

CREATING HEALTHIER ENVIRONMENTS FOR TEACHING AND LEARNING:

APPLYING CONCEPTS FROM THE WELL BUILDING STANDARD TO SCHOOL DESIGN AND OPERATIONS

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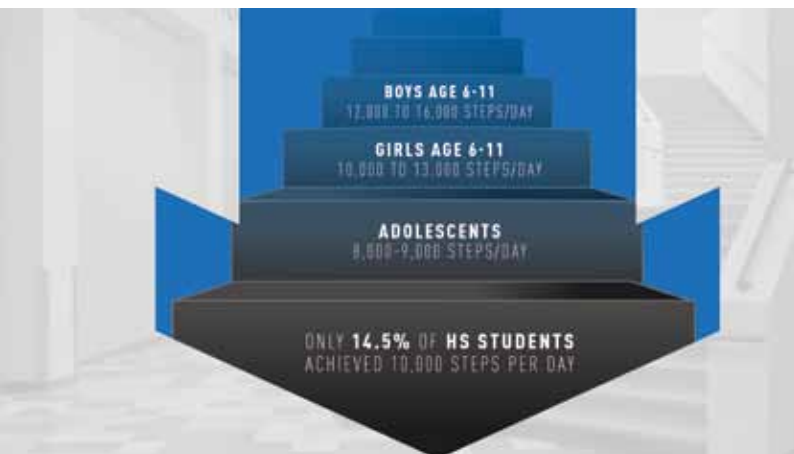
Schools are an ideal place to incorporate design and operational strategies that support physical and mental wellbeing and improve student and staff fitness, mood, sleep patterns and performance. The WELL Building Standard¹ focuses on human health and wellness, setting performance requirements in seven categories related to occupant health in the built environment. There are several WELL features that are not discussed enough in typical practice or under other building standards, and which research suggests can benefit multiple body systems.

There is a wealth of wellness research and principles focused on adults, but it can be challenging to apply these to schoolchildren to achieve intended results. Most children have limited control over their lifestyles and physical environments; someone else decides what time they wake up, how many hours they spend in school, where they live and in which school they'll spend a quarter of their waking hours. More importantly, children are in the process of building habits that will shape their wellness as adults. Creating environments that better support children's health and wellbeing can reap lifetime benefits.

emergent herbicides, and reduce the use of pesticides and herbicides. WELL requires the creation of an Integrated Pest Management Plan (IPM) that defines how approved products are used and which products are prohibited. WELL uses the City of San Francisco's IPM as their model.² When San Francisco's IPM was implemented it resulted in an 80% decrease in pesticide use and an 88% reduction in the use of glyphosate, the chemical found in RoundUp.³

Glyphosate is the most widely used herbicide in the US, regularly used in agriculture, forestry, public parks, school grounds, and playing fields; however, it recently had its carcinogenic status raised by the World Health Organization. Glyphosate has up to a 60-day life. Most people do not know where it has been sprayed or when they are exposed to it.⁴

Awareness of IPMs is increasing as they are implemented across the country. The State of New Jersey, for example, requires all public, private and charter schools to adopt an IPM policy that includes a school-specific plan.⁵ To achieve herbicide reduction through IPMs, practices include a mix of pro-active weeding, monitoring, mowing and modifications to landscape design. The IPM approach is initially labor-intensive and represents a huge culture shift in maintenance operations for cities, school districts and institutions that are often short-staffed and rely on broad applications of chemicals for weed control. Design modifications, like changing tidy rock mulched xeriscapes to natural native plant meadows, can make this maintenance transition more manageable and create healthier landscapes.



Pesticide Management

The intent of WELL Feature 10 Pesticide Management is to eliminate the use of highly toxic chemicals, like pre-

Circadian Lighting Design

WELL Feature 54 Circadian Lighting Design assesses exposure to melanopic light.⁶ Melanopic lux evaluates light's impact on the release of melatonin, which is linked to the amount of blue light in the spectrum.⁷ During the day melatonin production stops, body temperatures rise and we become more alert, productive and physically stronger. At night our bodies secrete melatonin which helps us sleep. Research now tells us that a disrupted circadian system is connected to a long list of health and behavioral problems: cancer, obesity, diabetes, depression, and mood and sleep disorders.⁸ Circadian lighting helps keep the system in check by mirroring natural light, starting with cool blue light in the morning, progressing to a whiter light midday and becoming warmer toward evening.⁹

