

Greener Schools, Greater Learning, and the LEED Value

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ABSTRACT

Schools certified under the LEED certification support educational programs are the beacons to sustain our Earth. Green schools are a mechanism for learning and their existence is pure example for the future of school facility planning. The purpose of this article is to discuss the various approaches used in green school designs and touches on research that shows the benefits of these techniques that lead to *Greener Schools, Greater Learning and the LEED Value*.

Across our country in almost 15 thousand schools, students, teachers, staff, and administrators suffer because their air is unhealthy to breathe (Kats, 2006). This dangerous epidemic appears in forms as headaches, fatigue, and sneezing (Kellum & Olson, 2003). The “go green” movement has become increasingly favorable and of concern across areas of our lives. “Going green” is defined by an entity’s sustainability efforts, the material it uses in infrastructure, and endeavors, which consider the environment in all facets of operations. For this research, we will discover the meaning and benefits for “going green” in the k-12 educational setting. Green schools offer a healthy, relaxed, and secure environment (Evans, 2008). Voluntarily certified under the Leadership in Energy and Environmental Design (LEED), green schools provide a variety of benefits, with slightly higher costs to construct, which ultimately under shadows its payback.

Purpose of the Article

The purpose of this article is to discuss the learning and health benefits of creating a healthier school environment for all inhabitants. For school facility planners and administrators, this information should to be incorporated in school policies and practices, which influence remodeling or building of schools. In addition, this work will explore historical accounts of the learning environment and enlighten facility planners on the LEED certification.

Green Schools

According to Glenn Earthman (2009), until the late part of the twentieth century, architects and designers failed to recognize the impact design and construction of schools have on the physical learning environment. The cost for construction was the greatest concern. As student population increased, so did the need for educational space. Together, school boards and school administrators assumed cost effective school construction meant more resources to erect additional buildings. Those decisions have created an unprecedented amount of school facilities that are simply unfit for learning. In addition, Kats (2006) noted, over 60 million students, faculty, and staff across our country operate in unhealthy environments, which were not built to produce the best overall value.

Earthman (2009) defined green schools as an energy and water conserving mechanism, designed from material that is not harsh on the environment. Green schools support their natural environment. In addition, the outside world is incorporated into the building design. As one strides through the corridors, they feel as if nature was responsible for the design. Green schools can also be identified as “*sustainable or high performing schools*” (Kellum & Olson, 2003). “The U.S. Green Building Council (USGBC) defines a green school as a building that creates a healthy environment that is conducive to learning while saving energy, resources, and money” (Earthman, 2009, p. 260). In essence, a green school becomes elemental to the learning and teaching process. Schools using green designs become not a place for learning, but a tool for learning.

Historically, schools built prior to the “go green” evolution wiped out trees, were composed of harsh material, and lacked the ability to foster a nurturing learning environment. Yet, during the 1940’s, a man named William Caudell, author of *Toward Better School Design*, started researching school designs. His book emphasized the effectiveness of daylight combining specific window, overhangs, and skylight designs. His designs did not add burdensome heat or glares on chalkboard or desks. In addition, Caudell’s book demonstrated how to create natural ventilation in classrooms by locating vents and windows in the most strategic locations. Ideally, Caudell set the standard in this era and the future for school facility designs. Interestingly, in the 1960’s, the introduction of air conditioning and fluorescent lights in the classroom led to the dismissal of creating an environmentally friendly design for educational settings. The air conditioning and fluorescent lighting were thought to be an improvement to the classroom. New schools began to have smaller windows, which were criticized as being distracting to students (Linn, 2008). The air conditioning and smaller windows led to bigger issues that are widespread dilemmas in many schools today.

The Environmental Problem with Our Schools

Very few schools are designed to create the healthiest and most effective learning environment for students and air quality is not consistently regulated or monitored. The traditional air conditioner allows students to be cooler during hotter months. However, a shortage of funds in some schools may indicate a lack of resources to service these systems (Kats, 2006). In turn, inhabitants of the school could suffer from mold contamination and poor air quality. These factors send many to the doctor each year, raising out-of-pocket expense and health care costs. With students and teachers spending nearly 85 to 90 percent of their time indoors, the effects of improper facility design is an imperative issue. Inadequate school facilities not only have a detrimental effect on the physical health of individuals, but their emotional health as well. Design features such as lighting, materials and mechanical systems, and acoustics have behavioral effects on students and teachers. To explain, insufficient lighting has the ability decrease student academic performance. Low lighting and glares on a desk interferes with a student’s ability to concentrate and achieve objectives. Bodies have the ability to adjust to certain adverse situations and sometimes in the classroom; we find that students have adjusted to an environment not supportive of learning. Lighting fixture location and the room’s color affect light quality (brightness, width of spectrum, and glare). Classrooms without windows leave a lackluster feeling in students and teachers. Until recently, school administrators thought windowless classrooms would eliminate outside distractions and save on cooling and heating costs. On the contrary, Dr. Paul Grocoff conducted a study to determine whether kids behaved best under false lighting or under natural light. He found that students felt “the worst” or behavior was not at “best” under traditional lighting. In addition, students felt “at their best” and performed better under natural lighting, which was found to be more comfortable (PPRC, 2004). Many studies surrounding school design concentrate on student and teacher production. Kats (2006) emphasis how white-collar and non-factory worker positions require just as much concentration, mental

