Carpet Aids Learning in High Performance Schools

By Frank Hurd

From health and safety, to comfort, energy efficiency, and ease of maintenance, carpet is in step with the goals of high performance schools.

The Healthy and High Performance Schools Act of 2002 has set specific federal guidelines for school design, and developed a federal/state partnership program to assist local districts in their school planning. According to the Collaborative for High Performance Schools (CHPS), high-performance schools are, among other things, healthy, comfortable, energy and material efficient, easy to maintain and operate, safe, stimulating, and excellent places to teach and learn.

In many ways, the list of criteria for healthy, high-performance school environments parallels the list of carpet's recognized benefits. Carpet has contributed to high-quality school environments for many years. Valued by educational facility designers for its color and design flexibility, carpet's softness makes it a safer as well as more comfortable flooring choice. In a classroom, carpet reduces noise, defines learning areas, and cuts down glare. In terms of volatile organic compounds (VOCs), carpet is one of the lowest-emitting of all building materials, and multiple studies demonstrate how clean, dry carpet actually contributes to improved indoor air quality. Hard science illustrates how carpet in schools helps create environments where teachers are happy to teach and students are excited about learning.

Carpet Contributes to Healthy Indoor Air

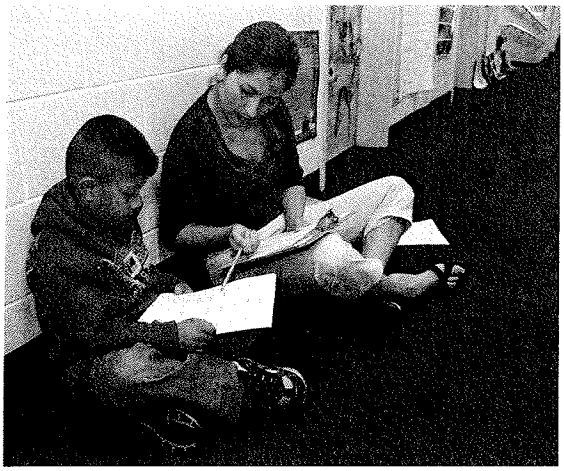
Maintaining superior indoor air quality (IAQ) is essential to the healthy and high performance school. We spend more than 90 percent of our time indoors, and children especially are susceptible to the potential harm associated with poor indoor air. The EPA estimates over half of all schools in the United States have IAQ problems.[1] Significant evidence links indoor air quality and health, and some research links IAQ with learning and productivity.

Carpet relates to indoor air quality in several ways. First, in terms of the allergens that can affect asthma and allergy symptoms, these dustborne particles must be in the breathing zone for exposure to occur. Careful measurements have shown that allergen particles are relatively heavy and difficult to get into the air, and fall quickly after becoming airborne. Carpet traps allergens in its fiber and keeps them from circulating, even in busy children's classrooms. Independent testing has shown that walking on hard surface floors distributes more particulate matter into the breathing zone than walking over carpet.[2] Allergens in carpet can be easily and effectively removed through a regular cleaning and maintenance schedule of vacuuming and periodic extraction cleaning.

Carpeted classrooms expand the potential learning area.

In a recent review, toxicologist Mitchell Sauerhoff, PhD, DABT, reviewed over 23 different studies and concluded that, "Based on the available science, carpet does not cause asthma or allergies and does not increase the incidence or severity of asthma or allergy symptoms. In fact...multiple studies have reported fewer allergy and asthma symptoms associated with carpet."[3]

Emissions of Volatile Organic Compounds (VOCs) from building materials also affect indoor air. Chemical irritants such as VOCs are thought to be asthma triggers, although they have not been related



Carpet provides increased thermal, visual, and acoustic comfort.

to allergies. Carpet is one of the lowest emitting products used for new construction and renovation, and may be the lowest-emitter in common school flooring choices. Carpet VOC emissions are short-lived, largely dissipate within 24-48 hours, and fall to below detectable levels within seven days. The same materials found in carpet emissions can be found at higher levels in many consumer products.[4]

Carpet manufacturers were the first in the flooring industry to study their products for indoor air quality effects in schools and commercial settings. In the early 1990's, the member-supported Carpet and Rug Institute (CRI) worked with the Environmental Protection Agency (EPA), the Consumer Product Safety Commission (CPSC), academic institutions, and independent laboratories to develop the Green Label and the even more rigorous Green Label Plus testing programs for indoor air quality.

