Supporting College Readiness: Preparing Middle School Students for High School Success in Texas

Ed Fuller, PhD
Education Consultant

with
Marilyn Springel
Educational Administration
The University of Texas at Austin

and

Greg Fuller
Education Consultant

This study was funded by the Texas Business and Education Coalition. The views and conclusions expressed by the author do not necessarily reflect those of TBEC or any organization employing Dr. Fuller

Dr. Ed Fuller is a former high school mathematics teacher and former Director of Research at the State Board for Educator Certification. He received his undergraduate degree in Math Education, Master's Degree in Educational Administration, and PhD in Education Policy and Planning from The University of Texas at Austin. He now works as an education consultant for a variety of local, state, and national organizations including the University of Texas at Austin, E3 Alliance, Education Trust, Association of Texas Professional Educators, Texas Business and Education Coalition, University Council for Educational Administration, University of Texas at Brownsville, University of Texas at San Antonio, University of Texas at El Paso, Center for Teaching Quality, International Survey Associates, National Education Association, American Association for Colleges of Teacher Education, and Texas Regional Collaborative. He also was appointed to the Board of the Texas Center for Education Research by Chairperson Gail Lowe of the State Board of Education. He has made over 100 national presentations and has a number of publications. He may be reached at edfuller@mail.utexas.edu.

EXECUTIVE SUMMARY

National and state policies over the last decade have focused on improving high schools. More recently, policymakers have focused on improving high schools to prepare more students for college. Indeed, the Legislature added measures of college readiness to the high school accountability system. While the focus on high schools is understandable, these efforts have largely overlooked the importance of elementary and middle schools in preparing students to be ready for middle school and high school, respectively.

Thus, the primary purpose of this particular paper is to examine the relationship between middle school achievement and high school outcomes. In particular, this study focuses on the relationship between the achievement of 8th grade students in Texas public middle schools and a series of high school outcomes.

Conclusions

This study reaches eight major conclusions:

1) The performance of students in 8th grade is strongly associated with a number of individual outcomes for students in high school. Specifically, students not taking the 8th grade TAKS or not passing the 8th grade TAKS math or reading tests are far ***less likely*** to:

- Pass the 9th grade TAKS math and reading tests;
- Complete and pass the 9th grade Algebra I course;
- Stay enrolled in the Texas public school system;
- Progress to the 11th grade on-time; and,
- Meet the 11th grade TAKS college-readiness standard.

For example, of the 135,000 students who did not take or did not pass the 8th grade TAKS in 2006, only 101,450 (75%) were still enrolled in a Texas public school in 2009, only 81,330 (60%) were enrolled in the 11th grade, and only 3,100 (2%) met the NCEA math college-readiness standard on TAKS (2300+) in the 11th grade.

2) At the school level, the percentage of incoming 9th grade students that either did not pass or did not take the 8th grade TAKS math test is an extremely strong predictor of a school being labeled low-performing and the percentage of students enrolling in college. In high schools that have an incoming 9th grade cohort of students whose TAKS math scores are .5 standard deviations below average are *seven times more likely* to be low-performing. Schools with incoming students that have TAKS scores greater than .25 standard deviations above average are almost *five times more likely* to be rated recognized or exemplary.

3) The performance of 5th grade students is strongly associated with the performance of 8th grade students. Specifically, students who either do not take the TAKS tests or do not pass the 5th grade TAKS tests are ***less likely*** to: (1) Pass the 8th grade TAKS tests; (2) Progress to the 8th grade on-time; and (3) Stay enrolled in the Texas public school system.

4) At the school level, the percentage of incoming 6th grade students that either did not pass or did not take the 5th grade TAKS math test is an extremely strong predictor of a school being labeled low-performing and the school having a low percentage of students being high school ready. In middle schools that have an incoming 6th grade cohort of students whose

5th grade TAKS math scores are .5 standard deviations below average are seven times more likely to be low-performing. The results for high schools are quite similar.

5) Very few middle or high schools are successful in taking incoming students who are very low-performing and preparing them for the next level of schooling. Of the 84 schools with at least 30 students who did not pass the 5th grade math TAKS test, only four schools moved at least 20% of the students onto a college-ready trajectory. At the high school level, of the approximately 500 schools with at least 30 students who did not pass the 8th grade math TAKS test, only about 80 schools moved at least 20% to college-ready status in math.

6) Middle schools successful in moving 6th grade students to a high school ready status in 8th grade tend to employ some common strategies. These strategies include:

a) Increase learning time through the double-blocking of some or all students and providing tutoring time before or after school, during lunch, or on Saturdays;

b) Foster teacher collaboration through time to meet and training;

c) Democratically develop a shared sense of accountability among all staff;

d) High-quality professional development that is on-going and understood and supported by school and district administration;

e) Use data to inform—not drive—decision making about curriculum, teaching, and learning;

f) Dramatically reduce class sizes for struggling students; and,

g) Use technology and hands-on learning to engage students in learning.

7) Districts with middle schools that help students improve dramatically in math use some common resources and strategies to promote student growth. These strategies include:

a) Provide the necessary resources for schools to address the specific needs of students;

b) Provide on-going professional development and support the continual learning of teachers;

c) Hire the best principal possible and give them the resources, support, and autonomy to lead successfully, then let them perform; and,

d) Provide timely and useful data and training about understanding and using the data;

8) ***Student economic disadvantaged status is the strongest predictor of student outcomes.*** Indeed, economically disadvantaged students have less positive outcomes than their more affluent peers, even after controlling for student performance levels and school characteristics. Every research study on student achievement reaches this same conclusion. While school factors are important, student background characteristics are even more important in explaining student outcomes.

Policy Implications

Because of the preliminary nature of this study, making concrete policy recommendations that will improve outcomes is difficult. However, some broad recommendations can be made

about how the state and school districts can prepare a greater percentage of students to meet rigorous college-readiness and workforce-readiness standards. More details about these recommendations are provided at the end of the report.

State Policy

The state can play a significant role in this area in a number of different ways.

State Policy

The state can play a significant role in this area in a number of different ways.

1) Address the issue of increasing poverty in Texas by creating a coordinated, multi-agency effort to increase access to affordable and high-quality health care, child care, and early childhood education.

2) Create a coordinated and integrated set of policies that address low-performing schools.

4) Fix the school finance system to ensure an equitable and adequate system that provides the funds to effectively target struggling students.

3) Shed more light on the inputs into the education system to ensure schools enrolling high proportions of struggling students in students in poverty are provided adequate resources to meet their needs.

5) Thoughtfully review our current strategy of creating more magnet, early college, and charter schools to ensure that students in poverty and struggling students are not disproportionately concentrated in certain schools.

6) Ensure the new testing system is constructed in a way that lessens the impetus to "teach to the test."

7) Improve teacher preparation, particularly for programs that provide teachers to schools with high proportions of struggling students.

8) Carefully examine how we prepare and assess elementary and middle school mathematics teachers to ensure all teachers have a solid mathematical foundation.

9) Improve principal preparations that individuals are better prepared to be effective school leaders.

10) Support smaller class sizes, especially in schools serving high proportions of students in poverty and students struggling academically.

11) Provide the financial resources for early screenings and evaluations so that struggling students with special needs are identified early.

District Policies

1) ***Focus on early interventions that are sustained over time so that students are prepared for the next level of schooling.***

2) ***Provide useful, timely data to schools.***

3) ***Ensure struggling schools are provided the necessary resources to achieve the goals set for them.***

4) ***Hire the best principals and support them.***

5) ***Support Teacher Collaboration.***

6) Provide Social Support for Students.

Below is a list of some middle schools that showed great progress in mathematics from 2007 to 2009. This is not an exhaustive list, but the list of schools included in our qualitative study.

List of Middle Schools Showing Large Improvements in TAKS Mathematics Scores for Students Enrolled Consecutively from 6th Grade in 2007 to 8th Grade in 2009*

District-Wide Improvement		Individual Schools with High Levels of Improvement			
Coppell ISD	East MS	Lyford ISD	Lyford MS	Anna ISD	Anna MS
Leander ISD	Running Brushy MS	Madisonville ISD	Madisonville JHS	IDEA Academies	IDEA College Prep
McAllen ISD	Cathey MS	Northside ISD	Neff MS	Pflugerville ISD	Park Crest MS
Ysleta ISD	Chacon MS	Austin ISD	Paredes MS	Ingram ISD	Ingram MS
Lewisville ISD	Downing MS				
Soccorro ISD	Sanchez MS				

*Some schools with high levels of improvement were removed from the study because the number of students leaving the school was greater than 20% or the difference in TAKS scores between students staying at the school and leaving the school was greater than 80% of schools.

Introduction

In the last five years, the attention of policymakers has increasingly focused on the need to prepare a greater number and percentage of high school students to be ready for college. Indeed, during the most recent legislative session, the Legislature added measures of college readiness to the high school accountability system.

Concomitant during this increasing interest in college-readiness has been a focus on reforming and restructuring high schools. The ultimate goal of this reform effort, led primarily by the Bill and Melinda Gates Foundation, was to improve the graduation rate while also improving student achievement.

While both efforts are commendable, some preliminary analyses during the legislative session suggested that many of the outcomes of Texas high schools—accountability ratings in particular—were driven largely by the academic ability of incoming 8th grade students.

Purpose

There are two primary purpose of this paper. First, to examine the relationship between middle school achievement and high school outcomes; and, second, to identify practices employed by schools having success in improving student TAKS mathematics scores from the 6th grade in 2007 to the 8th grade in 2009. In particular, this study focuses on the relationship between the achievement of 8th grade students in Texas public middle schools and a series of high school outcomes. These outcomes include:

- Percentage of students college-ready;
- Passing the 9th Grade TAKS Tests;
- Completing and Passing 9th Grade Algebra I;
- Percentage of Students Retained in 9th Grade;
- Student Disappearance and Progression Rates; and
- Percentage of Students Enrolling in Institutions of Higher Education.

In addition, this paper also includes an examination of the overall picture of achievement for 8th grade students in Texas. This examination includes longitudinal analyses of data from the National Assessment of Educational Progress and the TAKS as well as the achievement gap for both measures. Finally, this paper includes the results of a qualitative study of schools that were successful in improving middle school mathematics achievement as measured by TAKS scores. The data and methodology for the study are presented in Appendix A.

