

Casting A New Light On Educational Facilities:

A Lesson In Daylighting

*By Neall Digert, Ph.D., MIES
Solatube International Inc.*

Nearly 55 million people, or 20 percent of the nation's population, spend their days inside elementary or secondary school buildings. With an estimated 73 percent of those buildings having been built prior to 1970, that puts a large chunk of Americans living in the "Dark Ages" of building design. That's a serious problem from the perspective of energy efficiency as well as student (and teacher) performance.

Consider this: Until as recently as 30 years ago, natural lighting (or "daylighting") was the predominant source of illumination in classrooms. Because schools operate exclusively during daylight hours, it just made sense to take advantage of all the free sunlight to light the classrooms. When the energy crisis struck in the 1970s, there was a mad dash to remove potential sources of energy loss – and that meant windows were out. Dark, windowless classrooms became the norm, with students spending their days locked away from the natural environment, working under the flicker of electric lights for six or more hours a day.

While the logic seemed reasonable at the time, new information has come to light in recent years that is leading many educators to rethink the value of the electrically lit classroom. Studies have revealed that natural daylighting not only provides school districts with dramatic energy savings, but also provides a learning environment that helps students excel academically, be more productive and even stay healthier. The result is a shift in the way we view lighting in educational

buildings, making it a part of an overall strategy to create "smarter" schools.

The Economics Lesson

Utility expenditures are a major line item on every school district budget, averaging about \$110 per student per year. In fact, the cost of utilities is second only to salaries and exceeds that of books and supplies. It stands to reason, therefore, that anything that allows utility charges to be reduced provides more funding for the direct needs of students, such as books, computers and teachers.

Daylighting can provide a significant tool for slashing energy consumption. According to the National Center for Educational Statistics, 72 percent of the cost of energy in educational buildings goes towards electricity, with the majority (56 percent) going toward electric lighting. By utilizing sophisticated new daylighting tools, such as today's cool, energy-efficient skylights and windows, in combination with lighting controls and dimming systems, schools can reduce or eliminate the need for heat-producing electric lights during daylight hours. This, in turn, significantly reduces the demand on cooling systems, lowering annual energy costs even more.

As an example of the true impact that daylighting can have on a school district's bottom line, take a look at Johnson County, N.C., where a series of schools replaced electric lights with daylighting. The schools reported energy savings between 22 percent and 64 percent as compared to typical neighboring schools. Since their

construction, these buildings have saved Johnson County Schools in excess of \$500,000 in energy bills. The daylighting measures cost less than one percent of the construction budget and achieved a payback of less than three years. As an added bonus, students at the schools out-performed their peers at comparable non-daylit schools by five to 14 percent.

The People Factor

Daylight is free, so it stands to reason that using daylight as a primary light source would be economical. One of the unexpected benefits of daylighting, however, is the significant impact on building occupants. In the case of schools, this includes students and teachers. Consider the following research findings related to classroom daylighting:

- A study conducted by the Heschong Mahone Group for Pacific Gas & Electric Company tested 21,000 students in three states and found that those in classrooms with the most daylighting had a 20 percent faster rate of learning relative to standardized math tests and 26 percent faster rate of learning relative to standardized reading tests in one year than those students in classrooms with the least amount of daylight.
- A study of 90 school children in Sweden showed that the lack of daylight disrupted internal body clocks and resulted in significant psychological and physiological impairment. The one-year study concluded that work in classrooms without daylight influenced children's ability to concentrate and

cooperate and may eventually impact annual body growth and sick leave.

- Photobiologist John Nash, Ph.D., reported that hyperactive children with confirmed learning disabilities calmed down completely and rapidly overcame their learning and reading problems while in a full-spectrum lighting environment. This is the type of lighting that most closely mimics and produces the effects of natural light.


- According to a study reported in the *International Journal of Biosocial Research*, the use of natural light in classrooms reduced reported incidents of aggressive, disruptive and destructive behavior among students.

- Most schools in the Netherlands

have naturally lit classrooms, less for the students than for an awareness of how important it is to maintain the most productive and healthful workplaces for teachers. An Atlanta-based research firm recently found teachers in the U.S. place similar emphasis on their work environments, with 89 percent of 1,000 public school teachers surveyed reporting that classroom design was important for teacher retention.

Lessons Learned

As we begin to discover the basic human connection to daylight, we can clearly see that the oldest lighting source of them all is still one of the finest. Fortunately, with today's

innovative new daylighting tools, it is becoming easier, more efficient and more cost effective than ever before to integrate natural lighting strategies into our educational facilities. In the years to come, the benefits of daylighting will be far reaching, promoting the financial health of school districts, creating desirable and healthy workplaces, and providing learning environments in which our students thrive. 

Neal Digert, Ph.D., MIES, is technical director of Solatube International Inc., the worldwide leading manufacturer of tubular skylights, based in Vista, Calif. Solatubes are being installed in new and retrofitted schools throughout the country as a cost-effective way to bring the benefits of daylight to the classroom environment. For more information on Solatube, call (800) 966-SOLA (7652) or visit the company's website at www.solatube.com.

Starting a Recycling Program

By Bob Roskos

Does your school or district have a recycling program? If not, it's important to consider the many benefits recycling offers.

Financial

From a practical standpoint, recycling can provide an additional revenue stream for educational entities. By organizing recycling drives for aluminum cans, newspaper, cardboard and other materials, schools and districts can generate extra dollars to help support important projects and initiatives.

Aesthetic

A well-organized recycling program can contribute toward neater, cleaner campuses and related facilities. By educating people to appreciate the value of recycling, an effective program helps direct bottles, cans and papers into collection bins, thereby raising the aesthetic level of any setting.

Environmental

Recycling affects our environment in a decidedly positive way through the conservation of valuable resources and the minimization of waste sent to landfills. The more complete and comprehensive a recycling program becomes, the greater will its positive environmental impact prove to be.

Getting Started

If the foregoing considerations have inspired you to organize a recycling program, there are a number of ways you can get started. One of the easiest and most effective involves partnering with an experienced private-sector business that has a recognized track record when it comes to recycling and resource recovery.

Torrance-based Virco Mfg. Corporation provides an excellent example. As America's leading manufacturer and supplier of classroom furniture, Virco's Conway, Arkansas, facility has estab-

lished a "Cardboard for Cash" program, through which they assist 25 local schools with their cardboard recycling endeavors. Virco's contributions include constructing collection bins, transporting cardboard to recycling centers, and then returning the proceeds from these operations. So far, Virco has forwarded over \$45,000.00 dollars to the schools participating in this highly successful program.

By partnering with a business endowed with such environmentally significant credentials, you'll be taking a big step in the right direction toward launching a successful environmental program. You'll also want to check with local and state agencies, such as the California Integrated Waste Management Board, to see if there are any particular recommendations or requirements that could apply to the program you're considering. Once you've done so, you'll be ready to begin reaping the benefits of recycling. 