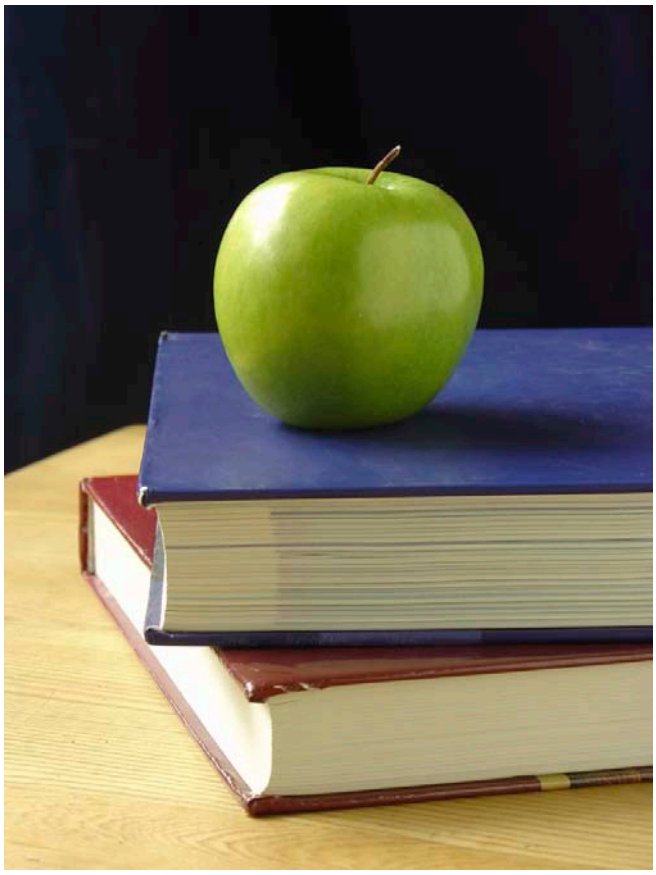
A Study of the Public Schools of Missouri



Report Prepared for the Joint Committee on Education

by
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Executive Summary

Overall students in Missouri public schools continue to perform quite well. Of Missouri's 523 districts, 319 districts received the Distinction in Performance recognition from the Department of Elementary and Secondary Education in 2008 for achievement on the Missouri Assessment Program exam.

Through a closer examination in the variations in student achievement in Missouri schools, two primary findings emerged. First, consistent with decades of research, socioeconomic status has a strong negative correlation with student achievement. Second, in high-poverty, high-achieving districts, the clearest distinction between those schools and high-poverty, low-achieving schools is in the teachers' reporting of the quality of the learning environment in the schools.

SECTION 1

Highlights and Supplementary Information to the Missouri Public School Accountability Report (December 2008)[1]

Each year the Department of Elementary and Secondary Education (DESE) produces the Missouri Public School Accountability Report. Information contained in Section 1 is a companion piece to that report.

District Accreditation 2008

Accreditation is determined by review through the Missouri School Improvement Program (MSIP). Each year 20% of Missouri school districts participate in the MSIP review so that each MSIP cycle is a five-year process.

Charter Schools

Charter schools refers to the number of individual charters that have been approved by the State Board of Education. The number of school buildings is referred to as the number of campuses. (Table 1.)

Table 1. Missouri Charter Schools

	# of schools	# of campuses
Kansas City	18	24
St. Louis	10	19

Free or Reduced Price Lunch

Free or reduced price lunch is based on a national standard of income eligibility[2] and is the most commonly used proxy for socioeconomic status in school data.

Missouri Graduation Rate

Table 2. Missouri Graduation Rates

	2004	2005	2006	2007	2008
Graduation rate	85.6	86.0	85.8	86.3	85.2

[1] All data come from the Department of Elementary and Secondary Education unless otherwise noted.

[2] To qualify for free lunch, family income must be at or below 130% of poverty. Family incomes between 130% and 185% of poverty qualify for reduced-price lunch. In FY09, 130% of poverty for a family of four was $27,560. 185% of poverty for a family of four was $39,220. Source: National School Lunch Program, http://www.fns.usda.gov/cnd/Lunch/AboutLunch/NSLPFactSheet.pdf.

Graduation Rates vs. Dropout Rates[3]

Graduation rate refers to the percentage of students who graduated out of their cohort entering in the 9th grade.

