Chapter 2

A CASE STUDY OF THE MILWAUKEE PUBLIC SCHOOLS FACILITIES MASTER PLAN

"There is no clear relationship between how well kids do in school and the facilities they occupy. Buildings that are in disrepair should be fixed because that is the prudent thing to do, and kids should be removed from cloak rooms because that is also the right thing to do. But none of this will necessarily improve education."
Mayor or Milwaukee, October 28, 1992

The controversy over the true impact of the physical setting on the quality of education is an important issue which has not been adequately addressed by either the educational or architectural communities. The current political drive to build new school buildings and renovate existing ones has not taken into account how school and classroom design actually impacts learning. The outcome of this debate will affect the way administrators, school boards and the public in general perceive to be the realizable goals of school design in relation to improved education for their children. The position taken here is that there is compelling evidence that the physical setting, among other psychological and social variables, has both direct and indirect affects on student learning outcomes -- the bottom-line quantitative measures of educational performance. This chapter will first discuss the social, economic and political aspects of this issue by presenting a case study: The Milwaukee Public Schools Facilities Master Plan. Secondly, empirical evidence supporting the notion that the physical setting has an influence on the quality of education will be presented through a brief literature review. Following that, the impact of class size reduction on achievement outcomes will be addressed with special attention given to the position taken by MPS. Finally, the debate over the role of the physical setting in learning within the context of the current school reform movement will be discussed.

2.1 THE CURRENT STATE OF SCHOOL FACILITIES & THE MPS FACILITIES MASTER PLAN

Public recognition that school buildings in many communities across the nation are in poor condition is growing. School buildings represent an important public asset and a major source of the cost of education. It has been estimated by a 1990 Educational Writers Association study that over $143 billion will be required nationwide for new construction, building renovations, and maintenance and repair over the next ten years. There are many reasons for the decline in the quality of school buildings in the last decade: (a) the discovery of hazardous building conditions, (b) the recognition that learning environments have become inadequate to meet new curriculum developments such as computer technology, (c) instructional modes such as individualized instruction, and finally (d) there is limited community desire to finance major construction projects.

In addition, it has even been argued that the decline in the quality of school facilities may be a significant factor negatively affecting student performance. In a recent study, Maureen Edwards (1991) claims that educational building conditions, such as deferred repair and renovation, in the Washington, D.C. area are influencing student

performance and estimates that improved facilities could lead to a 5.5% to 11% improvement on standardized tests.

Currently, many school districts across the country are in the planning stages of a massive upgrading of the facility infrastructure. Demographic projections indicate a continued increase in K-12 populations over the next 10 years. Despite the urgency, there is no consensus among the taxpaying public, state departments of public instruction, or local school districts as to what constitutes the real needs of schools and how best to address these needs once they are identified. In addition, there is little agreement among teachers, administrators, public officials or the public at large regarding the significance of these statistics, or whether school buildings even impact educational performance in any substantial way.

As a case in point, Superintendent Howard Fuller of the Milwaukee Public Schools in 1992 announced a $474.3 million facilities master plan for new construction and maintenance of existing school facilities in the district (MPS, 1992). The plan calls for preserving existing capacity (maintenance and repair) and increasing capacity by upgrading vocational and technical facilities, providing computer, art and music rooms, expanding kindergarten to all children who qualify, constructing a new technical high school, and additional classrooms to reduce overall class size.

In addition to the usual reliance on enrollment projections, the MPS Facility Masterplan was based on research by the Tennessee Star Program on the effect of class size on academic achievement. The recently completed program which followed some 6,500 children from kindergarten through third grade, found that as class sizes decreased, there was clear evidence of increased academic achievement. In addition, these same children continued to outperform their peers when placed back in traditional classrooms. The study also found that smaller class sizes were especially helpful for children of inner city schools (Miner, 1992).

