

A grayscale photograph of a child hugging a teddy bear. The child's hands are visible, gripping the bear. The bear is a classic brown teddy bear with a white snout and black eyes. The background is a textured wall.

How Facilities Can Help Overcome the Impact of Poverty on Education

by Monte Hunter

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Introduction

Poverty has such a dramatic impact on school outcomes that other variables are possibly masked.

- *Kenneth R. Stevenson*

Trends indicate that poverty is the most significant stressor on student achievement. The enclosed summarizes student poverty trends in Texas and facility planning practices that can help overcome the impact of poverty on student achievement.

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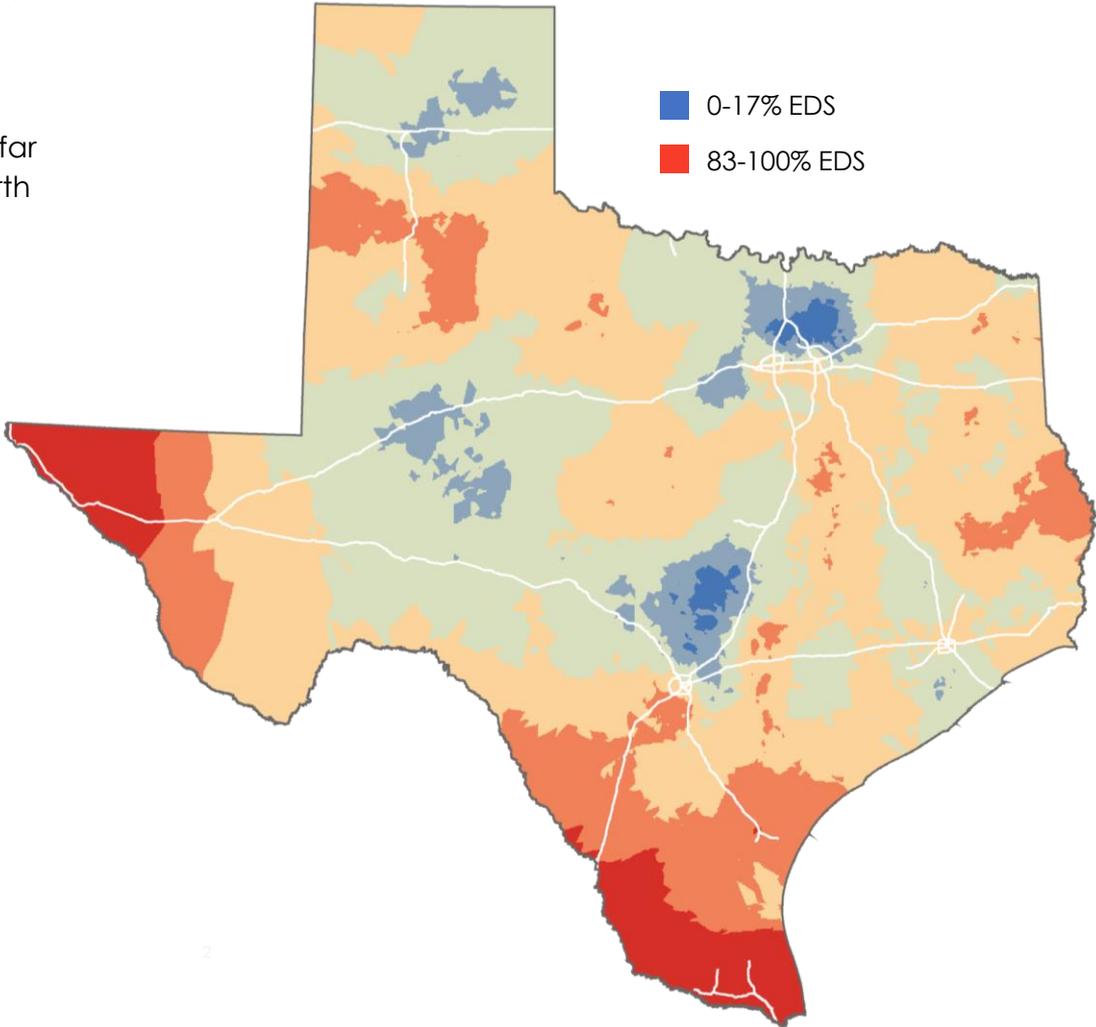
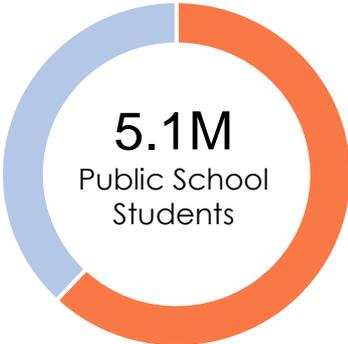
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STUDENT POVERTY IN TEXAS

