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# SCHOOL Planning & Management

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## ATHLETIC PROGRAMS ARE IMPORTANT FOR SCHOOLS

## RELIGHTING INSTEAD OF JUST RELAMPING

## UNDERSTANDING THE BIDDING PROCESS

Photo © Mark Darley Photography

# School Lighting

Monik Mehra

**Think relight, not just relamp, when you want to optimize both student and financial performance.**

The average cost of electricity rose more than 40 percent over the last 10 years, according to the Department of Energy (DOE), presenting a rising cost for today's schools. As a result, many school districts are exploring ways to improve financial performance by investing in energy-efficient building systems such as lighting, which accounts for about one-fourth of the average school's electricity costs.

The current stock of more than 300,000 K-12 school buildings presents significant opportunities to save energy and "go green" by improving environmental sustainability. Nearly two-thirds of this floor space (63 percent) was built before 1980, of which 40 percent has never been renovated, according to DOE. These schools are likely overlighted using obsolete lighting technologies such as T12 fluorescent lamps, which are being phased out by DOE regulation starting in July 2012, with some exceptions, and fluorescent magnetic ballasts (ballasts being devices required to start and operate fluorescent lamps), which will complete their phase-out by July 2010, with some exceptions.

The simplest change involves replacing these lamps and ballasts with more-efficient T8 lamps and electronic ballasts while keeping the same light fixtures and layout, resulting in up to 48 percent energy savings, according to the National Lighting Bureau.

But this can be a serious mistake. Simply changing older light fixtures can

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# HELPING YOU FIND THE RIGHT SOLUTION

Good Lighting is a critical component of today's school.

RT5 Volumetric Recessed Lighting
for new construction and renovation

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Acuity Brands Lighting offers the greatest breadth of lighting products to support the learning environment, from classrooms to gymnasiums and from parking lots to sports fields.

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make an inappropriate lighting design even worse, and takes student visual comfort out of the decision-making process. As light is for people, not buildings, the goal should be not only to optimize financial performance but student performance as well.

Why is this important? Some 80 percent of human impressions of the world are generated by vision. Light makes sight, and is essentially a commodity. Lighting, however, affects visual comfort and perception, and therefore should be treated as an asset. As an example, consider the positive effects of properly designed daylighting. In one study conducted in 1999 by Heschong Mahone Group on behalf of PG&E, students with access to the most daylighting in their classrooms in one district progressed 20 percent faster on math tests and 26 percent on reading tests in one year than those with the least. In two other districts, students in classrooms with the most daylighting were found to have 7-18 percent higher scores than those with the least.

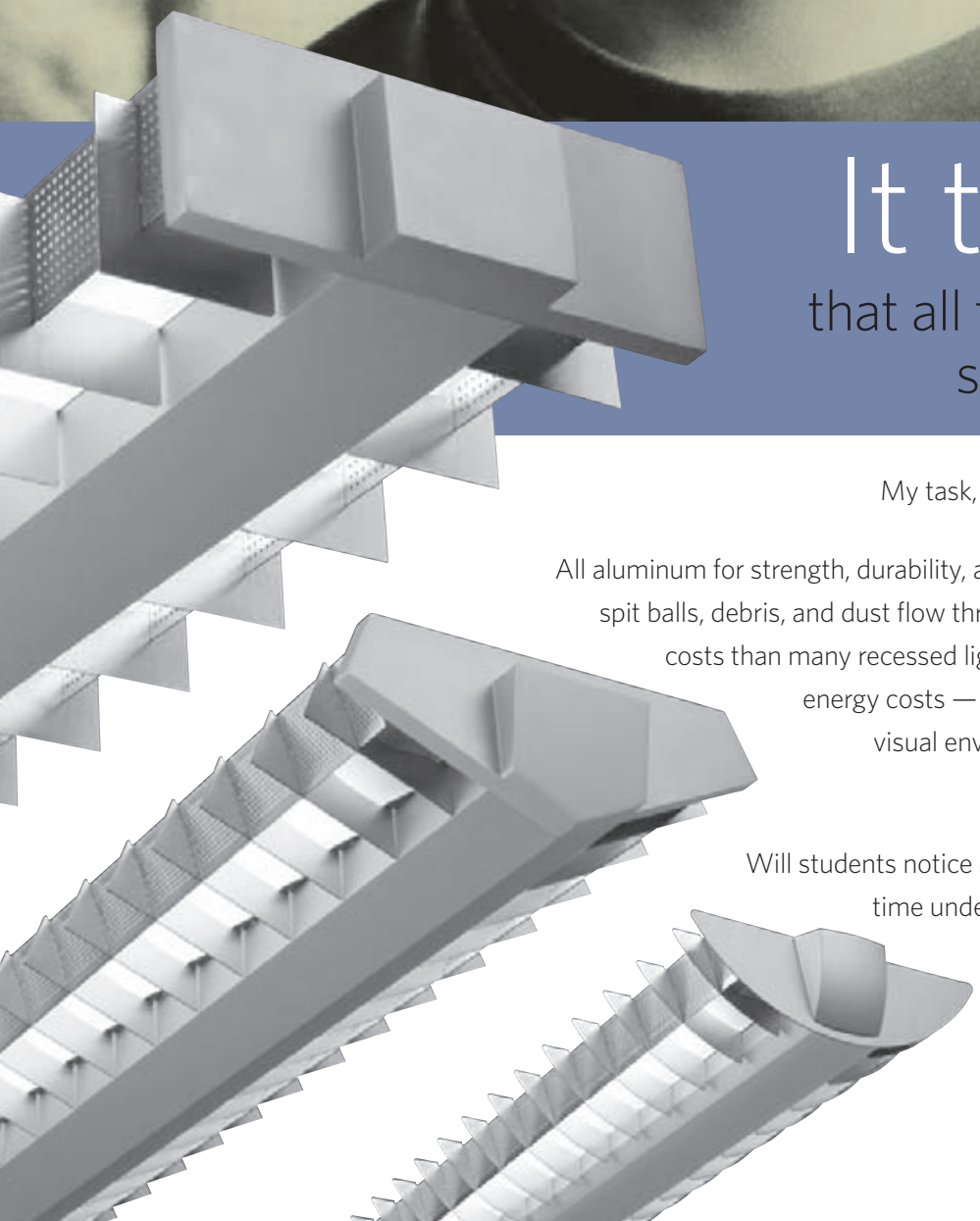
Given the importance of good lighting, school districts should consider relight instead of just relamp to improve lighting quality in their schools while generating even higher energy savings and flexibility by incorporating efficient design and lighting controls. A relight involves upgrading existing fixture's internal components with relight assembly containing fewer, longer-life lamps that reduce energy spend by up to 50 percent. Other lighting upgrade options are one-to-one replacement of older recessed fixtures with higher-performing alternatives or a fresh design involving suspended indirect/direct fixtures based on lighting best practices. Existing classrooms, after all, deserve the same advantages of good design as new buildings. If the classroom features teaching methods using computers and multimedia technologies, a relight is simply essential.