Schools are beginning to experiment with tunable LED lighting, including Kongsgardmoen School in Norway. Morning starts with a fixed setting of cool white light, helping students and staff start their day. As the day progresses, teachers can change the light color to support the task at hand, using intensive cool white light for short term concentration or warm white light to create a relaxing atmosphere.¹⁰ Critics are concerned that the installation is premature. Jim Benya, a lighting researcher, states: "We simply are not ready yet to prescribe lighting for human circadian benefit. Lacking protocols for how much light, for how long, of what spectrum, prior light history, temperature and other factors, installing lighting systems for any human benefit related to the human circadian system is an experiment right now."¹¹

While it appears that more research is needed to determine the benefits of applying circadian lighting to the learning environment, a proactive approach would be to limit screen time in the evening. Research recommends shutting off devices 2-3 hours before bedtime to avoid disrupting students' natural circadian rhythms.¹²

Interior Fitness Circulation

WELL Feature 64 Interior Fitness Circulation focuses on improving cardiovascular, muscular and skeletal health by discouraging reliance on elevators and instead promoting use of stairs and walking paths as a source of indoor exercise.

Children's activity levels, measured in steps/day, have been found to peak before age 12 and decrease through adolescence¹³, with some studies finding that only 14% of

high school students are achieving 10,000 steps per day.¹⁴ Recess as a source of activity for younger children continues to be threatened. Surveys indicate that 25% of elementary schools no longer provide recess to all grades, 40% of districts have reduced or eliminated recess to make more time for academics, and 77% of principals report taking away recess as a form of punishment.¹⁵ In addition to addressing recess policy, schools can encourage students to walk more indoors and climb stairs more frequently.



Stair use can be promoted by locating them in a prominent location and by locating popular destinations, such as libraries and common rooms, on upper levels to drive stair use. In high schools, the social power of stairs can be exploited by locating stairs where they become the space to see and be seen. Incorporating artwork, interactive digital music and light effects, or jokes and trivia questions can also make stairs and pathways more interesting and appeal to human curiosity.¹⁶ Combining welcoming design attributes and creative ideas may be the best strategy to turn today's schoolchildren into a generation of adults who naturally choose the stairs.

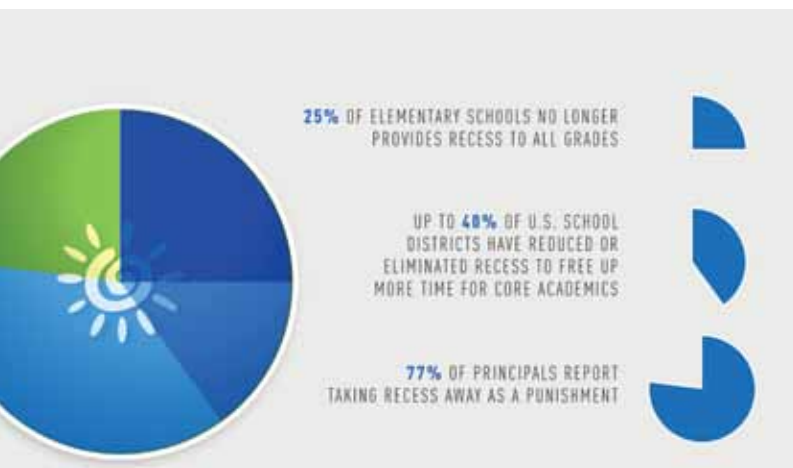
Exterior Active Design / Physical Activity Spaces / Active Transportation Support

WELL Features 67, 68, and 69 facilitate active living with a focus on outside activities.¹⁷ By providing quality amenitized connections to surrounding areas, outdoor fitness-friendly spaces, and support services for biking and walking, facility design can help people make healthy decisions.

Sixty-nine percent of adults are overweight and lead sedentary lives¹⁸ – driving to work and sitting at a desk. For children in school, obesity can lead to a lifetime of health challenges and social stigmas associated with being overweight.¹⁹ Design

that deliberately creates easy, appealing opportunities to be active can make a difference.

- Facilities for fitness include, bike paths and sidewalks, tracks and trails to build endurance and improve aerobic conditioning, and courts, playground equipment and multi-purpose fields to improve balance, flexibility and strength.
- Amenities that encourage activity include movable furniture, drinking fountains, water features, gardens and public art – all of which facilitate social integration. More exercise-focused amenities include trails, playgrounds, workout stations and access to gyms and pools.
- Support facilities for active transportation include walkways, showers, locker and changing rooms, secure bike storage and bike maintenance tools.



