Green School Design

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American children and young adults are required to spend twelve years in school. For most of these students, these twelve years will be spent in the public school system and its crumbling facilities. Many of the buildings where most students spend their formative years were designed with economic—rather than ecological or educational—interests in mind. The designers of these behemoths and the school boards that hire them have called for designs that emphasize durability, sustainability, and efficiency. Unfortunately, the emphasis was not placed on the correct kind of durability, sustainability, or efficiency.

Historically, the accepted methods and ethos of school design have encouraged school districts to construct buildings that were made from materials that could endure a cost analysis and be considered the most economical at the time of purchase, had designs that could sustain the factory school model, and that could efficiently deploy district maintenance funds. However, these practices and beliefs did not encourage designers or school officials to examine the ecological and environmental impacts of their projects, so the resulting buildings sent students through twelve compulsory years in ecologically disastrous surroundings that support the factory model of schools—matching a curriculum that encourages the same ruinous cycle.

Though this mindset has persisted for nearly a century, the types of design and methods of instruction that underwrote it are beginning to change. Now, innovative school design refers to "schools that are socially smart, cognitively supportive, emotionally safe, and environmentally friendly" (Jensen 91). One of the most prevalent forms of innovative school design is the environmentally conscious, or green, school design. This type of design requires a break from the methods and ethos that dominated the field of school design in the past, and buildings constructed under this form of design may require more initial capital, but the benefits are numerous.

Green school design is less damaging to the environment and is more conducive to student learning. It generates alternative, productive educational opportunities and is beneficial to school districts and to communities, as well.

The more apparent benefits of green school design are environmental. Although each green school is unique, there are some features and considerations that are prevalent. Some common features in green schools include windows or skylights to allow for natural lighting, compact fluorescent light bulbs, Energy Star appliances, pipe insulation, using motion sensors to avoid lighting unoccupied rooms, indoor ventilation systems, dual-flush toilets, geothermal heating and cooling systems, recycled construction materials, and natural cleaning products. Some schools have also installed solar panels or wind turbines in order to supply their own alternative energy. Often, green designers choose building materials based on their lifetime cost, rather than their initial cost, and such lifetime costs must account for building site, which can also result in more environmentally friendly decisions. There are also many opportunities for previously built schools to retrofit green practices and technologies into their existing program and facilities. Some certification programs, such as LEED (Leadership in Energy and Environmental Design) and CHPS (Collaborative for High Performance Schools) exist and are able to evaluate the environmental friendliness of a building; in fact, LEED has a specific certification program for educational facilities.

The implementation of any of these practices is beneficial, and much data suggests that energy consumption between green schools and traditionally designed schools can make significant impacts in budget reduction. A recent report, entitled "Greening America's Schools: Costs and Benefits," found that by and large, green schools use "33 percent less energy and 32 percent less water than conventional schools" (Agron 6). According to the U.S. Green Building Council, green schools are better than traditional schools because they cause less harm to their local environments, and the energy saved over a green school's lifetime helps to lessen the demand for fossil fuels and helps to decrease pollution worldwide.

Along with benefits for the physical environment, environmentally friendly schools can offer benefits for students' learning environments as well. Eric Jensen writes about the importance of the physical environment in his 2005 book *Teaching with the Brain in Mind*. The first thing students experience when they enter the school setting is the physical environment of the school, and according to Jensen, students' perceptions of the school as being safe, welcoming, comfortable, familiar, and friendly help determine how students will perform. Jensen writes that there are five environmental factors that greatly influence those perceptions: seating, temperature, lighting, noise, and building design.

The design and features of green schools mesh well with several of these environmental factors that affect students' learning and success. Temperature helps to control neurotransmitters, which play a role in the fluctuation of student behavior and mood. Some green schools feature heating and cooling systems that adjust to the temperatures of various areas of the building, thereby avoiding large vacillations in temperatures. Lighting also is essential to student learning. The human body needs a certain amount of natural light in order to function properly, and natural light activates the synthesis of Vitamin D, which helps the body to absorb essential minerals. By increasing the amount of sunlight in a building, students can be exposed to natural light, and less energy will be used to power artificial lights. Fluorescent lighting, which is commonly found in traditional schools, flickers and emits an audible hum. This hum "can increase cortisol levels in some [students], which can suppress the immune system" and "has a detrimental effect on student performance, especially in reading" (Jensen 86). Green school design often attempts to provide natural light and minimize glare, which have been shown to correlate with improvements on achievement tests ("Green School Economics"). Many green schools feature natural light and compact fluorescent light bulbs, both of which would eliminate some of the problems associated with traditional lighting practices. Studies have shown that "chronic noise can have a negative effect on academic performance…and may actually prevent children from acquiring speech recognition skills" (Jensen 87). A major source of noises in the classroom is the heating or air conditioning unit. While most classrooms are still fitted with individual units which create more sound than a central heating or cooling system, green schools often use Energy Star appliances or feature efficient building-wide heating and cooling systems, which diminishes the level of noise inside the classrooms.

