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School Facilities Management

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ABSTRACT

A key responsibility of school administrators is facilities management. School buildings across the nation are aging and becoming a barrier to optimal learning and teaching. This results in escalating school infrastructure costs. A case can be made to renovate or build new facilities that maximize an effective learning environment. This will involve allocation of funds for building renovation or new construction. In this article I discuss these two issues: school infrastructure costs and financing new construction.

The management of school facilities falls within the key duties of the school administrator. Administrators need to embrace this responsibility as they gain greater control and are held more accountable. Aging school buildings often create barriers that impede effective teaching and learning. This has resulted in escalating school infrastructure costs. A case can be made to renovate or build new facilities that maximize an optimal learning environment. Such a choice will necessitate financing school construction.

School Infrastructure Costs

The nation's school infrastructure is in a state of critical disrepair. By *infrastructure* is meant the basic physical facilities that underpin the school plant (plumbing, sewer, heat, electric, roof, masonry, carpentry). Schools seem to be deteriorating at a faster rate than they can be repaired, and faster than most other public facilities (Lunenburg & Ornstein, 2008). Plumbing, electrical wiring, and heating systems in many schools are dangerously out of date, roofing is below code, and exterior materials (brickwork, stone, and wood) are chipped or cracked. The cost of deferred expenditures currently runs to over $200 million in Los Angeles, Detroit, Chicago, Seattle, and Miami's Dade Country, with an enormous bill of $780 million for the New York City schools. The accumulated cost to repair the nation's public schools, according

to knowledgeable sources, can now be conservatively placed at $60 billion and may run as high as $150 billion (Report to Congressional Requesters, 2005). In the year 2009, government sources estimated the nation's school repair bill to be $2,900 per student, and the cost per student for schools needing to make the repairs was $3,800 per student. Approximately 76 percent of public schools needed major repair or renovation (U.S. Department of Education, 2010a).

Although experts maintain that schools need to allocate 5% a year for repairs and replacement, recent findings suggest that schools allocate only 3%. The investment in new construction is equally insufficient. Whereas colleges and universities allocate 7% annually for new construction and other public sectors allocate 8%, public schools allocate approximately 3.5%.

Schools in small towns and suburbs are in the best shape. A majority of these school board members report their school buildings are in either better than adequate (43%) or adequate (35%) condition. They say this despite the fact that their schools are aging. More than 60% report their schools are between twenty-five and fifty years old. Nearly 25% say their schools are between ten and twenty-five years old (Moulton, Curcio, & Fortune, 1999).

Schools in cities and in the Frostbelt suffer the greatest infrastructure problems because they are the oldest and the most decayed. Nearly 35% of the schools in the older industrial cities of the Northeast and Midwest were built before 1930; a large number were constructed before 1900. For example, nearly half of Chicago's 597 school buildings were built before 1930, and as many as 80 schools still in existence in 1991 were built before 1900. In Akron, Buffalo, Houston, Kansas City (Missouri), Minneapolis, and Portland, 50% or more of the schools were built before 1930 (Ornstein & Cienkus, 1990).

A school building has five stages. It has lived its normal life the first 20 years, especially in the Sunbelt where construction is cheaper. When it is 20 to 30 years old, frequent replacement of equipment is needed. When it is 30 to 40 years old, most of the original equipment and materials should have been replaced—especially roofs, lighting fixtures, and heating equipment. Accelerated deterioration takes place when it is 40 to 50 years old. A fifty-year-old building is sometimes too new to abandon, especially in the Frostbelt, where construction is usually good; but after sixty years, a number of buildings are usually abandoned, reconstructed, or replaced (Lewis, 1989; Theobald, 2006).

Nationwide, 29% of all public schools are considered in "inadequate condition," built before 1970. Sixty-one percent have been built after 1970, but renovated since 1980, and are considered in "adequate" condition. Ten percent are considered in "good" condition, built after 1984. A larger percentage of schools in the Midwest (36%) and Northeast (33%) are considered inadequate and in need of major repair or renovation, compared to the Southeast (21%) and West (25%). Only 6% of schools in the Midwest and 5% in the Northeast are in the "new" category ("good" condition) compared to 11% in the Southeast and 15% in the West (U.S. Department of Education, 2010b). The differences among regions reflect in part stagnant enrollments in the Midwest and Northeast and growing enrollments in the Southeast and West.

Small schools (fewer than 300 students) have an average age of forty-eight years compared to large schools (1000 or more students) with an average age of thirty-nine

years. City schools have a mean age of forty-six years compared to suburban (40 years) and rural schools (42 years) (U.S. Department of Education, 2010c). Nationwide, 26% of schools were built before 1950.