Ergonomics: Visual and Physical

WELL Feature 73 Ergonomics focuses on providing alternative postures to reduce visual and physical discomfort.²⁰

The latest research shows young people spend around 6.5 hours a day in front of screens compared to 3.5 hours 10 years ago,²¹ and the prevalence of nearsightedness among Americans has increased more than 66% over 30 years.²² Studies in China and Australia have demonstrated that exposing children to 66.7 minutes of outdoor activity can reduce myopia,²³ and spending around three hours per day under light levels of at least 10,000 lux can protect against myopia (a well-lit office or classroom is usually no more than 500 lux).²⁴ Reducing screen time, increasing exposure to high levels of light through outdoor activity, and shifting from short to long-distance views can all address the myopia epidemic.



To relieve other strains, classroom furniture is progressing. Standing workstations are common in the workplace, but a relatively new trend in the classroom, in which the seated posture remains the norm. Some schools have moved to a completely standing environment which introduces a whole variety of new risk factors. It's important to provide a variety of settings to alleviate risk factors associated with extensive sitting or standing.²⁵

A recent study of 374 elementary school students in College Station, Texas installed standing desks and stools in classrooms. They found the students were more active and burned more calories. For the modern student, or office worker, being free to move around and stand for part of a day is a good way to keep moving.²⁶

Read and Ride programs are also taking hold. Ward Elementary in North Carolina furnished a classroom space with donated exercise equipment. This innovative use of space gives kids the benefit of physical activity without a reduction in curriculum time, and reading proficiency is up 83% for participants.²⁷

Flexible classroom environments and innovative programs activate teachers and students to use all of the real estate in the room. Providing a variety of options gives students and teachers an opportunity to stand, perch, or sit for portions of the day.

Biophilia: Qualitative

WELL Feature 88 Biophilia focuses on nurturing human-nature connections for the benefit of the nervous system. Numerous studies have correlated spending time in nature with reduced anxiety and ADHD symptoms, enhanced self-esteem, restored attention, and improved test scores and productivity. Yet Americans spend up to 90% of their time



TIME SPENT INDOORS DISCONNECTS US FROM NATURE

WE SPEND UP TO 90% OF OUR DAY INDOORS

indoors.²⁸ Many school designs incorporate simple forms of biophilia by incorporating views to nature, indoor plants and interior materials with natural themes and imagery. Fractals, self-similar patterns found in nature, are incorporated into many finish materials and have been found to reduce stress levels by as much as 60 percent.

A more complex area of research and design exploration focuses on how the built environment can incorporate stochastic, or random, sensory experiences found in nature. For example, in a natural setting, sensory experiences may include random bird chirps and rustling vegetation, visual variation in light coming through trees and clouds, movement of leaves and tactile stimulation from small temperature changes and breezes. This complex variation is part of what seems to give nature its power to restore attention, particularly after mental stress.²⁹

In contrast, most classroom environments strive for evenly distributed lighting and acoustic isolation, and have mechanical systems that provide constant background noise and very controlled, predictable temperature and airflow. This uniformity is intended to create good workspace and consistent conditions, but research suggests that the

momentary distraction of dappled light, the sound of water or movement from the wind blowing, may help students concentrate better on the task at hand. Stochastic visual patterns can be introduced by having natural elements outside the classroom, or fritted glass patterns, cast shadows into the classroom, and these can be subtly integrated at periphery of the space. Complex patterns can also be introduced through changes in sound, temperature, airflow and other non-visual environmental attributes that connect people to natural phenomena and create positive distractions.

Conclusion

The WELL Building Standard for educational facilities is in pilot status, and research into how to best incorporate design and operational strategies to benefit human health and wellness continues to develop. School districts and designers can use these evolving resources to generate ideas to better promote health and wellness, while considering the ways in which strategies impact each other and relate to other district programs. These concepts can be used to encourage physical activity and connections to nature, limit exposure to pesticides, consider circadian rhythms while selecting classroom lighting or promote ergonomics through furniture

and policy decisions – but significant benefits require that school designers, administrators, teachers and maintenance personnel work together with a focus to support physical and mental wellbeing. ●

FOOTNOTES

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