Section I: High School Outcomes

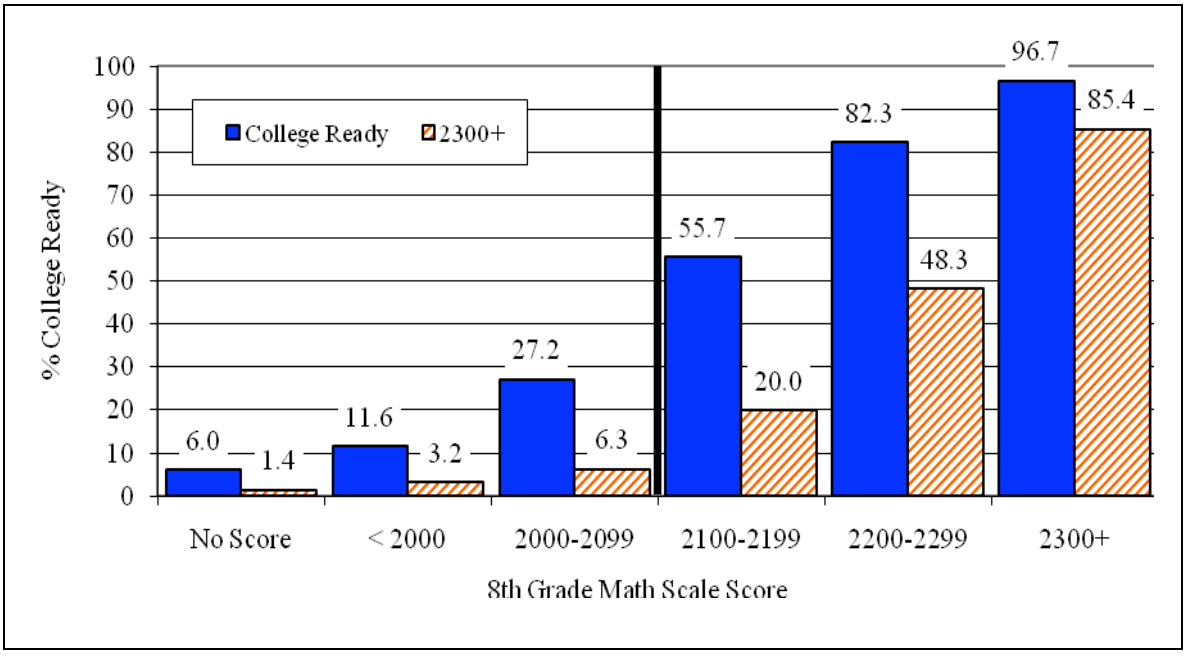
This study focuses on several outcomes at the high school level. While high schools can certainly impact these outcomes, the analyses below show that the 8th grade achievement of a student is strongly associated how well the student will perform in subsequent years.

Percentage of Students College-Ready

The purpose of the college readiness standards in Texas is to create a baseline of knowledge required for students to be successful in college and the workplace. In addition, the standards included a cut score to identify whether students had acquired the necessary knowledge and skills to enter a Texas higher education institution without enrolling in a remedial course. Specifically, the Texas Education Agency (TEA) and Texas Higher Education Coordinating Board (THECB) set this cut score at a scale score of 2200 for both the 11th grade TAKS English Language Arts and mathematics tests. However, the National Center for Educational Accountability (NCEA) reviewed data and determined that the 2200 cut score was too set too low to ensure that students were truly ready to successfully complete college English and mathematics courses. Rather than the 2200 cut score, NCEA proposed a 2300 cut score. The authors of the study (Dougherty, Mellor, & Smith, 2006) argued that a score of 2300 was better aligned to other measures of college readiness such as the SAT, ACT, and THEA. The authors found that a score of 2200 predicted that a student would have only a 77% probability of not needing remediation in English while a score of 2300 was associated with a 90% probability of not needing remediation. In mathematics, a score of 2200 was associated with only a 26% probability of being ready for college algebra while a score of 2300 was associated with a 77% probability of being prepared for college algebra. In the analysis below, I employ both standards.

As shown in Figure 1, a student's 8th grade TAKS mathematics score was strongly associated with whether the student was considered to be college-ready in mathematics the 11th grade in 2009. Strikingly, even for students who passed the 8th grade TAKS mathematics test and scored between 2100 and 2199, only 56% met the lower state standard for college readiness and just 20% met the higher NCEA standard. A more detailed analysis not included in this paper revealed that only when students scored at around 2250 or greater was the percentage of students considered college-ready greater than 50% at both standards. To reach a point where 70% of students were considered college-ready in 11th grade, students had to score at least 2300 in 8th grade. Yet, in 2006, only 30% of 8th grade students scored at 2300 or above. In 2009, about 29% of 8th grade students scored at the 2300 level. Thus, optimistically, only slightly less than one-third of the 8th grade students in 2009 were on track to be college ready in 11th grade.

Figure 1: Percentage of Students Meeting Mathematics College Readiness Standards by the 8th Grade TAKS Mathematics Scale Scores in 2006

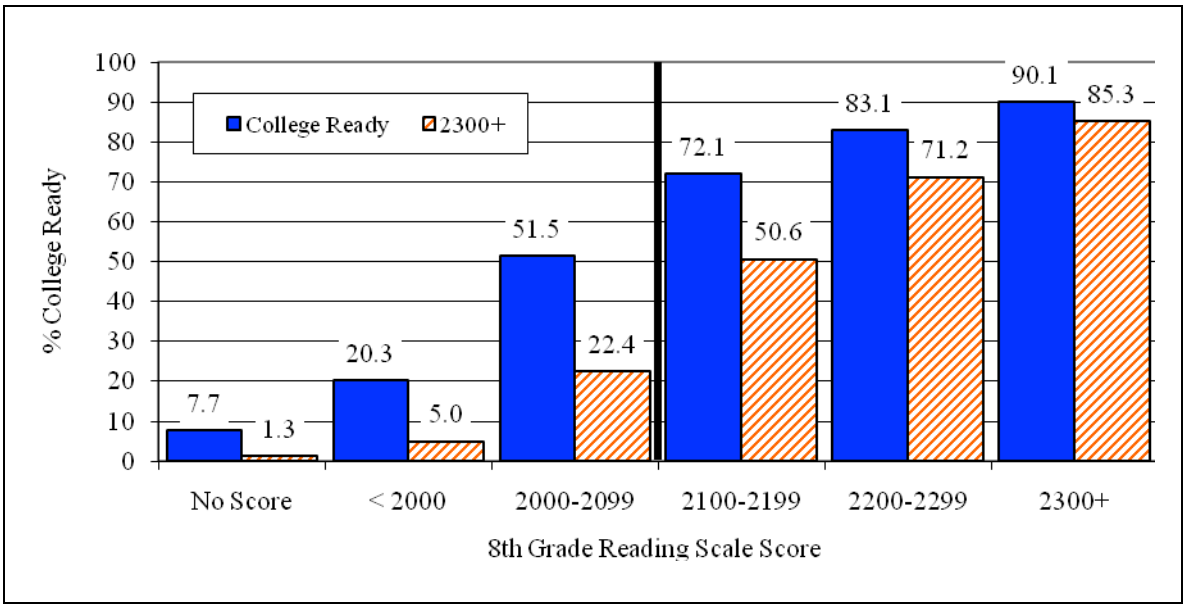


At the individual student level, a student with an 8th grade TAKS math score below 2000 was about 90% *less likely* than a student with a score between 2100 and 2199 to achieve a college-ready score of 2300 or above on the 11th grade TAKS math test, even after controlling for the student's economically disadvantaged status and the demographics of the high school attended by the student. At the other end of the spectrum, a student with an 8th grade TAKS math score of 2300 or above was 23 times *more likely* than a student scoring between 2100 and 2199 to achieve a college-ready score of 2300 or above in the 11th grade.

Very few schools were successful with the group of students scoring below 2000 on the mathematics TAKS in 8th grade. Indeed, of the 492 schools with at least 30 9th grade students with 8th grade TAKS scores below 2000, only 7% (34 of 492) of high schools were able to move at least 25% of students into the 11th grade in three years and achieve the college-readiness standard. Only four schools were able to move more than 20% into the NCEA college-readiness range.

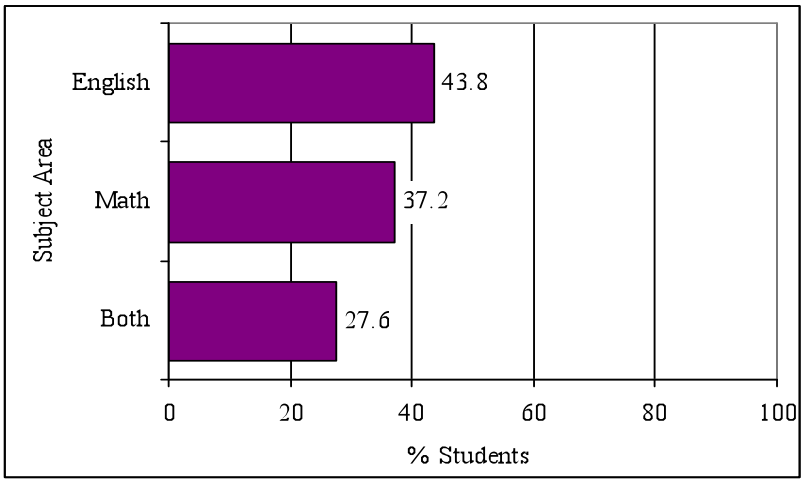
As shown in Figure 2, a student's 8th grade TAKS reading score was strongly associated with whether the student was considered to be college-ready in English in the 11th grade in 2009. For those students not passing the test, only 21% met the state standard while just 4% met the NCEA standard. As with the mathematics analysis, a more detailed analysis of the reading scores suggests that only when students scored around 2250 in 8th grade was the percentage of students meeting both college readiness standards greater than 50%. To reach a point where 70% of students were considered college-ready in 11th grade, students had to score at the commended level in 8th grade—2400 or above. In 2006, about 28% of students scored at the commended level on the TAKS reading test. In 2009, about 37% of students scored at the commended level, thus more than one-third of students are on track to be college ready in English in the 11th grade.