What is best practice for lighting today's classrooms? What is good lighting? The Collaborative for High Performance Schools (CHPS) incorporates lighting best practice into its rating system, which recognizes learning environments that are healthy, comfortable, efficient and easy to operate and maintain. For example, CHPS encourages indirect/direct lighting and giving teachers the ability to adjust lighting conditions for A/V presentations and whiteboard teaching with suitable light levels on desktops and whiteboards.

Most older classrooms are lighted using recessed parabolic lighting fixtures. This type of lighting can create

Photos courtesy of Acuity Brands Lighting and Controls

In this classroom, volumetric-distribution fixtures distribute light horizontally and vertically, without glare, improving visual comfort and perception of the space. By integrating lighting controls into the design, the lighting can be adjusted by the teacher for different needs, such as instruction (top) and A/V presentations (middle), while automatically dimming light levels based on available daylight (bottom). Some fixture manufacturers now offer classroom lighting and control systems that can be specified and installed as a single package.

# It turns out

## that all those hours in metal shop weren't wasted.

My task, design a lighting system for classrooms.

All aluminum for strength, durability, and long life — check. Open design to let spit balls, debris, and dust flow through — tested it myself. Lower installed costs than many recessed lights — yep. High performance to reduce energy costs — nailed it. Create a calm and comfortable visual environment for learning — non negotiable. I call it Icetray — see it?

Will students notice all this, I doubt it. But they'll be spending time under a lighting system designed to enhance their learning. And for me, that's what it's about.

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harsh shadows and a dim atmosphere. Combining direct and indirect distribution, which places uniform, diffuse illumination on walls and ceilings, can improve visual comfort (reduced glare, eyestrain, harsh shadows) and facial recognition while making the space feel larger, brighter, more open. The addition of high-color-rendering fluorescent lamps, meanwhile, will make the classroom appear more visually vibrant.

Two of the "six trends to watch" identified in America's Digital Schools 2008 include implementation of 1:1 computerized classrooms and adoption of interactive whiteboards. Many classrooms now use computers and multimedia teaching tools, with the latter technology certain to accelerate rapidly in significance with future introduction of document cameras that can render augmented reality images. This has resulted in demand for lighting that is adjustable in terms of light output to improve image visibility. Lighting originally designed for black chalkboards and a single horizontal task plane is clearly inadequate for these environments.

While PIER 4.5 was revolutionary several years ago, today even this cutting-edge design is considered somewhat limited. Manufacturers have already begun to move beyond PIER 4.5, offering not just a few (as in the case of PIER's good, better, best approach), but hundreds of options providing a choice of aesthetics, light distribution, lamping, efficiency, control and economics to match the requirements of virtually any learning application. A number of manufacturers offer various choices of classroom solutions as integrated lighting and controls packages with plug-and-play wiring and all components clearly labeled for easy installation in an existing or new classroom. Many are based on indirect/direct lighting, as this enables separate control of the uplight and downlight components of the fixture with associated switching flexibility, but some are not.

For example, in some spaces, such as classrooms with lower ceiling heights, suspended indirect/direct lighting may not be practical. As an alternative, specially designed "volumetric" distribution recessed T8 and T5 light fixtures are available that distribute light horizontally as well as downward, but do not produce excessive brightness at high angles that can cause direct glare. The result is improved illumination on walls and lighting conditions that foster visual comfort using the same principles as indirect/direct lighting. The fixtures typically replace existing recessed fixtures on a one-for-one basis, slashing energy consumption by up to 50 percent while producing required light levels using up to 50 percent fewer lamps. Lower energy use is not only better for operating budget of the school but also promotes sustainability. A typical 50-classroom school lighting upgrade can save up to $113,000 through the course of 15 years, and have the same environment impact of planting up to 1,800 trees.

Meanwhile, other controls such as dimming and daylight harvesting control can be integrated into the indirect/direct or recessed system to increase flexibility and savings, while control strategies can extend beyond the classroom across the entire building or campus, with remote centralized control from a single operator workstation.

School lighting traditionally has been about putting enough light on desks. Now, it is about providing an effective and comfortable total visual environment. Lighting fixture manufacturers offer a large palette of solutions providing many ways to achieve high levels of lighting quality, efficiency and flexibility that ties in perfectly with financial performance and sustainability impact from lighting upgrade for an existing school system. SPM

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