19 million children out of school-the highest number globally.

Even before the recent conflict, Sudan's education system faced chronic disparities. Urban enrollment rates reached 74 percent in primary schools, while rural areas lagged at 43 percent; secondary enrollment dropped to 16 percent in rural communities (UNICEF, 2021). Gender inequality remains acute: early marriage, household labor, and cultural restrictions reduce girls' school participation. Approximately 31 percent of children aged 7–14 engage in labor to support family income (World Bank, 2023).

These inequalities intersect with infrastructure deficits-floods, heatwaves, and power shortages frequently disrupt schooling. In many internally displaced persons camps, classrooms operate under trees or in tents that deteriorate within months. As one UNICEF field report notes, "the temporariness of learning spaces has become permanent" (UNICEF, 2024, p. 6). Within Sudan's volatile environment, education functions as protection-a buffer against exploitation and radicalization. UNICEF and Save the Children (2023) both highlight that schools reduce exposure to child labor, gender-based violence, and recruitment by armed groups.

4.2. Cultural and Environmental Considerations

Sudan's cultural landscape necessitates gender-sensitive design. Schools must accommodate social expectations of privacy, modesty, and religious practice, particularly in conservative rural areas. Flexible modular layouts, as envisioned in the Cuick School, can partition classrooms or integrate prayer and counseling spaces without imposing foreign architectural forms.

Climatically, high temperatures (often exceeding 45°C) and seasonal flooding present severe risks to standard TLS structures. Modular container-based schools could be elevated on platforms, shaded by photovoltaic canopies, and ventilated naturally to improve habitability. These design adaptations align with Megahed and Ghoneim's (2020) post-pandemic "resilient architecture" principles emphasizing airflow, natural light, and environmental self-sufficiency.

5. Conceptualizing the Cuick School for Sudan

Drawing from the synthesis of studies on education in emergencies (EiE) and modular architecture, the Cuick School-short for Culturally Informed Quick-Deployment School-is envisioned as a modular, container-based learning infrastructure that bridges immediate crisis response with long-term educational recovery. The concept moves beyond the temporary logic of conventional emergency learning spaces by integrating educational, psychosocial, and environmental functions into a single adaptable framework. It situates architectural design as both a pedagogical and psychosocial intervention, emphasizing how the built environment can support protection, belonging, and community rebuilding in contexts of conflict and displacement.

5.1. Foundational Dimensions of the Cuick School

The conceptual foundation of the Cuick School rests on four interrelated dimensions: protection and safety, continuity and adaptability, psychosocial and community integration, and sustainability and resilience. The first dimension, protection and safety, underscores the dual physical and psychological role of education in

crisis. Schools in conflict zones not only prevent exposure to violence, exploitation, and recruitment but also restore a sense of order and normalcy (Burde, 2014; UNICEF, 2024). The second, continuity and adaptability, emphasizes that emergency education must balance immediacy with durability. Learning environments should deliver rapid access while remaining flexible enough to evolve into long-term community assets (Smith and Quale, 2017). The third dimension, psychosocial and community integration, highlights the role of schools as spaces for healing and rebuilding social cohesion. Research shows that participatory and culturally grounded design fosters collective ownership and strengthens community identity (Winthrop and Matsui, 2013). Finally, sustainability and resilience call for environmental responsibility and local empowerment. Educational infrastructure should reduce ecological footprints, rely on renewable energy, and be maintained through local materials and skills (Kamel *et al.,* 2025).

Together, these dimensions frame the Cuick School as a holistic system where education operates simultaneously as protection, adaptation, healing, and sustainability.

5.2. Core Design Principles and Implementation Logic

Translating these dimensions into practice, the Cuick School is guided by three central design principles: speed and scalability, durability and adaptability, and psychosocial and cultural sensitivity. These principles ensure that modular schools can be deployed rapidly after displacement, reconfigured as communities stabilize, and sustained as inclusive spaces of safety and belonging.

Each Cuick School unit repurposes shipping containers into modular classrooms equipped with solar panels, rainwater harvesting systems, and passive cooling mechanisms. The structures can be assembled within 48 hours using prefabricated modules, linked horizontally or vertically for expansion. Unlike tent-based temporary learning spaces (TLS), which are often dismantled or deteriorate quickly, the Cuick School functions as transitional infrastructure, which is deployable in crisis yet convertible into semi-permanent community assets.

1) Technical Feasibility and Environmental Sustainability

The first dimension-technical feasibility-addresses how modular architecture can deliver durable, climate-responsive, and cost-efficient educational spaces. Shipping containers, already used successfully in Egypt, India, and Cambodia, provide a structurally robust, globally available base for construction (Shen *et al.,* 2020). In Egypt's New Assiut City, container classrooms achieved indoor thermal stability comparable to conventional schools while reducing energy consumption by 40% (Kamel *et al.,* 2025). Similarly, Telangana's Container Schools Initiative demonstrated that solar-powered units could function sustainably at one-third the cost of brick schools (Raju, 2025).