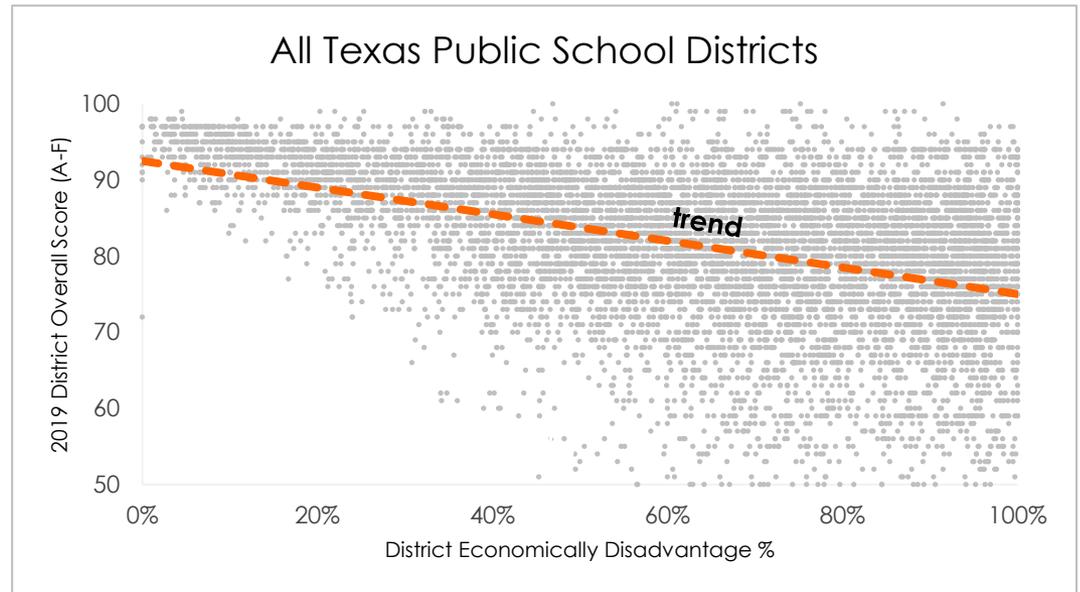
Of the 5.1 million students in Texas, 3 million are classified as economically disadvantaged (Texas Education Agency 2019). The heat map to the right shows the state-wide intensity of the economically disadvantaged students (EDS).

The highest intensity of EDS is in far West Texas and far South Texas. The lowest intensity of EDS is in the north Dallas-Fort Worth area and Central Texas.

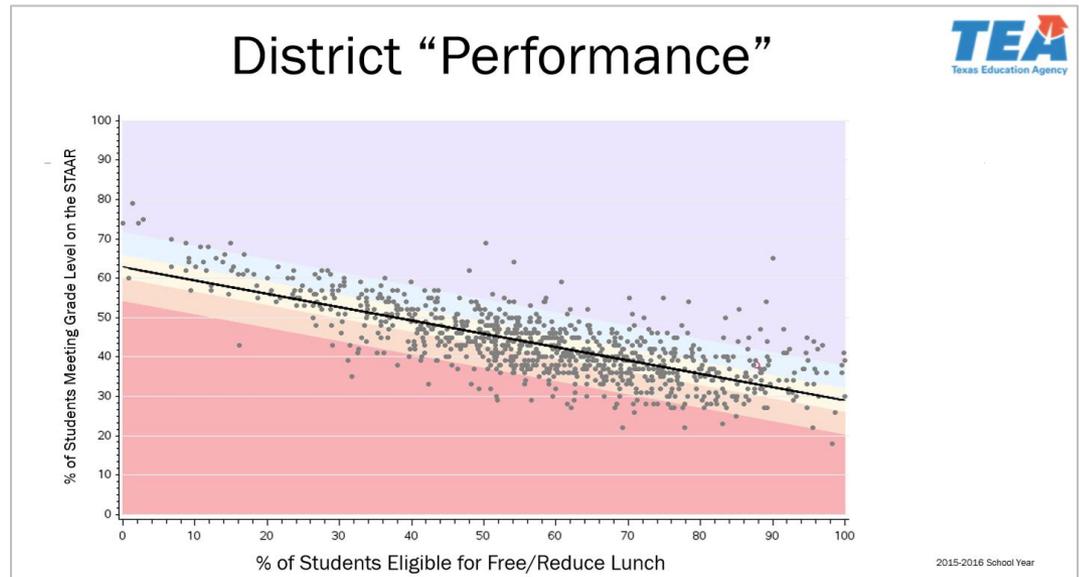


SCORES DECREASE AS POVERTY INCREASES

From 2019 Texas Education Agency Data the district overall A-F score was plotted against the district economically disadvantaged student percentage of all public schools. The general trend indicates district scores decline as economically disadvantaged percentages increase. The A-F scoring factors economically disadvantaged percentages, ethnicity, academic progress, race, and others. This suggests an association of the two, not necessarily a cause and effect.



