Meeting Needs? A Survey of School Facilities in the State of Texas

By
Lori L. Taylor, Sara Barrineau, Leslie Barron, Matthew Fiebig, Sarah Forbey, Jennifer Gray, Joshua Hodges, Jeff Jewell, Ashley Kelm, Marcia Larson, Erin Lesczynski, Zach May, Steve Murello, Jennifer Myers, Megan Paul, Manal Shehabi, and Megan Stubbs

Bush School of Government and Public Service
Texas A&M University

April 2005

Every child has a building called "a school"...but what is found within one school will [not] bear much similarity, if any, to that which is found within another.

— Jonathan Kozol[1]

Introduction

Until relatively recently, school facilities funding in Texas was largely a local affair. Prior to the 1970s, making do with tax resources that varied from district to district was the rule, as there was no meaningful state contribution. An incentive program for the consolidation of small districts was inaugurated in the 1970s, and bond financing reduction aids followed to meet the marked population growth of the 1980s, but neither approach proved sufficient. A real tremor in school facility financing was felt in 1985 with the Edgewood v. Kirby lawsuit (Edgewood ISD v. Kirby. Cause No. 362,516 [1987]. 250th Judicial District, Travis County, Texas, commonly referred to as Edgewood I), which gave public voice to low-income schools' demands for state assistance, especially for building construction and maintenance. The 1989 Supreme Court decision, which upheld the lower court ruling in favor of poor schools, increased the impetus to the Legislature to accommodate basic Texas facility funding needs (Edgewood v. Kirby. 777 SW 2d 391 [1989]. Supreme Court of Texas). Subsequent court decisions, including 1995's Edgewood v. Meno (Edgewood v. Meno. 917 SW 2d 717, 108 Ed. Law Rep. 1310 [1995]. Supreme Court of Texas, also known as Edgewood IV), reaffirmed the court's concern with facilities equity.[2]

A number of policies were enacted in the late 1990s to provide additional state support for facilities construction. The Instructional Facilities Allotment, which became effective in 1997, provides assistance to school districts for new facilities-related debt. The Existing Debt Allotment, which became effective in 1999, provides assistance with pre-existing debt.

There has been little evidence to illustrate the extent to which these policies may have reduced inequalities across Texas school facilities, however. This report, compiled from survey data submitted by individual school districts, addresses that gap by describing the geographic and demographic distribution of educational facilities in Texas.

The Study

We rely on two sources of information for this study. The first is a survey e-mailed to all traditional Texas school districts during the fall of 2003.[3] Superintendents were asked to provide information on the age, square footage, replacement value, and value of contents for each building in their district. They were also specifically asked to report on temporary as well as permanent structures. To minimize the costs of responding to the survey, superintendents were invited to simply send a copy of their insurance information. A research team at the George Bush School of Government and Public Service at Texas A&M University compiled and standardized the data submissions. (See appendix for more information.)

Participation in this study was voluntary, and 327 of Texas's 1039 Independent School Districts (ISDs) responded. The respondents ranged in size from some of the smallest Texas districts—such as Allison, Kelton, or Megargel—to many of the largest, such as Dallas and Houston. The survey respondents enroll nearly half of Texas school children. We are very grateful for their assistance.

While the survey response was very good, it was far from complete. Therefore, we supplemented the survey with additional information provided by the Texas Association of School Boards (TASB). TASB serves as an insurer for Texas school districts, and was the original source for some of the data provided by the survey respondents. TASB insurance files provided information on an additional 392 school districts.[4] Between the two sources, we gathered facilities information for 719 school districts, which educate 64 percent of Texas school children.

Characteristics of Sample School Districts

This sample of Texas school districts, though not random, mirrors the complete set of Texas school districts in many key respects. Sample districts are similar in size to non-sample districts, although districts with fewer than 500 students are more common in the sample than in the state as a whole.

Districts in the sample are also growing at the same average rate as districts outside the sample. Fast-growth districts—those with a five-year growth rate exceeding 20 percent—are as common in the sample as outside it. Given the impact of enrollment growth on school district crowding and school construction, it is particularly reassuring that sample districts are similar to non-sample districts in this respect.

Also reassuring is the similarity of districts with respect to the relevant budgetary characteristics. Interest and sinking (I&S) taxes are an important source of revenue for facilities construction, and the average I&S tax rate for sample districts is statistically the same as the average rate for out-of-sample districts. On average, both the levels and the budget shares for capital outlays, plant maintenance, and debt service are the same for in-sample and out-of-sample districts.

Average per pupil wealth is higher for sample districts than for non-sample districts, but only because the sample includes three of the four districts in the state with fewer than 35 students (and very small districts tend to have high property wealth per child). Excluding those districts, there is no significant difference in wealth between sample districts and non-sample districts.

In Texas, school districts with relatively high property wealth per pupil must share that wealth through a process known as *recapture*. Districts subject to recapture are known as Chapter 41 school districts. Because the Texas school finance formula recaptures revenues from maintenance and operations (M&O) taxes but does not recapture revenues from I&S taxes, there is some belief that Chapter 41 districts have an incentive to invest more heavily in capital than in other aspects of their local schools.

The share of Chapter 41 districts in the sample is statistically equal to the share outside of the sample.

As Figure 1 illustrates, sample districts are also reasonably well-distributed throughout the state. Urban districts are as common in the sample as in the state as a whole. Sparsely populated rural areas and very sparsely populated rural areas are also represented proportionally. On the other hand, very few districts in far west Texas responded to the survey, and the El Paso, Laredo, and Midland metropolitan areas each have less than 10 percent of enrollment represented in the sample.