In Sudan's semi-arid climate-characterized by heat extremes, seasonal flooding, and limited access to materials-such systems could prove transformative. Containers can be insulated using locally sourced materials (e.g., straw or gypsum composites) and equipped with solar-powered ventilation and rainwater harvesting to ensure operational independence. A single 20-foot module can be converted into a 40 m^2 classroom accommodating roughly 30 students, while the modular design allows expansion as populations shift (Levinson, 2016). By using abandoned or surplus containers, this approach also advances circular-economy principles, transforming waste into educational infrastructure.

2) Socio-Cultural Adaptability

The second dimension focuses on the socio-cultural adaptability in the design of Cuick School. Research underscores that education interventions succeed when they align with local customs and involve community participation (Badrasawi *et al.,* 2018; Arar, 2020). In Sudan's predominantly Muslim context, gender-segregated schooling and privacy norms strongly influence school acceptance and attendance. Failure to address these norms can produce mistrust and low participation.

In Sudan, where decades of conflict, displacement, and climate stress intersect, the Cuick School framework offers a locally adaptable blueprint for re-establishing education under duress. The model's modularity enables deployment across diverse terrains-from arid Darfur to flood-prone Blue Nile states-while its cultural flexibility ensures alignment with community norms. The Cuick School model incorporates participatory co-design, allowing parents, teachers, and students to influence spatial configurations. Movable partitions enable flexible use of space-for example, separate classes for boys and girls during early schooling-while maintaining inclusivity. Separate sanitation facilities, shaded gathering areas, and localized aesthetic features such as traditional patterns or murals further enhance acceptance.

Evidence from Cambodia shows that when communities co-constructed container classrooms, vandalism decreased and attendance rose (Lo *et al.,* 2016). These findings support the argument that participation transforms emergency schooling from a donor-driven service into a collective act of resilience. In Sudan, such co-design processes could reinforce community trust, ensure cultural congruence, and foster intergenerational responsibility for educational spaces.

3) Psychosocial Support

The third dimension-the psychosocial function-recognizes that the physical environment of learning profoundly shapes emotional recovery and identity reconstruction. Studies of war-affected children show that safe, colorful, and well-lit classrooms help restore a sense of normalcy, reduce trauma, and rebuild social connections (Winthrop and Matsui, 2013; UNICEF, 2024). The Cuick School design operationalizes these findings through trauma-sensitive architecture: open courtyards encourage group play, shaded areas provide comfort, and student-created art fosters self-expression and pride. Its psychosocial emphasis directly responds to the high prevalence of trauma among displaced children, integrating education, protection, and healing within one spatial and pedagogical system.

Teachers play a crucial role by adopting trauma-informed pedagogy, combining arts-based learning, storytelling, and peer mentoring. According to (Burde *et al.,* 2015), learning spaces in emergencies must serve therapeutic as well as instructional purposes. Accordingly, Cuick Schools are conceived as psychosocial infrastructures-spaces where emotional regulation, safety, and relational trust are cultivated alongside academic learning. Involving local artisans and parents in mural design and landscaping not only enhances aesthetics but strengthens the community's affective bond with the school.

5.3. Toward an Integrative Framework

The Cuick School thus operates through a single integrative logic combining technical feasibility, cultural embeddedness, and psychosocial resilience. Technically, modular container architecture offers rapid, low-cost, and climate-responsive construction suited to Sudan's semi-arid conditions. Proper insulation, passive cooling, and renewable-energy systems allow classrooms to remain comfortable and self-sustaining with minimal environmental impact. Socially and culturally, participatory co-design ensures that spaces align with community expectations around gender, privacy, and collective use-factors proven to improve attendance and trust. Psychosocially, the school's spatial design fosters healing and belonging: bright, open, and flexible environments support emotional regulation and creativity, while community involvement in decoration and upkeep turns each school into a shared symbol of renewal. This synthesis transforms emergency schooling from a short-term humanitarian measure into a sustainable developmental asset. By embedding modularity, participation, and emotional safety within the same design system, the Cuick School advances a new paradigm for education in conflict-affected regions such as Sudan-one where infrastructure itself becomes a tool of protection, dignity, and social reconstruction.

Ultimately, the Cuick School model aims to redefine educational infrastructure not as static construction but as a living process of recovery-one that links design innovation to human dignity. By embedding protection, adaptability, community participation, and sustainability into its structure, the model offers a pathway for Sudan and other conflict-affected contexts to transform emergency education into a durable foundation for peace and resilience.

