

Future of Work Initiative

Architects of Resilience: Sustainable Architecture in Lebanon

Global STEAM & Leadership Challenges – Case Study



“When students use rubble from their own homes to design sustainable housing solutions, they're not just learning STEAM concepts—they're reclaiming agency in circumstances designed to strip it away. This is education at its most essential: turning broken pieces into foundations for a more resilient future.”

—Maya Hammoud, STEAM educator and [Teach For Lebanon](#) fellow

A Community Transforms Adversity into Innovation

The landscape of Tibnin bears the visible scars of Lebanon's compounding crises – damaged infrastructure, intermittent electricity, and disrupted education. Against this backdrop, Teach For Lebanon fellow Maya Hammoud's sustainable architecture initiative at Tibnin Middle School reveals education's profound resilience. A planned collaboration with UNICEF on eco-friendly housing had been abruptly halted when conflict erupted, forcing school closures and displacing families. Months later, the Global STEAM Challenge offered an unexpected opportunity to revive educational ambitions precisely when traditional learning seemed least relevant yet most needed.

What emerged from this disruption wasn't merely an academic exercise but a powerful testament to education's transformative potential even in the most adverse circumstances. The students of Tibnin, many having experienced profound loss, would demonstrate how learning connected to real-world challenges can become a vehicle not just for knowledge acquisition but for psychological healing and community reconstruction. This journey would challenge fundamental assumptions about education's purpose in crisis recovery, transforming rubble into foundations for renewal.

When Sustainability Becomes Survival

Lebanon's sustainability challenges create a particularly complex landscape for STEAM education. The country has endured years of electricity crisis, with households depending on expensive private generators amid chronic fuel shortages. The recent conflict exacerbated these conditions, leaving many Tibnin families without safe housing and forcing rebuilding efforts to prioritize speed over sustainability

principles. Environmental considerations became perceived luxuries amid urgent humanitarian needs, while STEAM education itself seemed disconnected from immediate survival requirements.

The data tells a sobering story: less than four hours of public electricity per day in most regions, with generator costs consuming up to 35% of household income. In Tibnin specifically, approximately 30% of structures—including homes, a hospital, an orphanage, and schools— sustained damage during recent conflicts, creating an immediate housing crisis that pushed long-term thinking to the periphery. Most critically, students faced the psychological burden of displacement and uncertainty, with teachers reporting increased anxiety, difficulty concentrating, and a pervasive sense of helplessness. This convergence demanded an approach addressing not just technical learning but emotional healing and community rebuilding – transforming sustainability from an abstract concept to an immediate necessity.

Finding Voice Through Creation

When cautiously presented with the possibility of reviving the sustainable architecture project, students responded with unexpected enthusiasm rather than hesitation. Their eyes lit up with determination, suggesting the initiative offered something beyond technical learning – a chance to reclaim agency in circumstances designed to strip it away. The solution process began with structured research into sustainable building approaches, with student teams investigating solar applications, rainwater harvesting, and natural cooling methods adapted to Lebanon's climate.

"We may not be able to rebuild our homes yet, but we can design how they should be rebuilt," shared Fatima, a 13-year-old student who had lost her home months earlier. This sentiment captured the project's essence – creating space for future-oriented thinking precisely when the future seemed most uncertain. The project's transformative moment occurred organically when students began integrating materials from their surroundings into design concepts – reclaimed wood from damaged furniture, broken tiles from collapsed structures, and rubble from their own homes. What started as pragmatic resource utilization evolved into profound meaning-making, transforming sustainability education into a framework for processing trauma and envisioning possibility amid disruption. Through this process, STEAM concepts became more than academic exercises; they became tools for imagining and building a different reality.

Building Hope From What Remains

The project's implementation embraced both structured learning and responsive innovation through a four-phase approach. Students began by analyzing existing sustainable housing solutions for appropriateness to Lebanon's specific challenges. As word spread, community resources emerged organically – parents volunteered specialized expertise, with engineers evaluating structural concepts and electricians advising on alternative energy systems. Students then created scaled architectural models incorporating multiple sustainability features, experimenting with different insulation approaches using locally available materials and designing simple solar applications from repurposed components.

Through peer feedback sessions and expert guidance, iterative improvement became central to the learning process. Implementation faced significant challenges, including school closures and resource scarcity. The teaching team adapted by establishing WhatsApp groups for progress updates and shifting to home-based construction when necessary. When electricity failed – a daily reality in Tibnin – students continued working by candlelight, their determination becoming a powerful inspiration for the broader community.

The most powerful dimension emerged when students deliberately incorporated materials from damaged homes into their models. Najwa, whose family had been displaced twice, carefully integrated fragments of shattered bricks and broken glass from her grandmother's destroyed home into her

sustainable housing design. "These pieces still have value," she explained, "just like our memories and knowledge." This symbolic integration transformed architectural exercises into acts of remembrance and reconstruction that connected technical learning with emotional processing, demonstrating how educational spaces can hold complexity beyond academic content.

Transformations Beyond Architecture

The initiative's impact transcended conventional educational metrics, generating profound transformations that illuminate education's power in crisis contexts:

- **From Victims to Visionaries:** Students discovered their capacity as change agents, with surveys showing 72% increased belief in their community impact potential. "Before, my future was broken like my home. Now I design how we rebuild," reflected Mohamad, embodying the crucial reclaiming of agency amid forced helplessness.
- **Rebuilding Community Bonds:** The project created healing spaces where 25 parents contributed expertise, reconnecting fractured family relationships. One father who lost everything shared, "Now I teach her about walls while she teaches me about cooling systems"—exchanges restoring dignity while enhancing technical project quality.
- **Reimagining Crisis Education:** Rather than postponing meaningful learning until stability returns, the project demonstrated how STEAM experiences actively contribute to trauma processing. Models incorporating home fragments became physical manifestations of resilience—education transforming destruction into sustainable futures.

Looking forward, an upcoming exhibition for 500+ attendees will launch both student showcases and a practical guide for crisis-context STEAM education—expanding from Tibnin to communities across Lebanon through partnerships with the Ministry of Education and humanitarian organizations, demonstrating education's power to transform rubble into renewal.

For more information about the **Future of Work** initiative, visit the official [website](#).
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