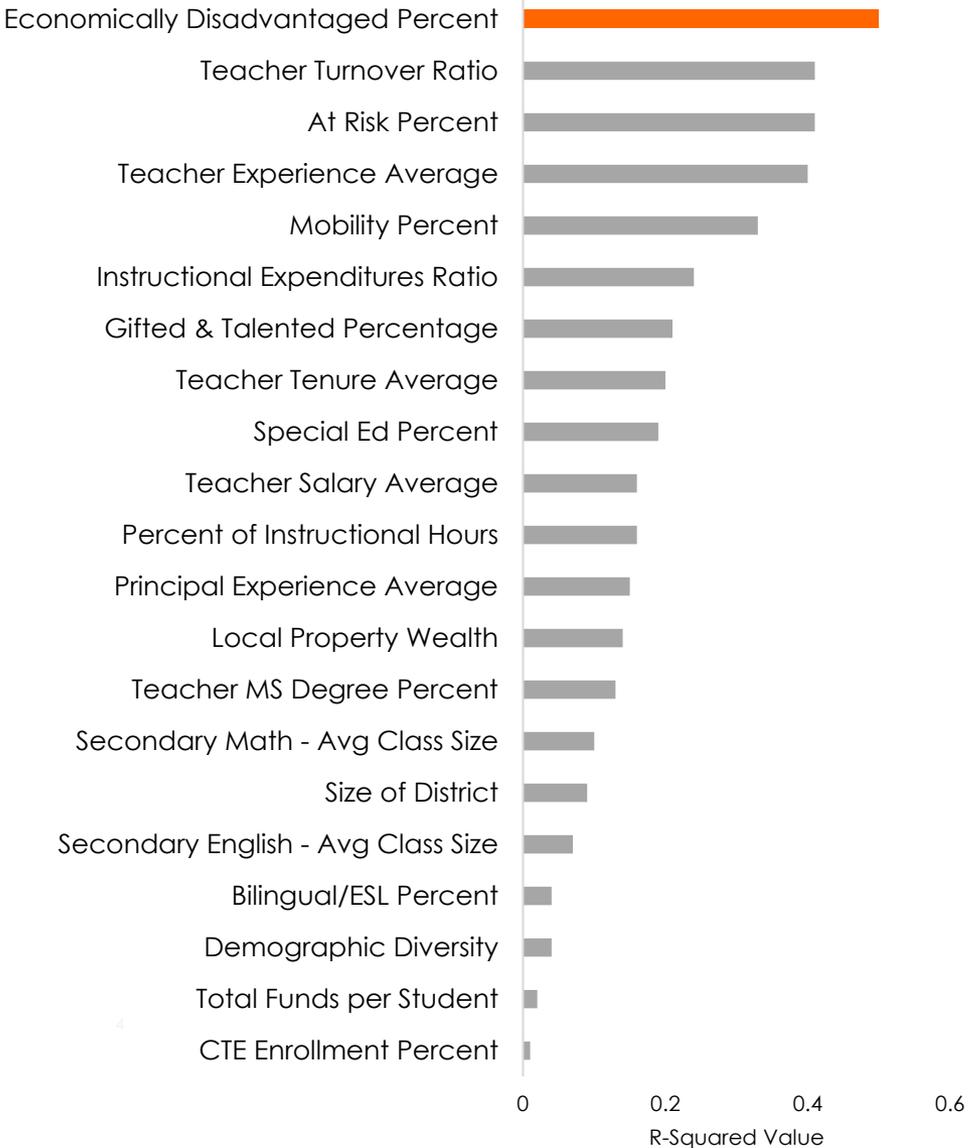
Texas Education Agency has identified a similar trend using STAAR test results and free/reduced lunch percentages. This chart is from a 2018 Commissioner Mike Morath presentation to the Texas Commission on Public School Finance. TEA found similar results at the campus level. These findings were for the 2015-2016 school year.



FACTORS ASSOCIATED WITH STUDENT ACHIEVEMENT

Dr. Chris Jackson analyzed multiple factors of the 2018 A-F scoring system to determine which had the highest association with student achievement. The chart to the right ranks the top factors in terms of association (R-squared).

Economically disadvantaged percent highest association



10 PLANNING PRACTICES

- 1 Nutrition & shelter
- 2 Safety & security
- 3 Manage cost of ownership
- 4 Campus size
- 5 Scale of space
- 6 Indoor environment quality
- 7 Extra-curricular facilities
- 8 Early childhood facilities
- 9 School-community facilities
- 10 Internet connectivity

5



1 Nutrition & Shelter

Maslow's hierarchy of needs indicates the most basic need is physiological needs, including nutrition and shelter. Research indicates an association of nutrition and student achievement (Alaimo, Dodsworth, Ross-see end notes).

Facilities should be planned to provide **adequate food service** and **dining facilities** for before, during and after school programs.

Facilities should also be **maintained in good condition**. There is substantial research that indicates a correlation of overall facility condition and student achievement, especially for economically disadvantaged students (Cotton, Earthman, Stevenson-see end notes).

More so for economically disadvantaged students

2 SAFETY & SECURITY

Maslow's hierarchy of needs indicates safety as a basic need. Recent research indicates a connection between safety/security and student performance (Gronna, Milam, Sparks-see end notes).

After the 2018 Santa Fe High School shooting in Texas, the Legislature increased funding and guidelines for school safety/security were refined. The United States Secret Service provides resources for school safety including An Operational Guide for Preventing Targeted School Violence.

Facilities should be planned to provide basic safety per building codes, life safety codes, regulations, Texas State Safety Center recommendations, and available safety/security standards.