Figure 2: Percentage of Students Meeting English
College Readiness Standards by the 8th Grade TAKS Reading Scale Scores in 2006



The following analyses employ only the NCEA standard for college readiness since the standard is arguably a more accurate predictor of college readiness than the state standard (See Dougherty, Mellor, & Smith, 2006 for details).As shown in Figure 3, the percentage of 11th grade students in 2009 scoring at the NCEA college-ready standard of 2300 was about 44% for English, 37% for mathematics, and only 28% for both English and mathematics. Thus, only about one-quarter of this year's graduates will have met the college readiness standard in both subjects.

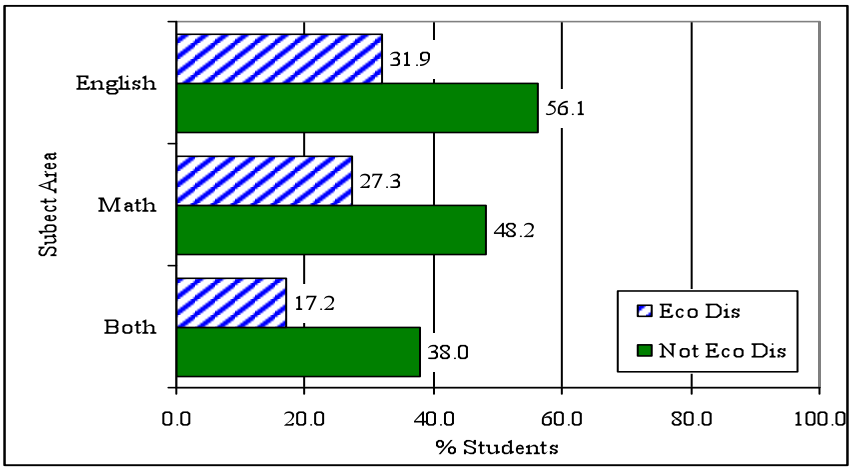
Figure 3: Percentage of 11th Grade Students Meeting
the NCEA College Readiness Standard Status (2009)



In Figure 4, the percentage of students meeting the NCEA college readiness standard is disaggregated into economically disadvantaged and not economically disadvantaged students. Clearly, there are large gaps in the percentage of students meeting the college readiness standard

between the two groups. Indeed, while 38% of not economically disadvantaged students met the college readiness standard in both subjects, only 17% of economically disadvantaged students did so. Given that the proportion of high school students who are economically disadvantaged has increased every year over the last decade, this result does not portend well for the future.

Figure 4: Percentage of 11th Grade Students Meeting the NCEA College Readiness Standard by Student Economically Disadvantaged Status (2009)



While Figure 4 provided the overall percentage of students meeting the NCEA college-readiness standard, Table 1 details the percentage of economically disadvantaged and not economically disadvantaged students meeting the standard in schools with different percentages of economically disadvantaged students overall.

Clearly, regardless of the overall percentage of economically disadvantaged students enrolled in the school, a lower percentage of economically disadvantaged students achieve the college readiness standard than their not economically disadvantaged peers. For schools in quartiles I and II, the percentage of not economically disadvantaged meeting the college readiness standard was twice the percentage for economically disadvantaged students. For Quartile III schools, the percentage of not economically disadvantaged meeting the college readiness standard was 10 percentage points greater than the percentage for economically disadvantaged students. Finally, for Quartile IV schools, the gap between the two groups was about five percentage points.

While the gaps do get smaller as the percentage of economically disadvantaged in the school increases, the percentage of students meeting the standards decreases for both groups of students, but in particular for not economically disadvantaged students. Specifically, the percentage of not economically disadvantaged meeting both standards in Quartile I schools was 48%, but only 22% in Quartile IV schools.

Interestingly, the percentage of economically disadvantaged students meeting both standards in Quartile I schools was slightly greater than the percentage of not economically disadvantaged students meeting both standards in Quartile IV schools.

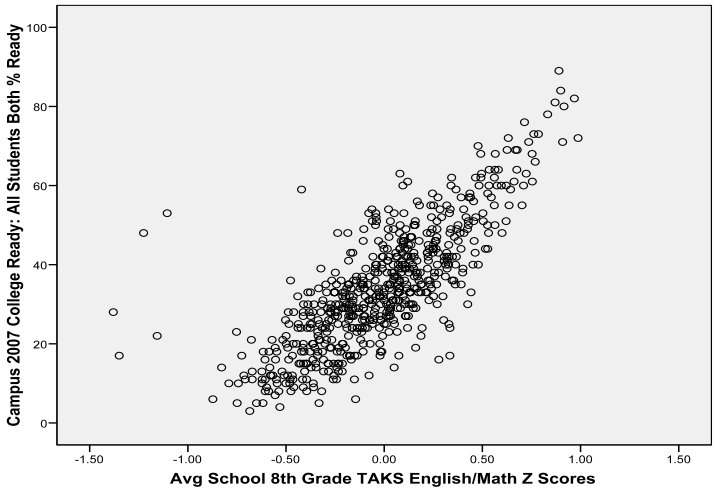
The data, then, suggest that both being an economically disadvantaged student as well as well as being enrolled in school with greater percentages of economically disadvantaged students affects the probability of a student Yet, as shown previously , the factor with the greatest impact on a student being college ready in 11th grade is the student's 8th grade TAKS mathematics and English scores.

Table 1: Percentage of 11th Grade Students Meeting College Readiness Standards in English and Mathematics by the Percentage of Economically Disadvantage Students in a School and the Student's Economically Disadvantaged Status

% Eco Dis Students	Eco Dis Student	Subject Area		Both Subjects
		Mathematics	English	
Quartile I:	No	58.1	65.1	47.8
00.0-25.0%	Yes	34.0	40.0	23.3
Eco Dis Students	Total	55.0	61.8	44.6
Quartile II:	No	44.7	53.0	34.5
25.1-50.0%	Yes	28.0	33.8	18.2
Eco Dis Students	Total	39.0	46.4	28.9
Quartile III:	No	35.4	44.3	25.9
50.1-75.0%	Yes	25.6	30.0	15.7
Eco Dis Students	Total	29.5	35.7	19.8
Quartile IV:	No	31.2	41.3	21.8
75.1.-100%	Yes	26.7	29.6	15.9
Eco Dis Students	Total	27.3	31.3	16.7
	No	48.2	56.1	38.0
All Schools	Yes	27.3	31.9	17.2
	Total	39.5	46.1	29.4

As shown in Figure 5, the school level results are even more dramatic. Clearly, there is an extremely strong relationship between the 8th grade TAKS performance of incoming 9th grade students and the percentage of students meeting the TEA's senior high school readiness standard. This standard considers TAKS scores as well as SAT performance of students. There is extremely little variation in these results, suggesting that high schools are simply unable to change the improvement trajectory of students once they reach high school. Perhaps these results will change after we have data on cohorts of students that attended restructured high schools. But the evidence suggests that a better return on investment is available at the elementary and middle school levels than at the high school level.

Figure 5: Percent of Students Meeting College-Readiness Standard (2009) and Average School 8th Grade TAKS Reading and Mathematics Scores for Incoming 9th Grade Students (2007)



All of these above results would be even more troublesome if the analyses would have been adjusted to reflect the number of students disappearing from the system and the number of students not taking particular tests. Thus, the effects of middle school achievement on college readiness would be even more pronounced if all students remained in the system rather than having many of the lower performing students simply disappearing or not taking the TAKS tests.

Passing 9th Grade TAKS

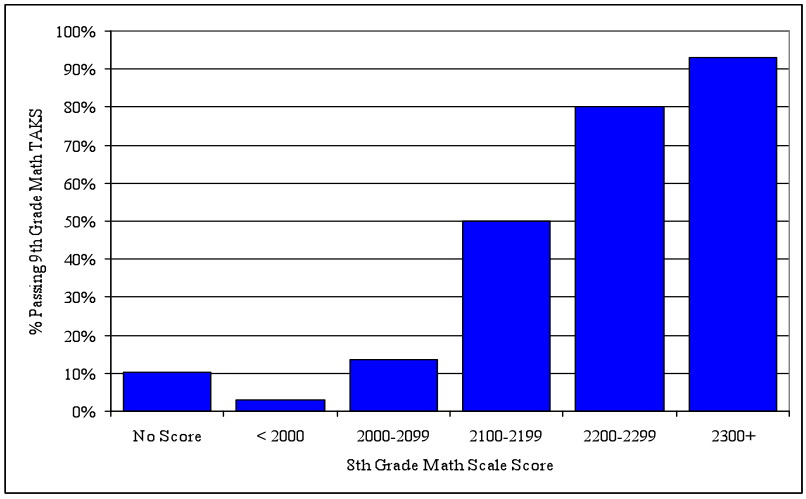
This section reviews the relationship between 8th grade TAKS scores and 9th grade TAKS outcomes. The data used in these analyses were individual student records in all grades tested from 2003 to 2009.

As shown in Figure 6, there was an extremely strong association between students' 8th grade TAKS mathematics scale scores and passing the 9th grade TAKS mathematics test. This is not surprising given that once a student achieves the level of knowledge and skills to pass the TAKS test at any grade level, the student is very likely to maintain that level over time.

Given that overall trend, there are some surprising and disturbing trends in the data. First, only 50% of the students who scored just above passing on the 8th grade test (scale score of 2100 to 2199) actually passed the 9th grade test. Second, only about 12% of students scoring just below passing in 8th grade (scale score range of 2000 to 2099) actually passed in the 9th grade. In fact, students scoring in the 2000 to 2099 range on the 8th grade test were almost 80% less likely than students scoring in the 2100 to 2099 range to pass the 9th grade TAKS math test. Alternatively, students scoring in the 2200 to 2299 range on the 8th grade test were more than four times more likely than students scoring in the 2100 to 2199 range to pass the 9th grade test.