capacity, and physical effort as in academic settings. The health effects for self-controlled temperature settings and ventilation were studied in 107 “European” buildings housing over 11,000 workers. This study found that when the individual had the ability to control the room temperature and direction of airflow, their productivity increased. On the other hand, workers who had little control over temperature were less productive. Likewise, in classrooms, teachers and students suffer because they often do not have the ability to control temperature in the classroom. Conventional (non-green schools) cost more to operate than green schools. These schools lack the best r-value insulation; structures are sometimes similar to prisons. These buildings also contain structural components that do not support learning. In addition, these schools burn more energy, while being a contributor to the release of fossil fuels and the global warming outcry. “*Science* published a review of over 900 scientific studies on global warming... a consensus among climate scientists that serious human induced global warming is happening... there can no longer be genuine doubt that human-made gases are the dominant cause of global warming” (Kats, 2006, p. 7). As schools, industrial plants, and automobiles were built; few thoughts and action plans were developed to combat the harmful effects of fossil fuels and energy consumption. The “go green” movement and its current endeavors across all sectors have proven to be a significant piece of the solution to our global warming crisis.

The Benefits of Green Schools

Green schools not only change the way buildings are constructed, designed, and utilized, they have an impact on the way we view and respect our environment. Green schools are constructed with the most valuable material whose waste has a lesser chance of entering landfills. The construction of green schools takes an all around approach to land and energy conservation. No shortcuts are taken and the idea of creating a product friendly to our environment is constructed from the ground up. In addition, everyone involved in the facilities planning process for green schools embrace the goal to create the best eco-friendly environment possible. Administrators are aware green schools have certain attributes, as described by the Massachusetts Technology Collaborative’s definition of a “high-performance green school:”

1. It is less costly to operate than a conventional school building;
2. It is designed to enhance the learning and working environment for students and teachers;
3. It conserves important resources such as energy and water. (Earthman, 2009, p. 260)

Kats (2006) explains how green schools not only provide the most efficient learning environment, but also boosts the community’s image, have the ability to recruit and retain teachers, reduce student absences, and increases student performance. These benefits stem from the supportive learning environment green schools create. Their modern designs, which incorporate the natural environment, make the local communities superior among its constituents. In addition, Washington State reported a 5% decrease in

teacher turnover in their green schools. Furthermore, constructing green schools help provide jobs for citizens. For instance, in New York, the City Council passed legislation in 2005, to build “significant” constructions from green material in order to boost jobs (Kats, 2006, p. 14). In evaluation of the complex procedures involved with creating green schools, construction costs are higher than conventional schools. “Waste diversion,” is an associated, yet beneficial cost in construction of green schools. Waste diversion decreases the amount of recyclable material in landfills by sending it to recycling plants for separation and further usage. Furthermore, a study found when the process for every 1,000 pounds of waste is disposed for no future use, only 2.5 jobs were created and 4.7 jobs were created for the same amount of waste being diverted to recycling plants. Having greener schools is critical to the education of our children; we see the benefits in the local community as well. To expound, Capital E’s report on *Greening America’s Schools*, states that out of 30 green schools studied, 32% reported using less water than schools built from non-sustainable material (Kats, 2006). This finding alone is an important step to conserving our natural resources.

Although most of our world is made of water, most is unfit to drink, due to years of pollution. Approaches that serve to conserve water include, “low-volume toilets, low-flow faucets, and automatic shutoff valves” (Kennedy, 2007, p. 2). In addition, Kennedy noted that schools could benefit from plants and vegetables that survive low rainfall climates. These plants will also benefit from the usage and nourishment of rainwater being caught in canisters and stored for later use (Kennedy, 2007). The go green endeavors are seen in products and stores across our country. Many companies are creating recyclable products in the form of pens, dish-scrubbing brushes, boxes, paper, and tissue. Comparing, all these products can be used in a school setting, leading to a holistic approach to a green school.