[N of grads / (9th-12th grade cohort dropouts + grads)] x 100

Dropout rate refers to the percentage of students who leave school in a given year as a percentage of the average enrollment.

[N of dropouts / (total September enrollment + net transfers in) / 2]

Completion of Postsecondary Education[4]

These data represent the percentage of the population from age 25 to 65 holding a degree as of 2007.

Missouri AA/AS/AAS or higher – 7%
National AA/AS/AAS or higher – 8%
Missouri BA/BS or higher – 28%
National BA/BS or higher – 29%

National Assessment of Educational Progress (NAEP)

NAEP is not required of all Missouri districts. The numbers reported in the Missouri Public School Accountability Report reflects a total of 12,200 students in 155 districts. The sample was selected by stratified random sampling based on locale and minority enrollment. The National Center of Education Statistics (NCES) selects a sample of students and schools representing each state.

Adequate Yearly Progress (AYP)

AYP is the performance requirement mandated by No Child Left Behind (NCLB). AYP may be achieved by raw score averages that meet the required levels or by meeting the goals of an estimated growth trajectory that would have students at the required levels within the timeframe required by NCLB.

Definition of Highly Qualified Teachers

NCLB definition of *highly qualified teacher*: To be deemed highly qualified, teachers must have: 1) a bachelor's degree, 2) full state certification or licensure, and 3) proof that they know each subject they teach.[5]

[3] There are different calculation methods for graduation rate and dropout rate. The definition listed is the one used by DESE. The formulas can be found at http://www.dese.mo.gov/divspeced/DataCoord/PDF/CalcMethodGradDO_US_vs.pdf.

[4] Source: American Community Survey. U.S. Census Bureau. http://www.census.gov/acs/www.

[5] Source: U.S. Department of Education. New No Child Left Behind Flexibility: Highly Qualified Teachers. http://www.ed.gov/nclb/methods/teachers/hqtflexibility.html.

Student-Teacher Ratios 2004-2008

Table 3. Student to Teacher Ratios 2004-2008

	2004	2005	2006	2007	2008
Students per teacher	14	14	13	13	13
Students per classroom teacher	19	19	18	18	18

The MSIP minimum quality standard for student-teacher ratios is listed below. The desirable standard is noted parenthetically.

K-2 1:25 (1:20)
3-4 1:27 (1:22)
5-6 1:30 (1:25)
7-12 1:33 (1:28)

Teachers' Years of Experience and Education Level

Table 4. Teacher Credentials

	2004	2005	2006	2007	2008
Average years of experience	12.9	12.8	12.6	12.6	12.4
Percentage with masters degree or higher	47.5%	49.6%	49.9%	50.6%	51.3%

ACT and SAT scores 2007-08

Table 5. ACT Means and Percentage Tested

	Missouri	National
ACT composite	21.6	21.1
Percent of graduates tested	69%	43%

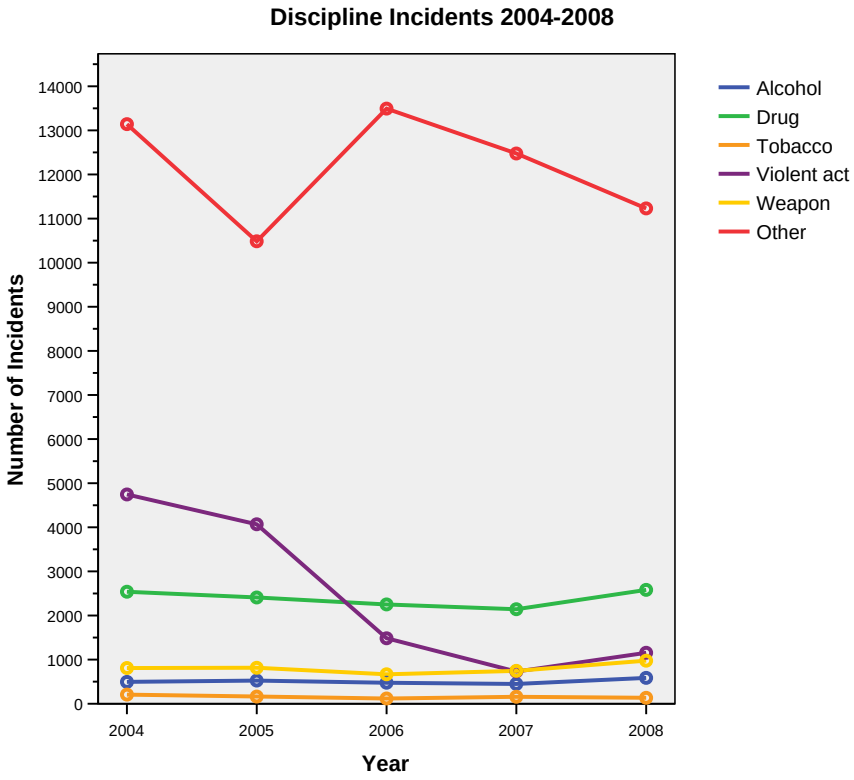
Table 6. SAT Means and Percentage Tested[6]