SAFE SECURE
SCHOOLS

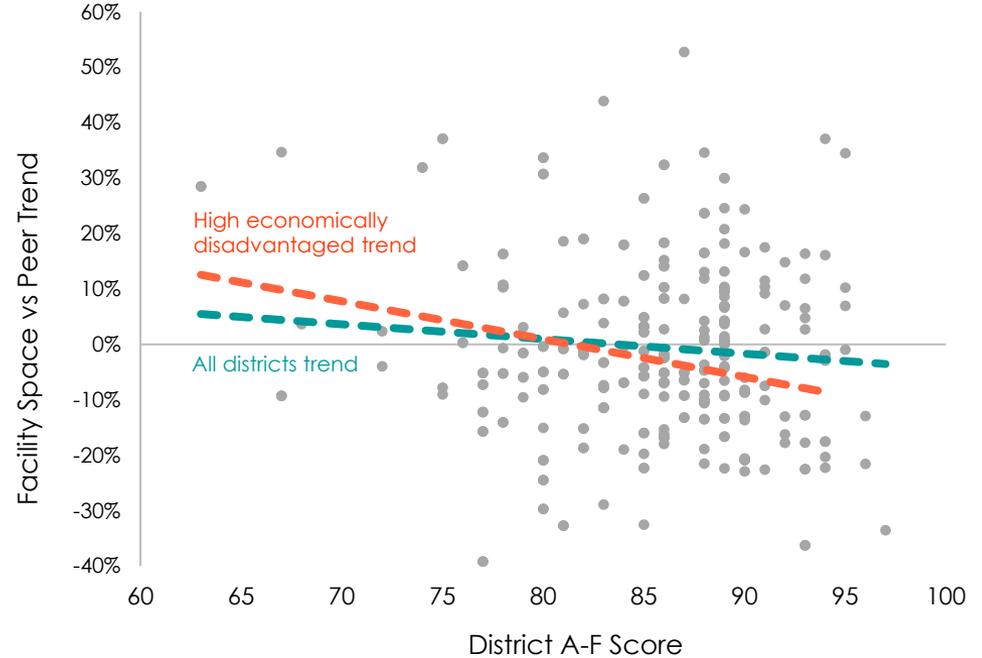
3 PRESERVE FUNDS BY MANAGING FACILITY COST OF OWNERSHIP

Long-term facility cost of ownership can be 5-8 times the initial cost. Two of the most effective ways to manage cost of ownership are **strategic renewal** and **space efficiency**. Strategic renewal is replacing buildings when long-term models indicate renovating would be more costly. Strategic renewal also includes right-sizing the facility for the programs and student population.

Adequate space is necessary to support education programs. Research indicates adequate space is associated with student achievement (Cotton, Earthman, Howley-see end notes). However, the cost of ownership associated with excess space can divert operation funds from education programs. The case study on the following page demonstrates how excessive space can divert funds from education programs.

The chart to the right shows the trend for Texas districts. 2019 A-F scores were plotted with facility space efficiency. The space efficiency was determined by how total district space compared to the trend of 198 Texas school districts. The districts vary from 200 to 200,000 enrollment with 48% above the economically disadvantaged state average. The space trend correlation is high (R-squared = 98).

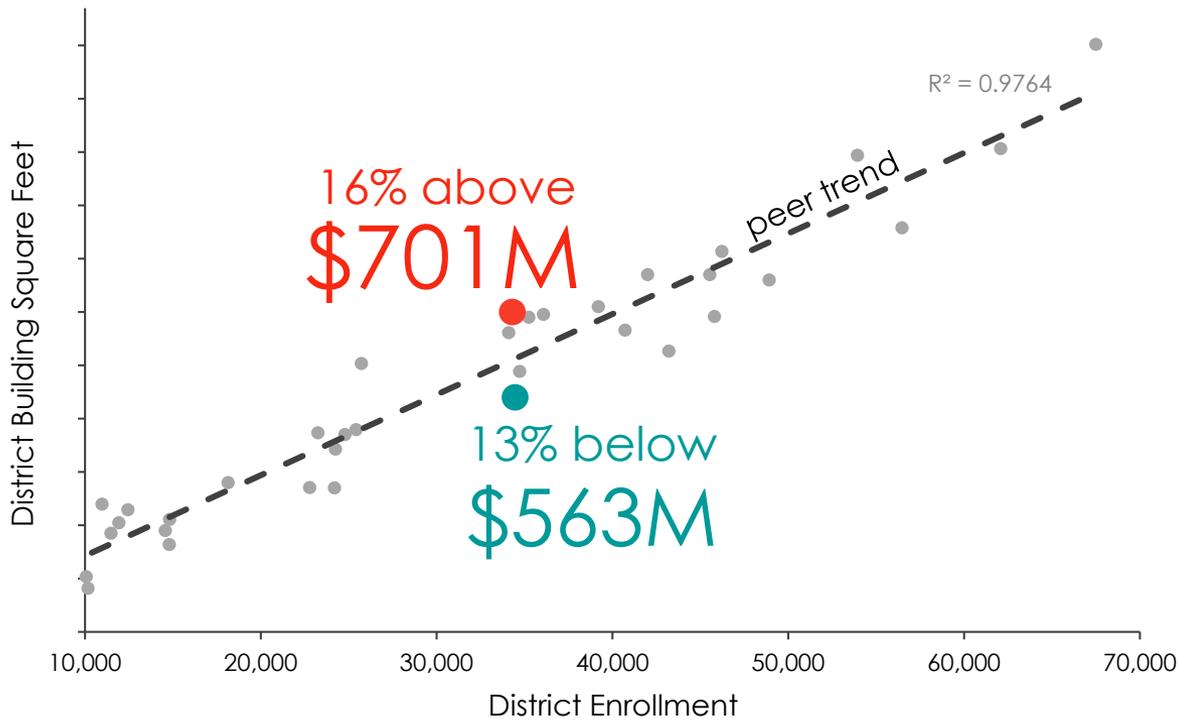
Trends indicate district scores increase as space efficiency increases for the entire group and the high economically disadvantaged districts. This is not to say space efficiency will result in improved scores but indicates space efficiency efforts will not compromise achievement.



District scores increase as space efficiency increases

CASE STUDY - SPACE EFFICIENCY

This chart demonstrates the impact of space efficiency on facility cost of ownership. The space efficiency of two districts of ~35,000 students is compared. One district is 16% above the peer space trend; that translates to \$701M in long-term cost of ownership above the peer trend. The other district is 13% below the trend, which translates to \$563M in long-term cost of ownership below the peer trend. The estimated long-term cost of ownership for this total delta is \$1.2 billion, \$8.4M annual operating funds that could be used for remedial programs, or 162 annual teacher salary equivalents in operating funds.