The conclusion reached by the MPS facilities planning committee was that certain aspects of facility design do have an impact on student learning outcomes and that the findings of this research should be incorporated in the masterplan in the form of additional classroom space. A week after the MPS plan was announced, Milwaukee Mayor John Norquist presented a proposal for a $184 million alternative plan calling for a reduction in the amount of new construction and an emphasis on building maintenance. As part of his justification for proposing the alternative plan, Norquist strongly maintained that Fuller's plan offered no guarantee of improvements in education for children. Norquist stated,

"There is no clear relationship between how well kids do in school and the facilities they occupy. Buildings that are in disrepair should be fixed because that is the prudent thing to do, and kids should be removed from cloak rooms because that is also the right thing to do. But none of this will necessarily improve education" (*Milwaukee Journal*, Wednesday, October 28, 1992).

Placing the issue of improved educational performance into a larger economic and political context, Mayor Norquist has challenged Fuller to consider other types of policies which may have more of an impact on performance than improvements to physical infrastructure beyond maintenance (Parks, 1992; Hissom & Herr, 1992). The Mayor's office argues that staffing and teacher salaries or structural changes such as curriculum change, school choice, site-based management and other market-based

accountability measures may cost less and have a stronger impact on performance than reducing class size, or providing additional classroom space (David R. Riemer, personal communication, 12/8/92).

The debate over whether the physical setting has any influence on overall school climate is not at issue. Even critics assume, almost axiomatically, that the physical environment has an impact on a child's learning. Norquist, for example, admits without reservation that children should not be learning in cloak rooms or be required to spend their days in sub-standard conditions. The issue rather, is the extent to which the physical environment plays a role in *academic achievement.* The outcome of the debate will determine the degree of attention the physical environment will receive: a comprehensive examination of the environment's impact on learning, or merely the enforcement of minimum standards.

2.2 DOES THE PHYSICAL SETTING INFLUENCE LEARNING OUTCOMES?

Historically, concern for the physical environment of the school has been limited to the enforcement of minimum standards for classroom size, acoustics, lighting and heating -- the actual physical conditions of the school building itself. The assumption has been that as long as these basic requirements are met, the child's learning depends in large part on pedagogical, psychological and social variables (Weinstein, 1979). The role of the physical environment as a *variable* influencing learning outcomes has not been investigated extensively in the educational research literature. This second, more dynamic way of viewing buildings, as part of an interrelated component of a larger learning environment system, has rarely been addressed in the research literature.

In order to understand the current debate over the role of the physical setting on learning it is necessary to look at the school reform movements of the 1950's and 1960's; the origins of this debate. The open education movement of the 1960's is largely responsible for the increase in awareness of the impact of the physical environment on student behavior and attitudes. Right or wrong, architects designing new schools took a literal interpretation of the open education philosophy by creating *open* space schools. The rationale most commonly cited for these radical changes in design was economics, however it is obvious design was being driven by a new philosophy in education.

Much of what is known about the physical environment of the school is a direct result of research conducted under the auspices of the Educational Facilities Laboratories (EFL) established in 1965 and funded by the Ford Foundation. With the dissolution of EFL in the middle 1970's the research on the physical environment of the school has dropped off considerably.

The results of the empirical evidence generated during the open classroom experiments concerning the impact of the physical setting on learning have been mixed. Physical features which have been researched include such variables as seating position, classroom arrangement, open versus traditional classrooms, class density, noise, windowlessness and lighting. Where these features of the physical setting have been examined for causal linkages to student achievement there has been very little empirical support. However, there is considerable evidence that the physical setting directly effects both teacher and student behavior and attitudes. It

will be further argued that the impact of the physical environment on behavior and attitudes has an *indirect effect* on student achievement, an effect generally unappreciated by both researchers and educational policy makers.

In summarizing the results of almost fifteen years of research, Weinstein (1979) concluded that the physical environment of the conventional classrooms have not consistently demonstrated an impact on *academic achievement*. Furniture arrangements, aesthetic appeal, presence or absence of windows, classroom density, and short-term exposure to typical school noise all show no significant differences in achievement across comparative conventional classrooms. Open space classrooms, similar to conventional classrooms, do not appear to have any appreciable impact on student achievement either. The only physical variable to which differences in achievement has been significant is seating location, however the data is inconsistent.

Since Weinstein's review there has developed considerable evidence in the relationship between class size and student achievement. Glass et al (1982) conducted a meta-analysis of a collection of studies which looked at the impacts of class size and concluded that reducing class size from 30 to 20 can yield a gain of 6 percentage points on achievement scores, whereas a reduction from 20 to 10 students per classroom yields another 13 percentage points in achievement. They also found that reductions in class size begin to make substantial differences in learning achievement around 15 students per class.