Interestingly, schools in poorer areas have a greater percentage of newer schools than those in middle-class areas, which flies against the charges of reformers who often refer to most inner-city schools as dilapidated. For example, for schools with less than 20% of students eligible for free or reduced-price lunch, 42% were built before 1950 (U.S. Department of Education, 2010c).

Leading the list of inadequate buildings are Connecticut (60%), California (55%), Washington, D.C. (50%), Illinois (50%), and Rhode Island (40%). Of the buildings that are inadequate, 61% need major repairs, 43% are obsolete, 25% are overcrowded, and 13% are structurally unsound (Lewis, 1989; Theobald, 2006). Many, of course, have multiple problems.

In comparison with other public sectors, the construction and repair needs for schools rank among the most serious in the nation. Yet it is doubtful if the public is willing to spend sufficient money to meet these needs. A nationwide survey of the largest 100 school districts (74% responded) identified in rank order the top three repair items on which schools are spending money: (1) roofs, averaging $31,555 per school and $39 per student; (2) heating and air conditioning at $27,652 per school and $34 per student; and (3) painting at $25,101 per school and $32 per student. Other costly repair items in descending order were plumbing and sewer repairs, electric repairs, carpentry, brick and mortar, carpet and tile, and insulation (U.S. Department of Education, 2010b).

Government estimates for the condition of the nation's schools are grimmer. The top items rated as "inadequate" and in need of repair or replacement in the year 2010 were as follows: (1) heating, air, and ventilation (29%), (2) plumbing (25%), (3) exterior walls, windows, or doors (24%), (4) roofs (22%), and electricity (22%). As much as 50% of the nation's schools had at least one inadequate feature (U.S. Department of Education, 2010a).

Several factors other than age contribute to the deterioration of school buildings and the costs for repairs and renovation (Report to Congressional Requesters, 2005).

Energy Prices

Although energy prices stabilized in the 1990s, they have dramatically increased since 2000. K-12 schools spend more than $7 billion a year on energy costs—or $125/student/year. Most schools, particularly in old, Frostbelt communities, continue to be heated by inefficient boilers. Electrical costs are higher because the school design rarely takes advantage of sunlight. The operating funds devoted to increased energy costs and energy-saving devices have robbed schools of money for repairs and maintenance.

Weather Conditions

The weather is severe in certain parts of the country, especially in the Frostbelt where the 100- to 120-degree annual temperature range causes considerable contraction and expansion of school buildings, roofs, and pavement. The intense cold makes the

water and sewer systems, as well as exterior brick, vulnerable to cracks and leaks. In addition, acid rain, common in heavily industrialized or polluted areas, causes deterioration of all structural surfaces.

Density and Vandalism

Big-city schools are usually located in densely populated areas, resulting in concentrated use of and greater demand for facilities. Moreover, many of these schools are located in highly concentrated poverty areas and service youth populations that are more often involved in property destruction and theft than youth from more affluent areas. All this results not only in higher costs and more frequent repairs but also in higher budgets for security measures, which depletes a system's financial resources and operating funds for repairs and maintenance.

Newer Buildings

Many new schools were constructed during the last twenty-five years, especially in the Sunbelt and suburbs. Many of these schools were constructed with haste to accommodate expanding enrollments. Quality suffered, and these buildings are now approaching the end of their life spans. In contrast, the problems with older buildings involve not only their quality but also their energy efficiency, their failure to meet health and safety codes, and the results of accumulated neglect.

A Ticking Time Bomb

For the most part, educators and the public alike are unaware of the time bomb that is ticking in U.S. schools. What catches our attention is student test scores and the need to reform or upgrade the curriculum. The safety and operating efficiency of the schools are not on the minds of the public unless there is a call for new taxes (Bulach, Lunenburg, & Potter, 2008; Lunenburg & Ornstein, 2008).

Many school board officials are aware of our schools' environmental and structural problems, but have left them for the next generation. Ignoring our inadequate school facilities has enormous costs and will potentially lead to inadequate schools. The longer we wait, the greater the cost for future educational services and the more difficult it becomes to sustain long-term educational growth and financial solvency among school districts. Either we devote, today, a greater share of local and state revenues to the repair and renovations of our educational facilities, or we burden our children and grandchildren with crippling educational expenses.

Financing School Construction

Public school investment in new schools, compared to other public sectors, has been minimal in the last 20 to 25 years because of previous taxpayer resistance and

student-enrollment declines. Nationwide, 61% of the schools were constructed during the 1950s and 1960s, and only 6% were built in the 1980s; more than 20% were over 50 years old in 1990, and the percentage is growing about 0.5% each year (Lewis, 1989; Theobald, 2006). As of 2009, the average age of the nation's schools was fifty years and the average age or year since the last renovation was 21 years (U.S. Department of Education, 2010a).