Districts Delta



\$1.2B

Facility cost of ownership



\$8.4M

Annual M&O funds diverted from education programs, or



162

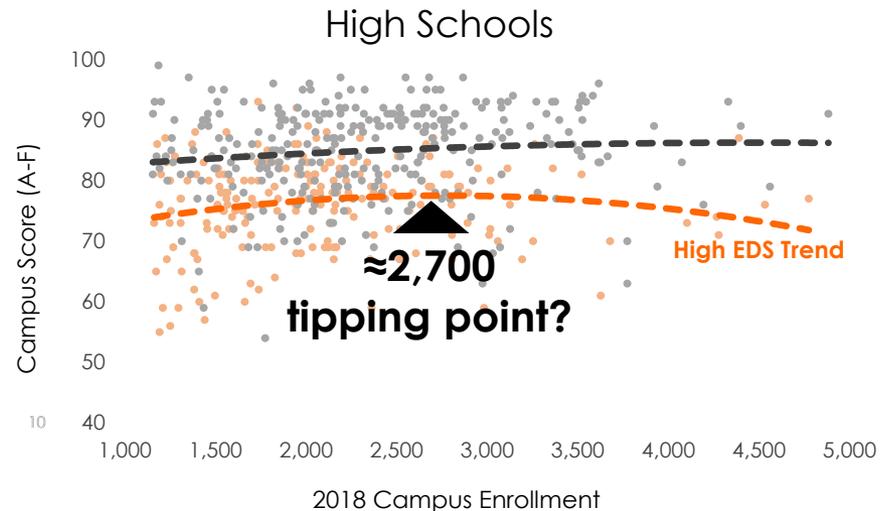
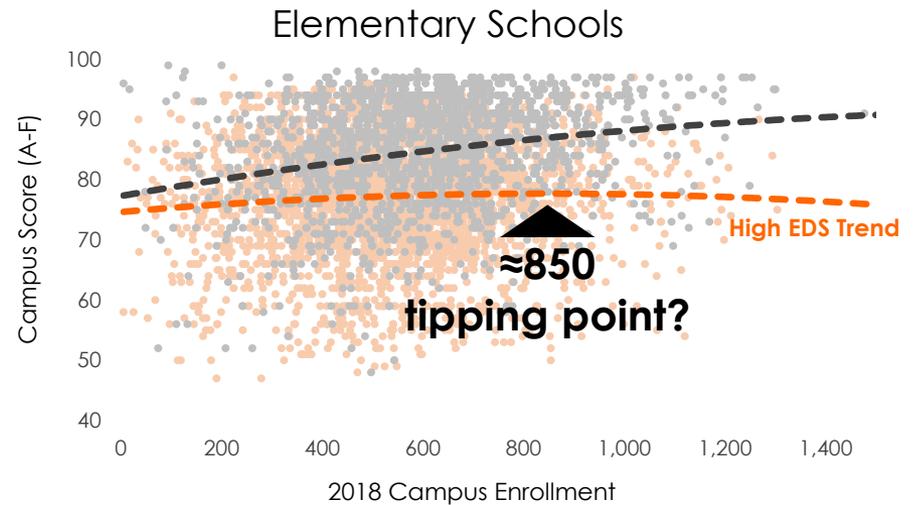
Annual teacher salaries

4 CAMPUS SIZING

Space efficiency can preserve funds for education programs but taken too far can be detrimental to student achievement. The top chart plots all Texas public elementary school campus scores and enrollment. The trend for all schools indicates campus scores increase as campus enrollment increases. The trend for the high economically disadvantaged student (EDS) campuses peaked at ≈ 850 students, suggesting this may be the target maximum for campuses with higher economically disadvantaged populations.

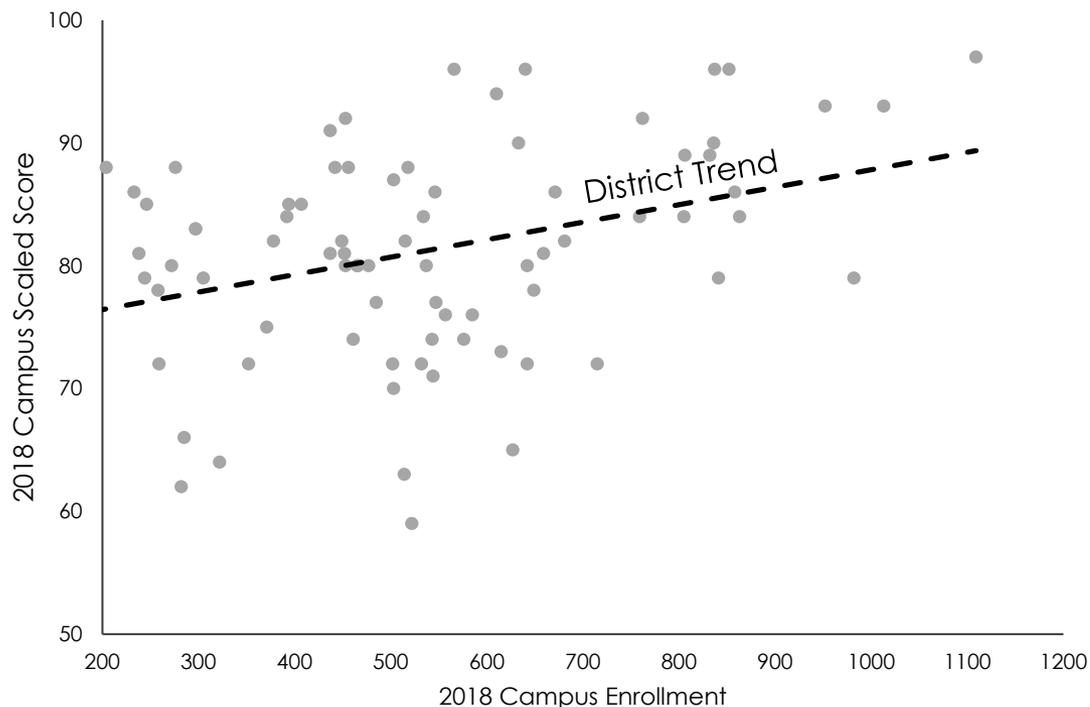
The bottom chart does the same for 492 5A and 6A high schools. The trend for all schools indicates campus scores increase as campus enrollment increases. The trend for the high economically disadvantaged campuses peaked at $\approx 2,700$ students, suggesting this may be the target maximum for campuses with higher economically disadvantaged populations.

