

# School Controls: The More Things Change, the More They Stay the Same

**Technology may be different, but issues are the same**

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In the March 1869 issue of *Manufacturer and Builder*, an article titled “The Ventilation and Warming of School-Houses”<sup>1</sup> said, “No more difficult problem is presented to the engineer of ventilation than the correct and entirely satisfying heating and ventilation of a crowded school-room.”

More than 130 years later, this still is the case, despite the evolution of HVAC and control systems.

## HVAC SYSTEMS THEN

Around 1960—the last major construction period in the Northeast—a typical middle school was around 100,000 sq ft, with two low-pressure, hot-water fire-tube boilers supplying a heating loop controlled by a three-way valve reset on outdoor air. Circulation was via a constant-speed pump. A typical classroom was equipped with a unit ventilator and perimeter radiation controlled by a wall-mounted pneumatic thermostat. User interaction typically took place in the boiler room at the master control panel, with a seven-day time clock and occupied, unoccupied, and automatic

control-unit or zone-selector switches and analog panel meters.

## HVAC SYSTEMS NOW

Today, a new middle school might be around 150,000 sq ft to meet educational, expanded school-as-the-center-of-the-community, and technology-program needs on a year-round basis. It may be equipped with a geothermal heating and cooling system, rooftop heat-recovery units, and variable-speed building and ground-loop pumps. A typical classroom might be equipped with a water-source, vertical, unit-ventilator heat pump controlled by a wall-mounted “open-platform” networked sensor/controller. A Web-browser device might serve as the user interface to hundreds of networked sensors/controllers for the real-time and dynamic operation of the building and subsystems via a secure Internet connection.

## HISTORY REPEATS ITSELF

Despite the changes of the last 40 years, the fundamental issues outlined in the 1869 article live on.

To paraphrase Benjamin Franklin, who said, “I haven’t failed—I’ve found 10,000 ways that don’t work,” as designers, installers, and operators of school HVAC and control systems, we haven’t failed—we’ve found 10,000 reasons why our systems won’t work. A few of them are:<sup>2</sup>

- A disconnected zone-actuator link.
- Incorrectly sized filters.
- A dirty reusable filter.
- A defective heating valve in a unit ventilator.
- Water accumulating adjacent to a rooftop HVAC fresh-air intake.
- A leaking heating/cooling coil in the air handler.

## OPPORTUNITIES FOR CHANGE

Like those of any other building type, occupants of schools can be quite creative in their attempts to achieve comfortable space conditions. This can include “teasing” the thermostat or space-temperature sensor/controller, opening windows and doors, and manually shutting down equipment.

Historically, school buildings have been designed to meet basic educational needs and provide functional spaces. Today, however, we have the opportunity to make school buildings themselves learning tools. Several schools—the University of Colorado at Boulder, Queen’s University, Fleming College, and the California Institute for Telecommunications and Information Technology—are exposing physical and virtual elements of buildings to students, teachers, design professionals, equipment providers, facility staffs, and the community at large.<sup>3</sup>

Many schools have used this approach for environmental-education programs with great success. The long-term benefits have included public financial support and the advancement of the combined needs of school-facilities, technology, and educational programs.

All of the pieces are in place, with connections just waiting to be made.

## FOOTNOTES

1) For a link to this article, visit [www.fes-nj.com/History/historic-buildings-engineering.htm](http://www.fes-nj.com/History/historic-buildings-engineering.htm).

2) For more, go to [www.fes-nj.com/ed-res.htm](http://www.fes-nj.com/ed-res.htm), and click on Link 53.

3) For more information, go to [www.fes-nj.com/ed-res.htm](http://www.fes-nj.com/ed-res.htm), and click on links 61, 62, and 64-66.

For previous *Control Freaks* columns, visit [www.hpac.com](http://www.hpac.com).

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