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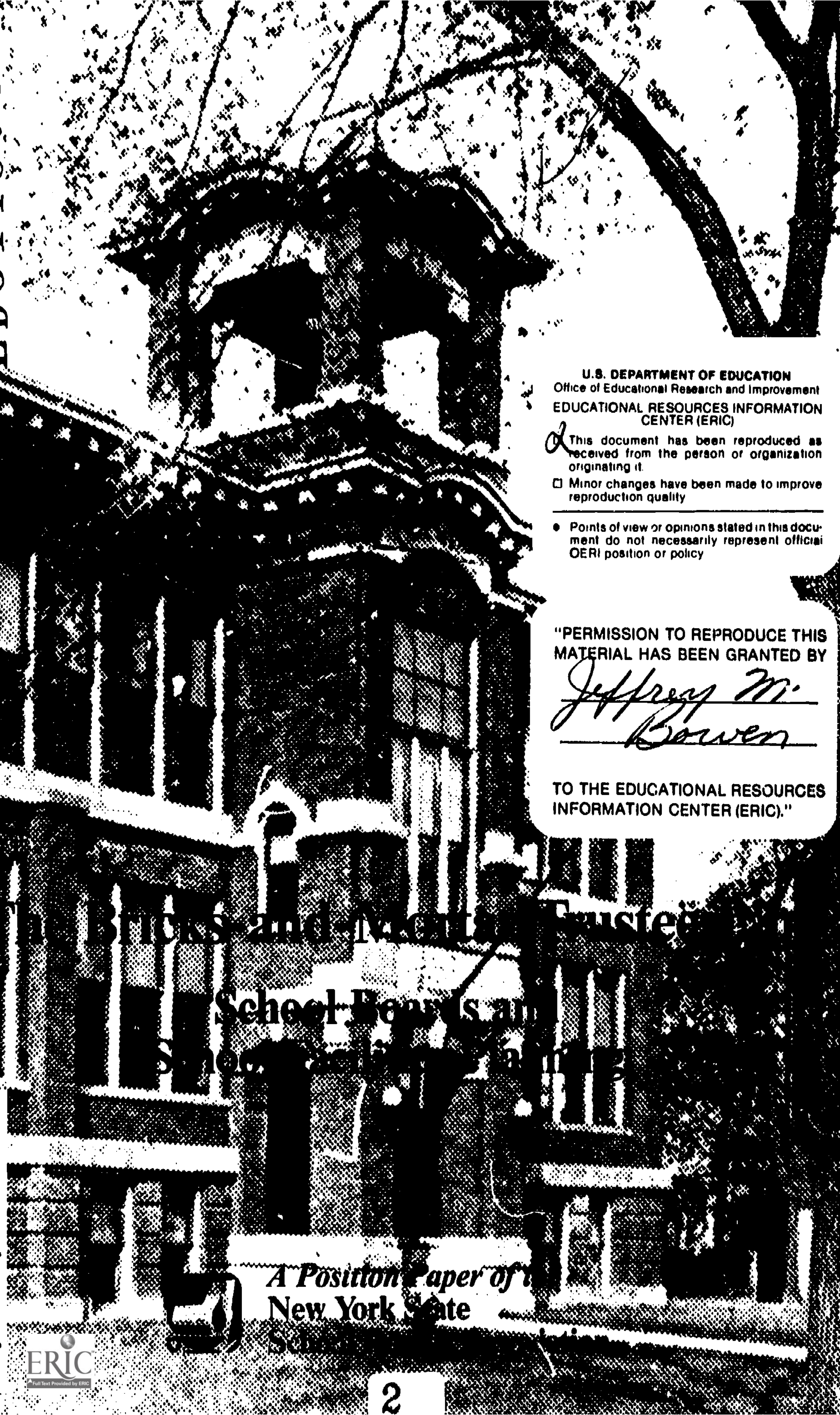
ABSTRACT

Guidance is provided in the area of facilities planning, design, and management. Facilities directly influence learning in physical as well as psychological ways. In facilities development, long-range plannning is critical. Strategic and tactical planning characterize an effective planning process. Facilities advisory committees should be involved in the facilities planning process as well. Although each school board develops its own unique vision, responsive facility development demands acknowledgement of certain trends. The following trends, corresponding issues, and tactical implications for planning the educational facility are discussed: (1) demographic trends and implications; (2) social trends; (3) instructional technology; (4) reform movement trends; (5) the problem of deferred maintenance; (6) energy conservation; (7) health and safety trends and implications; and (8) liability trends and implications. A summary of recommendations prefaces the booklet, and a list of pollutants found in school facilities and a suggested liability-related section of a policy on the public use of school facilities are appended. (22 references) (SI)



Board of Directors

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The Bricks-and-Mortar Trusteeship

School Boards and School Facilities Planning

A Position Paper of the
New York State
School Boards Association

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Summary of Recommendations

1. School boards and facilities committees must develop a vision of the future and exercise their responsibility to bring innovation to the planning of school facilities.
2. Facilities planning should involve in a meaningful way the groups that will use district facilities. The planning and involvement should be an ongoing process, not one that begins only when a new school is to be built.
3. School districts should develop a program of activities to ease student interaction with the school facility. Such a program can include utilizing plant systems (e.g., heating and electrical) for instructional purposes; involving students in energy conservation; and having students participate in building and grounds maintenance.
4. School boards should assess teachers' working conditions with facility design and space usage in mind. The addition of teacher work space should be made eligible for state building aid.
5. Principals should be more involved in facilities issues.
6. Written, adopted board policies should govern the establishment, structure, specific charge, functions, reporting procedures, responsibilities, membership, chairpersonship and evaluation of facilities advisory committees where such committees are used as vehicles of cooperative planning.
7. New facility designs should maximize user/owner options by allowing for immediate internal functional flexibility; that is, variable sizes of space, potential for future modifications, logical and simple expansion possibilities and predesigned convertibility to other uses.
8. Flexibility and an eye to the future must govern the use of excess space. Leasing school space is a preferred option because it is temporary and because leasing to community or human-services programs can be mutually beneficial to the district and the tenants. Space should be rented to programs the school board and staff regard as appropriate.
9. School board members and others involved in facilities planning should obtain up-to-date demographic and socioeconomic information and enrollment projections from appropriate administrative personnel.
10. Efforts to evaluate the progress of the Schools as Community Sites Program should continue. Eligible districts are encouraged to participate, and state financial and professional support should be increased.

11. School districts should consider the facilities implications of the "cradle-to-grave" concept of education as they join forces with the community and widen services offered by schools and their facilities. For example, school boards should consider ways to use facilities to address the needs of the senior citizen population to a greater extent.
12. Innovative ideas to meet long-range, technology-related goals and to prepare logistically for the incorporation of all kinds of technology should guide the building or renovation of the schools of the future. As learning becomes more individualized, technical and complex, "people spaces" where informal communication and socializing can occur should serve to soften the high-tech impact.
13. School districts are urged to participate as fully as possible in the Capital Assets Preservation Program because it promises a more effective, efficient and cost-saving method of maintaining school facilities.
14. The best way to ensure energy conservation and the resultant savings in facility management is to incorporate measures for energy conservation into plans for new construction. School boards should inform their architects/engineers that conservation is a priority. They should also seek information about ways to conserve energy by changing existing facilities.
15. Relevant aid programs should be enriched and expanded to include other environmental hazards.
16. School boards should be aware of and understand the problem of indoor air pollutants. To the extent possible, those involved in school facilities planning should consider ways to avoid or minimize indoor air pollution.
17. State building code standards need to be reviewed and updated to address urgent health and safety requirements. However, the state should be prepared to accept the fiscal obligation those requirements will produce.
18. Districts should have a strong risk-management program, including a prevention component that enhances the safety of all who use the building. In addition, districts should formulate a written policy requiring all outside groups that use the facilities to provide evidence of proper insurance.
19. School boards and administrators should take advantage of resources such as the Council of Educational Facilities Planning International (CEFPI), the American Institute of Architects (AIA), and educational and architectural publications. Boards should also visit other facilities to obtain new ideas and evaluate the advantages and disadvantages of what has been done.

