Chapter 3
Green School Characteristics, Sustainability, and Student Learning

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ABSTRACT
An exploration of learning environments within and around green schools provides the basis for this chapter. One of its most important goals is to encourage research on where students learn and the quantity of information that students learn, with parallel emphasis on sustainability, school design, and green schools. A general theme is to encourage the study of green schools within the broader context of the total physical environment, while viewing learning experiences and achievement of students through social, economic, efficacy, and sustainability perspectives. Several sustainable design perspectives are included in this chapter, and findings in five areas of school design research are associated with selected green school concepts. As a rather unique component akin to the affective dimension of explaining research findings, acknowledgement of the biophilia hypothesis is suggested as an alternative pathway to view context and enhance depth in research methods, procedures, and interpretation.

INTRODUCTION
Since the late 1980s many school leaders have been genuinely seeking ways to use less energy, provide cleaner air, healthier services, and save money (Baker & Bernstein, 2012). From efforts such as these and the increasing need for greater awareness of sustainability issues, the United States Green Building Council (USGBC) was created. It defines a green school as any building or facility that creates a healthful environment conducive to learning while saving energy, resources, and money. As part of the USGBC, the Center for Green Schools (CGS) was formed to influence the transformation of all schools into sustainable and healthful places to live, learn, and play. Notwithstanding, we often hear individuals say or imply that students learn better in green schools. This is an excellent assertion but at present it may be only optimistic speculation. Can we prove through sound quantitative research that significant relationships exist, among character-
istics of green schools, sustainability measures, school design, student behavior, and academic performance?

This question may best be answered by application of research methods that entail classifying green school design features, defining the characteristics of green schools, and then establishing links with these two factors among the affective, behavioral, and cognitive categories of learning. To this end, this chapter is also devoted to an overview of selected sustainability issues and how students learn. Somewhere woven into this perspective is the biophilia hypotheses advanced by Wilson (1984). It suggests an instinctive bond between human beings and other living systems, one that intensifies a love for life, one grounded in human nature and biology. The biophilia hypothesis opens a path for inferring certain human behaviors brought on by the physical environment. It bridges certain compartments of the gap between qualitative and quantitative research.

GREEN SCHOOLS AND LEARNING ENVIRONMENTS

What makes a school green? The Center for Green Schools has identified selected characteristics that identify a typical green school. Out of the 13 characteristics of a green school as defined by the CGS, the School Design and Planning Laboratory (SDPL), as of the development of this chapter, has gathered evidence on and conducted studies of five closely related areas (Center for Green Schools, 2013). They are as follows:

- Improved indoor air quality (1)
- Employs day lighting strategies (2) and improves classroom acoustics (3)
- Promotes habitat protection (outdoor learning environments) (4)
- Improved thermal comfort (5)

Note that two areas (items 2 and 3 above) are combined in the CGS’s original 13 characteristics. In this chapter the assumptions are made that outdoor learning environments overlap to a definite degree with habitat protection, and that thermal comfort, when viewed according to standards of conservation regarding insulated spaces, may also be a result or side effect of decreased energy consumption. Assuming that green schools may influence overall student outcomes, a research agenda might be established for the remaining eight areas currently defined by the CGS.

Do green schools enhance learning? The answer is perhaps, maybe, and sometimes yes, given the research that has been completed by the author since 1997! A school having all 13 characteristics defined by the CGS might not necessarily include appropriate architectural design characteristics that would influence student outcomes positively. Therefore, a school can be as green as a gecko and also be a poor place to teach and learn because of poor architectural design.

Places ‘where students learn’ is a phrase first used by the Council of Educational Facility International (CEFPI). It has special meaning when we consider sustainability issues for schools. Place is often overlooked by many undergraduate schools of education involved in teacher training. I have special concern for these schools of education that have not even given one minute of thought to the physical environment where teaching and learning takes place. We cannot fault all educational researchers and writers; however. Many advanced training programs in educational leadership minimize courses in environmental psychology and educational facilities planning. Conclusion? When educators do not know how and why the physical environment influences behavior and learning, a significant portion of the maze of teaching and learning is missing. A worthy goal for advanced and undergraduate educational programs alike should be to emphasize how and why school buildings (the school environment) enhance a