Unfortunately, there are also a number of important dimensions in which the sample districts differ from those for which we have no facilities information. Sample districts have fewer students who are economically disadvantaged, a lower share of students with limited English proficiency, and a lower share of minority students than out-of-sample districts.

It is somewhat risky to conclude that the districts outside of the sample are similar to those in the sample with respect to their capital stock, when they systematically differ with respect to the students they serve. Nevertheless, the sample contains more than two thirds of Texas school districts and is representative of all school districts in many key respects. Thus, it provides a useful perspective on the nature and distribution of educational facilities in Texas.

Educational Capital in Texas

Texas school districts own a wide assortment of capital facilities, ranging from cattle barns to computer labs. We classified school district facilities into four broad categories—general facilities, athletic facilities, equipment, and teacherages (residential structures).

- The general facilities category includes all structures dedicated to academic, administrative, or operational activities. It is a broad catch-all category that includes everything from administrative offices and maintenance sheds to classrooms and cafeterias.
- The athletic facilities category includes, among others, gymnasiums, stadiums, field houses, and dugouts. It does not include dual-purpose athletic buildings such as single unit cafeteria-gymnasiums.
- The equipment category includes satellite dishes, signs, fences, and lighting, as well as general building contents. It is broken into two parts—general equipment and athletic equipment.
- The teacherages category includes 599 residential structures (including garages) that districts own for the use of district personnel—primarily teachers, but occasionally superintendents or other employees. Of the 719 districts in the sample, 143 own at least one teacherage. The Crockett County ISD maintains 32 teacherages for the use of its staff.

Quite naturally, the vast majority of capital facilities are for general use, as illustrated in figure 2. General facilities comprise 77 percent of the capital stock of sample school districts. General equipment is another 17 percent. Athletic facilities and equipment comprise 6 percent of the total facilities in the sample, and teacherages less than one tenth of one percent. Portable buildings are less than one percent of the value of educational capital.

Some districts provided additional descriptive information about their facilities. Based on these descriptions, we also know that approximately 0.1 percent of general facilities are partial structures such as sunshades, pavilions, or breezeways; 0.2 percent are agricultural structures such as barns, pens, or stables; and 1.2 percent of general facilities are explicitly operational facilities (storage, maintenance, or transportation structures). All subsequent discussions of general educational facilities exclude these partial, agricultural, and operational facilities.

The Composition of Educational Capital

While athletic facilities and equipment comprise only six percent of Texas educational capital, many school districts deviate remarkably from this average. Seventy districts did not separately identify any athletic facilities. Among the remaining 649 districts, the share of educational capital devoted to athletics ranges from less than half a percent to more than 50 percent. Seventeen school districts devote more than a third of their capital stock to athletics.

School districts with a disproportionate share of sports facilities (more than three times the sample average, or at least 18 percent) have a number of similar features. They are much more likely to be rural, agricultural, and geographically isolated.[5] Sports-intensive districts also tend to be much smaller than other school districts. (The average sports-intensive district has 625 students, and half of the sports-intensive districts have fewer than 400 students.) Finally, while there is no systematic difference between sports-intensive districts and other districts with respect to school district wealth, sports-intensive districts tend to have a higher proportion of white students and a higher proportion of students participating in the school lunch program (an indicator of student poverty).

Teacherages form a very small fraction of total educational facilities in Texas. Even among the 143 districts with teacherages, these residential structures represent less than two percent of the value of facilities, on average. Nevertheless, teacherages are an interesting part of the picture. Districts that have teacherages are disproportionately small, rural, and isolated. They are typically located in areas where residential property is an unusually small fraction of the total tax base, and oil is an unusually large fraction of the tax base. As a general rule, teacherage-equipped districts are comparatively affluent, and serve a disproportionately large number of poor students. These teacherage-equipped districts also tend to have lower pupil-teacher ratios

We paid particular attention to the fraction of school district facilities that are portable buildings. Most districts did not report the age of their portable buildings, but among those that did report, the average school district portable is nearly 14 years old. Clearly, portable is not equivalent to temporary. However, a disproportionate reliance on portables may signal the need for new construction in a district and is therefore noteworthy.

Portable buildings represent a surprisingly small fraction of the total capital stock of school districts in Texas. One third of sample districts do not report any portable buildings at all. Most districts use portables only sparingly. On average, portables comprise less than four percent of the general purpose floor space (the square footage of facilities excluding sports and teacherages) in districts that use portables. There are only 28 districts where more than 10 percent of the general facilities are portables. Bluff Dale

ISD relies most on portable buildings; nearly 60 percent of its general purpose space is in portables.

Districts that rely heavily on portable buildings are more likely to be shrinking than growing rapidly. Eighteen of the 28 districts most reliant on portables shrank over the last five years while only five of the 28 grew by more than 20 percent. Rural districts are no more likely to rely heavily on portables than urban districts, and there is no consistent difference in wealth between portable-reliant districts and other districts in the sample. However, districts that rely heavily on portables are disproportionately likely to serve poor students, minority students, and students with limited English proficiency.