Introduction

New York State's school buildings represent the largest collection of buildings under one aegis in the entire state. There are currently about 4,000 public school buildings throughout the state, approximately 1,000 of which are in New York City. Nationally, a recent survey found that one quarter of the nation's school buildings are not fit environments for children because of needed repairs, obsolescence, environmental hazards, overcrowding and unsound structures.[1] As is the case across the country, the educational infrastructure in New York State is deteriorating, especially in our cities. Approximately two-thirds of all the public school buildings in the state were built before 1960 (see fig. 1). Many are decaying due to deferred maintenance over a long period, old age and limited durability. A large number of capital projects—renovations, additions, maintenance projects and new construction—will be initiated over the next several years. Consequently, there is a need to examine the issues surrounding planning the educational facilities that will house the students of the 21st century.

Facilities are a topic of great concern to school boards because it is a school board's responsibility to provide educational programs and the space in which to conduct those programs. In addition, the health, safety and security of school occupants is a board's legal responsibility as well as an educational prerequisite. Health and safety issues must be adequately addressed both in the planning of new or added facilities and in the maintenance and daily operation of existing ones.

It should be noted that to date New York State public schools have an excellent health and safety record. Regulations for building and

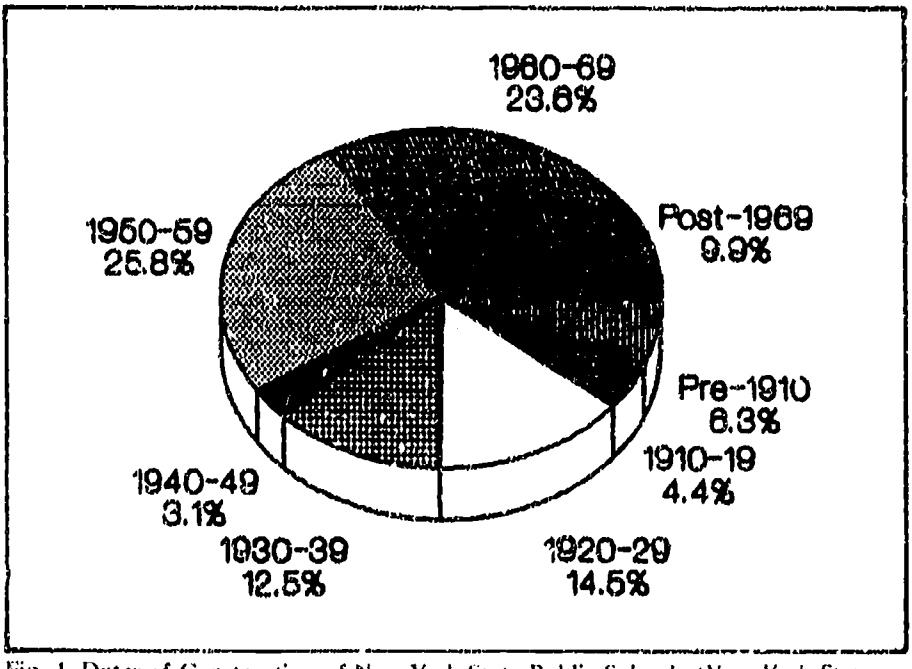


Fig. 1. Dates of Construction of New York State Public Schools *(New York State Education Department)*

fire safety are stringent and well-enforced. For example, the New York State Education Department has reported that none of the fires in public schools has been related to structural or building systems failure or major operational failures. Rather, most have been minor, caused by vandalism, accident or malfunction of small equipment.[2] As further examples of stringency, fire inspection regulations require school boards to hire only fire inspectors who have been approved by the New York State Fire Administrator, and New York State regulations regarding asbestos in the schools are much more stringent than those of the federal government for school buildings.

Facilities planning is important to school boards because most communities do much more than educate their children. The buildings often serve as a link between the schools and people in the community not directly involved in education. School buildings often are used by community groups, and, as will be discussed later, there is a definite trend toward increased and diversified use of school facilities by communities.

The main purpose of this paper is to provide guidance in facilities planning, design and management. The schools of the future must be dramatically different from schools of the past. The enormous amount of new construction and renovation now occurring presents an opportunity to respond efficiently and innovatively to the new demands being placed on school facilities.

Impact of Facilities on Students and Learning

School construction; facilities operation; leasing of space; and purchase of sites, furniture and equipment are powers and duties of the board of education specifically listed in Section 1709 of the Education Law. The quality of the education received by students is dependent on how well school boards perform these duties.

The learning process and the physical environment in which it occurs cannot be separated. Facilities can directly influence learning in many ways, including

- Accommodating a variety of individual learning styles. This can be realized through rooms with many corners where one student or a small group can work and generally flexible, well-equipped and well-designed space.
- Providing settings in which communication is fostered. This includes technological as well as social communication and communication among staff and between students and staff. Mailboxes for each student by the classroom door; electronic bulletin boards in the front entrance; well-equipped, aesthetically pleasing faculty rooms; conference space; and student lounges are all examples of how the physical plant can facilitate communication.
- Creating an appropriate environment through the aesthetic use of light, color and the display of student work. Especially influential is a building that allows students to interact with the environment. At one high school, the boiler room is visible from a window in the corridor providing students with a visible understanding of the building's heating and ventilation system.

- Reflecting regard for teachers' professional status; for example, through availability of work space
- Meeting users' needs for adequate space, storage, and a flexible, easily controlled environment[3]

School buildings that exhibit these characteristics convey the message that students and staff are important, that their needs are the focus of the educational process and thus the facilities-design process as well. Such facilities, well-tailored to the needs of students and teachers, generate a sense of ownership and pride and contribute to higher morale. Morale is part of a positive educational climate, a widely acknowledged characteristic of the most effective schools.

The physical plant of a school can facilitate academic and social development of its occupants in a number of specific ways, including

- Making the building support systems (heating, air conditioning, electrical, plumbing) physically accessible so that instruction about how they work can be incorporated into science and technology curricula at different grade levels
- Involving students in energy conservation and other environmentally related activities such as energy audits, maintenance and operations procedures related to conservation, the monitoring of indoor air quality, and testing for environmental hazards (radon, lead)
- Involving students in the maintenance of the school building and grounds, including cleaning, painting, repair. Doing this on a regular basis can contribute to a positive educational climate. In addition, the incidence of vandalism can be reduced if students feel the school is "theirs."
- Making the display of student artwork and other creations an integral part of the school decor

School districts should develop a program of activities to facilitate student interaction with the school plant. The program could be coordinated by a group that could include a designated operations and maintenance staff person or administrator, a science teacher, student representatives and other interested staff. Before initiating such a program, school officials should consult their insurance company and attorney regarding possible insurance exclusions and limitations on the type of activities in which students may become involved.

The Planning Process

In facilities development, long-range planning is critical to success. It is possible to change or eliminate a poorly planned, unsuccessful educational program, but it is unlikely that a poorly planned school or addition can be razed and rebuilt. Effective facilities planning saves money; the cost of the planning process itself is minuscule in relation to the cost of the project. During *strategic planning* the question Where are we going? should be asked. The mission and goals of the district should be defined and the vision and the future direction of the district established.

