

Affordable Computing and Remote Manageability for the Global Classroom with Intel® Hybrid Edge Computing and TSSC's IT-INSIGHT platform

TSSC, in partnership with Intel®, is leveling the digital playing field through IT-INSIGHT—a turnkey platform powered by Intel® Hybrid Edge Computing (HEC). This "set-and-forget" architecture is built for schools where IT staff is a luxury, providing high-performance computing at a fraction of the cost.

IT-INSIGHT acts as the centralized control plane for each Intel HEC-based virtual lab. While the hardware optimizes performance and efficiency, IT-INSIGHT ensures operational continuity, complete visibility, and remote management without requiring on-site specialized personnel. By leveraging HEC technology to transform one mini-PC into four independent student stations, we ensure that technical barriers never stand in the way of a student's potential. Paired with TSSC's cloud management for seamless remote support, we bring professional-grade infrastructure to any school with a heartbeat of internet connectivity.

The Computing Access Challenge

Education systems are operating in an environment where per-device costs are increasingly difficult to predict. As deployments scale, traditional approaches require repeating memory, storage, and core system components for every endpoint, driving higher capital investment and limiting flexibility as needs change. This economic reality is pushing institutions to look for ways to deliver the same computing capability with fewer physical systems and less duplicated hardware per classroom. Even in connected regions, schools face significant barriers to achieving true digital equity. The intersection of budget constraints, management complexity, and a lack of specialized IT resources often leaves PC labs unused and prevents technology from reaching the students who need it most. While many education systems view 1:1 computing as a long-term objective, schools often find themselves at different stages of their digital learning journey, requiring flexible approaches that balance access, affordability, and operational reality.

- **The 1:1 Cost Barrier:** Financial and operational constraints often prevent schools from implementing 1:1 at scale, contributing to gaps in access and digital equity.
- **Operational Complexity:** Without dedicated IT departments, teachers and administrators are often forced to troubleshoot hardware instead of focusing on pedagogical outcomes.
- **Connectivity Dependency:** Many modern educational tools are "cloud-only," meaning learning grinds to a halt during frequent internet outages or bandwidth throttling.
- **Scalability Limitations:** Schools require modular solutions that grow incrementally, protecting investments through incremental steps and avoiding the "all-or-nothing" approach of wholesale infrastructure overhauls.

Solution Architecture

The IT-INSIGHT platform leverages HEC to provide a compact, resilient, and enterprise-grade learning environment that functions regardless of connectivity status. This platform was developed by TSSC, a well-known company with deep experience in security and remote manageability.

1. Hardware Efficiency through Hybrid Edge Computing

By utilizing advanced virtualization optimized for the edge, HEC transforms a single, high-performance Intel-based mini-PC into multiple independent learning stations. This architecture eliminates the need for expensive centralized servers while providing:

- **Dedicated Performance:** Each student is allocated specific CPU cores and memory, ensuring a low-latency, full-desktop experience.
- **Affordability:** HEC uses a small, compact device that functions independently of heavy infrastructure like data centers and is comparable in cost to traditional PC labs using low performance CPUs.
- **Software Versatility:** Native support for Windows 11 or Linux, enabling the use of standard classroom applications and collaborative tools.
- **Simplified Lifecycle Management:** By reducing duplicated compute and storage at the classroom level, this approach lowers failure points and maintenance overhead. Centralizing computing power into fewer physical units reduces the failure points and maintenance burden of traditional labs.

2. Intelligent, Compact Deployment

Designed for modern space constraints, each unit supports four complete student workstations. A standard 20-seat lab operates with only five centralized compute units, minimizing physical space and power demands and reducing total hardware needed per classroom. Each station includes its own monitor and peripherals (mouse, keyboard and other USB devices), while the supporting infrastructure—firewalls, Wi-Fi access, and backup power—is consolidated into a single, pre-configured network cabinet. This model allows schools to extend reliable computing access to more students today while retaining the flexibility to increase individual capacity over time as programs, funding, and infrastructure mature.

