Chapter 4
Research on Green Schools and Student Performance

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ABSTRACT
Research on the possible influence green schools have upon student and teacher health, performance, and attitudes has been a recent endeavor of scholars. This is because green schools are a recent development. Considerable research on the economic and environmental benefits green schools produce has been completed. However, there has been little research conducted using certified green schools because of the paucity of certified green schools. The National Research Council of the National Academies of Science enlisted a group of scholars to investigate the possible relationship between green schools and student achievement. The committee had difficulty finding any research available that addressed the topic. Since the efforts of the committee, more certified green schools were built, and limited research has been conducted. The findings from these research studies have produced mixed results. This chapter deals only with that portion of available research that deals with the relationship between green schools and student achievement. Because of this, suggestions for further research are given.

INTRODUCTION
School buildings hold a special place in the hearts and minds of every person in the country. These are the places where everyone has experienced the introduction to learning about the world. Schools are also the places where students have found accomplishment in their learning. Schools have a profound influence upon how students work and play, and for the most part these experiences have been rewarding.

School buildings become the home away from home for students and normally an exciting work place for teachers and administrators for a large part of the day most of the year. The building itself works to influence the attitudes of students, teachers, and parents by the arrangement of spaces, location, classroom accoutrements, site, building finishes, circulation patterns, sounds and smells, and interactions with the building itself. This builds for a history of experiences relative to being in school. The building also has influences beyond attitudes and experiences. The building can also
have an influence upon performance and health of the occupants. It is common knowledge that the building itself influences how students learn and how teachers work, but determining the extent of this influence is challenging to researchers.

With the advent of high performance and sustainable school buildings, a movement called Green Schools became very current. The definition of Green Schools varies from region to region, but there are certain commonalities that can be associated with schools that have high performance and sustainable components designed and constructed into the structure. Several states have definitions of Green Schools that can be called high performance structures. California, Washington, and Massachusetts have developed guidelines for the design of such high performance, sustainable school buildings, and of course, the U.S. Green Building Council has developed guidelines for Green Schools.

Research on the economic and environmental benefit of green schools has produced many studies that are valuable to school authorities and design professionals. Some research has suggested that the financial benefit to the school system is such that including green features in all new construction is a wise investment. Additionally, research studies relating to the benefit green schools have towards the environment have pointed out that including green measures in schools considerably help the environment. This body of research has not been included in this chapter because of the focus upon the possible influence green schools may have upon student learning.

With the high expectations of an environmentally friendly school building comes the suggestion that perhaps these buildings could also be more beneficial to students and teachers than conventionally built buildings. That proposition is very enticing for researchers and for those involved in designing Green Schools. As a result, the proposition becomes more a question of better student's performance in Green Schools than in conventionally built schools or the influence Green Schools have on student and teacher performance and health. These were the question put before the National Research Council of the National Academies of Science.

GREEN SCHOOLS RESEARCH COMMITTEE

In 2005, the National Research Council (NRC), through the Board on Infrastructure and Constructed Environment (BICE) appointed a committee of researchers and scholars to “review, assess, and synthesize the results of available studies on green schools and determine the theoretical and methodological basis for the effects of green schools on student learning and teacher productivity.” (National Research Council, 2007, p.1)

The result of this request was a funded study of the available research on Green Schools and the influence these buildings have upon student and teacher health and productivity. A group of 14 individuals from a number of different universities and research organizations was enlisted to complete the work of the study, which required 15 months to accomplish. The members of the committee represented a variety of academic disciplines. The disciplines involved ranged from public health, epidemiology, building materials, acoustical and lighting engineering, ventilation, pediatrics, acoustics, education, architecture, to medicine. Each of these individuals was considered an expert in their own field of study, having contributed to the knowledge base of their discipline through publications and presentations.

The task of identifying studies was not easy for several reasons. First, there was a paucity of research studies dealing with actual Green Schools as such, because of the definition of what a Green School happens to be. There are many definitions of a Green School and some variations on the exact components the building should have to be considered a Green School. There is not a common definition of the components of what a Green