Tactical planning is characterized by the question How do we get there? The budget plan, curriculum plan and facilities plan are considered, and the educational specifications developed. Educational specifications involve considerations such as

- The grade-level arrangement for the school and district
- Facilities needs as determined by curricular objectives
- The variety of activities to be housed
- The delivery of instruction (e.g., small group, large lecture, etc.)
- The number of people to be accommodated
- Class size
- Amount of space needed (best determined by consideration of state standards, what other districts are doing, professional organizations' opinions)
- The relationship between programs (for example, is there to be cooperative teaching of social studies and English that would have implications for facilities?)

- Major equipment (computers, science, etc.)
- Environmental concerns[4]

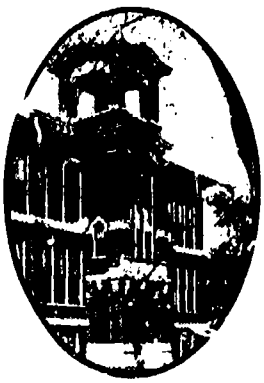
The basis for facilities planning and the development of educational specifications for projects should be the required, comprehensive, long-range facilities plan described in Section 155.1 of the Commissioner's Regulations. This plan should be kept on file in each district and updated annually.

Another important aspect of tactical planning is the selection of school sites. School district long-range plans should identify areas where growth and development are likely to occur, and thus where schools are likely to be needed.

Site-selection teams can include administrators, consultants, architects, regional planners, landscape architects and legal counsel. Potential sites should be evaluated according to a set of criteria established by the site team. The criteria should include, but not be limited to,

- Health and safety characteristics (e.g., air quality, service by fire and police departments, noise and traffic levels)
- The degree to which the site will support the educational program
- Convenience for pupils and proximity to other community services
- Practicality and feasibility characteristics (e.g., availability, expansibility, availability of water and utilities, drainage, topography)
- Affordability[5]

Keeping stated goals in mind, planners must constantly consider whether their decisions will reflect the mission and achieve the long-range goals of the district.



Facilities Advisory Committees

Facilities planning should involve in a meaningful way the groups that will use district facilities. The planning should be ongoing, not a process that begins only when a new school is to be built. A good vehicle for cooperative planning is a facilities advisory committee. It can develop ways for school facilities to serve diverse groups in the community. The facilities advisory committee can be a source and champion of *innovative* ideas to meet long-range goals of the district and to integrate technology into the educational facilities of the future. A committee that has met regularly over a sustained period and developed a cooperative working relationship can contribute greatly to the success of new educational facilities.

Facilities advisory committee representatives may include school board members, administrators, teachers, students, maintenance and operations staff, municipal officials or staff, the business community, parents, neighborhood groups, and community groups that will use or be affected by district facilities (the YMCA, scouting organizations, senior citizen groups and so on). Involving community groups will strengthen the link between the community and the schools by maintaining continuous communication and coordinating diverse needs.

Written, adopted board policies should govern the establishment, structure, specific charge, functions, reporting procedures, responsibilities, membership, leadership and evaluation of facilities advisory committees.

Facilities Planning Issues and Trends

Although each school board develops its own unique vision, informed, responsive facility development demands acknowledgement of certain trends. The following is a discussion of those trends and corresponding issues and tactical implications for planning the educational facilities of the future.

Demographic Trends and Implications

Currently, different areas of the country face dramatically different demographic situations. School populations are growing rapidly in the south and southwest, while the decline of enrollment in New York State is just beginning to decelerate. In New York State the baby boom caused statewide public school enrollment to increase rapidly throughout the 1950s and 1960s. Statewide enrollment has been declining since the early 1970s. Figure 2 illustrates the decline in school construction that parallels the decline in enrollment over the past decades. Between 1948 and 1957, there were 951 school buildings approved for construction. Between 1978 and 1987, only 23 buildings were approved for construction.[6] In fact, 650 public schools were closed across the state from 1972 through 1981. Although a few areas around the state have experienced rapid development during the past few years, (e.g., Fort Drum districts), the number of new schools being built statewide has remained very small.

Total K-12 public school enrollment is not projected to increase until 1990, and, even then, increases through 1995 are not expected to exceed 1.5 percent per year.[7] However, enrollment in the elementary

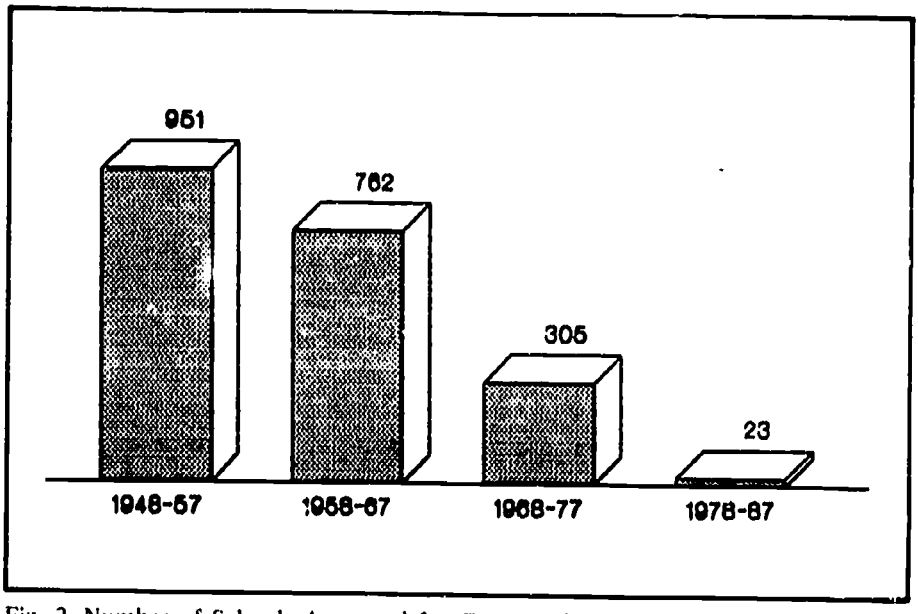


Fig. 2. Number of Schools Approved for Construction, 1948-57 through 1978-87 *(New York State Education Department)*

grades began to rise in 1984 and will continue to do so at least through 1995. Enrollment increases in the early grades, attempts to reduce class size in these grades and greater use of classrooms for specialized programs will result in space shortages in many districts. Thirty-five percent of 536 districts surveyed by the New York State Education Department in 1987 reported that available instructional space was inadequate. Fortunately, the expected growth is of a magnitude that may be dealt with by utilizing space that might have been idle during the decade and a half of decline, reconfiguring the grades, using a small number of portable or modular classrooms, relocating special programs or altering attendance zones.[8]

Increases in elementary enrollment will be temporary in many cases, since the elementary students will soon move on to secondary school. Thus, a key to accommodating this growth, and many other changes, is *flexibility;* major changes should not be irreversible. *New facil ty designs should maximize user/owner options by allowing for immediate internal functional flexibility; that is, variable sizes of space, logical and simple expansion potential, and predesigned convertibility to other uses.*[9]

Due to the dramatic decline in enrollment, the less than optimal quality of some hurriedly built structures, a backlog of deferred maintenance and the age of many school buildings, repair and renovation have replaced new construction as the means of improving the learning and teaching environment in New York State's public schools. Evidence of this is provided by a survey conducted by the education

department in November 1988. Results of that survey indicate that 430 school districts and BOCES districts across the state will include 1,322 capital projects in their 1989-90 budget proposals. Only 36 (2.7 percent) of the projects proposed are for new elementary or secondary schools. The majority are reconstruction projects, asbestos projects, school additions or roofing projects. Figure 3 shows the types and number of projects as a percent of all projects. In addition, although new school construction has declined dramatically over the past several decades, there has been a dramatic increase in reconstruction and modernization projects, as illustrated by figure 4.