The Age of Texas School Buildings

Excluding sports facilities and teacherages, districts provided age and renovation information for 11,384 permanent buildings. Of those, 1,544 could be identified as partial, agricultural, or operational structures and have been excluded from the analysis of age. For the remaining 9,840 general purpose school buildings, we calculate age as the number of years since the most recent renovation.[6] The oldest Texas school building still in use is at least 113 years old, and the average permanent structure is 24 years old.[7] Half of Texas school buildings were built before 1978, and three quarters were built before 1994. According to the Bureau of Economic Analysis, the life expectancy of a public educational building is 50 years.[8] By that standard, more than half of the useful life of the average Texas school building remains. However, 15 percent of the general purpose buildings (or equivalently 11 percent of general purpose square footage) have exceeded their expected lifetimes.

Not surprisingly, school building age varies substantially throughout the state. The average rural school building is 30 years old, while the average urban building is younger by 7 years. Rural school buildings are nearly twice as likely as urban school buildings to have exceeded their expected useful life. The average building age exceeds 60 years in 29 districts school districts, 22 of which are rural.[9]

We were able to detect some interesting patterns in the age distribution of Texas school facilities. First, we found no evidence that wealthier school districts have newer facilities. Across all districts in the sample, there is a weakly positive relationship between average age and district wealth, which implies that wealthier districts have older buildings. If the sample is divided between urban and rural districts, there is no relationship between property wealth per child and average structure age. After controlling for urbanicity, school district enrollment, and student ethnicity, there remains no correlation between property wealth per child and average structure age. (See appendix table B.) Furthermore, despite a school finance formula that appears to encourage disproportionate capital investment by Chapter 41 school districts, we find that the average age of school buildings is no different for Chapter 41 districts than for other school districts. If anything, the districts with the newest buildings tend to have less property wealth than those with the oldest buildings.

Second, we found that while the state appears to have succeeded at breaking any link between the age of facilities and school district wealth, there remains a significant correlation between the age of facilities and student characteristics. All other things equal, as the share of students who are Hispanic increases, the age of the capital stock increases. (See appendix table B.) There is no such relationship for black students.

Students with limited English proficiency attend schools with generally newer buildings, and there is a significant relationship between the share of students receiving free or reduced lunches and building age. Within the sample, poor students attend class in significantly older buildings than other students.

We found a weaker than expected relationship between the age of a district's facilities and the level of spending on maintenance. We expected to find that use of older buildings necessitates greater maintenance expenditure. Instead, the relationship is modest. We compared the 25 percent of districts with the oldest buildings (average age of buildings over 40) with the 25 percent of districts with the newest buildings (average age of buildings under 19). On average, districts with the oldest buildings spent 11.9 percent of their current operating expenditures on plant maintenance and operations, while the districts with the newest buildings spent 11.5 percent—a statistically insignificant difference (see table 1).

Table 1: School Facility Age			
	Quartiles		Difference statistically significant?
	Oldest	Newest	
Percent of students who are			
Economically disadvantaged	56 (1.3)	43 (1.7)	Y
White	58 (2.0)	66 (2.1)	Y
Black	6 (0.9)	6 (0.7)	
Hispanic	35 (1.9)	26 (2.0)	Y
Limited English proficiency	6 (0.7)	8 (0.9)	
Property wealth per student ($1,000)	367 (34.7)	284 (35.2)	
Chapter 41	12.9 (2.6)	14.6 (2.7)	
Enrollment	2,209 (985)	4,770 (758)	Y
5-year enrollment growth rate	-6.1 (1.0)	14.3 (2.1)	Y
Percent urban	27 (3.4)	61 (3.7)	Y
Maintenance expenditures per student	$1001 (32.5)	$798 (20.7)	Y
Maintenance share of expenditures	11.9 (0.2)	11.5 (0.1)	
Pupil-teacher ratio	10.3 (0.2)	12.5 (0.2)	Y

Standard errors in parentheses. A 'Y' indicates that the means are statistically different at the 5 percent level.

The districts with the oldest buildings did spend $200 more per student on maintenance than did the districts with the newest buildings, but that differential appears driven by a lack of economies of scale rather than building age. Holding enrollment constant so that economies of scale are not an issue, each one-year increase in the average age of a district's buildings increases expected maintenance expenditures by only $2.40 per pupil.[10]

Finally, we found an interesting correlation between the age of the structures and the teaching environment: the older the buildings, the lower the pupil-teacher ratio. Even after controlling for differences in school district size, districts with older buildings tend to have smaller-pupil teacher ratios. One interpretation of such a pattern is that facilities and personnel are substitutes for each other and that having older school buildings is consistent with a broad district strategy of relying more heavily on personnel. The unusually low pupil-teacher ratios may indicate that districts offset the disadvantages of older facilities with attractively small class sizes when trying to hire and retain teachers. On the other hand, both small class sizes and an aging capital stock may merely be symptoms of declining enrollment.

Crowding in Texas Schools

Crowding is another key characteristic of school facilities. Our indicator of potential crowding is total general facilities square footage (including portable, but excluding partial, agricultural, and operational buildings) divided by total school district enrollment in 2002-03.

Square footage per student varies dramatically across Texas school districts. Three districts in the sample report that they have less than 80 general purpose square feet per student. All of them also have more than 20 percent of their capital stock devoted to athletics, suggesting that their athletic facilities may do double duty. Among the remaining districts, square footage per student ranges from 80 square feet to more than 1,250 square feet per student. The average student in the sample has 151 square feet of general purpose space. To place that figure in perspective, the state of Texas requires that new classrooms have between 28 and 36 square feet per student, depending on the grade level. Of course, the estimate of general square footage includes non-classroom spaces such as cafeterias and administrative offices. However, the gap between the required classroom space and the estimate of general square footage is sufficiently large that it would appear that crowding is a relative rather than absolute concept in Texas.

