

Virtual Living Learning Lab

Engaging Students with Learning that's Real

White Paper



Trane's VL3® Turns Your Buildings into an Education Asset that Uses Actual Data

Two seemingly disparate current events are shaping realities for higher education: Companies and campuses are facing stricter sustainability regulations pertaining to energy efficiency and decarbonization. Meanwhile, employers are counting on schools for future employees that possess the technical and analytical skills they need. This unique set of circumstances has created an innovative opportunity for collaboration between educators and Trane Commercial. The company's VL3™ turns campus buildings into virtual living learning labs. Students can access live data to hone their analytical skills while developing an understanding of how much energy buildings consume—and how building operators and users can curb emissions.

Sustainability and Building Technology

Students in higher education are deeply concerned about climate change and the state of the planet that will be theirs to deal with. New regulations and energy efficiency requirements are adding external motivations for campuses to pursue deeper environmental projects. "Sustainability" has meant different things at different times. Today the focus is on *decarbonization*: HVAC systems can produce lower carbon emissions indirectly by using less electricity from power plants (energy efficiency), and directly by replacing fossil fuel heating and hot water systems with alternatives that run on electricity (electrification). Electrification is gaining attention as electric utilities nationwide continue the shift toward using cleaner natural gas and renewable energy sources. National and local legislation, along with building codes, are bringing new urgency to zero-carbon initiatives on campuses—and beyond.

Meanwhile, the influx of recent funding, including the Inflation Reduction Act (IRA), has made it possible for campuses to move forward with major projects aimed at reducing their buildings' fossil fuel energy use. Upgrading aging HVAC infrastructure makes buildings inherently more energy efficient since new equipment meets Department of Energy 2023 efficiency requirements. Adding digital control over that equipment by implementing a building automation system (BAS) can reduce a building's energy use even more; some experts say BAS can improve energy efficiency by up to 40%.¹ And, the benefits of BAS are available whether or not new equipment is in place. Building professionals can measure and manage energy use more effectively in any connected system with the insights that are gained through data and analytics. Campuses can decarbonize more when buildings are managed through a comprehensive BAS such as Trane's Tracer® Ensemble®. When educational institutions work with Trane, that BAS system can become a live learning opportunity by giving students appropriate access to the data and dashboards that describe energy use and trends. This is the basis for the VL3.

Case Study PIMA Community College



Trane is collaborating with Pima Community College, by engaging in its campus climate and energy curriculum. VL3 uses essentially every square foot of the connected campus for active, reality-based learning. PIMA students gain technical skills and learning STEM concepts that will be needed to solve real-world energy and sustainability problems.

The VL3 Virtual Living Learning Lab

Trane VL3 uses real building data to create learning opportunities that can be more engaging and meaningful. Students have access to the user interfaces without being able to disturb the actual facility setup. They can see how system data is given meaning, and how facilities staff use data to make operational decisions, and how those decisions affect the sustainability of their campus. It's a firsthand view into the energy dynamics that are happening within their building.

Inputs are collected from multiple points throughout the building. Room sensors provide information about temperature, CO2 and occupancy. System controls provide data about how well the building is performing. External data provided by sources including weather services, renewables and local utility companies provide important "causal evidence" about the external factors that can affect energy use and cost.

Trane provides system and analysis training to teachers, who then have flexibility to use it in engaging ways to support classroom curriculum. The VL3 has potential applications within a wide range of courses in both two- and four-year higher education, as well as advanced high school science and engineering classes.

Obvious opportunities exist within technical training programs for HVAC system design, installation or energy management. However, the access to live data and energy focus means the VL3 can also bring hands-on learning to curricula in STEM, analytics, environmental studies and more.

Educators can also use the VL3 to enable students to earn an industry-recognized credential through the National Coalition of Certification Centers (NC3); a network of education providers and corporations fostering effective training, elevation of skilled careers and employment opportunities.

Supporting Career Readiness

Data drives decision making in virtually every sector today. As a global sustainability company, Trane is a prime example of the way digital technology can transform an industry. Our technology enables buildings to manage energy use much more effectively, and the VL3 gives students access to real-world tools used by professionals that provides learning that is hands-on and realistic. Experience in reading real-world data and understanding how it can inform analytical and critical thinking are skills that are universally valued by employers.

For many skilled trades, work-ready employees need a combination of technical and mechanical skills—and VL3 brings the connection between machines and data to life.

Broader access to hands-on job skills training can help build economic equity. Today, only 11.8% of lower-income students graduate from four-year colleges and universities, compared to 60.1% in the highest wealth group. Skills-based workforce development programs may be the key to a more equitable economic environment.²

Extending Educational Value

Education institutions that are engaging with Trane to resolve aging and obsolete energy-using infrastructure and technology issues can gain a valuable tool for hands-on, career-focused learning in the process. Trane's VL3 means the operating systems can have dual roles, as both energy management and educational tools. The long-term value becomes much greater when building systems are used to help shape a new generation of technology-savvy employees.

Technology will be the great enabler behind lower-carbon industry. Trane's VL3 is one example of the way companies can share their tools, talent and expertise to inspire the next generation of innovators and problem solvers.

¹ Project Drawdown, Building Automation Systems, Drawdown.org.

² Fabian Pfeffer, Growing Wealth Gaps in Education, Demography (March 2018), cited in American Compass, Giving Community Colleges a Clear Purpose.



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