There are a number of possible explanations for this. One explanation is that the 9th grade test is simply more difficult than the 8th grade test. Conversations with educators suggest this explanation may have some validity. Second, when a student takes a test, that score is not an exact assessment of the student's ability to answer the set of questions correctly. Rather, a test score is an estimate of the student's ability and with that estimate comes a margin of error. For students scoring just above or below a cut score, an additional test may change their score in a way that moves them above or below the test score. This measurement error could account for the lower passing rate in 9th grade. In fact, of students scoring close to 2100 in 8th grade, about 50% passed and 50% did not pass in 9th grade. However, given the scale sore ranges employed, a greater percentage of students should have passed if only measurement error was influencing scores. A third explanation could be that the 9th grade test is not very well aligned with the 9th grade curriculum. A fourth explanation is that the results could simply indicate that students are not making particularly good progress in the 9th grade. Indeed, since 9th grade teachers tend to be the least experienced and least qualified teachers on a high school campus, students simply might not make as much progress in 9th grade as they need to. A final explanation is that the transition from middle to high school culture has some type of negative impact on student progress.

Figure 6: Percentage of Students Passing the 2009 TAKS
9th Grade Mathematics Test by the 2008 8th Grade TAKS Scale Score



In all likelihood, the results shown in Figure 6 are probably explained by some combination of the above four possible reasons as well as other reasons not listed here. However, regardless of the *reasons* for the results, the actual results are extremely clear—students must score substantially above 2100 on the 8th grade mathematics test to have more than a 50% probability of passing the 9th grade mathematics test.

Figure 7 provides an analysis of those students not passing the 8th grade TAKS mathematics test in 2008. The students were provided three opportunities to pass the tests and this analysis incorporates data from all three test administrations. By statute, schools must convene a placement committee for each student in order to determine if the student should be retained in the 8th grade or promoted to the 9th grade.

As shown in Figure 7, the vast majority of students who failed the TAKS test in 8th grade in 2008 were promoted to 9th grade in 2009. Specifically, 83% of the students advanced to the 9th grade while just fewer than 7% were retained in the 8th grade. The remaining 10% were no longer enrolled in a Texas public school in 2009.

Of those students retained in the 8th grade 51% did not pass again, 43% passed, and 5% did not have a score reported. The students advanced to the 9th grade fared much worse. Specifically, 63% did not pass, 11% passed, and 26% did not have a score reported. Regardless of whether the students were retained or not, students who did not pass the 8th grade mathematics test did not fare well in the subsequent year. Those advanced to 9th grade, however, fared far worse than those retained. Unfortunately, we don't have enough data to examine the long-term outcomes of the retention or advancement of these students. For example, we would want to examine whether students retained in grade were more likely to drop out than those students who advanced to the 9th grade. We would also want to see the percentage of students from each group who passed the 11th grade test, who graduated from high school, and who enrolled in higher education.

Figure 7: 2009 Enrollment Outcomes for Students Not Passing the 8th Grade TAKS Math Test in 2008 and TAKS Outcomes in 2009

8th Grade	Not Enrolled	9th Grade
6.6% (3,967)	10.4% (6,280)	83.0% (50,054)

8th Grade TAKS Math		9th Grade TAKS Math	
Did Not Pass	51.4% (2,044)	Did Not Pass	63.4% (31,752)
Passed	43.5% (1,730)	Passed	10.6% (5,294)
No Score	5.1% (202)	No Score	26.0% (13,008)

Figures 8 and 9 present the overall passing rates of 9th grade students from 2003 to 2009 by the race/ethnicity of the student. Clearly, the percentages have increased for all groups in both reading and mathematics over time. In reading, the vast majority of students passed the 9th grade test in 2009. In mathematics, 70% of White students, 60% of Hispanic students and only 40% of African American students passed the 9th grade mathematics test in 2008.

Figure 8: Percentage of Students Passing the TAKS 9th Grade Reading Test by Student Subpopulation (2003-2009)

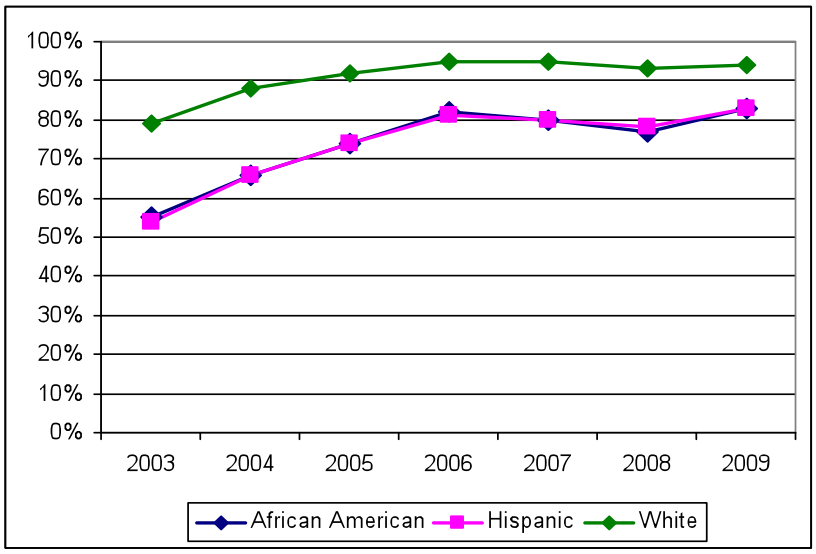
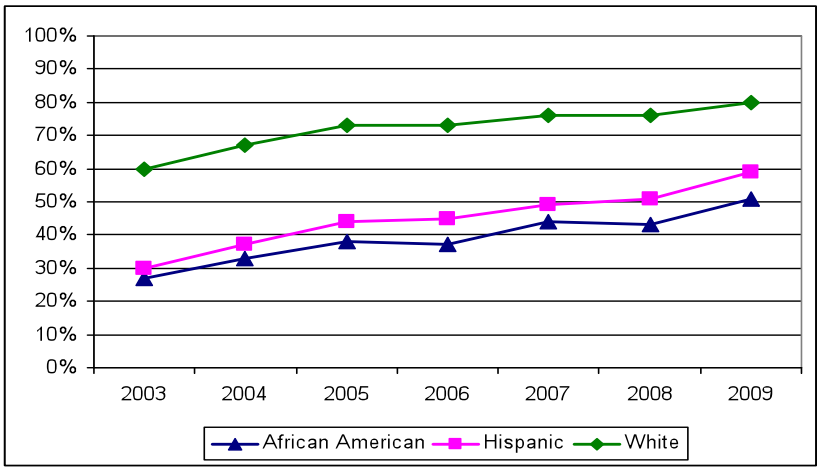


Figure 9: Percentage of Students Passing the TAKS
9th Grade Mathematics Test by Student Subpopulation (2003-2009)



Completing and Passing 9th Grade Algebra I

This section of the study examines the relationship between 8th grade TAKS achievement and 9th grade course completion and course passing rates in 9th grade Algebra I. The data underlying these analyses are individual student 8th grade TAKS data from 2007 and individual student level course completion and course passing data from 9th grade Algebra I. The two data sets—both from TEA—were merged at the individual student level.

As shown in Figure 10, there was a strong relationship between student 8th grade TAKS mathematics scale scores and passing 9th grade Algebra. Less than 50% of students who scored less than 2000 on the 8th grade TAKS passed 9th grade Algebra I while only 65% of those who scored between 2000 and 2100 passed 9th grade Algebra. Thus, the probability of passing 9th grade Algebra I was severely diminished for students not passing the 8th grade TAKS mathematics test. On the other end of the continuum, students who scored above 2200 were likely to pass Algebra I in 9th grade, Indeed, over 90% of students scoring 2200 or above successfully completed and passed 9th grade Algebra I.

Figure 10: Percentage of Students Passing 9th Grade Algebra I in 2008 by
8th Grade TAKS Mathematics Scale Scores in 2007

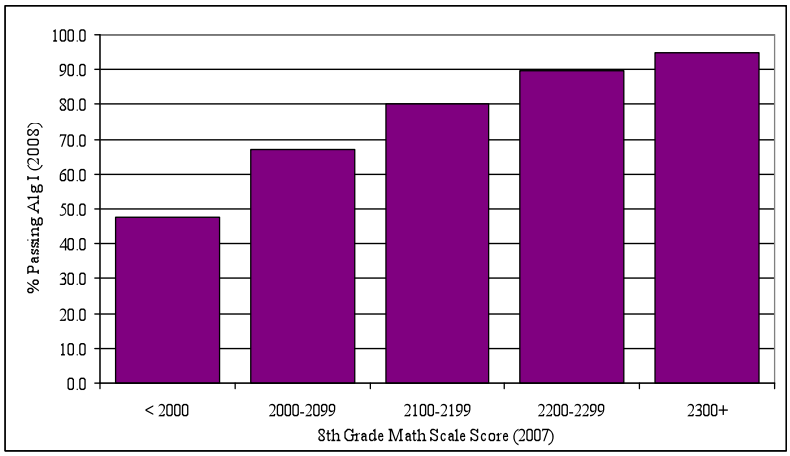
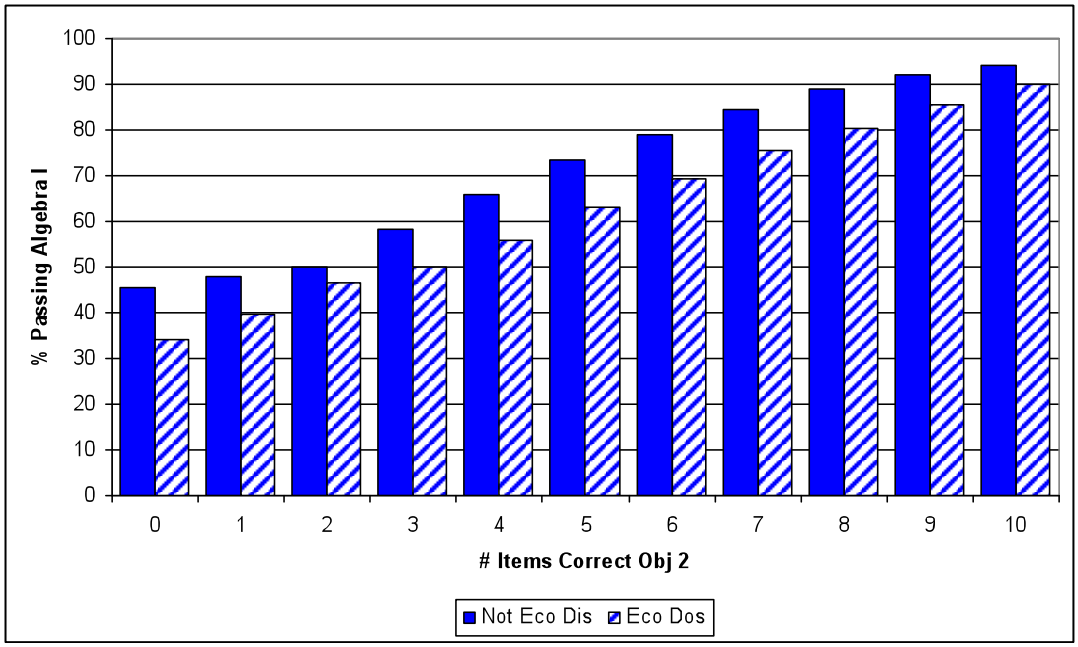


Figure 11 displays the relationship between the number of items correct on Objective Two of the 8th grade TAKS mathematics test and the percentage of students passing 9th grade Algebra I. This objective has 10 questions that cover patterns, relationships, and algebraic reasoning. Of the available objectives, this objective is generally considered to be the best predictor of success in Algebra I .