3. "Offline-First" Resilience & Distributed Architecture

Unlike cloud-dependent or thin-client models, the unit is built for high availability in low-bandwidth or intermittent-connectivity environments.

- **Continuous Uptime:** Each unit operates independently with local compute and storage. If the internet goes down, students continue working on local files and applications without interruption.
- **No Single Point of Failure:** Because the architecture is distributed, an issue with one unit or the school's main network does not disable the entire classroom.
- **Edge-Native Curriculum:** Curriculum and essential educational resources are cached locally, ensuring that the speed of learning is never limited by the speed of the internet.



Figure 1: Intel® Hybrid Edge Computing Configuration

TSSC IT-INSIGHT Cloud Management Platform delivers remote administration capabilities purpose-built for schools without IT departments. TSSC's infrastructure monitoring platform, developed specifically for virtual lab deployments, connects directly to each NUC host through network integration. The platform monitors the base operating system running on each NUC that virtualizes the Windows or Linux environments for students, providing real-time visibility into system health and performance. School administrators access a centralized cloud-based dashboard that translates technical complexity into simple operational status. TSSC's support team handles remote golden image restoration, software updates, configuration management, and troubleshooting.

- **Binary Operational Status:** Dashboard shows each learning station as simply working or off with no technical metrics requiring interpretation. If a workstation is on, it must be operational in Windows; if there's an issue, the platform can restore the functional default state.
- **One-Click Golden Image Restore:** Returns any workstation to its functional default configuration with a single click, reducing troubleshooting from hours to seconds and ensuring continuous classroom operation.
- **Multi-Site Management:** District administrators oversee computer labs across multiple schools from a single console, pushing software updates and monitoring system health across all deployments.
- **Proactive Monitoring:** System alerts notify staff of potential issues before students experience problems, with TSSC's monitoring platform tracking performance, security threats, and operational status in real time including:
 - Monitoring of the base operating system (CPU, RAM, I/O, temperature, critical processes).
 - Monitoring of virtual machines: status, uptime, resource consumption, failures.
 - Intelligent alerting:
 - Dynamic thresholds
 - Anomaly detection
 - Proactive notifications
 - Tenant management by school
 - Roles and permissions by administrative level
 - Unified dashboard for hundreds of labs
 - APIs for integration with district systems