Green schools can be constructed in various, yet creative ways. Earthman (2009, pp. 260-261) noted guidelines green designs and engineering criteria should include:

- Locating schools near public transportation to reduce pollution and land development impacts;
- Placing a building on a site to minimize its environmental impact and optimize daylight and solar gain;
- Designing irrigation systems and indoor plumbing systems to conserve water;
- Designing energy and lighting systems to conserve fossil fuels and maximize the use of renewable resources;
- Selecting materials that are healthy, biodegradable, easily recycled, minimize the impacts on landfill, and otherwise reduce waste; and
- Creating an indoor environmental quality that provides occupants with thermal comfort, and acoustic, visual, and air quality.

In addition, Kennedy suggested that green school construction should support local business by purchasing their resources and products. This effort plants money back in the community while developing its local economy. Furthermore, facility planners and their architects should research local contractors who specialize in sustainable building construction. Some states are now offering incentives to build greener schools. For example, the Massachusetts Technology Collaborative is providing a \$15 billion grant to

schools that incorporate environmentally friendly systems and green designs in construction of their schools (2007).

Green schools not only provide a comfortable, safe, and economical learning environment, they also are tools for learning and teaching. Green designs create the opportunity to teach about “ecology, resource management, and the effects of construction and design decisions have on the environment” (Kennedy, 2007, p. 2). This is a unique and self-fulfilling aspect of green schools because it allows students to see the tangible results of using energy conserving mechanisms such as solar panels and daylighting. Daylighting is a term to describe the use of natural lighting in designs. This is accomplished by using windows that have the ability to adjust or dim light and are placed in strategic locations throughout the building. Daylighting can decrease energy consumption by thirty to seventy percent over time because this technique does not depend on electricity (Kennedy, 2007). This energy conserving technique has been used throughout homes and offices for a substantial time. This technique allows students to concentrate and see better. According to the U.S. Green Building Council (2009, April), students who were exposed to daylighting improved 26% faster on math tests than students who received little or no daylighting. In some instances, students and teachers can get a “break” from daily routines by a quick glance out the window. Some would also argue that it accommodates those with disorders such as claustrophobia.

From this research, creating the most valuable educational environment for students and teachers, while conserving our natural resources, are by products of greener schools. Yet, not all school districts have adopted resolutions and endeavors to transform to greener campuses. According to Kats (2006), many executives surveyed discourage greener buildings due to higher construction costs, lack of awareness of benefits, and difficulty validating benefits. Research shows high performing schools costs are somewhat higher than conventional schools, but the benefits appear as better education of students and improved environment quality. According to USGBC (2009, January), nearly 10% of commercial construction projects in 2010 have construction goals to sustain our environment. The Leadership in Energy and Environmental Design (LEED) certification makes projects as this superior to construction projects built on conventional school designs.

LEED Certification

This certification was developed but the U.S. Green Building Council with guidelines for constructing greener schools. This certification classifies schools as green or high performance. This certification supports a holistic approach to school buildings, while giving attention to specific areas. The LEED certification has been around for over a decade and recently developed guidelines for school systems. In 2007, six categories were created to grade school systems. The categories include “Sustainable Sites, Water Efficiency, Energy and Atmosphere, Materials and Resources, Indoor Environment Quality, and Innovation and Design Process” (Earthman, 2009, p. 261). The USGBC rates each school, by information from construction documentation, on a scale from 29-79. After totaling scores, schools are classified as Platinum (which is the most regarded rating) with a score if 58 - 79, Gold, Silver, or Certified (Earthman, 2009). This

certification is highly esteemed because its use worldwide. The recertification system is a tool for schools to maintain building structures and systems. Most importantly, state legislators have emerged as leaders in the green school movement. Currently, 32 states have formed green school caucuses and groups, who will network, provide policy interpretation, and costs/benefits of green infrastructure in schools (USGBC, 2010, March). These events are important and open a threshold of possibility because most monetary and policy decisions for schools are made on state levels.

The LEED certification has taken tremendous strides across our nation. So far, there are 185 LEED Certified School Projects, 1,521 LEED Registered School Projects, and 10 states that require green school construction (USGBC, 2009, September).

Concluding Remarks

In conclusion, the green approach to school construction provides remarkable benefits including ranking as a mechanism for learning, a leader for sustainability, and accommodating learning and teaching needs. Through time and research, we see the catastrophic effects harmful emissions, waste, and misuses of natural resources have on our environment. The LEED certification is a tool for school campuses, both K-12 and colleges, to not only transform and create greener schools, but sets the stage and way of thinking for creating a more sustainable future.

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