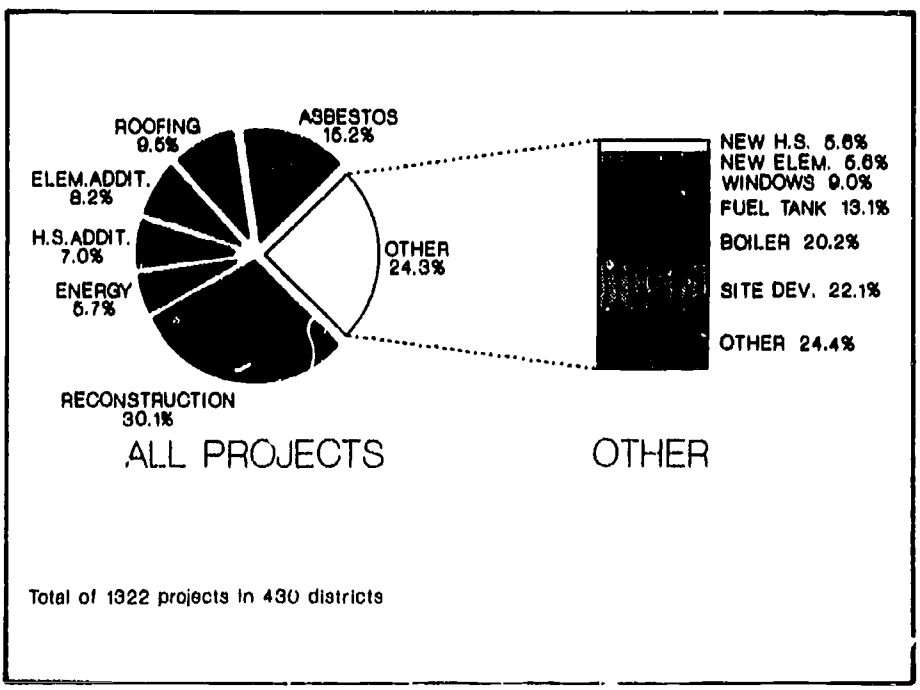


Fig. 3. Types of Capital Projects Planned for 1989-90 *(New York State Education Department)*

Many districts are still experiencing declining secondary enrollments and have to deal with the issue of excess space. *As does growth, flexibility and an eye to the future must govern the use of excess space. Leasing school space is a preferred option because it is temporary and because leasing to community or human-services programs can be mutually beneficial to the district and the tenants. Space should be rented to programs the school board and staff regard as appropriate.* One New York State district leases school space to, among others, a senior citizens' program and a community center that runs after-school programs. Leases should be short-term, however, leaving open the option of reclaiming the space for school use should it be needed.

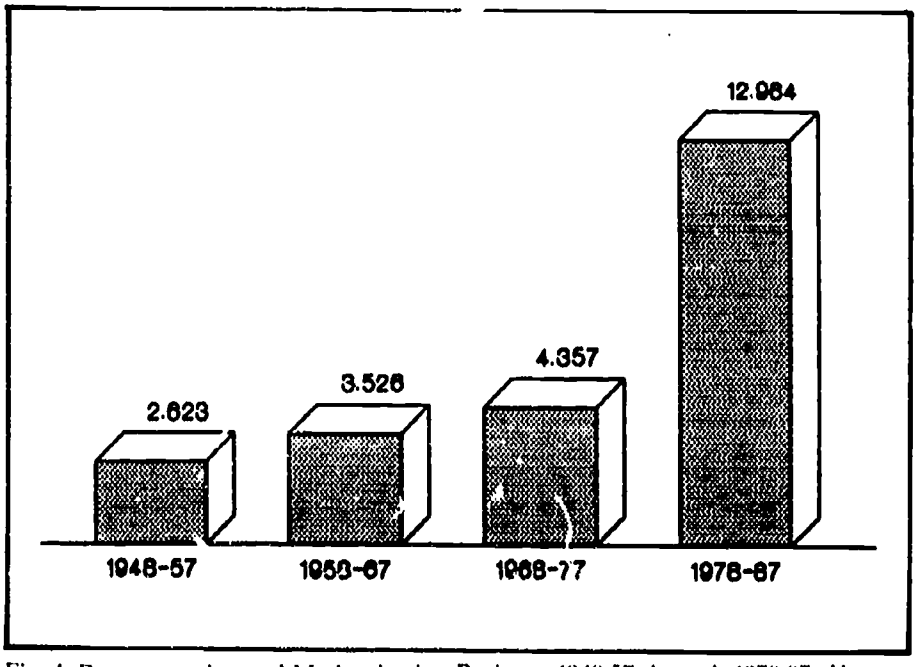


Fig. 4. Reconstruction and Modernization Projects, 1948-57 through 1978-87 *(New York State Education Department)*

Even when the lease is short-term, district officials should communicate regularly with tenants, ensuring that they understand the district may need to reclaim the space at some time in the future. If the tenants have programs that the district feels are valuable to the school and community, and if the relationship has been cooperative throughout, the district may want to assist in relocating the program.

An important component of planning is obtaining enough demographic data to accurately predict district enrollment. Computerized packages based on the cohort method are now available at relatively low cost. Many facilities planners, or, in smaller districts, business administrators, are using these programs on a regular basis. However, when new facilities, renovations or additions are being planned, and a better assessment of future facilities needs and potential school sites is needed, more extensive data should be collected. Additional sources of data include the retention rate of high schools; in-and-out migration; census data; county planning departments; issuance of building permits; health departments; and independent surveys conducted by organizations such as the chamber of commerce, utility companies and state economic development agencies.

School board members and others involved in facilities planning should obtain up-to-date demographic and socioeconomic information and enrollment projections from appropriate administrative personnel.

Social Trends

The number of children living below the poverty level is increasing nationwide and statewide. These students are often referred to as the *at-risk* student population. To address their needs, public school systems and their facilities must better coordinate their services with other service providers. The state's Schools as Community Sites Pilot Project is doing just that. Pilot districts have been awarded grants to fund schools as community sites. The schools develop programs that coordinate educational, social, health, recreational and other services intended to improve student performance in economically distressed areas. Special efforts are made to involve parents, community organizations and business representatives in the projects. The schools are open from early morning to late evening (some on an extended-week or extended-year basis) and may offer day-care, latchkey, nutritional, drug-prevention, computer-literacy, parenting and academic-enrichment programs, among others. In one city, the Schools as Community Sites Project has been successful enough to serve as the model for four new schools.

Efforts to evaluate the progress of the Schools as Community Sites Project should continue. Eligible districts are encouraged to participate, and state financial and professional support should be increased. It is likely that all communities could benefit from some variation of the model.

Senior citizens are increasing in number and will also constitute a larger portion of the population. Consequently, their support for budgets and bond issues will become increasingly important. *School boards should consider ways to use facilities to address the needs of the senior citizen population to a greater extent.* Providing access to programs and facilities run by the public schools not only benefits participating senior citizens, it also establishes communication with and gains the support of a group that may tend to oppose increasing educational expenditures.

Another important social trend affecting the use of facilities is the restructuring of industrial jobs, which has generated a need for retraining. Access to school facilities for the retraining of adults is another way in which schools can more fully serve the community and gain public support.