As with building age, there are a number of interesting patterns in the distribution of general purpose square footage. Smaller districts have substantially more square footage per child. The average district with less than 500 students has 100 more square feet per pupil than the average district with more than 5,000 students. Not surprisingly, fast growth districts have less square footage per student than districts in the midst of declining enrollment.

While we found no correlation between building age and district wealth, there is a strong correlation between building size and wealth. As district wealth per student increases, the square footage per student increases. Chapter 41 districts, on average, have 100 more square feet per student than other districts in the sample. Interestingly, there is little correlation between square footage per student and student characteristics. Square footage per student is not correlated with student poverty. There also is no correlation between the percent of students who are Hispanic and the quantity of school space. Black and limited English proficiency students tend to attend districts with less space, but the effect is negligible once district wealth is taken into account (see appendix table C). Given district wealth and size, there is no statistical relationship between student characteristics and square footage per student.[11]

To further explore this pattern, we compared the 25 percent of districts with the most square footage per pupil to the 25 percent of districts with the least square footage per pupil. The lowest quartile had less than 152 square feet per pupil, and included most of the large school districts in the sample. The top quartile had more than 230 square feet per pupil. As table 2 illustrates, the most spacious districts are disproportionately small, shrinking, and wealthy. The least spacious districts serve students who are disproportionately urban, black, and limited English proficient.

Table 2: School District Space			
	Quartiles		Difference statistically significant?
	Lowest	Highest	
Percent of students who are			
Economically disadvantaged	49 (1.5)	52 (1.3)	
White	58 (2.1)	66 (1.8)	Y
Black	9 (0.9)	4 (0.8)	Y
Hispanic	31 (2.1)	29 (1.7)	
Limited English proficiency	9 (0.8)	5 (0.6)	Y
Property wealth per student ($1,000)	208 (11.3)	537 (54.3)	Y
Chapter 41	7.1 (1.9)	23.3 (3.2)	Y
Enrollment	9868 (1741)	623 (148)	Y
5-year enrollment growth rate	7.3 (1.0)	-3.6 (1.4)	Y
Percent urban	64 (3.6)	22 (3.1)	Y
Maintenance expenditures per student	$701 (11.0)	$1166 (47.7)	Y
Maintenance share of expenditures	10.9 (0.1)	12.1 (0.2)	Y
Pupil-teacher ratio	13.6 (0.2)	9.6 (0.2)	Y

Standard errors in parentheses. A ‘Y’ indicates that the means are statistically different at the 5 percent level.

A Composite Index of Educational Capital

Our predominant concern was whether or not there were disparities in the distribution of educational resources. Answering such a question required a composite measure of educational capital. The replacement value of facilities and equipment reflects not only the quantity but also the quality of the physical resources available to school districts. We used the per-pupil value of general purpose facilities and equipment as our indicator of educational capital. This indicator excluded teacherages and capital devoted to athletics, but included all portable, partial, agricultural, and operational facilities. As such, it was a measure of educational capital rather than of school district assets.

We concluded that there is dramatic variation in the educational capital of Texas school districts. Educational capital per student ranges from less than $5,000 per pupil in two districts with a high athletic concentration, to more than $100,000 per pupil. The average school district has roughly $20,000 per pupil.

There are a number of strong patterns to the distribution of educational capital in Texas. Urban districts have substantially less educational capital per pupil than do rural districts. The average urban district has $17,541 per pupil in educational capital while the average rural district has $22,090.

Small districts have substantially more educational capital per pupil than large districts. The average district with less than 500 students has more than $25,000 per pupil in educational capital while the average district with more than 5,000 students has less than $16,000.

Despite all the state's efforts to break the link between district wealth and school facilities, the relationship remains strong. The amount of educational capital in a district is an increasing function of the district's wealth, and variations in wealth alone can explain nearly 40 percent of the variations in educational capital.[12] The districts may have acquired those assets long before the state's recent efforts to equalize access to educational capital, and the gap may have narrowed sharply in the Robin Hood decade, but the gap remains. The average Chapter 41 district in the sample has nearly 60 percent more educational capital per pupil than the average Chapter 42 district.

Of course, the question of equitable access to educational capital matters because of its potential effects on students. Therefore, the primary question is the extent to which educational capital is related to student characteristics. Here, the evidence is much more encouraging. There is no correlation between student poverty and the distribution of educational capital across districts.[13] There are weak but statistically significant correlations between the percentage of students who are black or limited English proficient and educational capital (variations in the share of black or limited English proficient students can explain 1.8 percent and 0.9 percent, respectively, of the variation across districts in educational capital per student), but there is no correlation between the percentage of students who are Hispanic and educational capital.

Table 3 illustrates the relationship between student demographics and educational capital per student.

