

CHAPTER 1

THE CRISIS IN AMERICAN SCHOOL BUILDINGS¹

There is a crisis in education in the United States today, *and* in the infrastructure of its school buildings. The nation's school buildings are frail and aging. The public is saying, "It's no surprise that America's public schools are failing." But what is the connection between school buildings and education? Is it one of simply housing children and teachers who will get on with their work independent of the condition or character of the buildings? Or is the connection more intimate--that sound buildings designed in particular ways will aid the goals of education--both academic achievement (bottom-line educational performance²) and social-emotional development?

We will examine this issue, first by looking at the infrastructure of US school buildings, and then, in Chapter 2, by examining some of the empirical studies that have looked at the building/performance issue, followed, in Chapter 3, by presenting a model that tries to summarize the data and bring some clarity to the issues involved. We will present in some detail several of some 27 design patterns we have developed that respond to the empirical literature and suggest ways in which our school buildings could better support educational achievement. In conclusion, we will show a prototypical design that grows out of the patterns, and suggest needed new directions for empirical investigation.

School buildings represent an important public asset and a source of major elements of the cost of education. Public recognition is growing that school buildings in many communities across the United States are in poor condition. The ills besetting US educational facilities have been documented widely. A 1989 Washington, DC, study reported in the June 20, 1991 *Washington Post* cited 11,000 fire code violations in 152 schools in the nation's capital alone. The District of Columbia Commission on Public Education (1989) cited fire doors that don't work, classroom doors that don't close, broken toilets, crumbling plaster, potholed playgrounds, and malfunctioning heating systems, among other problems in the learning environment. A study by Maureen Edwards (1991)

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² There is confusion in the literature about the impacts of design variables on ... what? In an attempt to help clarify the issues involved, we will use a general term *educational outcomes* to include both *academic achievement* (test scores) and *prosocial behaviors* (personality, social, and emotional development, like improved self-concept, what Weinstein [1979] termed "nonachievement behaviors"). We prefer the positive term *prosocial behaviors* or *prosocial development* to the slightly pejorative "non"-achievement behaviors, and will use it throughout this paper. We will, furthermore, use the terms *educational performance* and *academic achievement* as synonymous and interchangeable.

in Washington, DC, found that educational building conditions are hurting student performance, and estimated that improved facilities could lead to a 5.5% to 11% improvement on standardized tests. A 1988 Carnegie Foundation study found that student attitudes about education are a direct reflection of their learning environment.

Over 50% of schools in the United States were built in the 1960s with a projected life of 35 years, meaning that over 50% will need major renovation or refurbishing between 1995 and 2000 (Goldberg & Bee, 1991). Many rural schools are even more frail. The Educational Writers Association (1990) suggested that \$84 billion in new construction and retrofitting will be required to overhaul the nation's urban school buildings, another \$41 billion for maintenance and repair, and \$18 billion for rural schools, for a total price tag of approximately \$143 billion. Of this amount, a staggering \$10 billion was spent on school facilities in 1990 and \$10.6 in 1991 (David Walters, Christian Science Monitor, personal communication, May 8, 1991).

There are many prongs to the problem: existing hazardous conditions found in schools throughout the United States; inadequate learning environments to meet new curriculum developments (especially technology changes brought on by the reform movement) and instruction modes; limited community ability or will to finance major maintenance and construction projects; and despite new efforts at year-round schooling, most of the nation's schools being empty for three months each year.

Some commentators, like the Public Education Association (cited in District of Columbia, 1989) and Whittle Communications' Edison Project (Whittle, 1992), have argued for a complete reshaping of the nation's educational system and its schools. The Public Education Association has recently recommended downsizing schools to 500 to 600 pupils per school based on the argument that smaller schools will lead to a more humane educational system. Many commentators decry the amount of time that the nation's schools are closed, arguing to keep schools open year-round and in operation more hours per day. Edward Fiske, in his recent book, *Smart Schools, Smart Kids* (1991), mentions 70 innovative "learning communities" where schools have been integrated with community centers to become centers for child advocacy, health, social, recreation, and housing services.

The urgency of the situation is obvious. Many school districts nation-wide are in an expansion mode and are in planning stages for upgrading facility infrastructure. Demographic projections indicate a continued upswing in K-12 populations over the next 10 years. Since there is no consensus among taxpayers, state departments of public instruction, and local school districts as to what constitutes real needs and how best to address them, improvements are delayed, stop-gap, or attended with large outlays for public relations barrages and top-name facility planners.

Despite these well-documented cases, there is little agreement among teachers, administrators, public officials, or the public at large regarding the significance of these statistics, or even whether school buildings themselves play a fundamental role in

educational outcomes. Researchers and educational proponents have asserted that school facilities *are* important to education. There are a number of excellent empirical studies of the explicit relationship between facility characteristics and educational system output (see, for example, the 1990 book, *The Quality of the Physical Environment of the School and the Quality of Education*, edited by Ronald Colven from Sweden, the review by Paul Gump on "School and Classroom Environments" in the 1987 *Handbook of Environmental Psychology*, and recent articles on school buildings by Edward Fiske in the *New-York Times*). In the face of widespread government budget deficits--and while well-documented crises in United States education attract national attention and international amazement--educational facilities typically are ignored or overtly neglected. And thus, some observers say, we just don't know what role school buildings play in educational performance.

There is a crying need for additional studies of the impact of educational facility design on performance, and for excellent dissemination of the results into the educational, facility management, and architectural communities. As a member of the Building Research Board of the National Academy of Sciences, the first of us (GFM) has proposed that the National Academy of Sciences initiate a two-pronged study of educational facilities in the United States. The first prong would be to fully investigate the coast-to-coast magnitude of current problems with the infrastructure of the nation's educational facilities. The second would be to critically review and synthesize the state of knowledge on the impact of school buildings on educational achievement. Following that, those of us in the educational community concerned with the nation's school buildings need to recommend actions that federal agencies, educational associations, facility managers, and architects and engineers can take to alleviate the problems and provide an appropriate infrastructure for the nation's educational needs for the 21st century.