Not surprisingly, the greater the number of items answered correctly, the greater the percentage of students passing Algebra I in 9th grade. Moreover, this was true for both not economically disadvantaged and economically disadvantaged students. Despite the positive relationship between the number of items answered correctly and passing Algebra I, roughly 50% of the students who answered one to three questions correctly actually passed Algebra I. Further, answering five or more questions correctly was associated with 70% of students or greater passing Algebra I.

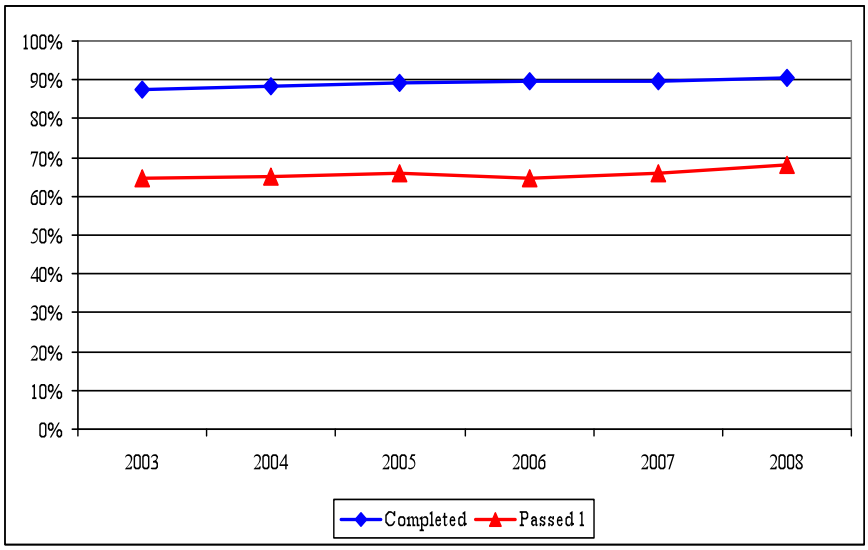
Thus, this objective does not appear to be a particularly strong predictor of success in Algebra I. this may be the small number of questions in the objective overall and the very small number that directly assess algebraic thinking.

Figure 11: Percentage of Students Passing 9th Grade Algebra I by the Number of Items Correct on Objective 2 of the 8th Grade TAKS Mathematics Test



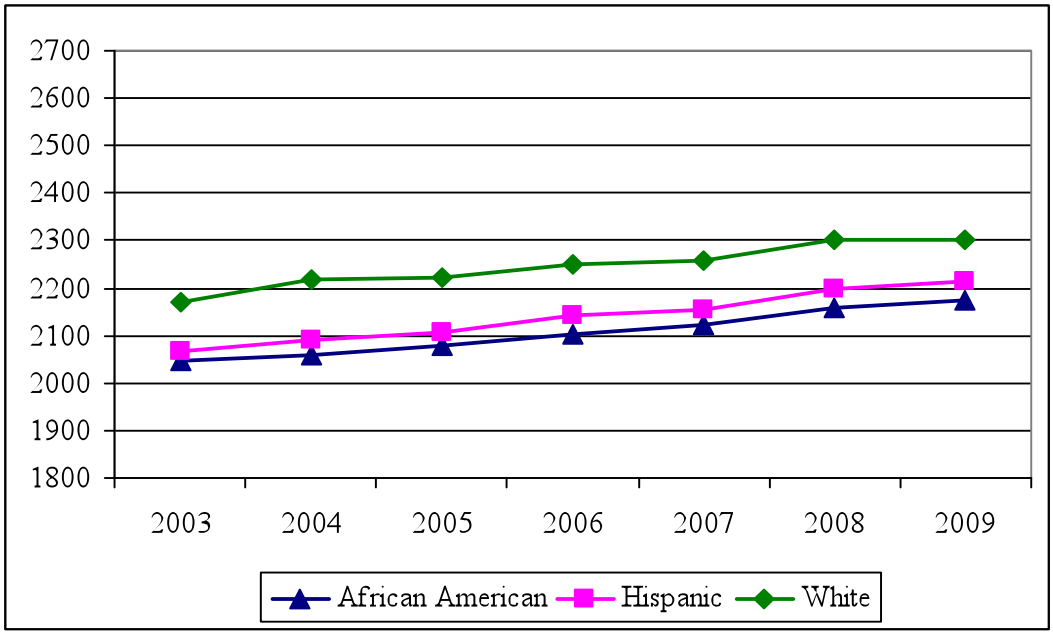
Interestingly, as shown in Figure 12, the percentage of students completing and passing 9th grade Algebra I has remained fairly steady from 2003 to 2008. There have been some marginal increases, especially in the past year or two.

Figure 13: Percentage of Students Passing 9th Grade Algebra I (2003 to 2008)



One possible explanation for the lack of improvement in passing Algebra I is that a greater and greater percentage of students are taking Algebra I in middle school, thus leaving only students from the lower end of the distribution of scale scores taking 9th grade Algebra I. In contrast, as shown in Figure 13, the average scale score of students has increased over the past seven years for all student groups. One would expect that the percentage passing 9th grade Algebra I would have increased over time as the average scale increased over time.

Figure 13: Average Scale Scores of Texas Students on the TAKS
8th Grade Mathematics Test by Student Subpopulation (2003-2009)

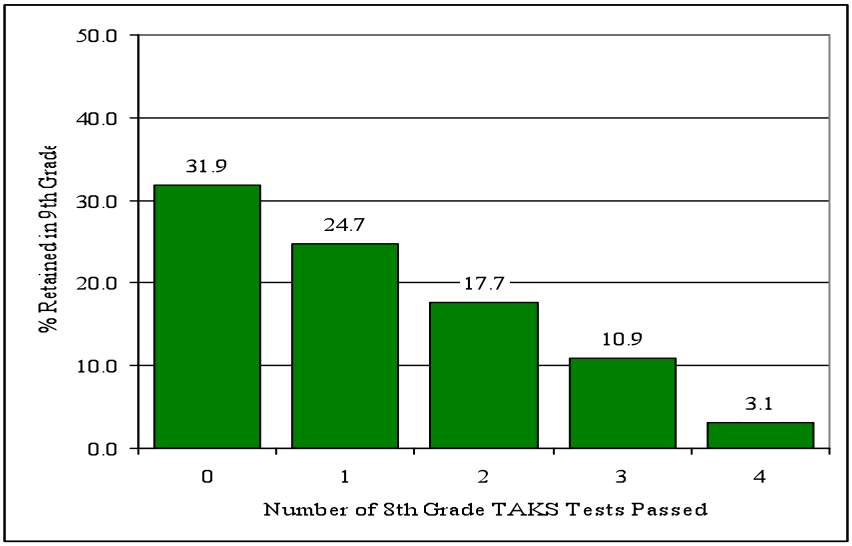


Percentage Retained in 9th Grade

This section more closely examines the percentage of students retained in 9th grade. Again, the analysis is based on student-level data merged over time.

As shown in Figure 14, the greater the number of TAKS tests passed in 8th grade, the lower the percentage of students who were retained in the 9th grade. Indeed, while over 30% of students who did not pass any tests in 8th grade eventually were retained in the 9th grade, only 3% of students who passed all four tests were retained.

Figure 14: Percentage of Students Retained in 9th Grade
by the Number of 8th Grade TAKS Tests Passed



The TAKS mathematics achievement alone is a strong predictor of whether a student is retained in the 9th grade. Indeed, even after controlling for individual and school factors, students without a valid score on the 8th grade math TAKS were 16% *more likely* to be retained than students scoring in the 2000 to 2099 range while students scoring lower than 2000 on the 8th grade TAKS math test were 63% *more likely* than students scoring in the 2000 to 2099 range to be retained in the 9th grade. After controlling for previous test scores, economically disadvantaged students were 55% more likely than other students to be retained in the 9th grade. Further, the greater the school percentage of economically disadvantaged, African American, bilingual, and mobile students, the greater the likelihood a student will be retained in the 9th grade even after controlling for personal characteristics and 8th grade student achievement.

Student Disappearance and Progression Rates

This section examines the relationship between 8th grade TAKS scores and student disappearance rates. A student is considered to have disappeared if the student had an answer document submitted for a TAKS test in one year, then did not have an answer document submitted by any Texas public school for a TAKS test in the subsequent year. Importantly, all students enrolled in a Texas public school should have an answer document submitted regardless of whether the student actually takes the test or not.

As shown in Figure 15a, the percentage of students who took all four TAKS tests in 8th grade no longer enrolled in a Texas public schools one year after 8th grade varied inversely with the number of 8th grade TAKS tests passed. Specifically, 11% of students who had not passed any tests disappeared while just over 3% of students who passed all four tests disappeared. While certainly not all of these students actually dropped out of school, it would be fair to assume that some substantial proportion of these students no longer enrolled in school did actually choose to drop out of school.

In figure 15b, all students in 8th grade except those masked for FERPA reasons were included in the analysis. If a student did not have a score for a test for any reason other than masking for FERPA protection, then the student was considered to have not passed the test. This analysis, however, examines whether students are still enrolled after two consecutive academic years. When these students are included, over 20% of students not passing any tests disappeared from the Texas public education system within two years while 6% of students passing all four tests disappeared from the Texas public education system within two years.