There is considerable evidence that the physical environment can affect *non-achievement* behaviors and attitudes of both teachers and students (Weinstein, 1979): open space schools (Meyer, 1971; Pritchard & Moodie, 1971), small schools (Garbarino, 1980), small class sizes (Miner, 1992), classroom design modifications (Evans and Lovell, 1981) and the impact of the school's physical setting on the best of teachers and their desire to continue teaching (Johnson, 1990).

Open space schools, for instance, frequently lead to increased interaction among teachers, who feel a greater sense of autonomy, satisfaction, and ambition. They also place a higher value on evaluation by their colleagues than teachers in conventional schools (Meyer, 1971) and enjoy teaching in open-plan schools despite complaints about noise (Pritchard & Moodie, 1971). Open space schools generally appear to enhance students' participation: feelings of autonomy, willingness to take risks, persistence at a task, and an opportunity to meet more with teachers during the day, and engage in a greater variety of activities (reported in Weinstein, 1979).

Garbarino (1980) found that small schools, those on the order of 500 students, in addition to having lower incidence of crime levels and less serious student misconduct, encourage a sense of responsibility and meaningful participation, particularly among students who have academic difficulty and come from lower socio-economic backgrounds. Advocates of smaller class sizes claim that when class size gets smaller, teacher contact increases, classroom management improves, teacher stress decreases and teachers are more likely to try innovative techniques (Miner, 1992).

Evans and Lovell (1979) investigated the effects of a design modification in an open space alternative high school which was experiencing problems with student distraction, class interruptions, high noise levels, and poor traffic-flow patterns. Variable-height, sound-absorbent partitions were provided to redirect traffic away

from class areas and to define class boundaries. The result was that classroom interruptions were significantly reduced, and substantive, content questioning increased, while nonsubstantive, process questioning did not change.

This brief review of non-achievement findings strongly suggests that the physical environment plays an *indirect* role in student achievement. The research findings demonstrate evidence that a comfortable, attractive physical setting can be supportive of humanistic goals of education such as creating enthusiasm for learning, and encouraging positive social relationships (Weinstein, 1979). It is not unreasonable to suggest that more positive attitudes and behaviors on the part of children may reflect positively on improved achievement. It stands to reason then that positive attitudes and behaviors on the part of teachers would encourage, on the whole, higher quality teacher-student relationships resulting in further advantages for improved student achievement.

Admittedly, the extent to which the physical environment plays a role in the learning process remains an issue of contention. It is clear that the physical environment has been unappreciated for its potentially supportive role in student learning. The relationships between the physical environment, pedagogical, psychological and social variables have yet to be explored to any great extent by educational researchers. If the physical environment is more influencial than realized, as suggested by the significant findings on student and teacher attitudes and behavior, it will be incumbent upon educators to take another look at the factors upon which the child's learning depends. The next subsection will take a more in-depth look at one such factor, class size, within the context of MPS policy making.

2.3 CLASS SIZE RESEARCH AND THE PROPOSED MPS FACILITY STANDARD

Differences of opinion on the impact of the physical environment on learning may seem rather subtle, however the level of importance placed on the physical environment can have a profound impact on a school district's budgetary planning as illustrated in the competing Fuller and Norquist plans. One single research finding from the Tennessee Star Program accounts for a majority of the difference in cost between the plans: *as class sizes decrease to between 13-17 students, a significant increase in academic achievement is realized*. MPS has clearly taken a stand which promotes a more direct role of the physical setting up on learning than the Mayor is willing to commit.

There is considerable agreement in the research literature, that when class sizes are decreased, student achievement increases (Glass et al, 1982; Miner, 1992). Bourke (1986) went further by testing a causal model linking student, school, and teacher background information, class size, teaching practices, and mean class mathematics achievement. He found that the teaching practice variables that varied with class size and affected achievement were teachers' grouping practices, frequency and type of interaction with students, some aspects of teachers' questioning behavior, the amount of homework given, and the noise level tolerated during lessons. In summary, class size research almost exclusively emphasizes teacher practice variables without addressing physical environment variables which may impact learning as well.