Expecting gains in student achievement seems reasonable after designing a school that features natural lighting, non-toxic materials, and better ventilation and acoustics, but the health benefits for students attending green schools are evident as well. There are far fewer cases of asthma in green schools than are present in traditional schools, a discrepancy than can likely be attributed to the better ventilation and air quality in green schools.

The design of a school building can also be integrated into the curriculum and academic program of a school. Having a green school gives students an excellent opportunity to become familiar with ecological concerns from a young age and develop skills that will enable them to

become the next environmental advocates. Although understanding ecology is important today, it will become necessary in coming years of fossil fuel shortage and global warming, so having ecological education and development present in schools is important and will be beneficial towards students' abilities to succeed in a world vastly different than today's. The design of a school is a tangible demonstration of the school's underlying values, so choosing to design an ecologically sound learning environment communicates that the environment is important to the district and that students' health and success are valued.

Green school design is also useful to the overall operation and success of school districts. Although high standardized test scores are only one way to evaluate a school and the achievement of its students and teachers, in this era of the No Child Left Behind Act, any increase in these scores can be beneficial to a school or school district. Teachers often benefit from the more healthy teaching and learning environment, and the benefits for teachers are similar to the benefits for students. Teachers in green schools miss fewer days of work and often report being less stressed. Green school design also supports small schools with fewer students and smaller facilities. Smaller schools are easier to manage and often allow for more individual attention.

With all of these things in mind, for many schools, the most evident benefit of green design is the amount of money saved on energy bills. A common misconception about green schools is that they are more expensive to build and maintain than conventional schools, but this is simply not true. The recent report called "Greening America's Schools: Costs and Benefits" found that "the long-term financial benefits of constructing a sustainable facility are 20 times greater than the initial cost to build—saving an average of $100,000 a year per facility" (Agron 6). The cost for building and maintaining a green school over its lifetime is much lower than the cost of building and maintaining a traditional over the same period of time. These savings stem from "lower energy and water costs, improved teacher retention, and lowered health costs" ("Green School Economics").

The community surrounding a green school benefits from the lower cost of green schools in the long run. The tax dollars of the community will stretch to cover more of the costs of green schools than conventional schools. The lower environmental impact of these schools will also benefit the local community in the form of cleaner air and water and less construction waste entering the waste stream. Green school design practices also promote community involvement in planning the school. Having the community participate in planning the school helps to ensure that the building will be used throughout the evening hours and that the school and its programs will be supported by the members of the community. Support from the community will also make more ecological education programs possible, as members of the community can lobby the school to offer these types of programs. A community that cares about its students, schools, and environment encourages academic and ecological achievement; it is one that will also benefit from ecologically-minded students and graduates. These young people will be an excellent resource and asset to the community and its environment because of the ecological education present in green schools, both in and out of the classrooms.

Green school design offers an excellent way to save energy, conserve water, and minimize maintenance costs. The characteristics typical of green school design benefit students via improved health and a learning environment that is more conducive to learning. The design and construction methods of a green school address environmental concerns that also improve the characteristics of the physical environment of a school that have been shown to affect student achievement and cognition. This type of design also lends itself to the implementation of a

curriculum that offers many opportunities for teachers and students to consider ecology and the environment. The school building itself can be a model of environmental responsibility that can encourage students to make responsible decisions throughout the rest of their lifetimes. The community around a green school also benefits from this type of facility. In addition to lower operating costs, the community suffers from less environmental damage and has the opportunity to develop an ecologically literate work force.

One of the greatest things we can do for our students is to offer a public education that has ecological and environmental components. Green schools and sustainable design provide an excellent opportunity to do just that, and we would be foolish to continue designing, building, and operating schools in ways that do not take the environment into consideration. The ideas of green school design can be implemented on elementary, secondary, and college campuses, and different educational opportunities for students exist at each level. Sustainable building design is a necessity in this era of high energy costs and a diminishing supply of fossil fuels. In addition to support from communities and educators, green school design is gaining support from the government via the 21st Century High Performing Public Schools Facilities Act that was recently passed in the U.S. House of Representatives. The practices and beliefs that dominated the field of school design during the era of cheap fossil fuel will simply not work in the future, but the current practices and values of green school design offer some hope for the future of school grounds and especially for the students who are educated there.

Works Cited

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