School districts should consider the facilities and related fiscal implications of the cradle-to-grave concept of education as they join forces with the community and widen services offered by schools and their facilities. With various groups using facilities, office and meeting space will be required. Safety and security needs change as a result of school buildings being in constant use. Reducing the amount of time during which school buildings are unoccupied can reduce the incidence of

vandalism. Nonetheless, more attention must be paid to safely blocking access to portions of buildings during evening use, to vandal-proofing buildings, and to the design and supervision of restroo areas. In addition, more and better-lighted parking facilities will be needed. Physical access and overall comfort for senior citizens and parents should be considered. By posting clearly written signs in the buildings, and by providing adult-size chairs in meeting rooms, facilities can be made more welcoming to adults.

Drop-off/pick-up access to day-care and prekindergarten programs must be addressed to protect very small children from getting hurt in the shuffle or hit by cars in heavy traffic. Ideally, programs for very small children have their own pick-up and drop-off areas. There will be a need for greater storage space as day-care and prekindergarten equipment is purchased and as more spaces are used for multiple purposes (such as programs run by community organizations at community schools). The agencies involved should coordinate the maintenance of shared space, priority usage, scheduling authority, fee schedules, and other policy and administrative matters. The need for cooperation and coordination in these areas illustrates the appropriateness of facility advisory committees.

As community ties and service coordination are strengthened, a variety of facilities-sharing arrangements will become more common. For example, the YMCA already runs after-school latchkey programs in some districts; health-club facilities serve public school physical education programs; fast-food chains replace cafeteria services and provide work for students; and schools are located in shopping malls and attached to museums and parks.

Instructional Technology

The speed with which technology is advancing and becoming an integral part of elementary and secondary education must be considered. The implications for facilities of bringing technology into the schools are many and crucial. One of the key factors is flexibility. To the greatest extent possible, wiring and the arrangements for housing and accessing equipment must be alterable. For example, recently schools were being built or improved to contain computer labs. Now, more schools include computers in every classroom as computer use is being integrated into more programs. In addition to computers, the incorporation of videocassette recorders/players, videodiscs, cable television, digital television, telecommunications, television transmissions, and robotics has implications for facilities. Climate (especially humidity) control and locating computer wires are basic but important considerations, as are security issues related to the presence of expensive equipment in the schools.

The impact of technology on the learning environment has become pervasive.[10] *Innovative ideas to meet long-range goals and prepare logistically for the incorporation of all kinds of technology should guide the building or renovation of the schools of the future.* One resourceful school district got ideas for incorporating technology into school design from staff visits to high-tech companies, which included meetings with corporate staffs. Design features for science, vocational education, special education and a media center were identified as a result of this process.

A basic implication of increased technology in the schools is the impact on electrical systems: where to run the wires, how to wire to network certain classrooms, and how to wire flexibly so that when new equipment comes in it can be accommodated. An indirect implication of technology for facilities in the schools is the need to balance the high-tech with the "high-touch." *As learning becomes more individualized, technical and complex, spaces where informal communication and socializing can occur should serve to soften the impact of high technology.* Children need "people spaces"—spaces with warmth, natural light and comfortable seating.

As evidenced by a growing number of business/school partnerships, the business community has become increasingly concerned with and committed to what is going on in the public schools. The development of such ties can result in the use of state-of-the-art business facilities and the provision of equipment to the schools. For example, one computer company worked with a school district to test its new networking system. In this instance, the corporation gained a real-life testing environment, while the district gained the use of state-of-the-art technology. Another district planned a new facility to be paid for by charging rent to local businesses located on the school grounds. Students in work-study programs thus learn skills and serve as a labor pool for the businesses.

Reform Movement Trends and Implications

Aspects of the education-reform movement of the 1980s have implications for facilities design, although the physical learning environment has not often been directly addressed.

In New York State, reform initiatives have almost exclusively involved program and academic standards, as embodied in the Regents Action Plan (RAP). Unfortunately, little consideration was given to the program reforms' implications for facilities. For example, 29 percent of districts responding to a survey taken by the Association in 1986 anticipated major changes in their physical plants in order to implement RAP. Several program initiatives dealt with the middle grades, defined by RAP as housing grades seven and eight. However,

only 15 percent of districts responding to the Association survey housed their middle level as grades seven and eight.

The Board of Regents recently approved a policy statement on middle-grades education, as well as a new program that will utilize the waiver of regulations as an incentive to develop innovative middle-level programming. This option represents a potential acknowledgement of the importance of facility design and capability in relation to educational goals and program organization.

The same is true for recent statewide educational accountability proposals that rely on building-level planning and goal setting.

The systems reflect popular ideas about site management and effective schooling; however, decentralized planning guides seldom recognize the potential for integrating educational programs and facility design. For example, arranging and adapting classroom space may determine certain combinations of student grouping, course schedules and curriculum, thereby shaping building-level goals. The potential link between facility and educational programs should be recognized and worked into planning at an early stage.

Reform literature has pointed out the need to strengthen science programs in order to gain and maintain students' interest. Recommendations also have been made to provide facilities designed for hands-on science study in the elementary grades. This ties in with the previous discussion of technology: the design of science facilities should be included in plans for incorporating technology and more laboratory space into educational facilities.

The strong emphasis on early childhood education as a means of preventing students from dropping out has implications for facilities that were discussed previously. Not only are preschool programs being established, but an increasing number of districts will be expanding to full-day kindergartens from half-day programs. The addition of space for prekindergarten should be made eligible for state building aid.

Another area of reform initiatives concerns the professional educational staff. An example is the call for the professionalization of teachers. Across the country, districts are considering and architects are designing schools that provide more and more varied professional working space for teachers. Examples include preparation stations, conference space and places to make and receive phone calls.

New York State's commissioner of education has recommended that districts be encouraged to provide professional working environments for teachers and that the state building aid formula be amended to permit aid to be used for improving teachers' working environments. School boards should be aware that students may ultimately benefit from such improvements (for example, parents may be more

willing to meet with teachers if private, "adult" conference space is available). *School boards should assess teachers' working conditions with facility design and utilization of space in mind. The addition of teacher work space should be made eligible for state building aid.*

A direct result of research on effective schools has been a focusing of attention on reforms at the building level, including strengthening the role of the building principal. *Principals should be more involved in facilities issues.* This involvement could mean working more closely with operations and maintenance personnel and initiating facility-maintenance programs, plans for access for the handicapped and energy-conservation programs.[11]

Acceptance of the benefits to all students of educating those students with handicapping conditions in the least restrictive environment has made the provision of space for special education programs an important consideration of educational facilities planners. New York State has taken action in this area by requiring each BOCES district superintendent to submit a five-year special education space-requirement plan to the education department. The plan must describe the current and future space needs of special education programs serving students within local district facilities, the BOCES and private schools in the BOCES region. Representatives from these service areas, as well as parents of students with handicapping conditions, must be represented on the planning committee that assists in developing the plan.

The purpose of requiring the plan is to "assure that local school districts and BOCES take adequate measures to provide sufficient, appropriate, and stable space for special education programs and services to students with handicapping conditions."[12] In addition, financial incentives have been developed to encourage districts to build space for special education programs, especially for non-handicapped pupils.[13]

Other trends that may have implications for the design of and need for school renovations and construction include equal access for women to physical education and vocational education programs, team teaching and the linking of curriculum areas, an increased emphasis on the arts (another aspect of the high-tech/high-touch balance), more specialized magnet school programs, less class time missed because of remedial and gifted programs, and the overall movement toward the individualization of learning programs.

The Problem of Deferred Maintenance

During the late seventies, many school districts deferred the maintenance of facilities because of inflation and the high cost of energy.