Analysis of Texas middle schools indicated campus scores increase as enrollment increases. There was no tipping point identified for middle schools.



CASE STUDY - THE COST OF SMALL CAMPUSES

A Texas district was considering consolidating older, small elementary campuses to reduce operating cost. An analysis of district elementary scores and campus enrollment size revealed that scores increased as enrollment increased, even for high economically disadvantaged population campuses. The estimated cost of ownership savings for consolidating nine older, under-utilized campuses to five new, larger campuses is \$297M with an annual operation savings of \$2.9M. The average size of the nine older campuses was 347 students.



5 for 9 elementary replacement savings



\$297M

Long-term cost of ownership savings



\$2.9M

annual operating cost for remedial programs or



61

annual teacher salary equivalents in operating cost

5 SCALE OF SPACE

Learning community size is associated with student achievement and overcrowding can be particularly detrimental to economically disadvantaged student groups (Contreras, Cotton, Howley-see end notes). Two possible strategies are adequate classroom size and small learning communities (school within a school, etc.). The space efficiency sweet spot may be smaller learning communities, which benefit lower socioeconomic students, in a larger campus, so economy of scale can preserve operating funds.

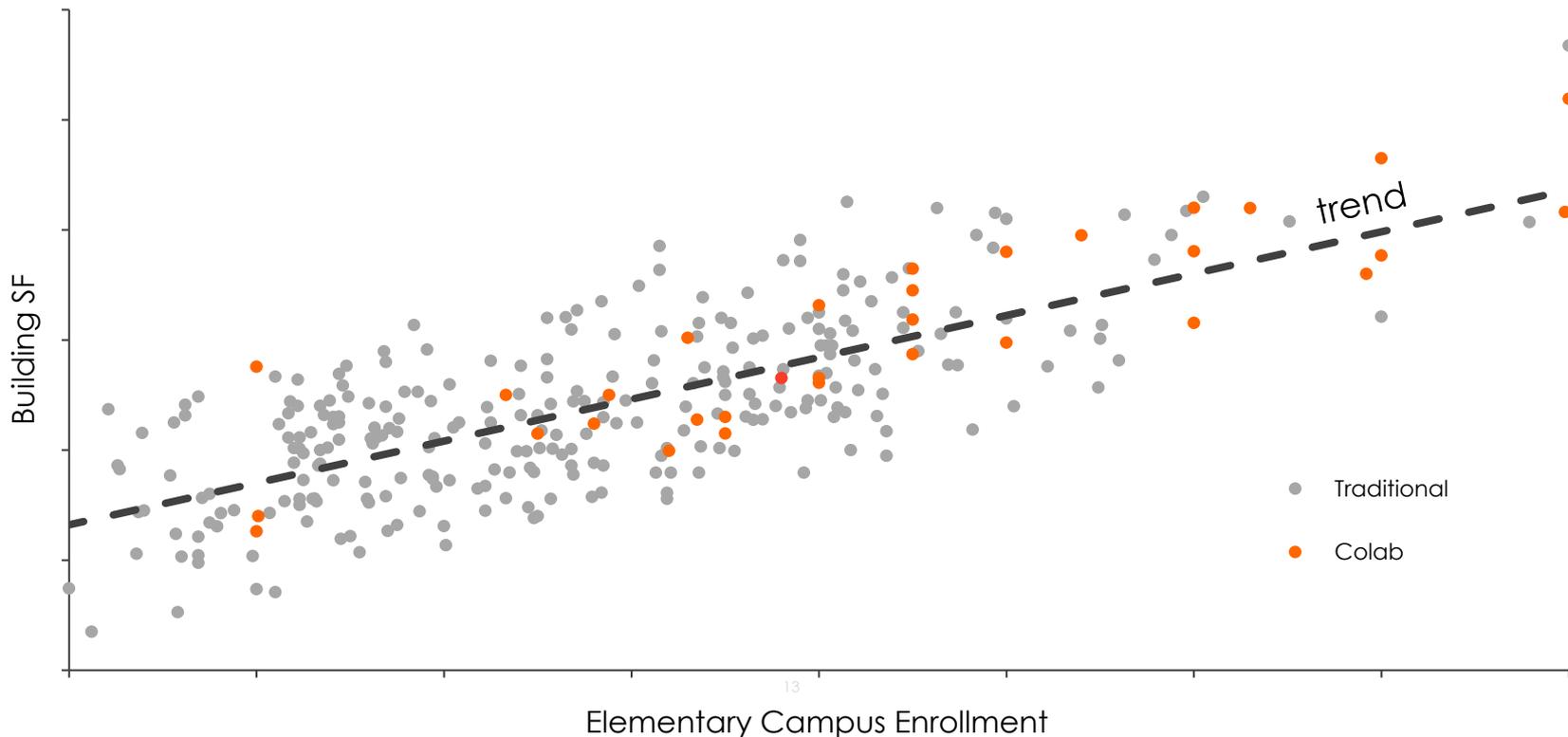
Sweet spot may be small learning communities within larger campuses



COLLABORATIVE SCHOOL DESIGN CAN BE EFFICIENT

The previous elementary plan featured a collaborative space design (21st Century, Next Gen, etc.) with small learning communities. Some believe that such designs require more space. The chart below plots more than 300 Texas elementary schools' space and enrollment. The orange data points are collaborative-based designs, many of which are below the overall trend. The project from the previous page is below the trend line.