At the individual student level, logistic regression results suggest that, as compared to students who passed all four TAKS tests in 8th grade, students who did not pass any of the four tests were almost four times more likely to disappear within two years. Even students who passed only three tests were 77% more likely than students who passed all four tests to disappear from the Texas public education system. Students who passed only one test were about three times more likely to disappear and students who passed only two tests were about 2.5 times more likely to disappear. Importantly, these results are independent of the effects of personal and school demographics on the probability of disappearing.

Figure 15: Percentage of Students No Longer Enrolled in Texas Public Schools by the Number of 8th Grade TAKS Tests Passed

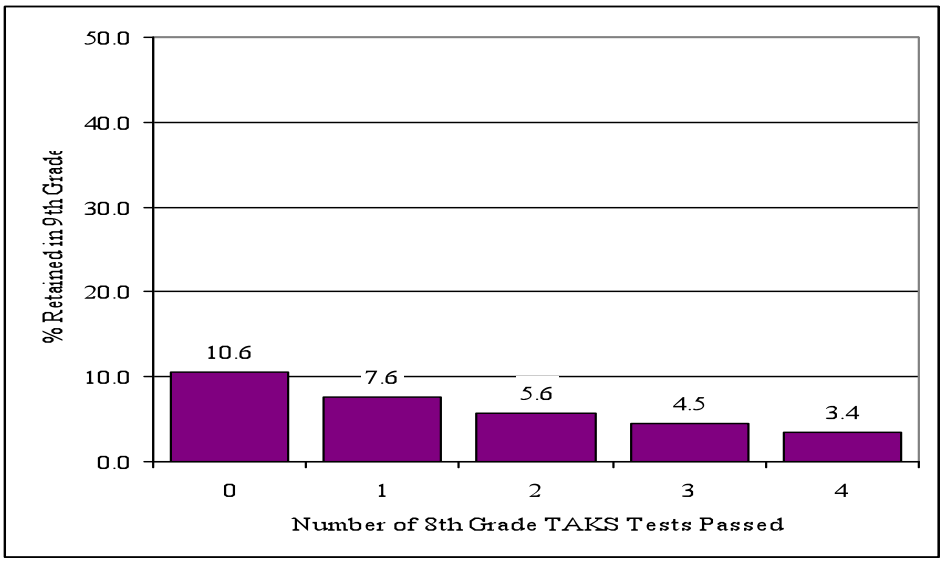
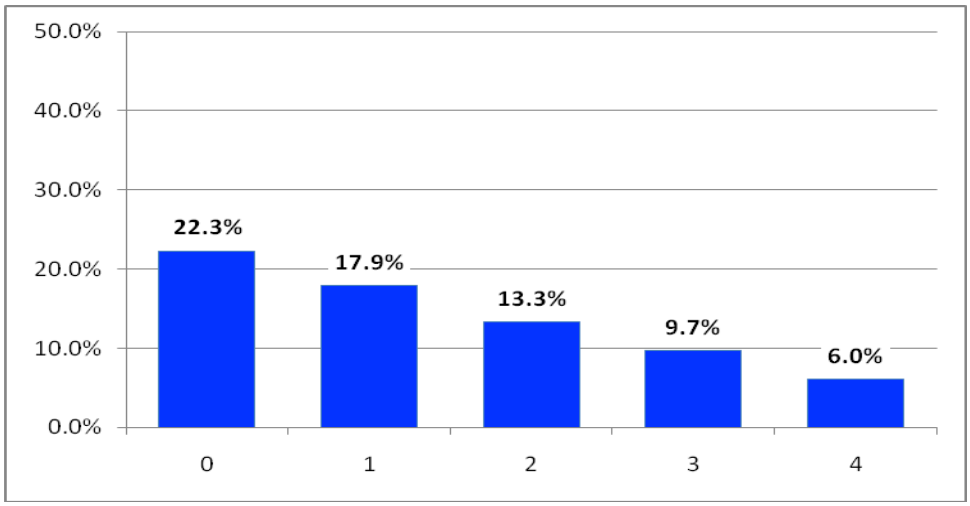


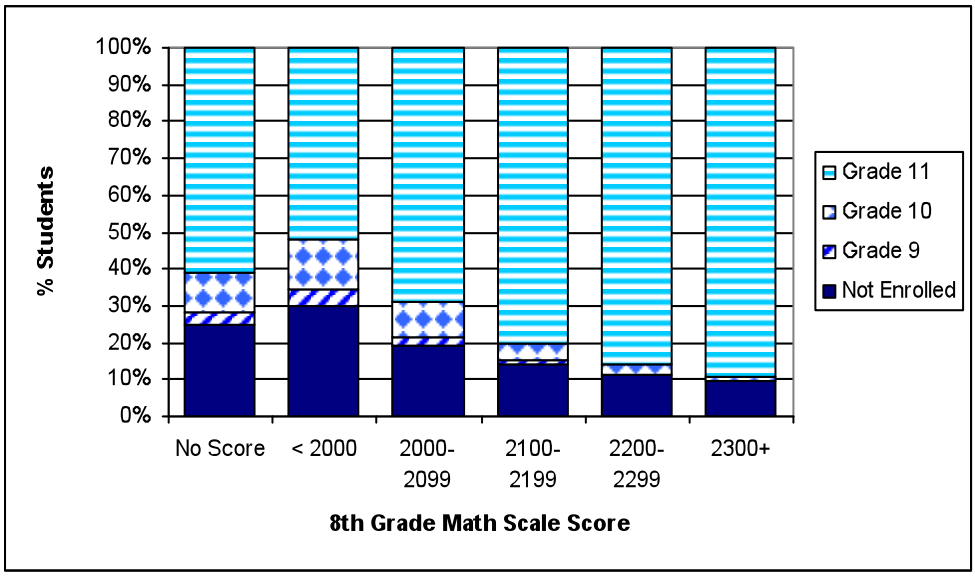
Figure 15b: Percentage of Students No Longer Enrolled in Texas Public Schools by the Number of 8th Grade TAKS Tests Passed



As shown in Figure 16, the greater the 8th grade TAKS mathematics scale score, the lower the percentage of students who were no longer enrolled in a Texas public school. Thus, there appears to be a negative relationship between 8th grade TAKS mathematics scale scores and remaining in the Texas public school system and a positive relationship between 8th grade TAKS mathematics scale scores and continuing on track for a normal grade progression.

Both of these outcomes certainly make sense. Undoubtedly, students scoring at the bottom of the distribution of TAKS are more likely to leave public schooling than other students. On the other hand, students scoring at the top end of the distribution are likely to progress from one grade to another on schedule since they are highly unlikely to be retained in grade and have no academic reasons to leave school.

Figure 16: Enrollment Outcomes in 2009 by the 8th Grade TAKS Mathematics Scale Scores in 2006



Percentage of Students Enrolling in Higher Education

Figure 17 compares the percentages of high school students graduating in the spring of 2007 who enrolled in a Texas higher education institution in the fall of 2007 by the performance level of the 8th grade TAKS reading and mathematics for incoming 9th grade students in 2004.

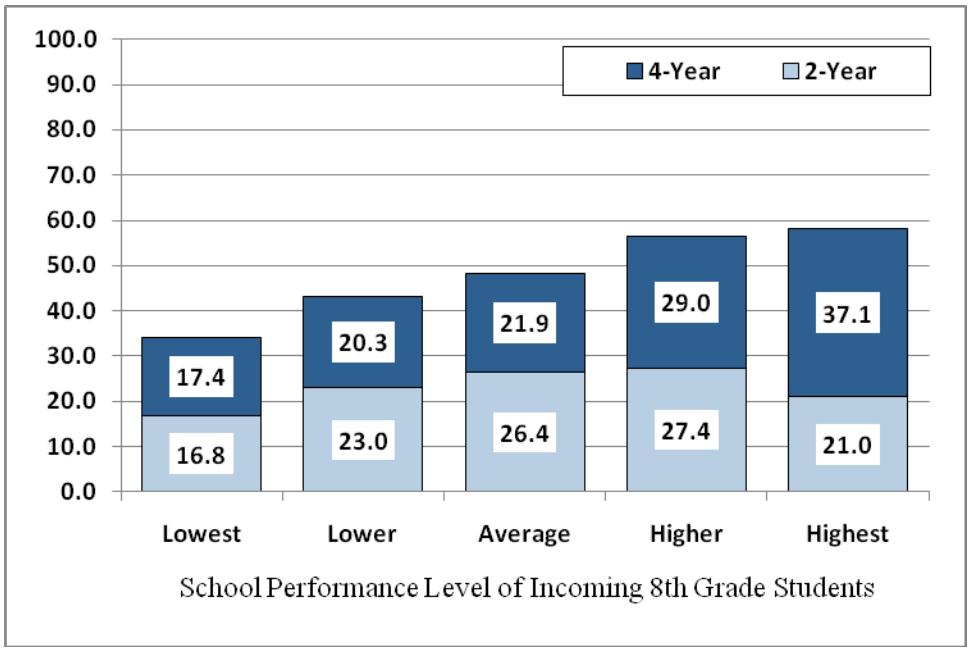
The performance level of the incoming 9th grade students was calculated by matching 9th grade students in 2004 with their 2003 8th grade TAKS scores. The TAKS scores had been converted to z-scores, a process which sets the average scale score to zero and makes the standard deviation of the distribution of scores equal to one. In this way, the reading and math scores could be combined into one z-score for all incoming 9th grade students.

The percentage of students enrolling in Texas higher education institutions was calculated by the Texas Higher Education Coordinating Board (THECB). There are two problems with this data. First, some students—especially immigrant students—do not have social security numbers, thus could not be tracked from high school to college. Second, students enrolling in institutions outside of Texas are not included in the data. Thus, the data are only rough estimates rather than precise counts and percentages of students.

As shown in the table, the greater the performance level of the incoming 9th grade students, the greater the percentage of students enrolled in higher education institutions and the in four-year colleges. With respect to community colleges, the percentage enrolled is a U-shaped curve, with the lowest percentages for high schools with the lowest and highest levels of performance for incoming 9th grade students.