Schools built by the Works Progress Administration continued to deteriorate, and many built during the baby boom had life spans of only 20 years because they had been built to fill an immediate need for space. In 1983, a report entitled *The Maintenance Gap* estimated that the backlog of deferred maintenance of school buildings in this country amounted to $25 billion.[14] A more recent study estimates the cost of deferred maintenance nationwide to be $41 billion.[15]

While the problem of deteriorating facilities affects school districts of all sizes and types, the situation in many large city school districts has reached crisis proportions. As illustrated by figure 5, well over half of the schools in Buffalo, Rochester, Syracuse and Yonkers were built before 1930. Less than one quarter of the schools in the rest of the state were built that long ago. In New York City over 80 percent of the 1,020 school buildings require capital repair work (window repair, painting/plastering, roofing, plumbing, heating/electrical or exterior masonry).[16] In short, billions of dollars are needed to make large-city educational facilities habitable and uncrowded.

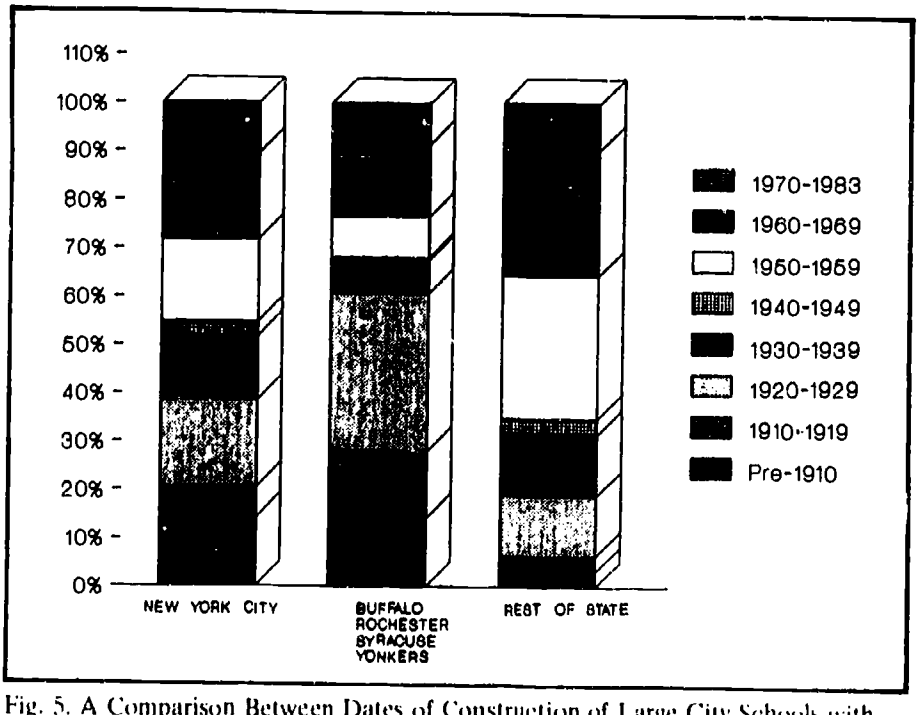


Fig. 5. A Comparison Between Dates of Construction of Large City Schools with Those of Schools Throughout the Rest of the State *(New York State Education Department)*

Inviting and uncrowded surroundings would not solve all the problems faced by urban education systems; but students cannot be educated unless they *attend* school, and the current condition of many urban schools certainly does not send out a welcoming message. Con-

cluding an eloquent argument for investing in the urban educational infrastructure of this country, one author writes, "To what degree can city youths be expected to believe that education is the principal route out of urban squalor and despair when society appears unable or unwilling to rescue their schools from similar conditions? And what message of self-worth and societal expectation does the abysmal physical state of inner-city schools convey to students who have no choice but to attend them or drop out?"[17]

In New York State, the problem of the deteriorating educational infrastructure was partially addressed by the legislature during the 1987 session. The state-mandated Capital Assets Preservation Program (CAPP) requires the assessment of the operation, maintenance, reconstruction and alteration needs of each public school facility in the state. The law also requires public school districts to develop long-range (five-year) facilities plans to include detailed information about existing facilities as well as estimates of construction needed in the future. A similarly formatted statewide inventory is to be developed by the New York State Education Department.

An education department computer software program eventually will enable districts to produce their required facilities inventory. In addition, the program can be used as a facilities-management tool. If kept updated, districts thereby will be able to plan when different maintenance jobs must be done based on information about the age and condition of each component of each facility. Districts will be able to obtain a manual on how to conduct complete, detailed inspections of buildings effectively and efficiently. Advantages to a system for facilities planning and management like CAPP include

- Consistent, uniform evaluation of all buildings, ensuring that all buildings receive a fair share of the maintenance dollar
- The low cost of an in-house maintenance audit as compared to the use of outside consultants
- Cost savings in cases where repair and maintenance increase the life span of facility components, thus avoiding replacement costs
- The assurance that thorough planning has preceded the expenditure of all maintenance funds, the written evidence of which can enhance the school board's public relations with the school system and the community
- The options afforded decision makers by the availability of information, which allows priorities to be established and acted on or postponed, depending upon the availability of funds.[18] *School districts, therefore, are urged to participate as fully as possible in CAPP because it promises a more effective, efficient and cost-saving method of maintaining school facilities.*

Energy Conservation

Perhaps the most important thing that school boards should know about energy conservation is that the problem is not over. Even in times of plenty, waste of resources should not be tolerated. Difficult fiscal times and increased use of school facilities enable all school districts to benefit potentially from renewed and extended energy-conservation measures. The American Petroleum Institute forecasts the following scenario: "Lower prices discouraging U.S. oil exploration at the same time it induces Americans to use more petroleum, will increase dependency on foreign oil. Then, in just a few years, OPEC could be positioned again to dictate higher prices because this country will have no other major source."[19]

The best way to ensure energy conservation and the resultant facility-management savings is to incorporate energy-conservation measures into plans for new construction. The investment made during construction is long-term and low-cost relative to renovating for improved energy efficiency. *School boards should inform their architects/engineers that conservation is a priority.* Decisions concerning a building's orientation (exposure to the sun, its slope); lighting fixtures; landscaping; and terrain are directly related to energy consumption. In addition, areas of schools not used on nights and weekends should be blocked off from areas provided for community use so that the entire facility need not be heated and lighted at all times.

School districts should also be aware of the technology available for monitoring heating and lighting systems. An energy-management system (EMS) computerizes the control of heating and cooling as well as ventilation and lighting systems. Computer programs turn heating and lighting systems on and off according to a predetermined pattern. Such a monitoring system "takes guesswork out of operating building energy systems, overrides human error and neglect, and quickly identifies malfunctions which could prove to be very costly if not repaired immediately."[20]

School districts wishing to make changes in existing facilities to conserve energy may wish to consider comprehensive shared-savings energy-conservation contracts. These provide engineering, financing, improvement of the energy system and monitoring. Companies that offer these packages make capital improvements to increase energy efficiency at no cost to the district. Payment is based solely on realized savings.[21]

There is also a federal matching-grant program administered by the New York State Energy Office called the Institutional Conservation Program. Grants are used for technical-assistance studies of heating and cooling systems, building structures and energy-conservation measures.[22] Finally, the state education department's Divi-

sion of Facilities and Management Services provides on-site visits by division staff who will examine a district's operations and maintenance procedures thoroughly and make recommendations about how to improve them.