	Missouri	National
SAT critical reading	594	502
SAT mathematics	597	515
SAT writing	584	494
Percent of graduates tested	5.6%	45.4%

[6] Source: The College Board SAT. http://professionals.collegeboard.com/profdownload/Missouri_CBS_08.pdf. National percentage tested was calculated from the College Board number tested divided by the total number of graduates as reported by ACT to keep the denominator consistent between ACT and SAT test takers.

Discipline Incidents

Below is a breakdown of discipline incidents by offense. Examples of offenses that would be included in *Other* are any offenses which do not fit into any of the other categories but result in a student being removed from the classroom for one half day or more. In 2006, the rule regarding the category of *Other* changed from a student being removed from the classroom for more than 10 days to a student being removed from the classroom for one half day or more. As a result, the number of *Other* discipline incidents reported in 2006 sharply increased.



SECTION 2

An Overview of Variables Related to Academic Achievement and Growth

Input Variables

Schools vary in the resources they have to educate their students. Some resources such as per pupil expenditure are a reflection of the property values and tax rate of a community. Other resource variables such as teachers' credentials can be affected to a limited degree by the success a school has in recruiting and retaining teachers with certain credentials. Additionally, students vary in the prior achievement, skill set, and environmental influences they bring with them into the classroom. Student-level input variables such as socioeconomic status have been shown through numerous studies to have a strong relationship with a student's academic achievement.

Process Variables

The impact of the processes that occur between the inputs and outcomes is the foundation of school effectiveness research.[7] Knowing which processes have the strongest correlation with student achievement status and growth is the basis for Section 3 of this report.

As part of the MSIP review process, DESE administers the Advanced Questionnaire (AQ) to faculty, parents, and students. The AQ was developed and is revised each MSIP cycle by a team of DESE staff, Office of Social and Economic Data Analysis (OSEDA) staff, and practicing educators. The AQ was developed based on current research in school effectiveness and best practices, and it includes questions about the learning environment of the school. Means for individual questions are grouped thematically, and scale variables are created for the different indicators.[8]

For example, the scale variable *School Leadership* includes the following individual questions. Items include responses on a scale of 1 (strongly disagree) to 5 (strongly agree):

- Instructional time available to teachers is protected from all types of interruptions.
- In our school teachers are encouraged to be instructional leaders.
- My school's principal fosters shared beliefs and a sense of community and cooperation.
- My school's principal monitors the effectiveness of school practices and their impact on student learning.
- Our principal identifies issues in the school that could potentially become problems.

[7] For example, see Robert Marzano, *What Works in Schools.*

[8] Each scale is tested for reliability using Cronbach's alpha. This coefficient, ranging from 0 to 1 indicates the degree to which the individual items collectively measure what they were intended to measure. In social science research, the Cronbach's alpha should be greater than 0.7 to be considered reliable. The Cronbach's alpha for the School Leadership scale was 0.91.

- My school's principal systematically engages faculty and staff in discussions about current research on teaching and learning.
- Our principal promotes innovation.
- The mission of the school is clearly defined.
- There are open channels of communication among students, staff, and administrators.

For this section of the study, the following scale variables were examined for their relationship to growth in student achievement.[9] Noted parenthetically is the group completing a questionnaire on that particular variable.