Table 3: Educational Capital			
	Quartiles		Difference statistically significant?
	Lowest	Highest	
Percent of students who are			
Economically disadvantaged	52 (1.4)	52 (1.3)	
White	58 (2.2)	64 (1.8)	
Black	8 (0.9)	6 (0.8)	Y
Hispanic	32 (2.0)	29 (1.7)	
Limited English proficiency	9 (0.8)	6 (0.6)	Y
Property wealth per student ($1,000)	200 (11.9)	543 (52.8)	Y
Chapter 41	5.6 (1.7)	26.8 (3.3)	Y
Enrollment	7,402 (1690)	1,136 (241)	Y
5-year enrollment growth rate	4.3 (0.9)	-2.6 (1.8)	Y
Percent urban	53 (3.7)	26 (3.3)	Y
Maintenance expenditures per student	$706 (11.7)	$1168 (46.8)	Y
Maintenance share of expenditures	10.9 (0.1)	12.1 (0.2)	Y
Pupil-teacher ratio	12.8 (0.2)	9.7 (0.2)	Y

Standard errors in parentheses. A ‘Y’ indicates that the means are statistically different at the 5 percent level.

As before, we compared the 25 percent of districts with the most educational capital per student with the 25 percent of districts with the least educational capital per student. The share of economically disadvantaged students is the same for both groups, as is the share of Hispanic students. The share of white students is higher in the districts with the most capital, but the difference is not statistically significant. However, the share of black students is significantly lower among the districts with the most capital. Furthermore, the share of students who are limited English proficient is substantially higher in the districts with the least educational capital per student.

The disproportionately high number of small districts in the sample might skew the data on student characteristics and educational capital. Consequently, in one final interpretation of our data we examined the joint relationship between educational capital and student characteristics, controlling for district wealth and enrollment (see appendix table D). As expected, we found that district wealth and size are strong determinants of educational capital per pupil. Once these factors are accounted for, there is no relationship between student ethnicity or student poverty and educational capital per student. However, districts with a disproportionate share of limited English proficient students have significantly less educational capital per student, even after wealth and size are taken into account.

Conclusions and Opportunities for Further Research

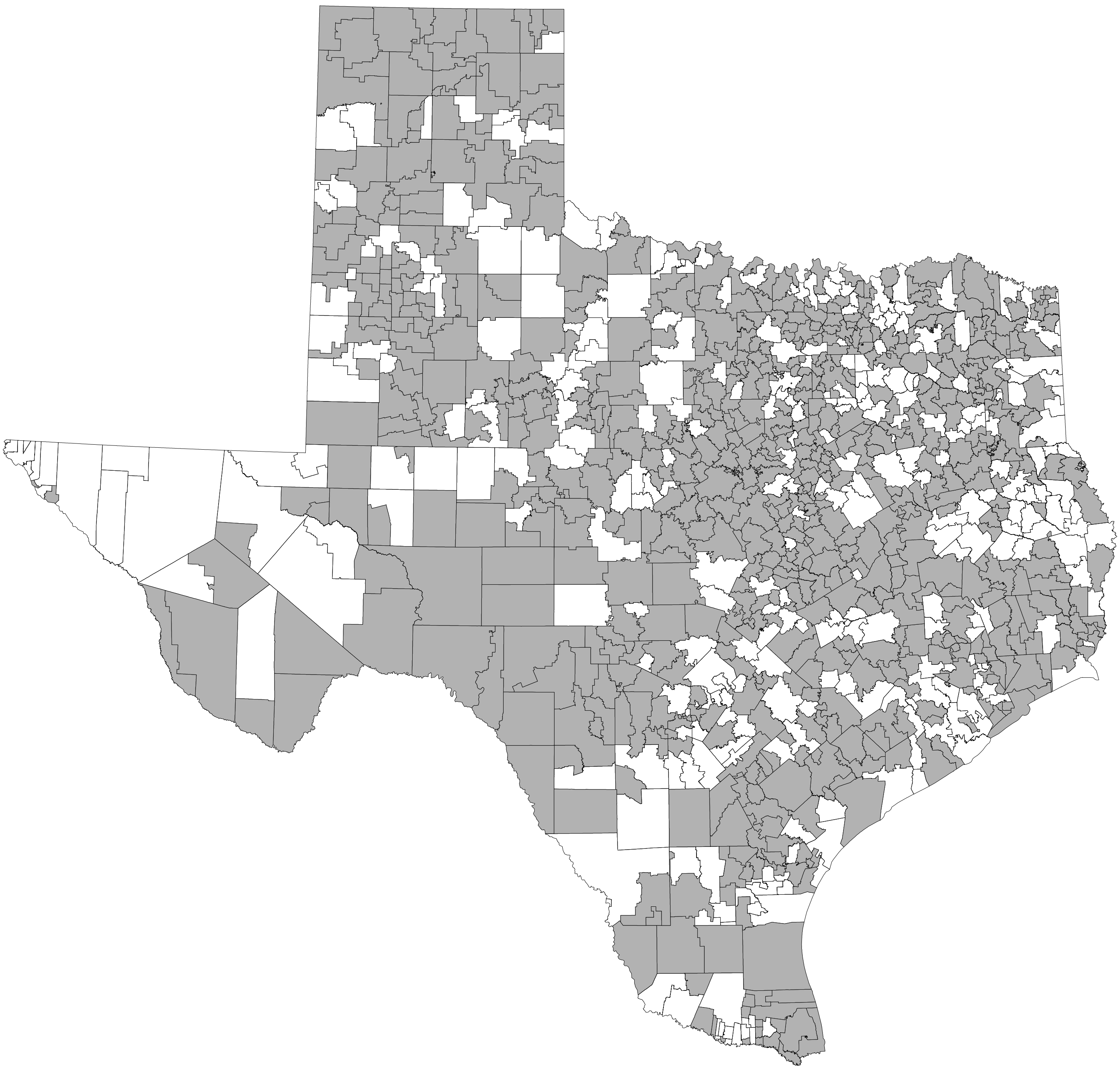
As a result of our data analysis, we have reached several key conclusions that would be important considerations for legislators interested in reducing the discrepancies between districts:

- The average Texas school building still has more than half its useful life remaining, and one quarter of the capital stock was built within the last ten years. Furthermore, the state appears to have broken any link between building age and school district wealth. However, poor and Hispanic students attend class in significantly older buildings than other students. While these patterns may be nothing more than artifacts of the under-representation of poor or minority districts in the sample, they are clearly inconsistent with the state's equity goals.
- Among the 719 districts in the sample, crowding is not a major issue. Reliance on portable buildings is modest, and more common among districts that are

shrinking—and therefore unable to justify new construction—than among districts that are growing rapidly.

- We found substantial evidence that educational capital differs systematically across districts. However, those differences, while reflective of district wealth, are generally not correlated with the demographics of the student population. There is no systematic difference in the value of educational capital available to poor and minority children. However, students with limited proficiency in English have systematically less educational capital than other children, all other things being equal. Future work will examine the consequences of such differences for student performance.
- We can lay one concern to rest now. We find no support for the argument that districts with old or inadequate capital stocks are forced to spend less on instruction because they must spend substantially more on maintenance than other districts. The share of district expenditures devoted to maintenance and the level of maintenance expenditures per pupil are, if anything, positively correlated with school district assets. Schools with more to maintain spend more on maintenance.
- While these findings are firmly supported by the data, the analysis would have benefited from greater school district response. In particular, districts with poor and minority populations were less likely to be included in the analysis than other districts. Our findings clearly describe the two-thirds of the Texas school system represented in the sample. However, caution should be used before generalizing to the non-responsive districts.

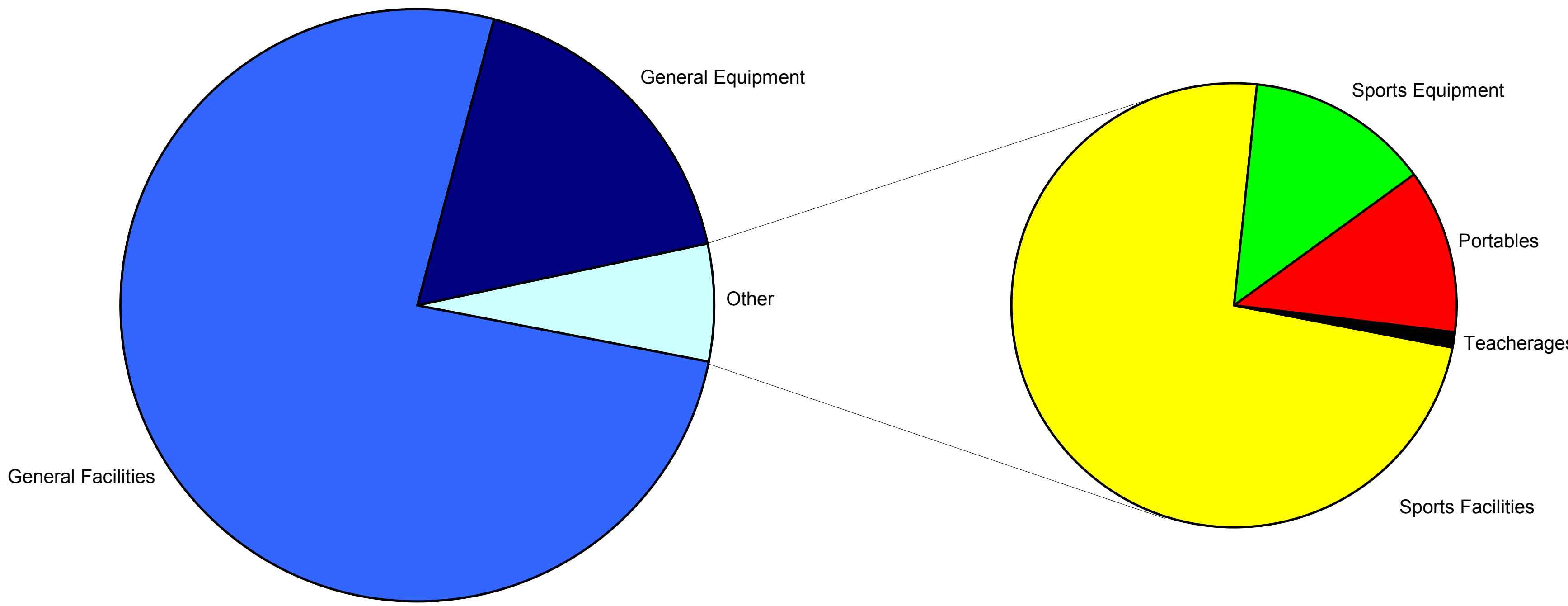
Districts Included in Texas School Finance Project Facilities Study, 2002-03



Participating School Districts

Texas Legislative Council
10/22/04
04R887
Source: Office of the Speaker of the Texas House of Representatives

Figure 2: The Composition of Educational Capital in Texas



Appendix

Nearly two-thirds of Texas school districts responded to the facilities survey, either directly or indirectly through TASB. Not all of the information from those 719 districts was complete, however. For example, nearly half of the districts reported the value of portable buildings, but not their square footage. Some school districts did not report the age of their facilities. Other districts reported historical or acquisition costs rather than replacement values. Most districts were missing at least one piece of information for at least one building.