Multiple collaborative designs below the trend



6 INDOOR ENVIRONMENT QUALITY

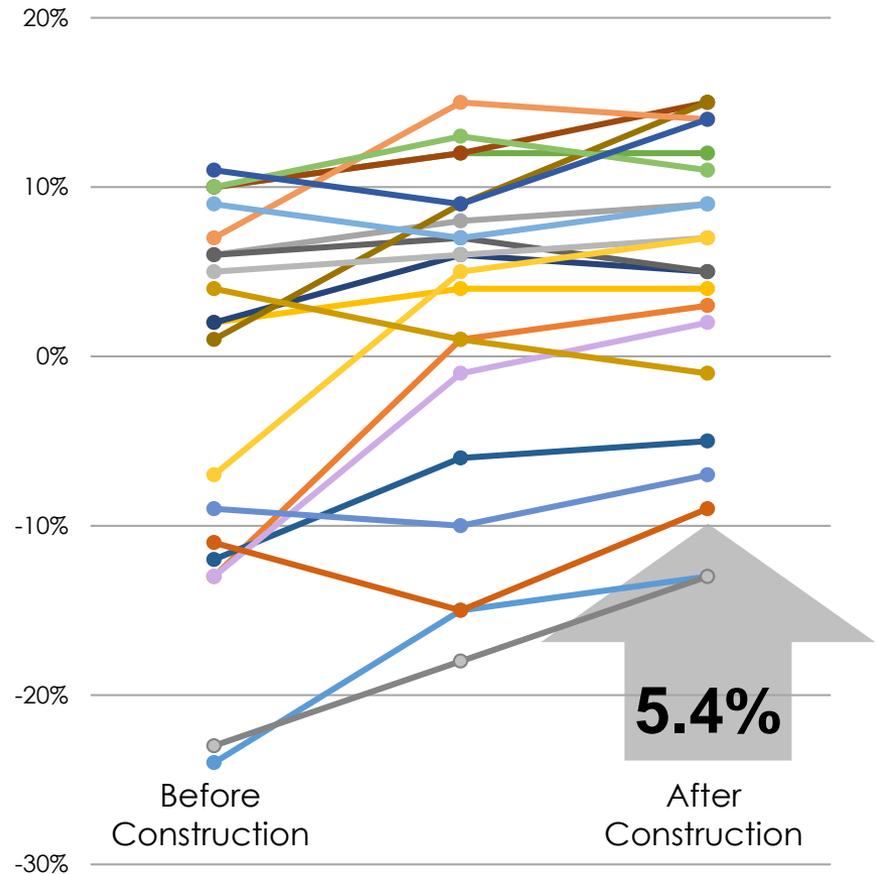
Acoustics, air quality, lighting, temperature control and other indoor environment conditions have shown an association with student achievement. Research indicates indoor environment quality can have a greater effect on lower socioeconomic students (Earthman, Environmental Protection Agency, Hirsch-see end notes).

The chart to the right tracks before-and-after test scores on campuses with a focused improvement on indoor environment quality. Twelve of the 21 projects were full or partial replacement facilities. The rest were significant renovations with additions.

The campus standardized test scores for all-tests-all-students were tracked the year before construction, during construction and the year after construction. To bridge changing testing platforms, the campus test pass rate in relation to the state average was tracked. Interestingly, test scores increased 3.8% from before to during construction, and another 1.6% from during to after construction.

More so for economically disadvantaged students

Campus Test Scores vs State Average



7 ADEQUATE EXTRACURRICULAR FACILITIES

Student involvement in extracurricular activities is associated with academic achievement (Cairns, Mahoney, Shulruf-see end notes). The results below are from a 2018 analysis of students involved in extracurricular activities vs those that are not. The study included 42 high schools in 22 school districts across Texas. The extracurricular student GPA was higher in 21 of 22 districts.

Possible reasons for this correlation include motivation to stay eligible, more motivated students gravitating to extracurricular activities, extracurricular students being more stimulated, having a sense of belonging to community and others.

Providing adequate facilities, without exceeding peer space trends, provides support for extracurricular activities.

More so for economically disadvantaged students



2%

Higher Attendance



10%

Higher GPA

8 EARLY EDUCATION FACILITIES

Trends indicate early education is associated with improved student achievement, particularly for economically disadvantaged student populations (Hart, Kisley, McCoy-see end notes).

A Texas Education Agency study found students that participated in Pre-K in 1999 persisted in college at a 6.8% higher rate than peers.

Recognizing the benefits of early education, the 86th Texas Legislature, 2019, increased funding for early education.

Adequate early education facilities can support these trends and findings.