School Leadership – Identifies the degree to which leadership is perceived as effective in improving student learning. (faculty)

Parental Involvement – Identifies the degree to which parents are viewed as partners in the education of their children. (faculty)

Safe and Orderly Environment – Identifies the degree to which the school environment is safe and orderly. (faculty, student, parent)

School Climate - Identifies the degree to which all students feel respected and valued. (faculty, parent, student)

Guaranteed and Viable Curriculum - Identifies the degree to which essential curriculum has been identified in the district and the degree to which students have adequate opportunity to learn the content. (faculty)

Professional Development - identifies the impact of professional development on improving learning for all students. (faculty)

Community Capital - identifies the level of commitment and support by the community for the school. (faculty)

Efficacy and expectations - identifies the degree to which teachers and students believe that they are capable of impacting student achievement. (students, parents)

Classroom management - identifies the degree to which educational personnel establish and enforce classroom management processes that enhance student learning. (students)

Outcomes

Two measures of achievement are included as part of this study. The first measure of student achievement is the median growth percentile for the school between the academic years 2006-07 and 2007-08. Growth measurements attempt to isolate the effect of the school/teacher on student achievement. The second measure of student achievement is percentage of students in the school scoring at the level of proficient or advanced on the MAP.

[9] The composite variable descriptions were provided by the Office of Social and Economic Data Analysis (OSEDA). OSEDA provides assistance to DESE with the collection and analysis of MSIP data.

SECTION 3

An Examination of Variables Related to Academic Growth and Achievement in Missouri Elementary and Middle School Students

A sample of elementary and middle schools (n = 308) reflecting the demographic profile of Missouri were selected for this study.[10] Each school had its 4th cycle MSIP review during the 2007-08 academic year.

Figure 1. Socioeconomic Status and Mathematics Achievement

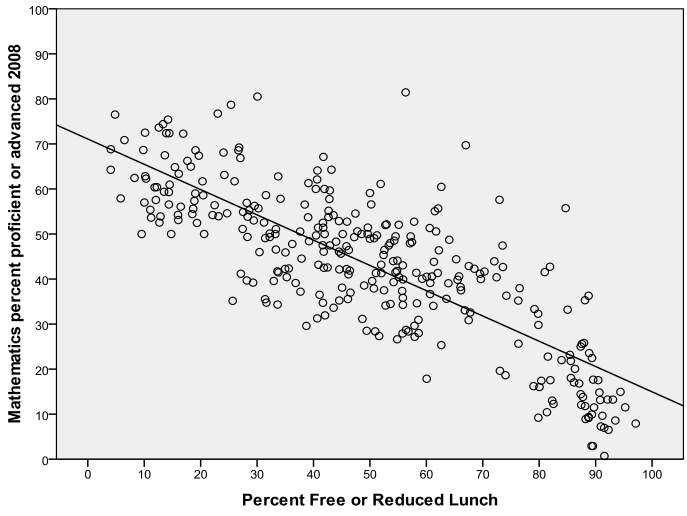
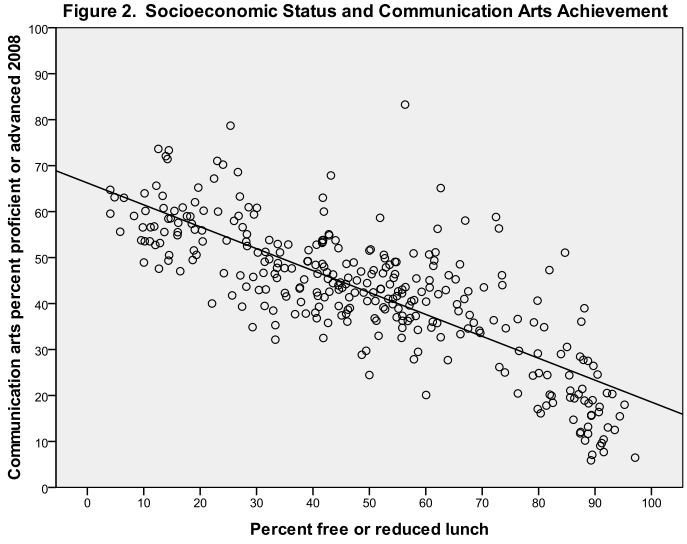


Figure 2. Socioeconomic Status and Communication Arts Achievement



As was noted in Section 2, socioeconomic status has been shown to have a strong relationship with student achievement. Figures 1 and 2 illustrate the strong, negative correlation between MAP achievement and socioeconomic status for the sample of schools in this study.

Correlation coefficients range from +1.0 (perfect positive correlation) to -1.0 (perfect negative correlation)

Mathematics
r = - 0.802

Communication arts
r = - 0.791

Correlations are statistically significant at the 0.01 level (2-tailed).