Although there is a large degree of measurement error in the THECB data, the results suggest a fairly strong correlation between the 8th grade TAKS achievement level of incoming 9th grade students and the percentage of students enrolling in higher education.

Figure 17: Percentage of Students Enrolling in Higher Education in 2007 by the 8th Grade TAKS English and Mathematics Performance Level of Incoming 9th Grade Students



Section II: National Assessment of Educational Progress (NAEP)

The National Assessment of Educational Progress (NAEP) is a test administered to students across the country. Students are sampled in such a way as to be representative of all students in a state, but not of individual schools or districts. The NAEP tests use a variety of test question types, including multiple choice, free-response, and constructed-response. The test is considered the "gold standard" of tests in the United States because of the high-quality.

Comparison to Other States

Over the last 17 years, as shown in Table 2, Texas students have increased achievement in overall mathematics and in Algebra by approximately one standard deviation—a fairly substantial gain over time. Put another way, Texas students in 2007 scored about three grade levels greater than their peers from 17 years prior. For Hispanic and African American students, the gain was closer to four grade levels. Thus, not only did all students make large gains over time, but African American and Hispanic students made the largest gains, thus closing the achievement gap between Whites and non-Whites.

In addition, Texas students scored at the same level or greater than peers in comparison states. Indeed, with only a few exceptions, Texas students statistically outperform their demographic peers in states that are large and diverse like Texas.

Table 2: NAEP Mathematics and Algebra Scale Scores for 8th Grade Students in Selected States by Student Racial/Ethnic Subpopulation (1990-2007)

	Overall Mathematics					Algebra				
State	1990	1996	2003	2007	**Change**	1990	1996	2003	2007	**Change**
White										
Texas	272	284	290	300	**27**	271	285	290	302	**31**
New York	273	283	293	290	**17**	271	282	283	294	**23**
Florida	265	277	286	289	**24**	264	280	287	292	**28**
California	270	277	283	287	**18**	269	276	287	294	**26**
Michigan	270	284	286	285	**15**	269	285	288	288	**19**
Hispanic										
Texas	234	249	260	271	**37**	233	252	262	276	**43**
New York	234	243	255	258	**24**	238	248	261	264	**26**
Florida	231	235	249	259	**29**	231	244	253	263	**32**
California	231	244	246	253	**21**	235	246	255	262	**27**
Michigan	231	245	245	244	**13**	233	252	249	251	**17**
African American										
Texas	245	255	267	277	**32**	242	257	268	279	**37**
New York	238	244	262	264	**26**	239	248	258	272	**33**
Florida	246	254	264	270	**25**	246	260	267	275	**29**
California	236	245	250	256	**20**	235	247	257	265	**30**
Michigan	na	na	267	259	**na**	na	na	272	264	**na**

As shown in Table 4, there were almost no gains in reading over the past nine years. Not only was this true for Texas, it was true for all the other comparison states as well with the exception of Florida White and African American students. Thus, while states were making substantial gains in 8tth grade mathematics, the same states were essentially treading water with respect to 8th grade reading.

Table 4: NAEP Reading and Gaining Information Scale Scores for 8th Grade Students in Selected States by Student Racial/Ethnic Subpopulation (1990-2007)

	Reading				Gaining Information			
State	1998	2003	2007	**Change**	1998	2003	2007	**Change**
White								
Texas	271	272	275	**3**	272	272	276	**4**
New York	275	277	274	**0**	274	279	276	**1**
Florida	264	268	268	**4**	**262**	270	268	**5**
California	268	265	266	**-2**	267	265	266	**-1**
Michigan	—	**272**	267	**na**	—	**273**	267	**na**
Hispanic								
Texas	246	247	249	**3**	248	249	250	**2**
New York	246	246	246	**-1**	245	248	251	**5**
Florida	236	239	244	**8**	236	243	247	**11**
California	238	239	237	**-1**	235	240	239	**4**
Michigan	—	**242**	236	**na**	—	**242**	239	**na**
African American								
Texas	250	247	251	**1**	249	249	252	**3**
New York	247	250	246	**-1**	245	253	247	**1**
Florida	**247**	251	256	**9**	**247**	253	259	**12**
California	238	237	239	**2**	236	238	242	**5**
Michigan	—	257	241	**na**	—	265	242	**na**

Racial/Ethnic Group Comparisons

As shown in Table 5, the gap between White and African American and White and Hispanic students has decreased slightly over the last 17 years. However, the decreases occurred primarily between 1990 and 2003, with no change between 2003 and 2007 with the exception of the White-Hispanic gap. Moreover, when considering statistical significance, the gap has not closed between White and African American over the 17 years and has not closed for White and Hispanic students since 2000 (data not shown).

Table 5: NAEP Mathematics and Algebra Scale Scores and Achievement Gaps for 8th Grade Texas Students by Student Racial/Ethnic Subpopulation (1990-2007)

Student Population	Overall Mathematics					Algebra				
	1990	1996	2003	2007	**Change**	1990	1996	2003	2007	**Change**
White	272	284	290	300	**27**	271	285	290	302	**31**
Hispanic	234	249	260	271	**37**	233	252	262	276	**43**
African American	245	255	267	277	**32**	242	257	268	279	**37**
Gap: W – H	38	35	30	29	**-9**	38	33	28	25	**-13**
Gap: W – AA	28	29	23	23	**-5**	29	28	22	23	**-6**

Table 6: NAEP Reading and Gaining Information Scale Scores and Achievement Gaps for 8th Grade Texas Students by Student Racial/Ethnic Subpopulation (1990-2007)

Student Population	Reading				Gaining Information			
	1990	2003	2007	**Change**	1990	2003	2007	**Change**
White	271	272	275	**3**	272	272	276	**4**
Hispanic	246	247	249	**3**	248	249	250	**2**
African American	250	247	251	**1**	249	249	252	**3**
Gap: W – H	25	25	26	**1**	24	24	26	**2**
Gap: W – AA	22	24	24	**2**	22	23	24	**1**

Section III: High-Improvement Middle Schools

As noted previously, we interviewed central office staff, principals, and teachers in schools identified as high-growth schools and in districts where all or almost all middle schools were relatively high-growth. We also surveyed teachers through an on-line questionnaire.

Our preliminary findings suggest the following strategies are successful in moving 6th grade students to a high school ready status in 8th grade. Schools in the study employed most or all of strategies to some degree.

1) Foster teacher collaboration through time to meet and training and democratically develop a shared sense of accountability among all staff.

Teachers were very clear about the strategy most important to them—the opportunity to collaborate with other teachers during the school day to improve instruction. Indeed, by far, teachers aid this was the critical factor in improving student achievement. When asked why such a strategy was important, both principals and teachers responded with three primary answers. First, the opportunity to collaborate ensured that no students slipped through the cracks. Teachers discussed not only student test scores, but overall student learning and behavior. Teachers were able to collaboratively develop intervention strategies to employ with struggling students.

Second, teachers and principals said that teacher instructional effectiveness improved through the collaborative meetings. Teachers were able to share best practices and provide follow-up to implementation of these practices.

Third, teachers and principals remarked that the increased collaboration among teachers and with school administration led to the development of a shared sense of accountability. In other words, teachers felt accountable to their colleagues to ensure that all students were exposed to high-quality teaching. Teachers, in fact, said that the accountability to each other was a far stronger motivator than the state accountability system.

2) Increase the amount of learning time provided to students.

Much has been made about the KIPP strategy of increased learning time to improve student achievement. KIPP often does this through extended days, extended school years, and/or holding additional classes on the weekends. The schools in this study also sought to increase the mathematics learning time provided to students. However, schools did not extend the school day, but employed other strategies. Most of the schools achieved this through the double-blocking of some or all students taking mathematics. School personnel said that such double-blocking was especially critical to those students behind grade level. Other schools increased learning time by holding tutoring sessions before school, at lunch, or after school. Finally, a few schools even offered tutoring sessions on Saturdays. Respondents believed this strategy was critical to improving student achievement.

3) High-quality professional development that is on-going and understood and supported by school and district administration.

Teachers and principals also mentioned that high-quality professional development that directly addressed the needs of the teachers and was fully supported by the principal and central office was instrumental in improving achievement. There was no little commonality in the actual content of the professional development because each school identified unique strengths and weaknesses based on an analysis of TAKS data and other achievement data. What was critically important from the viewpoint of teachers is that the professional development addressed their needs and was fully supported.

Teachers related that districts often provided a "one-size-fits all" strategy towards professional development. Thus, the needs of teachers may or may not have been met. In these schools and districts, the unique needs of teachers and schools were identified, and then the appropriate professional development was implemented.

Further, teachers communicated the importance of having school leaders and central office staff who understood and supported the professional development effort. Both groups of individuals ensured that teachers had time, resources, and instructional assistance to fully implement the professional development activities.

4) Use data to inform—not drive—decision making about curriculum, teaching, and learning.

While all schools reported widespread use of TAKS data to make decisions, most respondents said that TAKS data did not drive decisions, but informed decisions. To them, this meant that other pieces of important information were used to make decisions other than just TAKS data. Further, in most instances, schools did not focus specifically on TAKS questions per se, but used the data to identify the conceptual areas in which students needed additional assistance.

5) Dramatically reduce class sizes for struggling students.

Most, but not all, schools reported that struggling students were enrolled in dramatically smaller classes. Both teachers and principals reported that students struggling in school—especially those in 8th grade—required far greater attention that can only be provided in smaller classes and in individual tutoring sessions. For two schools, the principal said these smaller class sizes were a critical factor, yet budget cuts in the coming years would not allow them to continue the practice.

6) Use technology and hands-on learning to engage students in learning.

A majority of the schools reported employing cutting-edge technology to engage students in the learning process. In fact, one school used gaming systems in the second math class for struggling students to engage students in the learning process. Those schools using such technology reported that many of the struggling students entering middle school had already internalized that math classes were boring. Through the use of technology, the teachers were able

to engage the students to a far greater degree which led to greater attendance, less misbehavior, and an increase in learnining.

Districts with middle schools that helped students improve dramatically on the TAKS mathematics tests employed some common strategies to promote student growth.

