STUDENTS First

Improving Indoor Environmental Quality in Existing Schools

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The Green Lake School District's building in central Wisconsin was constructed in the 1950's and faced a situation common to many older schools throughout the United States. The roof leaked, windows were in abysmal shape, the heating bill was too high and rising, entryways were in poor form and not inviting, and band and choral rooms were deficient.

If that wasn't enough, the old windows on the west-facing classrooms had been almost entirely covered over with a wall material to control glare and provide a level of thermal improvement. In those classrooms that faced south, heavy curtains were typically drawn shut to control glare. But, these challenges didn't keep administrators from setting high indoor environmental quality (IEQ) standards as they planned and designed their remodeling project.

Indoor Air Quality

Buildings with improved air quality realized an average reduction of 38.5 percent in asthma-related issues, according to a review by Carnegie Mellon of five separate studies. Research has also revealed a reduction in the episodes of colds and flu when air quality is enhanced. The benefits of evaluating air quality and taking proper measures to improve it are significant.

When considering a remodel project, indoor air quality improvements should begin with an assessment of current conditions in existing facilities, such as looking for mold and mildew caused by excessive humidity or moisture intrusion. These conditions can exist without being apparent, for example, in tunnels, crawl spaces, attics, or in concealed ductwork and chases. In addition, irritating airborne particulates can gather over many years in any path of air transfer if the building envelope is not sealed entirely or the ductwork is not regularly maintained or properly filtered.

Cleaning products can have a sizable impact on the health of those using your facility. Make sure to educate your facilities staff on the impact of cleaning product choices and their application on the health and welfare of students and staff. New York state school districts are now mandated to reduce the exposure of children and school

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personnel to harmful cleaning substances. As a result, every public school in the state is cleaned with environmentally friendly goods.

Keep an Eye on the HVAC

When considering air quality, be certain to examine your HVAC (heating, ventilating and air conditioning) system.

This was a significant aspect of the 39,500-square-foot renovation in Nekoosa High School. The multi-level facility had an antiquated HVAC system that was replaced with an energy-efficient system that included a state-of-the-art digital control system. This ultimately resulted in improved air quality while holding energy consumption stable despite some additional square footage and the introduction of air conditioning.

To maintain an HVAC system that contributes to better air quality, be certain to inspect the system regularly including checking the operation of energy recovery units, dampers, and building schedules, and establishing a maintenance plan. Changing filters consistently, draining condensation pans, and keeping unit ventilators free of papers and books will contribute to a healthier environment. Regular cleaning of return registers, outdoor air intakes and supply diffusers are wise investments.

Defer to Daylighting

Windows frequently encompass a noteworthy percentage of the exterior wall area of schools and account for a sizable impact on the heating and cooling load of facilities. In recent years, many technological advances have enhanced the thermal performance of windows, providing fewer classroom distractions due to a greater consistency of visual and thermal comfort. These technologies include items such as improved framing materials, better edge-sealing techniques, low-conductance gas fills, edge spacers, and low-emissivity and solar control coatings. These advances can be combined or used individually to optimize performance.

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Case in point, over 21,000 students took part in the Heschong Mahone Daylighting Study that showed a strong connection between student performance and day-lit school environments. It confirmed that math and reading scores increased in well-lit environments. The study showed a 20 percent faster progression in math and a 26 percent faster progression in reading.

Knowing the impact of daylighting should influence decisions. Key steps in the Green Lake remodel included uncovering the expansive window openings on the west-facing classrooms to provide natural lighting, installing high-performance windows with lower visual transmittance and lower solar heat gain to control glare and unwanted heat, and making roof repairs.

Assessing the lighting levels and light quality in relation to the visual tasks being performed should be a vital consideration in the discovery phase of every project. Overlighting with daylight or electric lights as well as poor quality lighting (low CRI-color rendering index) are common problems that reduce teacher and student productivity and waste energy. Underlighting is rarely an issue for schools, but should also be avoided. For classrooms or offices where computer use is dominant, lower light levels are recommended and favored by users. These are important considerations, whether you're designing new space or considering a remodel such as the ones at Nekoosa or Green Lake.

Current product knowledge, combined with strategic product placement by the design team, will help to determine the right window system to effectively and efficiently manage lighting levels, glare, and unwanted solar heat gains and losses. Daylighting and improved views have such a positive impact on student and teacher health and sense of well-being that it's worth the investigative effort to determine the best solution.

IEQ — Not by Chance

As you consider a new construction or a renovation project, be certain that your planning approach considers the four critical components of Total Project Management: healthy productive environments, capital costs, life-cycle cost savings, and sustainable design and delivery. If every decision satisfies all four of these components, you'll realize a great solution.

LEED (Leadership in Energy and Environmental Design) can provide a great roadmap towards a healthier classroom. LEED standards, and certification if desired by the district, provide direction to make wise and principled decisions regarding the planning, design and construction of healthy classrooms. The U.S. Green Building Council (USGBC) deserves credit for the work they've done with LEED for Schools to move toward greater sustainability and healthier educational environments.

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Sensible Sound

Acoustics are an important element of LEED for Schools. High standards for reverberation time, background noise, and sound transmission coefficients (STC) are critical to being certain that students hear what's important.

Properly designed walls and doors with high STC will reduce room-to-room cross-talk; careful selection of ceiling tiles can swiftly help you reach an acceptable level for reverberation time. In addition, appropriately designed and placed HVAC vents and lined ductwork contribute to improved understanding of speech.

In urban settings, hitting the

background noise target for LEED can be more challenging. Be certain to use exterior windows that will cut distracting noise. This reinforces the importance of establishing a sound level goal in the initial stages with the planning and design team. It's also important to engage the proper consultants to assist with the design of specialized spaces such as gymnasiums, music rooms and auditoriums and more technical aspects of the project. Be certain to include acoustical elements in the project, even when budgets are pressed. The influence of sound can truly impact the ability to teach and learn.

New Construction Too

At River Crest Elementary in Hudson, the layout of the school takes advantage of northern and southern exposure for most classroom spaces. All classrooms and most regularly occupied spaces enjoy natural light. Clerestory windows illuminate the entry foyer, gym, and cafeteria, and skylights grace the staff and music rooms.

Northland Pines High School in Eagle River also receives great benefit from daylighting. Strategic placement of high-performance windows, which manage glare and heat gain, and high ceilings add daylight to classrooms while helping to manage glare and heat gains and losses.

At Northland Pines and River Crest Elementary, achieving high indoor air quality comes from a mixture of low- or no-VOC (volatile organic compounds) products specified for paints, adhesives, furniture, flooring systems, and carpeting, and the monitoring of carbon dioxide levels. At River Crest, classrooms employ air supply systems that provides the desired levels of outside air. Classrooms, offices, and other areas have the choice of using natural ventilation. Carbon dioxide levels are constantly monitored to make sure air quality is at the prescribed levels for LEED requirements.

Plan for IEQ

The benefits of better acoustics, enhanced daylighting, proper HVAC, and healthier air quality are numerous and can positively impact all who occupy your school. Take the time to plan and design for it in your next project and let the physical environment help your students and faculty excel. ■

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