More so for economically disadvantaged students



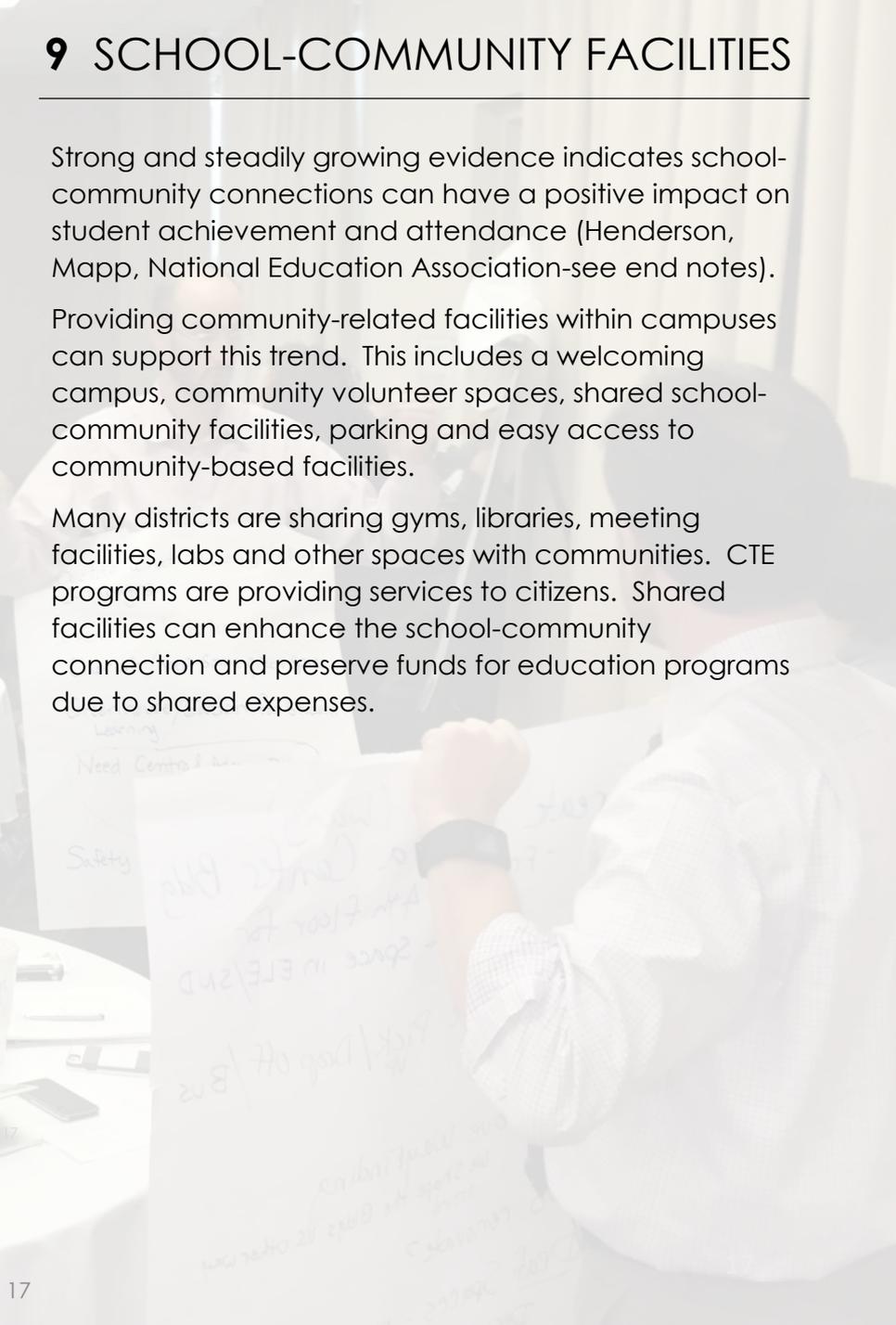
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9 SCHOOL-COMMUNITY FACILITIES

Strong and steadily growing evidence indicates school-community connections can have a positive impact on student achievement and attendance (Henderson, Mapp, National Education Association-see end notes).

Providing community-related facilities within campuses can support this trend. This includes a welcoming campus, community volunteer spaces, shared school-community facilities, parking and easy access to community-based facilities.

Many districts are sharing gyms, libraries, meeting facilities, labs and other spaces with communities. CTE programs are providing services to citizens. Shared facilities can enhance the school-community connection and preserve funds for education programs due to shared expenses.



10 INTERNET CONNECTIVITY

Student internet connectivity outside the classroom is becoming increasingly important for student success. Research identifies a connectivity gap for economically disadvantaged students that inhibits achievement and graduation rates (Kingston, National Center for Education Statistics, Runkle-see end notes). A lack of connectivity, or digital divide, limits access to digital learning resources.

The coronavirus event of 2020 began to reveal the extent of the connectivity gap as districts struggled with remote learning transition. This image background maps the economically disadvantaged student intensity for a 30,000-student Texas district. This analysis helped strategically locate towers to improve internet connectivity.

IMPLEMENTATION

Strategies to implement these design guides, measure progress, and celebrate success are summarized below.

- Stakeholder workshops summarizing community poverty, design guides, and benefits.
- Secure board approval of design guides and progress tracking process.
- Include design guides in education specifications and district facility standards.
- Manage scope creep to maintain space guidelines.
- Ensure design guide features are installed as intended.
- Demonstrate incorporation of design guides to stakeholders.
- Educate occupants on functions and benefits of building systems.
- Measure indoor environment quality periodically.
- Track progress annually.
- Celebrate success in attendance, GPA, graduation, preserved funds, etc.

END NOTES

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