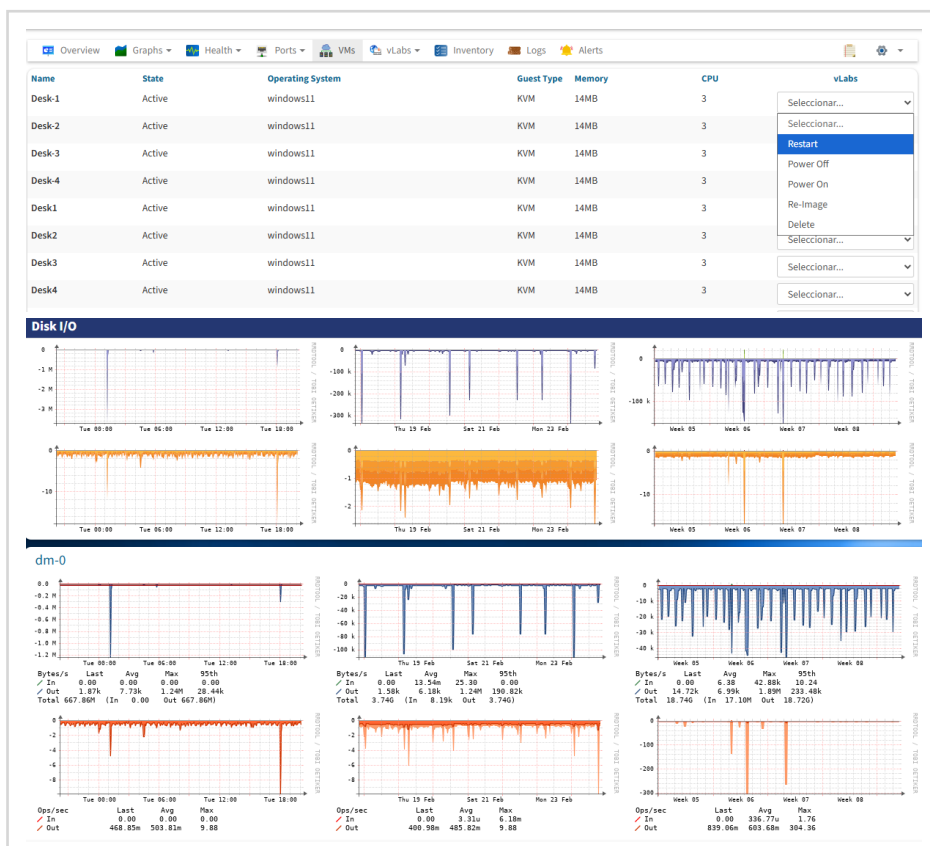


Figure 2: IT-INSIGHT Management Console (Overview and Disk I/O)

Technical Advantages

- **Intel® Core™ Ultra Processors:** processors use dedicated NPU and iGPU to offload AI inference and deliver multi-threaded performance for four simultaneous virtual machines, optimized for compact mini-PC form factors.
- **Hardware-level Resource Sharing:** Intel virtualization technology provides near-native graphics, USB, and network performance for each virtual machine. Hardware acceleration eliminates the performance penalties typically associated with thin-client solutions, ensuring each student experiences full PC responsiveness with seamless video playback and peripheral support. A high level of security through hardware-based isolation between virtual machines protects student data and system integrity.
- **Intelligent Storage Optimization:** Drastically reduce storage requirements through a shared-disk design. Instead of duplicating data for every student, the system uses a common 80GB core for shared files and apps, plus smaller individual partitions for user data. This allows 4 users to operate on just 160GB total rather than 400GB, maximizing disk efficiency.
- **TSSC Platform Monitoring:** The platform delivers remote administration with capabilities for content updates, software deployment, and centralized monitoring. It leverages enterprise-grade security expertise to protect student data and system integrity.
- **Intel vPro® Technology (Optional):** For organizations requiring advanced remote management capabilities, Intel HEC units can be configured with Intel vPro technology for hardware-based remote management, BIOS updates, and security management independent of OS status.
- **Centralized Management (Optional):** For environments requiring high client density and optimal efficiency, the system can be integrated with an Intel® HEC Server. This enables advanced features such as batch image deployment, rapid image recovery, and streamlined administrative control.

Why Schools Choose the TSSC IT-Platform using Intel HEC

- **Architectural Flexibility & Phased Scalability:** Take full advantage of an enterprise-grade educational infrastructure, packaged for schools without technical staff. Grow from a small deployment and scale incrementally, preserving infrastructure investments while enabling deployment models to adapt as program requirements and resources change.
- **Superior Performance & Dynamic Allocation:** Students enjoy a full-sized desktop experience with zero compromises. Flexible resource management allows teachers to dedicate all compute power to a single workstation for intensive STEM applications like video editing or 3D modeling, then revert to shared mode for standard tasks.
- **Reduced hardware duplication:** By running multiple independent desktops on a single hybrid edge computing system, schools lower overall hardware requirements per deployment and gain more predictable capital planning.
- **Future-Proof Economics:** Consolidated compute power reduces refresh cycles and maintenance costs while preserving the ability to adapt over time. As hardware ages, schools can reallocate resources to fewer stations to maintain high performance, extending device lifecycles and protecting the long-term budget.
- **Enhanced Security & Local Resilience:** Secure host computers in locked cabinets to eliminate theft and damage risks. Because students interact via low-cost peripherals, the primary investment remains protected, and the distributed architecture ensures a single point of failure never disrupts the entire classroom as it doesn't rely on the cloud to operate.
- **Sustainable Innovation:** Minimize your physical and environmental footprint. By supporting multiple students per host, this shared architecture helps reduce energy consumption and long-term e-waste, delivering a high-tech lab that is both space-efficient and eco-friendly.

Next Steps

Transform your school's computing infrastructure with Hybrid Edge Computing and TSSC. Contact your local representatives.

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