6. Discussion

The analysis highlights a persistent structural tension in conflict-affected education systems: how to balance the immediacy of humanitarian response with the durability of developmental planning. Education in emergencies (EiE) frameworks have succeeded in ensuring short-term access but have often struggled to sustain educational continuity in protracted crises. The Cuick School model offers a reframing of this dilemma by positioning educational infrastructure as transitional rather than temporary-designed to bridge relief and reconstruction through modular, adaptive design principles. This approach represents a conceptual evolution from short-lived emergency interventions toward transformative resilience, where physical and psychosocial reconstruction proceed in tandem.

At the policy and governance level, the model aligns with emerging calls to integrate humanitarian and development agendas within a single, adaptive planning framework. Education under crisis conditions must simultaneously safeguard rights, rebuild trust, and expand human capabilities. The Cuick School responds to this integrated vision through participatory processes that engage local builders, educators, and communities. Such collaboration not only accelerates recovery but also promotes civic ownership and long-

term sustainability, echoing evidence from post-conflict education reforms that link infrastructure renewal to social cohesion (Badrasawi *et al.,* 2018).

Equally important is the psychosocial dimension of learning environments. As Winthrop and Matsui (2013) observe, trauma-sensitive pedagogies thrive in spaces that enable interaction, play, and creative expression. Architecture can thus become a pedagogical instrument, shaping emotional recovery as much as cognitive learning. By embedding features that enhance comfort, safety, and community expression, the Cuick School reconceptualizes physical design as affective infrastructure-spaces that promote wellbeing and reconciliation. This understanding extends Sinclair's (2001) notion of "zones of peace" into the material domain, showing that built environments can mediate healing as effectively as curricular interventions.

The renewed global emphasis on digital and self-paced education following COVID-19 has raised questions about whether physical schools remain essential. Yet, as Crompton *et al.,* (2021) and Imran *et al.,* (2025) note, digital learning depends on stable connectivity, electricity, and domestic security-conditions rarely met in conflict zones. In fragile environments such as Sudan, schools are not merely venues for instruction; they are protective social institutions that anchor identity and safety. A UNESCO (2024) study found that on-site learners in displacement contexts were markedly less vulnerable to violence and exploitation than those in digital-only programs. Thus, the Cuick School model affirms the continuing necessity of physical, communal learning spaces-augmented but not replaced by technology-in advancing psychosocial recovery and educational equity.

Finally, the international cases of container-based learning environments in Egypt, Cambodia, and beyond demonstrate the feasibility of modularity as a sustainable and context-sensitive design approach (Lo *et al.,* 2016; Battaglia and Lee, 2019; Kamel *et al.,* 2025). These examples collectively suggest that adaptability, local participation, and environmental responsibility form the foundation of successful education reconstruction. The Cuick School localizes these global insights to the Sudanese context, proposing a hybrid model that merges humanitarian speed with developmental endurance.

7. Conclusion

This study advances a conceptual argument for redefining educational infrastructure as a continuum of resilience rather than a binary of emergency versus development. The Cuick School model exemplifies how modular, container-based designs can deliver educational continuity, psychosocial safety, and sustainability in contexts of protracted conflict. By integrating participatory governance, trauma-informed pedagogy, and environmentally adaptive architecture, the model reimagines learning spaces as engines of social and emotional reconstruction.

Several policy implications emerge from this conceptual synthesis. First, governments and development partners should embed modular architecture within national education recovery plans to bridge the gap between short-term aid and long-term infrastructure investment. Second, local employment and skill-building opportunities tied to modular school construction can strengthen livelihoods and enhance community ownership, reinforcing the social capital essential for post-conflict recovery (World Bank, 2023). Third, gender sensitivity must remain central: designs that incorporate privacy, sanitation, and safety are vital to supporting girls' participation and wellbeing. Lastly, the environmental potential of container reuse aligns with global sustainability goals-reducing waste and cost while promoting innovation in educational design (Levinson, 2016).

Future research should empirically assess the Cuick School model through pilot implementations in Sudan and similar contexts. Mixed-method evaluations could explore key metrics-deployment efficiency, environmental performance, psychosocial outcomes, and gender equity-to determine its real-world impact. Such inquiry would move beyond conceptual advocacy to evidence-based refinement, ensuring the model's scalability and cultural fit. The Cuick School concept reframes education in conflict not as a temporary humanitarian gesture but as a sustainable, psychosocially responsive right. Drawing on insights from education in emergencies and sustainable architecture, the Cuick School model highlights schools as transformative spaces where learning becomes a means of rebuilding lives, restoring dignity, and sustaining hope amid instability.

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