The question of the role of physical classroom size in affecting student achievement has never been explicitly addressed by the research on class size. Class size is

typically defined as a student/teacher ratio independent of the size of the classroom space the class is contained in. In order to tie the physical setting to achievement, the relationship between class size and physical classroom size, or classroom density, needs to be made explicit. It has been argued by Gump (1987) that almost all class size studies have investigated reductions of the numbers of students in a classroom without complementary increases in physical classroom size and therefore, in general, these studies can be considered investigations in classroom *density*. Acceptance of class size literature as investigations in classroom, or social, density would suggest the physical environment of the classroom does play an as yet undetermined role in the overall class size reduction effect on achievement. Ironically, the emphasis on teaching practice variables in the class size literature has influenced the conclusions reached by the facility planning committee of MPS.

MPS has proposed a class size reduction facility standard as part of the Facilities Master Plan based on conclusions of the literature on class size (Miner, 1992). The new Board standard on class size reduces the student/teacher ratio for all kindergarten through grade two classes at all schools to 19:1 maximum. MPS claims that the standard should be focused at these early grade levels because (a) research indicates that the greatest benefit of class size reductions occurs at the early grades, and (b) the cost to reduce class size in all the elementary grades is too substantial. The new standard does not change class sizes in grades 3-5, middle schools, or high schools, where they will remain at an average of 27:1, 29:1 and 28:1 respectively. The policy on class size is intended to improve teacher morale and subsequently effect student achievement (MPS, 1992; 2).

In addition to reducing class sizes, physical classroom space will be increased to an average of 900 SF, up from 750 SF (in buildings constructed before 1960) and 864 SF (in buildings constructed after 1960). The reasons cited for the increase in classroom size were (a) the need to provide more space for educational media such as computer workstations and audio/visual equipment, and (b) provide more space for future program flexibility. One should note that these reasons for increasing classroom size were not related to the need to decrease classroom density. The relationship therefore between class size and physical classroom size have not been explicitly addressed. The role of the physical setting is as yet implicit in the facility policy making of MPS.

The MPS facility planning policy on class size provides a clear example of the need to develop more comprehensive models of the factors contributing to learning achievement outcomes; including not only psychological, social and pedagogical factors, but explicit physical environment factors as well.

2.4 CONCLUSION

Regardless of the political nature of the debate, Norquist's challenge to Fuller to look for more comprehensive and financially efficient ways to improve student performance is an important reality check. Certainly staffing strategies and structural changes within the school system are critical, in some cases less expensive, aspects to consider when attempting to achieve the goal of improved student performance. However, it has been the contention here that the physical setting has long been ignored as an equally important third factor in improved student performance.

The implications of yet another school reform movement, "Restructuring" in the 1990's, have again been ignored and overtly neglected with respect to the design of new school facilities. Similar to the problems faced in the 1960's, new concerns have been voiced over the current crisis of the American public school facilities. Should school facilities simply continue to be held to minimum standards, or is there a linkage between educational programs and the physical setting which would suggest a more comprehensive approach illustrated by the MPS plan?

Fuller's MPS Facilities Master Plan commits millions of dollars to the construction of new school classrooms based on the more significant empirical findings coming out of the research literature, that being school and class size. The plan also carefully considers the *location* of schools, advocating schools physically placed in the neighborhoods of the children they are designed to serve. Beyond the economic concerns of busing, MPS hypothesizes that neighborhood schools will fulfill a supportive community function further contributing to increased student achievement outcomes. There are many other potentially supportive design principles which the plan could have adopted, however, attempting to implement just these few research findings is relatively unique in school district facility planning. Mayor Norquist, on the other hand, would rather fall back on basic health and safety standards (passing up the opportunity to promote the supportive role of the physical environment on learning) in favor of school restructuring policies which arguably obtain the same educational goals for less cost.

The position that the physical environment has been neglected, and even ignored, and that it warrants attention of educators equal to other strategies for improving educational program effectiveness has been argued. It is clear that before educators begin to redesign their schools to meet the requirements of a new wave of reform, they must first rethink and reconceptualize the role of the physical setting in the educational process, and design settings which appropriately support their reform efforts.

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