These programs identify carpets with very low emissions of VOCs. Using scientifically established standards, the Green Label Plus program meets the exacting requirements of Colorado and California's Collaborative for High Performance Schools (CHPS) testing protocol and the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) guidelines.

Over the past four years, more than 90 percent of the carpet industry's production has been accepted into the program. Few other flooring materials meet the carpet criteria. In addition, the scope of the testing has been broadened to cover floor covering adhesives and carpet cushions.

Carpet is Comfortable

According to the CHPS guideline, a high-performance school is comfortable, which includes thermal, visual, and acoustic comfort.

Thermal Comfort

Research conducted over the past two years at the Georgia Institute of Technology, as well as independent scientific studies, demonstrates that carpet increases the R-value, or insulation level, of the carpeted area. The R-value (thermal resistance) measures how much a material resists the movement of heat through a ceiling, wall, or floor in a building. The higher the number, the more effective the insulation.

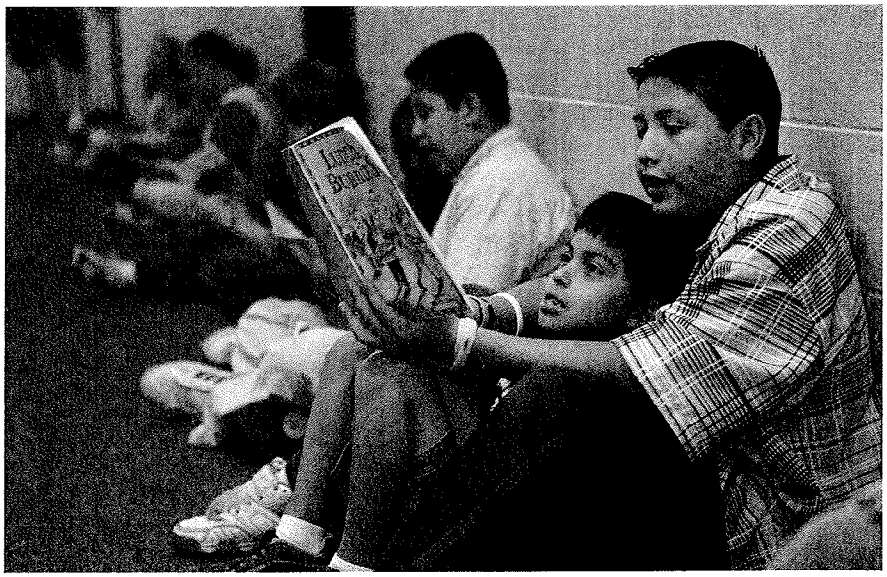
This research confirms carpet and pad significantly increase R-value compared to other flooring materials. Results varied according to the carpet's construction, with heavier products generally providing higher R-value. Carpets were tested with and without cushion, and the combination maximized the R-value.

Interestingly, this insulative quality of carpet also addresses another CHPS criterion, that the school be energy efficient. The enhanced R-value realized with the use of carpet can actually contribute to energy savings and lower utility costs.