To fill in the blanks and facilitate in-kind comparisons across school districts, we made a number of adjustments to the school district responses and TASB files.[14] On average, portable buildings had a reported value of $39 per square foot in urban districts and $32 per square foot in rural districts. We used these averages to impute values and square footages for portable buildings, where needed. Only 0.2 percent of the total value of portable buildings was imputed, but 43 percent of the total square footage of portable buildings was imputed from the information about values.

Permanent structures are much less consistent in their values and required a more sophisticated strategy for imputing the missing values. We conducted a regression analysis of the relationship between value per square foot and property characteristics and used that relationship to predict the missing values. Approximately three percent of the total square footage and 0.8 percent of the total replacement value for permanent structures in the sample were imputed in this fashion.

The regression analysis estimated the relationship between property value per square foot (in logs) and the age, type, location, and number of stories in a structure. Structures with fewer than 1,000 square feet were excluded from the analysis. The model also includes random effects for school districts and square footage categories. Table A presents coefficient estimates and standard errors.

While it was rare for replacement values to be missing, it was rather common for districts to not report the value of building contents. Approximately nine percent of permanent buildings had no reported contents. Among districts that did report the value of contents, many reported that the value of contents was proportional to the value of the buildings. In 125 of the 719 districts, the reported value of building contents was exactly equal to 30 percent of replacement values. We use this same rule of thumb to fill in where districts did not report the value of contents for permanent buildings. We do not impute contents values for portable buildings; partial structures (such as sunshades, pavilions, or breezeways); agricultural structures (such as barns, pens, or stables); or storage, maintenance, or transportation facilities. Just over 5 percent of the total value of building contents was imputed in this manner.

Finally, we recognize that a building that costs $10,000 to build in a low cost part of the state could easily cost $12,000 to build in other parts of the state; therefore, some of the variation in the estimated replacement values for school facilities could arise from regional differences in construction costs. Any such differences would not reflect differences in the quality of facilities available to children. The classroom experience is the same if the building is the same, regardless of the cost of construction. To address this concern and develop an estimate of the "real" value of facilities for each district, we explored using regression analysis to correct for systematic variations in values that arise from differences in construction wages, materials shipping costs (as measured by the distance from the nearest metropolitan area), and insulation requirements (as measured by the number of heating and cooling degree days at the nearest weather reporting station). We found that these potential cost factors (individually or in combination) can explain only seven percent of the variation in the value of Texas school buildings (per square foot).[15] Attempting to correct for regional differences in construction costs would introduce error that could easily offset the gains from making such modest adjustments. Consequently, our analysis is based on reported replacement values rather than "real" replacement values for a sample of Texas districts.

Appendix Table A: Imputed Value per Square Foot						
	Rural Districts			Urban Districts		
Variable	Estimate	Standard Error		Estimate	Standard Error	
Intercept	4.0979	0.2195	*	4.3963	0.0873	*
Transportation facility	-0.5609	0.0211	*	-0.5222	0.0172	*
Storage facility	-0.5466	0.0274	*	-0.5537	0.0186	*
Maintenance facility	-0.3379	0.0276	*	-0.3922	0.0177	*
1 story	0.0628	0.0908		-0.0543	0.0284	
2 stories	0.1067	0.0941		-0.0186	0.0289	
3 or more stories	0.0000			0.0000		
Stories unknown	0.0360	0.0952		-0.0792	0.0345	*
Distance from the center of a metropolitan area	0.0006	0.0014		-0.0035	0.0009	*
2001	0.0589	0.0813		0.0033	0.0793	
2002	-0.0561	0.0297		-0.0871	0.0391	*
2003	0.0000			0.0000		
Age	-0.0024	0.0009	*	-0.0057	0.0005	*
Age squared	0.0001	0.0000	*	0.0001	0.0000	*
Age unknown	-0.2937	0.0327	*	-0.2976	0.0216	*
Number of observations		3544			7700	
Log likelihood		2092.6			2490.2	
R-square		.5636			.5476	

Note: The rural equation also includes 155 county fixed effects while the urban equation includes 26 metropolitan area effects. Both equations include random effects for school district and facility size categories. All facilities with more than 75,000 square feet are in one category. Facilities with more than 10,000 square feet but less than 75,000 are in another category, and all other facilities are clustered according to square footage, rounded to the nearest 2000.

Appendix Table B: The Determinants of Average Age			
Parameter	Estimate	Robust Standard Error	
Intercept	94.0776	14.15955	*
Urban	-1.1265	1.539907	
Chapter 41	1.3578	2.664597	
Enrollment (log)	-11.4898	3.754385	*
Enrollment (log) squared	0.6329	.2337152	*
ADA growth rate	-21.1630	4.465039	*
Property value per pupil	-0.0000	.0025598	
Percent of students who are			
Hispanic	7.6695	4.163584	**
Black	2.3518	6.800106	
Economically disadvantaged	11.5313	5.777741	*
Limited English proficient	-30.3305	10.61114	*
Residential share of property value	-0.0141	.0443033	
Number of observations		689	
R-square		.2856	
Note: * indicates statistically significant at the 5 percent level. ** indicates statistically significant at the 10-percent level. Fort Sam Houston and Lackland ISDs are excluded because they have no tax base of their own. The model presumes that errors are uncorrelated across labor market areas, but may be correlated within labor market areas.			

