

CLASSROOM SAFETY FURNITURE

Shield-Integrated School Desk and Chair System

A Product Concept by Christopher D. Iorg • Longbow Horseman Enterprise

Seeking: Prototype Funding, Manufacturing Partners, and NIJ Testing Partners

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Executive Summary

American schools need better emergency response tools. Current school furniture offers no protective capability during an active threat. Students and teachers are left to improvise with whatever is at hand — backpacks, books, classroom doors — in the most critical seconds of an emergency.

This product concept proposes a purpose-built classroom furniture system in which the school desk itself becomes a personal protective shield during an emergency. The desktop detaches in one motion, converts to a lightweight ballistic-rated shield, and simultaneously triggers an automatic alert to school administration and law enforcement. No button to press. No decision to make. The act of grabbing the shield activates the response.

The system is designed in three student sizes (elementary, middle school, high school) and one teacher-scale version with maximum protective coverage. All shields are constructed from a fiber composite material stack specifically chosen to pursue NIJ ballistic rating through prototype testing.

Important note: *This is a prototype development concept. Specific materials, dimensions, and construction methods will be determined through engineering and testing. Ballistic protection claims are targets for NIJ certification — not current certifications. We are seeking funding and manufacturing partners to build and test the first prototypes.*

Section 1: The Problem

School shootings and active threat events have become a defining safety challenge for American education. Every school district in the country has implemented lockdown protocols. But the furniture students and teachers use every day offers no protective capability whatsoever.

In an active threat scenario, the seconds between the first alert and law enforcement arrival are the most dangerous. Current furniture options leave students and teachers completely unprotected during that window. Improvised solutions — barricading with desks, hiding under tables — offer minimal real protection.

At the same time, schools carry significant earthquake preparedness requirements across much of the United States, and fire safety requirements are universal. A furniture system that addresses multiple emergency scenarios simultaneously is more economically justifiable than a single-purpose solution.

The gap: *No current school furniture manufacturer offers an integrated personal protective shield system. The market exists. The need is real. The technology to build it is available.*

Section 2: Product Design Concept

2.1 The Student Desk — Three Sizes

The desk is designed in three sizes corresponding to typical school age groups: elementary (approximately ages 5–11), middle school (approximately ages 11–14), and high school (approximately ages 14–18). Each size is ergonomically proportioned for its age group.

The desktop surface is the shield. It is mounted to the desk frame via a quick-release latch system designed for one-handed operation. A student who needs to deploy the shield:

- Releases the latch with one motion
- Slides their non-dominant arm through a strap mounted on the underside of the desktop
- Grips a handle mounted under the desk surface
- Lifts and orients the shield for protection

The entire sequence is designed to be completable in under three seconds by a child. The strap and handle system allows one-armed students to deploy and hold the shield independently — accessibility is a core design requirement, not an afterthought.

When the shield is released from the desk, an integrated sensor triggers:

- An audible alarm at the desk itself
- An automatic digital alert to school administration systems and directly to local law enforcement dispatch

No button. No app. No decision. The physical act of deploying the shield is the alert. This passive trigger design is critical — in an emergency, students should not need to perform additional steps to call for help.

2.2 The Teacher Desk Shield

The teacher-scale shield is a larger panel designed for two-arm carry by an adult. It is sized to shield a larger area — enough to cover multiple students sheltering behind a teacher. The material stack is the same as the student version but at greater thickness and size, accepting additional weight in exchange for greater ballistic protection and coverage area.

The teacher shield mounts to or near the teacher's desk and deploys by the same passive-trigger alert system.

2.3 The Chair — Smart Emergency Response

The chair is a separate unit from the desk, designed to complement the shield system with its own emergency response capability. The chair integrates a passive sensor system that detects rapid, unusual movement patterns consistent with an emergency event and contributes to the school-wide alert network.

The chair's emergency response function is deliberately simple — a sensor that connects to the same alert system as the desk shield, providing additional data points for school administration and law enforcement responding to an event. Specific sensor technology will be determined during the engineering phase.

Like the desk, the chair is designed in three student sizes plus a teacher version. The chair frame uses the same fiber composite construction principles as the desktop shield, providing inherent structural strength appropriate for school use.