Moreover, Dr. Alan Hedge, professor of Department of Design and Environmental Analysis at Cornell University, cites another aspect of thermal comfort as one of carpet's advantages. "Carpet feels warmer to the touch than other floor coverings because the air at room temperature is trapped by the carpet fibers which acts as an insulator, and carpet has a low thermal diffusivity compared to other floor materials that have higher thermal diffusivities and that conduct heat away from the body more rapidly, resulting in a lower skin temperature, cooler sensation, and greater thermal discomfort," Hedge reports.[5]

Visual Comfort

While the CHPS description of visual comfort primarily relates to lighting, carpet provides visual appeal in its exceptional color and design flexibility. The only truly three-dimensional floor covering, carpet offers a texturally stimulat-



Carpet's textured surface reduces glare from natural light.

ing, non-glare surface. Recent advances in manufacturing technologies and fiber development have enabled new combinations of color, texture, and pattern in school carpet. The introduction of modular carpet tile, with its varied possibilities for pattern and placement, has led to innovative designs that work to delineate areas for small group or individual learning.

Acoustic Comfort

Perhaps the most compelling feature carpet lends to the school environment is that of acoustic comfort. In fact, some might argue that carpet is almost essential to maintain a proper acoustic level in the classroom.

Two forms of noise problems are particularly troublesome in schools, and carpet is beneficial in addressing both. Sound transmission between floor and ceiling is the area where carpet has the greatest impact. According to William Stewart, managing partner of SSA Acoustics in Seattle, Washington, recent changes in commercial building methods have affected acoustic performance in multi-story structures. "Building assemblies are lighter - instead of thick concrete floors, schools are being designed with wood frame and other assemblies that perform like a drum face. Even small children can generate sound on these surfaces to the floor below. In extreme cases, sound transmission can generate enough noise to cause instruction to cease."

Another acoustical challenge in classrooms is controlling reflective sound. Reflective sound is measured by the time it takes for sound to be effectively absorbed in a given environment. Longer reverberation times result in reduced intelligibility of speech and increased overall noise levels, and create an atmosphere where teachers' voices get tired and students can't hear to learn.

ANSI 12.60 is the acoustic standard that is required for a school design to meet the federal codes for the High Performance Schools Program. ANSI 12.60 recommends 35 dB(A) as the background noise levels for learning spaces, but sets a prerequisite of no more than 45dB(A). Without carpet in a classroom, Stewart says acoustic wall panels must be used, because "ceiling tiles alone aren't enough" to reduce sound sufficient to meet the standard.

ANSI 12.60 also requires a maximum of .6 sec. reverberation time in classrooms of 10,000 cubic feet or less. The American Society of Acoustics recommends .4-.6 sec. reverberation times for classrooms. According to Stewart, carpet is part of his standard recommendation for classrooms because it is an important tool in reducing the reflectivity of sound.

Safety

Keeping school environments safe is an important aspect of a high-performance school. Falls as a result of trips and slips are common and potentially dangerous. According to Dr. Hedge, falls are the second leading cause of accidental death in the United States, with two-thirds of falls occurring because of slips and one-third due to tripping.[6]

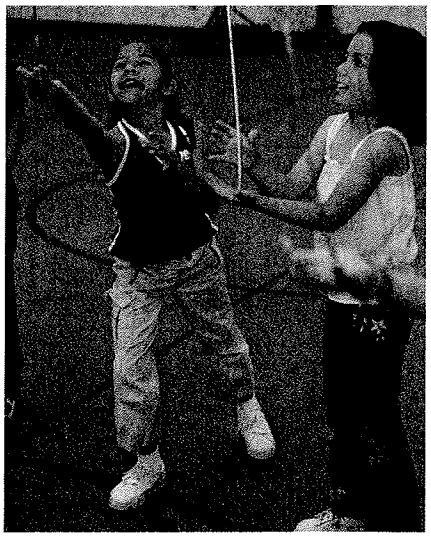
Slip and fall accidents are less likely to occur on carpeted surfaces, because carpet increases surface traction and greatly minimizes the risk of slipping, particularly under wet conditions. When falls do happen, carpet cushions the impact and lessens the chance of injury. Injuries from falls not only lead to absenteeism, but also pose liability issues for schools.