Appendix Table C: The Determinants of Square Footage per Student			
Parameter	Estimate	Robust Standard Error	
Intercept	513.9611	120.6373	*
Urban	2.4596	6.879751	
Chapter 41	-18.8070	23.01055	
Enrollment (log)	-62.4023	23.23542	*
Enrollment (log) squared	3.1345	1.406346	*
ADA growth rate	-67.3887	46.75986	
Property value per pupil	0.1433	.0350962	*
Percent of students who are			
Hispanic	11.4444	22.63948	
Black	-13.2945	28.64505	
Economically disadvantaged	14.3060	36.00802	
Limited English proficient	-111.9149	63.703	**
Residential share of property value	-0.2221	.2678775	
Number of observations		717	
R-square		.5280	

Note: * indicates statistically significant at the 5 percent level. ** indicates statistically significant at the 10-percent level. Fort Sam Houston and Lackland ISDs are excluded because they have no tax base of their own. The model presumes that errors are uncorrelated across labor market areas, but may be correlated within labor market areas.

Appendix Table D: The Determinants of Educational Capital per Student			
Parameter	Estimate	Robust Standard Error	
Intercept	55966.9719	12674.29	*
Urban	751.7186	706.8118	
Chapter 41	59.6580	1896.334	
Enrollment (log)	-7981.0783	2485.228	*
Enrollment (log) squared	445.8273	152.0748	*
ADA growth rate	-4553.5153	4556.781	
Property value per pupil	11.8753	2.374163	*
Percent of students who are			
Hispanic	2771.8507	2359.461	
Black	135.7347	2685.387	
Economically disadvantaged	-1616.1557	3621.233	
Limited English proficient	-13528.4962	5683.987	*
Residential share of property value	-49.4208	23.9497	*
Number of observations		716	
R-square		.4955	
Note: * indicates statistically significant at the 5 percent level. Fort Sam Houston and Lackland ISDs are excluded because they have no tax base of their own. The model presumes that errors are uncorrelated across labor market areas, but may be correlated within labor market areas.			

Notes

[1] Jonathan Kozol, *Savage Inequalities: Children in America's Schools* (New York: Harper Perennial, 1991): 209.
[2] Catherine Clark, "Texas State Support for School Facilities, 1971-2001," *Journal of Educational Finance* 27 (Fall 2001): 683-700.
[3] Charter schools were not asked to respond to the survey.
[4] We excluded any TASB files that had not been updated since 2000.
[5] Sports-intensive districts have 37 percent of their tax base in undeveloped land, 1 percent of their capital stock in agricultural facilities, and are an average of 46 miles from the nearest urban area; the averages for all other districts in the sample are 25 percent, 0.4 percent, and 37 miles.
[6] This approach has been criticized because we did not explicitly request that school districts limit themselves to reporting only major renovations. Instead, we asked them to report in a manner consistent with the TASB datafiles. We note that the major conclusions of the analysis are essentially unchanged if we use years since construction as our measure of school building age. Assuming no school building has been significantly renovated since its construction, the average age of rural buildings is 32 years and the average age of urban buildings is 28 years.
[7] Average age is a weighted average where the weight is square footage.
[8] U.S. Department of Commerce, Bureau of Economic Analysis, *Fixed Assets and Consumer Durable Goods in the United States, 1925-99* (Washington, DC: U.S: Government Printing Office, September 2003).
[9] We calculated the average age of school facilities in each district as a weighted average of the age of each general purpose building (excluding, as before, portable, partial, agricultural, and operational buildings) using square footage at the weight. Thus a building that is twice as large receives twice the weight in this calculation.
[10] In a regression of maintenance expenditures per pupil on average age, log of enrollment, and log of enrollment squared, the estimated equation with standard errors in the parentheses is:

$$M = \underset{(184.6)}{2405} + \underset{(0.8)}{2.4}*Age - \underset{(49.5)}{341.1}*Lenroll + \underset{(3.4)}{21.6}*(Lenroll)^2.$$

There are 689 observations and the adjusted R-squared is .2304.
[11] We cannot reject the joint hypothesis that there is a zero coefficient on percent black, percent Hispanic, percent economically disadvantaged and percent limited English proficient. The F-statistic is 0.99 with 4 and 705 degrees of freedom when the data are not clustered by metropolitan area, and 0.83 with 4 and 181 degrees of freedom when the model allows for a correlation among errors within a metropolitan area.
[12] The Pearson correlation between total wealth per pupil and educational capital per pupil is .6151.
[13] The Pearson correlation between the percent economically disadvantage students and educational capital is .0050.
[14] The data were also edited for internal consistency, and some districts were contacted directly to resolve apparently anomalous values. However, there are undoubtedly other errors or omissions in the original data that were not detected and therefore could not be addressed in this report. Furthermore, while extraordinary care was taken in the processing of the data, data entry errors are always a possibility in this type of work.
[15] We calculated the average value per square foot for general purpose structures in each school district and regressed the log of this average on the log of the average construction wage in the district's metropolitan area or Census place-of-work area; the 30-year average total number of heating and cooling degree days, the average miles from the center of the nearest metropolitan area (and its square); and indicators for whether the values estimates come from 2001, 2002, or 2003. The average construction wage is the average wage and salary for construction occupations in the construction industry from the 2000 Census, adjusted for the age, educational attainment, gender, ethnicity, and hours worked of the construction employees. The result holds whether or not the regression is weighted by the total number of square feet in a district.