Section 3: Material Stack Concept

The shield material stack is designed to achieve the best possible combination of lightweight portability and ballistic protection. The specific materials, thicknesses, and construction methods will be finalized through engineering analysis and prototype testing. The current concept proposes the following layered approach:

- **Hemp fiber composite base layer:** Industrial hemp fiber impregnated with a structural resin matrix provides the lightweight structural foundation. Hemp fiber has tensile strength comparable to carbon fiber and six times the flexibility of steel — properties that translate well to impact resistance.
- **Kevlar layers:** Woven Kevlar aramid fiber layers provide the primary ballistic resistance. Kevlar is the proven standard in body armor and ballistic panels. The number and weave of Kevlar layers will be determined through NIJ-standard testing protocols.
- **Liquid fiberglass impregnation:** Fiberglass resin applied through the composite structure adds rigidity and helps distribute impact energy across the panel rather than concentrating it at the point of impact.
- **Fluxed lime fiber composite layer:** A lime-based fiber composite layer adds structural mass and contributes to heat resistance — relevant for fire emergency scenarios as well as ballistic events.
- **Honeycomb matrix core:** An internal honeycomb matrix — similar to aerospace panel construction — provides maximum strength-to-weight ratio, earthquake impact absorption, and thermal resistance while keeping the overall panel weight manageable for a child to hold.

Testing pathway: All ballistic protection claims are targets for NIJ Standard-0108.01 (ballistic-resistant protective materials) testing during the prototype phase. No NIJ certification currently exists for this product — certification is the goal of the prototype and testing program we are seeking funding to execute.

Section 4: Manufacturing Capability Connection

The Longbow Horseman Enterprise is developing a vertically integrated hemp fiber composite manufacturing operation in Box Elder County, Utah. The same manufacturing capability being developed for infrastructure pipe, construction panels, and first responder textiles is directly applicable to classroom safety shield production.

The founder's background manufacturing precision composite parts for the F-35 Joint Strike Fighter program provides the engineering knowledge base to develop the composite sandwich panel construction required for this product. This is not a theoretical capability — it is an extension of manufacturing work the founder has already done at the highest levels of precision manufacturing.

The use of domestically grown industrial hemp fiber as the structural base layer connects this product to the regenerative agriculture operation also being developed in Box Elder County, creating a supply chain that is entirely domestic, traceable, and aligned with the enterprise's mission of building good things with American materials and American workers.

Section 5: Market Opportunity

There are approximately 130,000 K-12 schools in the United States serving roughly 50 million students. The school furniture market is approximately \$3 billion annually. No current product in that market offers integrated ballistic protection.

Federal school safety funding has increased significantly since 2018. The STOP School Violence Act, Bipartisan Safer Communities Act, and various state-level school safety funding programs have created dedicated budget lines for school safety improvements at the district level. A furniture product that addresses emergency preparedness can be purchased with safety funding rather than competing in the standard furniture procurement budget.

- Federal market: FEMA, Department of Education, Department of Homeland Security school safety grant programs
- State markets: All 50 states have school safety improvement funding programs
- Private and charter school markets: Independent purchasing authority, potentially faster procurement decisions
- International markets: School safety is a global concern, particularly in regions with active threat or earthquake risk

The opportunity: *A school furniture system that addresses active threat, earthquake, and fire emergency scenarios simultaneously, using domestically manufactured fiber composite materials, pursuing NIJ certification, and integrating with existing school alert systems — does not currently exist at market. First mover advantage is available.*

Section 6: What We Are Seeking

This concept is in the pre-prototype stage. We are seeking partners across three categories to move from concept to prototype to production:

6.1 Prototype Funding

Initial funding to design, engineer, and build the first functional prototypes across all four product variants (elementary, middle, high school student desk/chair, teacher shield). Estimated Phase 1 funding requirement: \$250,000–\$750,000.

6.2 Manufacturing and Engineering Partners

We are seeking composite materials engineers and manufacturing partners with experience in ballistic panel construction, honeycomb matrix fabrication, and NIJ-standard testing preparation. Partners with existing relationships with NIJ-accredited testing laboratories are particularly valuable.

6.3 School District Pilot Partners

One or more school districts willing to participate in a pilot program — providing feedback on ergonomics, usability, teacher and student response to the system, and integration with existing emergency alert infrastructure. Pilot participation would involve no cost to the district and would directly shape the final product design.

6.4 Alert System Integration Partners

Technology partners with existing school emergency alert system relationships — the passive shield-release trigger needs to integrate with systems already deployed in schools rather than requiring schools to adopt an entirely new platform.