Ease of Maintenance and Material Efficiency

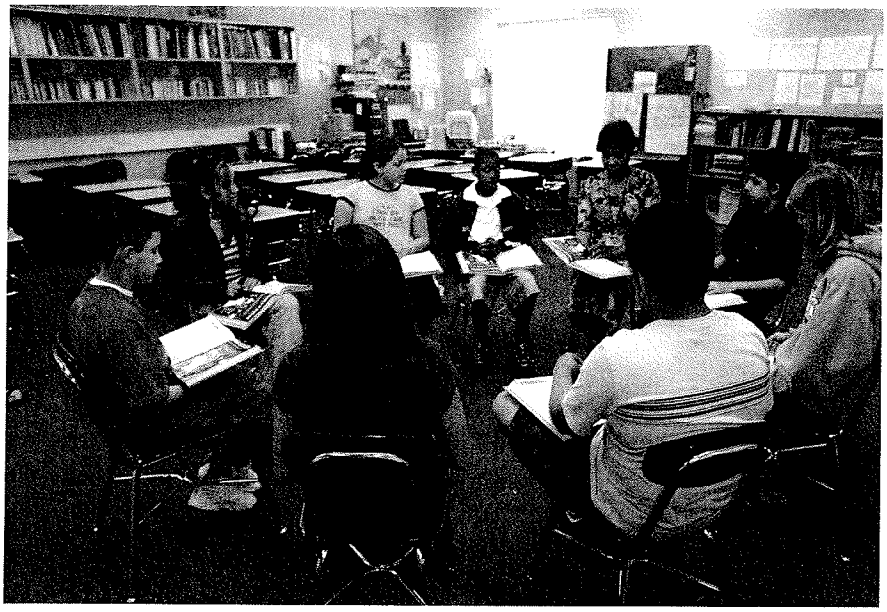
Carpet cleaning and maintenance involves soil containment through adequate entrance mats, in addition to a scheduled program of frequent vacuuming and extraction cleaning. Using the efficient cleaning equipment and environmentally responsible cleaning solutions available today, carpet can maintain its attractive appearance for years, as long as the carpet is matched to the proper end use and cleaned regularly and properly.

Carpet is a choice that can please virtually all concerned: facility managers, school boards, teachers, and students.

Life-cycle analysis studies show that carpet can be as much as 65% less expensive to maintain than hard-surface flooring.[7] The Carpet and Rug Institute's (CRI) Seal of Approval testing program certifies cleaning solutions, vacuums, and extracting equipment. Products and equipment that pass the independ-



Improved traction reduces slip and fall accidents.



In a classroom, carpet increases safety, comfort, acoustic performance, and energy efficiency.

ent laboratory testing are listed on CRI's web site, www.carpet-rug.org.

When carpet is appropriately selected, installed, and maintained it can last ten years or more, and modular carpet styles offer the option of replacing parts of a carpeted surface, instead of the entire carpet, for even greater efficiency. At the end of its useful life, carpet can be reclaimed into an active recycling network that has diverted over one billion pounds of carpet from the waste stream in the last 5 years.[8]

Science Coincides With Preference

Carpet is clearly a desirable choice in meeting the exacting requirements of a high-performance school environment. Moreover, in addition to the CHPS protocol, a national survey of 1,050 teachers found that ninety-two percent of respondents believed classroom design had an important effect on students' learning and achievement, particularly in the areas of safety, comfort, lighting, and acoustics. Sixty-nine percent of the teachers surveyed preferred carpet or a combination of carpet and hard surface flooring in their classrooms.[9] ■

Frank Hurd is Vice-President and Chief Operating Officer of the Carpet and Rug Institute, Chairman of the Board for the Carpet America Recovery Effort, Vice-Chair of the National Older Worker Career Center, and is a member of various standard-setting committees with ANSI, ISO and CHPS. With the California Collaborative for High-performance Schools, Mr. Hurd serves on several technical subcommittees and is active with revisions to the Colorado CHPS standard. He is a retired U.S. Army Colonel, where in addition to a wide variety of armor command and staff positions, he served as the U.S. Army's liaison to the U.S. Senate.

Resources

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