It is estimated that operations and maintenance procedures can achieve 40 percent of the potential energy savings that exist in a typical building; energy-conservation measures involving capital improvements account for only about 15 to 20 percent of the savings. Improving operations and maintenance procedures is the least expensive type of energy-conservation measure.[23]

Energy conservation as it is practiced in the schools can be a valuable instructional tool. For example, many schools have students conduct energy audits and learn about maintenance and operations procedures that conserve energy. The New York Science, Technology, and Society Education Project provides K-12 curriculum materials and teacher in-service training for teaching about energy conservation.[24]

Based on a New York State Education Department report written in 1983, energy consumption by New York State's public schools was 30 percent less in 1981 than in 1972 (see fig. 6). Thus, although there is still much to be done in the area of conservation, the public schools of New York State have significantly reduced fuel consumption over the past several years.

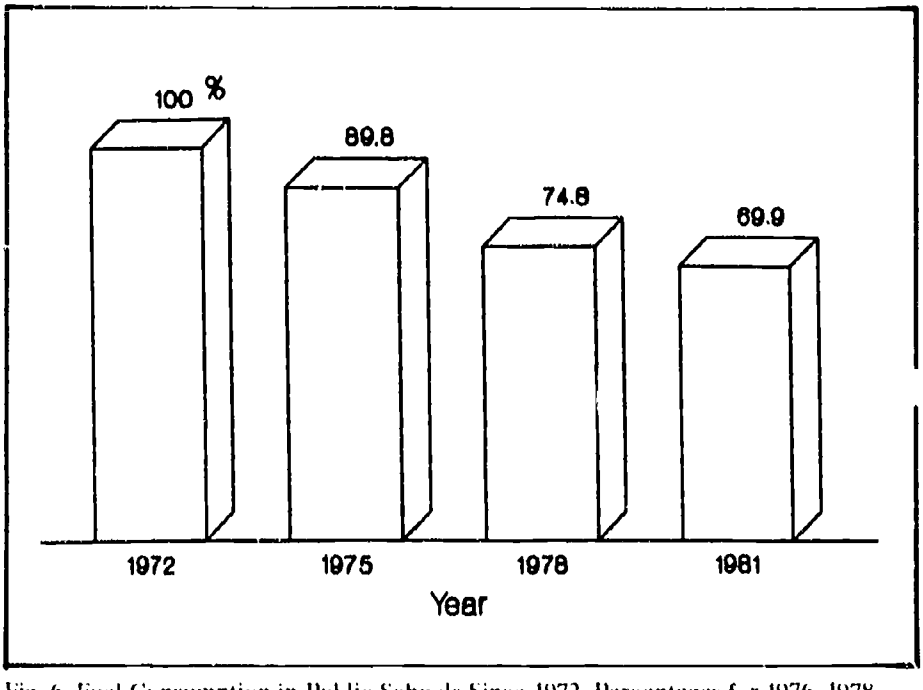


Fig. 6. Fuel Consumption in Public Schools Since 1972. Percentages for 1976 1978 and 1981 are based on consumption for 1972 viewed as 100 percent. *(New York State Education Department)*

Health and Safety Trends and Implications

Without question, asbestos represents the major facility-related health and safety issue of the late 1980s. The federal government has mandated school district plans for inspecting and managing asbestos abatement. Districts were to begin implementing those plans in the summer of 1989. Based on the plans submitted by the districts, the estimated cost of asbestos abatement in public schools statewide will be close to $1 billion.

Asbestos abatement is a highly emotional issue in school districts. Community members, often without the technical knowledge needed to assess the situation, may demand the removal of all asbestos from school buildings. Although this may sound like the ideal solution, it seldom is. Total removal of asbestos that can be otherwise abated may pose more danger than not doing anything. Asbestos can be released into the air and remain there when massive removal projects are undertaken. In addition, removal is by far the most costly way to deal with asbestos.

The New York State Education Department provides information to school districts and communities about why removal of asbestos should be considered only in extreme cases. This type of information, and all information about the nature and extent of the asbestos problem in a district, should be disseminated as widely as possible. In this way, school boards and administrators can make rational decisions based on expertise that will hopefully be supported by the community.

The management of asbestos will be extremely costly to districts over the next several years. A large part of the problem is the uncertainty involved; estimated costs are far below actual costs when attempted abatement reveals more asbestos and when abatement projects result in replacement costs. It cost one district $200,000 to replace ceiling lights after an asbestos-abatement project, and the average cost of the 200 planned asbestos projects reported on the state education department's survey of November 1988 was $479,000. Although there is a minimal amount of state funding available, the large part of the cost must be borne locally. The escalation of noninstructional costs such as asbestos abatement is a growing problem for school districts, particularly the less wealthy ones. *Relevant aid programs should be enriched and expanded to include other environmental hazards.*

Asbestos will not be the last major environmental problem to plague school districts. Evidence indicates that an oversimplified approach to energy management (e.g., making buildings as airtight as possible, thereby minimizing ventilation) has caused a new problem: indoor air pollution. *School boards should be aware of and understand the problem of indoor air pollutants.*

Some pollutants, such as automobile exhaust, are generated outdoors and infiltrate inside buildings; others are generated indoors by toxic substances emitted from construction materials, office machines, microorganisms located in heating and air-conditioning systems, and other sources.[25] Pollutants commonly found in school buildings include radon, asbestos, organic compounds and microorganisms such as bacteria and viruses.[26]

To the extent possible, those involved in planning school facilities should consider ways to avoid or minimize indoor air pollution. This can be done by testing potential building sites for radon, avoiding building materials that contain hazardous substances, providing adequate ventilation (especially in smoking areas) and avoiding energy-conservation measures that are likely to reduce the quality of the indoor air.

As indicated in the introduction, New York State schools have an exemplary health and safety record; however, current state codes do not address environmental issues such as energy conservation, the quality of indoor and outdoor air, toxic spills, toxic burning, lead, radon, the content of building materials or the safe location of school sites. *State building code standards need to be reviewed and updated to address urgent health and safety issues not currently included. However, the state should be prepared to accept the fiscal obligation those requirements will produce.*

Liability Trends and Implications

The main goal of addressing health and safety issues through facilities planning is the well-being of the students and staff who spend so much of their time in school buildings. However, the increasing litigiousness of our society is an important factor. *The planning of educational facilities should be viewed as a myriad of opportunities, one of which is the opportunity to reduce the chances of being sued by taking adequate risk-control measures.*

The trend toward increasing the community's use of schools and the expansion of programs to include prekindergarten classes highlight the risks of facility use, such as people falling or ingesting hazardous substances, or possible fire or vandalism. *Districts should have a strong risk-management program, including a prevention component that enhances the safety of all building users. In addition, each district should formulate a written policy requiring all outside groups using its facilities to provide evidence of adequate insurance.*[27] Finally, Section 2801 of the Education Law requires districts to adopt rules and regulations governing conduct on school property, as well as the enforcement and penalty for violation of such rules and regulations.

As a consequence of the skyrocketing number of lawsuits and the resulting cost increases for insurance companies, school district insurance coverage usually excludes high-exposure items such as trampolines and pollution. The pollution exclusion is especially significant, given the asbestos situation and the strong likelihood that school districts will become responsible for eliminating other environmental hazards from their facilities. A pollution exclusion translates into no liability coverage for any environmental impairment. Facilities planners should be aware of such exclusions when considering building plans and the furnishing and equipping of new and renovated facilities.