1) Provide the necessary resources for schools to address the specific needs of students;

All of the districts reported focusing on serving the needs of the school personnel through the provision of fiscal and other resources. These resources included targeted and embedded professional development, support for professional development implementation, additional funds and teachers to reduce class sizes, funds for technology, and even access to ancillary materials from the district web site. The importance of this finding is that district personnel perceived their mission to support teachers and principals rather than having schools respond to directives and questions from central office personnel.

2) Hire the best principal possible and give them the resources, support, and autonomy to lead successfully and then let them perform.

From the interviews with principals, teachers, and central office staff, it became very clear to us that each of the principals included in the study were well-prepared and had a plan to effect change at the school. Indeed, the principals had both short- and long-terms plans for addressing areas of weakness in their schools. However, it was also clear that the principals did not see themselves as the sole decision-maker. Rather, principals led change through engaging teachers in a democratic process to enact change when at all possible. In a few instances, principals had to say certain policies that were good for student learning were non-negotiable and that those who did not support such policies needed to find a different place to teach.

In one school, the principal reported this effort led to a number of teachers leaving to transfer to a more affluent and higher-performing school and the principal hiring teachers who were supportive of her vision for the school.

Principals also reported that the central office provided them with the support and autonomy they needed to be successful and allowed the principals to do their jobs with little interference from central office. Again, the importance of the central office serving the schools rather than the schools serving the central office surfaced as an important factor.

4) Provide timely and useful data and training about understanding and using the data.

Principals and central office staff also mentioned that the central office was able to provide data that was not only useful, but in a time-frame that allowed teachers to use the data to improve instruction. This was accomplished through trial-and-error and by constant communication between central office and school personnel until the system was refined to the point that teachers had access to the data and had been taught how to correctly interpret the data.

Policy Implications

Over the past decade, much of our national and state education policy has focused on building a bigger and stronger set of accountability measures to drive achievement. Much of these efforts were based on the belief that the introduction of the accountability system in Texas was the primary driver of student gains in achievement. Yet, many policymakers forget that Texas has infused a substantial amount of new money into the system in the early 1990s as well as distributed the money more equitably. The accountability system would not have worked without the resources for schools to meet the standards. Texas policymakers, however, have largely abandoned this successful strategy and focused primarily on the policy lever of accountability systems. The results have been less than promising. Indeed, while Texas made some of the largest gains on the National Assessment of Educational Progress (NAEP) in the 1990s, our students have made essentially no gains over the last decade. We argue that the current state policies and funding levels are simply inadequate to move student achievement forward and ensure a greater number and percentage of students are well-prepared for high school and college. We must find a better way.

The results of this study suggest state-, district-, and school-level policies. It is important to remember that many of the school level policies are dependent on district- and state-level policies and behaviors.

State Policy

The state can play a significant role in this area in a number of different ways.

1) ***Address the issue of increasing poverty in Texas*** by creating a coordinated, multi-agency effort to increase access to affordable and high-quality health care, child care, and early childhood education. The return on investment is monumental when spent in these areas. The earlier the state invests in improving a child's life chances, the less the state will spend on that individual over that person's lifetime and the greater revenues returned to the state from that individual. Moreover, far more emphasis needs to be focused on providing effective social supports for students in poverty.

2) ***Create a coordinated and integrated set of policies that address low-performing schools.*** These policies include: creating an adequate and equitable school finance system; improving the school accountability system (adding a growth component); closing the loopholes in teacher preparation that allow under-prepared teachers to obtain certification; creating incentives for talented principals and teachers to teach at hard-to-staff schools; and improving the financial accountability system to ensure funds are targeted to those students who need them most.

4) ***Fix the school finance system.*** At least one-half of the schools interviewed said that budget cuts over the next years would likely force them to eliminate at least one of the major strategies they believed was responsible for the dramatic gains in student achievement.

3) ***Shed more light on the inputs into the education system.*** Low-performing schools do not get any additional inputs, yet face a far more daunting task than most schools. To be successful, these schools need additional money, better prepared teachers, greater teacher stability, more experienced teachers and administrators, and outstanding principals. Moreover, these schools

need to provide a longer school day and summer instruction. These policies require additional money and changes to the school finance system.

5) ***Thoughtfully review our current strategy of creating more magnet, early college, and charter schools.*** Many students thrive in such schools, but creating these schools further concentrates poor and low-performing students into neighborhood schools that spiral downward until they are closed.

6) ***Ensure the new testing system is constructed in a way that lessens the impetus to "teach to the test."*** Without a well-designed testing system, the accountability system simply does not work. We should have more open-ended questions on the test and have a set of questions for individual students and another set for schools.

7) ***Improve teacher preparation.*** While the new teacher preparation program accountability system may improve the quality of newly prepared teachers, we still have a long way to go in this area. Secondary teachers certified through alternative certification programs are required to have only 12 undergraduate hours in their subject area compared to at least 24 from a traditional undergraduate program.

8) ***Carefully examine how we prepare and assess elementary and middle school mathematics teachers.*** Currently, elementary and middle school teachers can be assigned to teach math even if they failed the math section of the generalist test. The state should increase requirements to teach elementary math and review the requirements to be certified as an elementary or middle school teacher on a generalist certificate.

9) ***Improve principal preparation.*** Principals are key actors in school improvement, yet the state system for principal preparation is disjointed and out-of-date. The state is currently reviewing this area and needs to be sure to review the latest research and hear the recommendations of top programs.

10) ***Support smaller class sizes.*** While smaller class sizes are relatively expensive, they have fairly large effects at the elementary level and have moderate effects at the middle school level. The effects are more pronounced for students struggling in school. In fact, the higher the grade level, the smaller the class sizes need to be for students struggling academically. Schools with few struggling students should increase class sizes for students and use the extra resources to provide individualized instruction for struggling students. Schools with many struggling students should receive financial support to have smaller class sizes as well as intervention specialists.

11) Provide the financial resources for early screenings and evaluations. Many students struggle in school because of undiagnosed issues related to vision, hearing, mental illness, or learning disabilities. All children should be screened for vision and hearing difficulties and students below grade level for two consecutive years should be evaluated for other issues such as dyslexia, ADHD, Asperger's, and learning disabilities. Any student that fails two consecutive TAKS or other state-mandated tests in the same subject area should be assessed to diagnose the problems underlying poor performance.

District Policies

1) ***Focus on early interventions that are sustained over time so that students are prepared for the next level of schooling.*** This is especially important in elementary schools since being below grade level in 5th grade has strong negative effects on the probability of being ready for high school at the end of 8th grade.

2) ***Provide useful, timely data to schools.*** Teachers and principals need and want this data to plan collaboratively. Yet, many districts don't have the capacity to provide such data and need support from the state to do so.

3) ***Ensure struggling schools are provided the necessary resources to achieve the goals set for them.*** Numerous studies conclude that districts rarely provide the fiscal and human resources necessary for struggling schools to make dramatic improvements. Superintendents and school boards need to implement policies to ensure struggling schools have adequate resources and re-think their current strategies of providing elite schools for the high-performing students while allowing other students to attend under-resourced schools.

4) ***Hire the best principals and support them.*** Emerging research is clear—getting great teachers to go to and stay at a school is largely dependent on having a great principal who creates a clear school vision focused on teaching and learning, works democratically with teachers, and supports teacher collaboration. Districts need to pay whatever they have to in order to place and keep great principals at the schools that need them most. Districts also need to provide the principals the necessary resources, support, and autonomy required to be successful.

5) ***Support Teacher Collaboration.*** This research and other research have found that the opportunity to collaborate with other teachers during the school day is one of the most important factors in improving achievement (Mertens & Flowers, 2006; Mertens, Flowers, & Mulhall, 1998). The more opportunities teachers have to collaborate, the more training they are provided, and the more support they are provided, the greater the effect of teacher collaboration on student achievement.

6) Provide Social Support for Students. Many students struggling in school do so because of issues outside of the school such as abuse, neglect, malnourishment, or mental illness. Others struggle because of learning difficulties not diagnosed by the school. Schools—with financial support from the state—should assess students for underlying issues that may be causing the learning difficulties.

Appendix A: Data and Methodology

This study relies on several sets of data. First, student-level TAKS data was purchased from the Texas Education Agency. The data included student TAKS scores, End-of-Course scores, and both Algebra I and English I 9th grade course completion and passing rates. Second, data on school-level achievement, student demographics, and achievement were downloaded from the TEA website. Third, data on the number of students enrolling in Texas institutions of higher education after high school graduation was downloaded from the Texas Higher Education Coordinating Board website. Finally, data on the National Assessment of Educational Progress was downloaded from the National Center for Education Statistics website.

The qualitative portion of this paper relied on a quantitative analysis to identify high-growth schools, then phone interviews with principals and teachers as well as a survey of teachers. The identification of schools relied upon student-level data for all students in all middle schools in Texas. To ensure a fair comparison of schools, only schools enrolling students in the 6th-, 7th-, and 8th-grades during the 2006-07, 2007-08, and 2008-09 school years were included in the study. Moreover, schools had to enroll at least 50 students in the 6th grade during the 2006-07 school year to be included in the study.

Files on student TAKS achievement were merged over time to create a final file that matched individual students and their TAKS scores from 6th grade in 2006-07 through 8th grade in 2008-09.

Finally, an ordinary least squares regression was employed with the change in school-level z-scores as the dependent variable and the following variables as the independent variables:

- Percentage of economically disadvantaged students;
- Percentage of African American students;
- Percentage of students in bilingual education;
- School size;
- Percentage of students remaining in the school for three consecutive years;
- The difference in TAKS mathematics scale scores in the 6th grade between students staying at the school and students leaving the school;
- A binary variable for magnet and high-performing charter schools;
- Standard deviation of math TAKS scores in the 6th grade;
- Z-scores for reading TAKS in 5th grade; and,
- Z-scores for mathematics TAKS in 5th grade.

The model explained 64% of the variance in TAKS mathematics scores, with the 5th grade reading and math scores accounting for 39% of the overall variance. The purpose of this regression was not to identify individual variables associated with gains in student achievement, but rather identify schools that perform greater than expected after controlling for variables largely outside of their control. Thus, the standardized residuals from the regression analysis were saved and used in identifying effective schools. In addition to the standardized residuals, we used descriptive statistics of the achievement levels in grades five through eight, the

percentage of students remaining at the school for both three and four consecutive years, and the difference in achievement between students staying at a school and leaving a school.