Where will the money come from to build new schools? Although the states fund about 50% of the revenues for the maintenance and operation of schools, they only contribute 23% for construction. According to one study, 27 states use grant programs (equalized, flat, or matching) to finance new schools, 12 states rely on state or local bonds, two states use fully funded capital programs, but 16 states provide no state financial assistance (National Association of State Directors of Education Plant Services, 1999a). Based on these numbers, some states use more than one program.

The big-spending region for building is the Southeast, comprising eight states (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, and Tennessee). These eight states spent more than $3.3 billion on education construction in 2009. Of that amount, 67% went for new buildings, 20% for additions, and 13% for modernizations. School officials predict school construction will continue to rise; it has been rising since 1985.

Public school enrollments K-12 from 2010 to 2020 are expected to increase 7.5% in the West compared to the South (1%) and the Midwest (-3.3%) and Northeast (-4.2%). All 13 states in the West are expected to show increases, with Idaho (17%), New Mexico (14%), Nevada (13%), Alaska (13%), Hawaii (12%) and Arizona (10%) expected to show the greatest amount (National Association of State Directors of Education Plant Services, 1999b). In short, the western region of the country has replaced the South in K-12 student growth and construction. Nationwide school construction is expected to total approximately $30 to $40 billion per year from 2000 to 2011 and then level off, reflecting a need to replace and renovate old buildings on the one hand and the slowdown of increasing public schools enrollments (3.5 million students from 1993 to 2000 compared to 125,000 students from 2000 to 2011) on the other hand (U.S. Department of Education, 2010b)

Building a new school is no simple task. The rules are complex, the stakes are high, and the considerations are political. Try these questions, for example: How many students will the school accommodate? Where will the building site be located? How will attendance boundaries be drawn? Have environmental concerns been fully addressed? How will the cost be funded? How will voters react? Which companies will get the contracts? How many minority contractors will be hired? The list of questions, with the potential for vague answers is endless (Little & Rhodes, 2010).

Is it possible for one school serving the same number of students to be three or four times more expensive than another? You bet. Consider different building requirements (local construction codes, insulation factors, space requirements), building designs (open-air or enclosed, horizontal or vertical), land prices, professional fees, labor and material expenses.

A downtown Chicago or New York City attorney charges $350 to $600 an hour compared to $150 to $250 for an attorney in New Orleans or Tampa, Florida. A union

plumber costs more than $85 an hour in the Northeast or Midwest urban areas; the cost is half in southern urban areas, and in rural areas it is even cheaper. The cost of land can be two to ten times as high in one city (New York, Chicago, or Los Angeles) as another (Baton Rouge, Louisiana, or El Paso, Texas). In short, where you build is important. The cost of a school building can run from $85 to $110 a square foot in rural southern areas to $160 to $220 per square foot in the major cities (and adjacent metropolitan areas (Howell, 2004).

Another factor to consider regarding square footage is school level. High schools need more square footage per student (about 1 1/2 times more) than do elementary schools to adequately serve their clientele. The reason is related to specialization and additional facilities for older students—larger auditoriums, pools, theatres, cafeterias, indoor gyms, outdoor ball fields, student parking lots. Also, schools in cold climates cannot use outdoor areas as effectively as schools in warm climates. A typical high school serving 1000 students might comprise 100 square feet per student (at $100 per square foot) in the rural South. Another high school serving the same number of students might comprise 200 square feet per student (at $200 per square foot) in the urban Northeast or Midwest. The school's total cost in the urban Northeast or Midwest can run three to four times as high as in the rural sites: One school costs $5000 per student, and the other costs $20,000 per student (Case, 2004). To be sure, these differences in school construction costs have ramifications for property tax assessments.

Schools in the future will cost more than current prices because the designs will be more complex and built for varied functions using more sophisticated components and materials. There will probably be more (1) technological equipment, such as computers, videos, and satellite dishes; (2) school laboratories; (3) places for small-group and independent study; (4) flexible spaces, module classrooms, and adaptable walls; (5) contrasting or great spaces such as common rooms, atriums, and open courtyards; (6) innovative spaces and materials such as underground structures and new plastic and prefabricated materials; (7) expensive lighting, heating, and communications equipment; (8) energy-conservation controls, solar features, heat pumps, and geothermal heating and cooling systems; (9) earth berms and high clerestory windows; (10) curved corners and curved furniture; (11) pitched roofs and arches; and (12) centers or wings to house child-care, elderly, and community services (Case, 2004). Yesterday's "boxy" classrooms and rectangular buildings will increasingly be replaced by flexible spaces and a variety of exterior designs.

Conclusion

A key responsibility of school administrators is facilities management. School buildings across the nation are aging and becoming a barrier to optimal learning and teaching. This results in escalating school infrastructure costs. A case can be made to renovate or build new facilities that maximize an effective learning environment. This will involve allocation of funds for building renovation or new construction.

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