Innovation and Planning

Ted Schwinden, the governor of Montana, was chairman of the National Governors' Association Task Force on School Facilities. The task force recommended more efficient use of buildings for educating students; greater use of school property for general community use (i.e., day-care and after-school programs); active involvement of states in restoring buildings to safety and good repair; adoption of policies for the disposition of old facilities; and the development of greater expertise by national education organizations in alternative school use and design. The governor stated, "The one obstacle we foresaw common to these recommendations is the simple response to new ideas offered by character Tevye in *Fiddler on the Roof* —tradition![28]

It seems evident that traditional egg-crate classrooms and school buildings do not provide the most stimulating learning environment. If form is to follow function, then facilities must be adapted as educational program functions change to reflect changing demographics, social realities and technologies. *A vision of the future is needed. School boards and facilities committees must develop that vision and exercise their responsibility to bring innovation to the planning of school facilities.* And it must be noted that, contrary to popular thinking, innovative ideas for educational facilities are not necessarily more expensive to implement than traditional ideas.

School boards and administrators should take advantage of resources such as the Council of Educational Facilities Planners International (CEFPI), the American Institute of Architects (AIA), and educational and architectural publications. These sources can provide examples

of innovative facilities across the country, low-cost ways to implement innovative ideas and reference to other sources of information. *Finally, boards should visit other facilities to obtain new ideas and to evaluate the advantages and disadvantages of what has been done.*

Conclusion

In preparing *all* students to be full participants in the changing world and accommodating related demographic and social trends, the educational facilities available to communities will be more important than ever before. Increased access to the facilities by more and different groups; sophisticated instructional materials (hardware, software, TV, satellite, video); space configurations that support new ideas about instruction and teaching; and a reversal of infrastructure deterioration are all necessary components of the schools of the future. School boards will have the opportunity to be visionary, innovative leaders of facility-planning teams that will acknowledge a changing society and education's role in that change.

Appendix A

Pollutants Found in School Facilities

Radon

Source: Ground, masonry materials, water. Radon is "a naturally occurring radioactive gas that can become trapped indoors after emanating from the earth beneath [a building] or even from earth-derived building materials used in constructing it. Colorless and odorless, radon decays into highly unstable elements known as *radon progeny,* which attach readily to dust particles in the air that become deposited in the lungs, where the alpha radiation they emit can cause cancer."[1]

Hazard(s): Lung cancer

Countermeasure(s): Eliminate radon-containing materials; provide adequate ventilation of crawl spaces to the outdoors.

Asbestos

Source: Asbestos and fiberglass particles from insulation and fire-retardant materials.

Hazard(s): Asbestosis, lung cancer.

Countermeasures: Contain, encapsulate or remove offending material.

Organic Compounds

Source(s): Paints, copy machines, cleaning agents, foam in furniture cushions and carpet backing, etc.

Hazard(s): Skin, eye, throat and respiratory irritation; headache; nausea; cancer.

Countermeasure(s): Reduce the use of these materials in your facility; provide adequate ventilation. Maintain careful compliance with the New York State Right to Know Law and the federal Environmental Protection Agency's Hazard Communication Law.[2]

Microorganisms (Bacteria, Viruses, Fungi and Molds)

Source: People, plants, and animals; also, wet and humid environments such as ventilation systems, humidification systems, and damp crawl spaces are conducive to colonization by microorganisms.

Hazard(s): Infections, allergies, diseases. Legionnaires' disease is linked to microorganisms found in the stagnant water of ventilation systems.

Countermeasure(s): Clean and maintain ductwork and humidification media; locate access holes to crawl-spaces away from ventilation ducts.[3]

Appendix B

Policy on the Public Use of School Facilities

The following wording is suggested for a liability-related section of a policy on the public use of school facilities:

Any individual, group or organization using District facilities must provide proof that adequate insurance is maintained by the individual, group or organization providing for the defense and indemnification of the _____ Central School District, its officers and employees from any claim arising out of the use of the facility by the individual, group or organization based upon the intended use, the number of participants and other appropriate criteria.

Note: This policy was developed by the Office of Policy and Risk Management Services of the New York State School Boards Association. For more information, contact the Policy and Risk Management Services Department at (518) 465-3474, ext. 231, or 1-800-342-3360.

Footnotes

1. Education Writers Association, *Wolves at the Schoolhouse Door: An Investigation of the Condition of Public School Buildings* (Washington, D.C.: Education Writers Association, 1989), 4.
2. New York State Education Department, "Public School Facilities Report: A Report to the New York State Board of Regents," October 1983, Executive Summary.
3. Harold Hawkings and Betty Lightfoot Overbaugh, "The Interface Between Facilities and Learning," *CEFP Journal*, July-August 1988, 4-7.
4. Tony J. Wall, "School for the 1990s: The Next Generation of School Facilities," A presentation at the Annual Conference of the Council of Educational Facilities Planners, Milwaukee, Wisc. (October 1988).
5. R. Craig Wood, *Principles of School Business Management*, (Reston, Va: Association of School Business Officials International, 1986), 620.
6. New York State Education Department, "Public School Facilities."
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8. James Damm, "Growth: Blessing or Headache?" A presentation at the Annual Conference of the Council of Education Facilities Planners, Milwaukee, Wisc. (October 1988).
9. Kal Porter, "Imagineering: Options for School Buildings of the Future," *Thrust*, (February-March 1984), 15.
10. For additional information on technology in the schools, see the New York State School Boards Association position paper *Instructional Technology: Policies and Plans*, (Albany, N.Y., 1988).
11. Yale Stenzler, "Educational Facility Implications: The Report of the National Governors' Association," *CEFP Journal*, March-April 1987, 40-42.
12. *The New York State Register* 10, no. 45, 13.
13. For more information about these incentives, contact the New York State Education Department, Bureau of State Aided Programs, telephone (518) 474-977.
14. American Association of School Administrators, Council of Great City Schools, and National School Boards Association, *The Maintenance Gap: Deferred Repair and Renovation in the Nation's Elementary and Secondary Schools*, 1983.
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19. John Yewell, "The Problem is Over: Right?—Wrong!" *CEFP Journal*, May-June 1986.
20. New York State Education Department, "Public School Facilities Report," October 1983, 26.
21. John Schooley, "The Nature of Energy Shared Savings," *CEFP Journal*, May-June 1986, 21.
22. For more information and to request an application, contact the State Energy Office, Bureau of Institutional Energy Conservation, 2 Rockefeller Plaza, Albany, NY 12223, telephone (518) 474-6695; or call the statewide toll-free energy telephone hotline: 1-800-342-3722.
23. New York State Education Department, "Public School Facilities Report: A Report to the New York State Board of Regents," October 1983, 26.
24. The New York State Science, Technology, and Society Education Project can be reached by telephone at (518) 473-1965.

25. J. J. Wesolowski, "An Overview of Indoor Air Quality," *Journal of Environmental Health* 46 (1984), 311-16.
26. See Appendix A for details of the sources, causes and elimination of these pollutants.
27. See Appendix B for suggested wording regarding liability to be included in a policy for use of school facilities.
28. Gov. Ted Schwinden, "Remarks of Monta .a Governor Ted Schwinden, First General Session, Annual Conference of the Council of Educational Facilities Planners," *CEFP Journal* [Conference Issue], 1988.

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1. Mary Wayne, "The Dynamics of Indoor Air Quality," *EPRI Journal*, March 1986, 20-25.
2. These laws deal with the labeling, record keeping and employee training associated with the use of toxic substances. More information about these laws as they affect school districts can be obtained from Dr. Mae Timer, New York State Education Department, telephone (518) 474-3384.
3. David Cousins and John Kulba, "Indoor Air Pollution: An Energy Management Problem?" *CEFP Journal*, January-February 1987; and A. Caruba, "Indoor Pollution: The Invisible Enemy," *American School and University* 56 (1984): 46-47.

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