[10] OSEDA verified the representativeness of the sample through the following method: "The results indicated that the *SAMPLE* was statistically significantly different from *ALL SCHOOLS*, with an alpha of 0.05, for both PERCENT MINORITY and LOCALE TYPE. In order to create a representative sample, schools with 25% or more minority students and which were ('Large City or Mid-size City' or 'Large Town or small town') were randomly selected for removal until the chi-square analysis no longer showed statistically significant results."

The previous illustration is *not* intended to convey a lack of ability for schools to affect student achievement, but rather to acknowledge the influence of socioeconomic status so that variables may be examined independent of this influence.

In Figures 3 and 4, growth in student achievement is plotted on the horizontal axis and percent of students proficient or advanced is plotted on the vertical axis. In addition, schools have been grouped into three categories based on their percentage of students eligible for free or reduced lunch.

Figure 3. MAP Mathematics

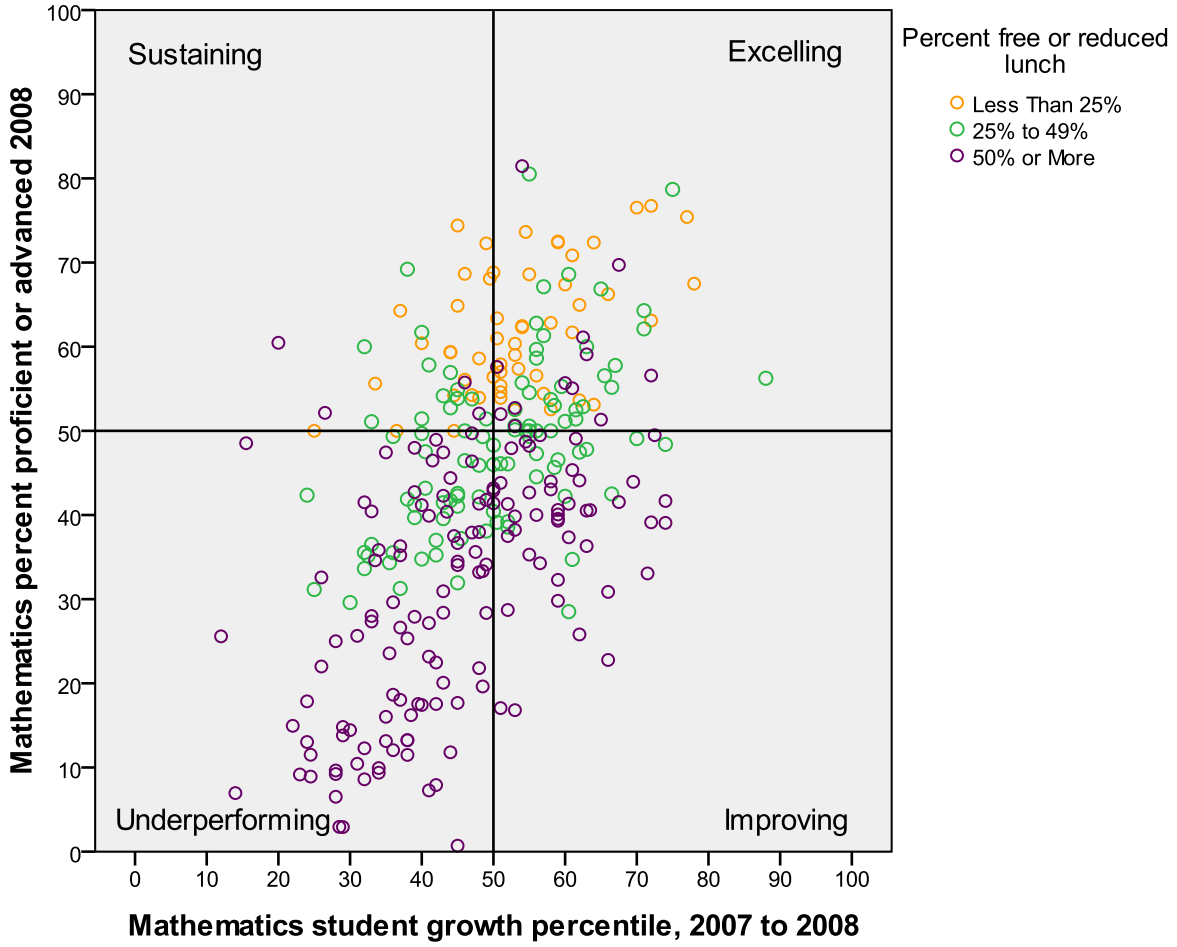
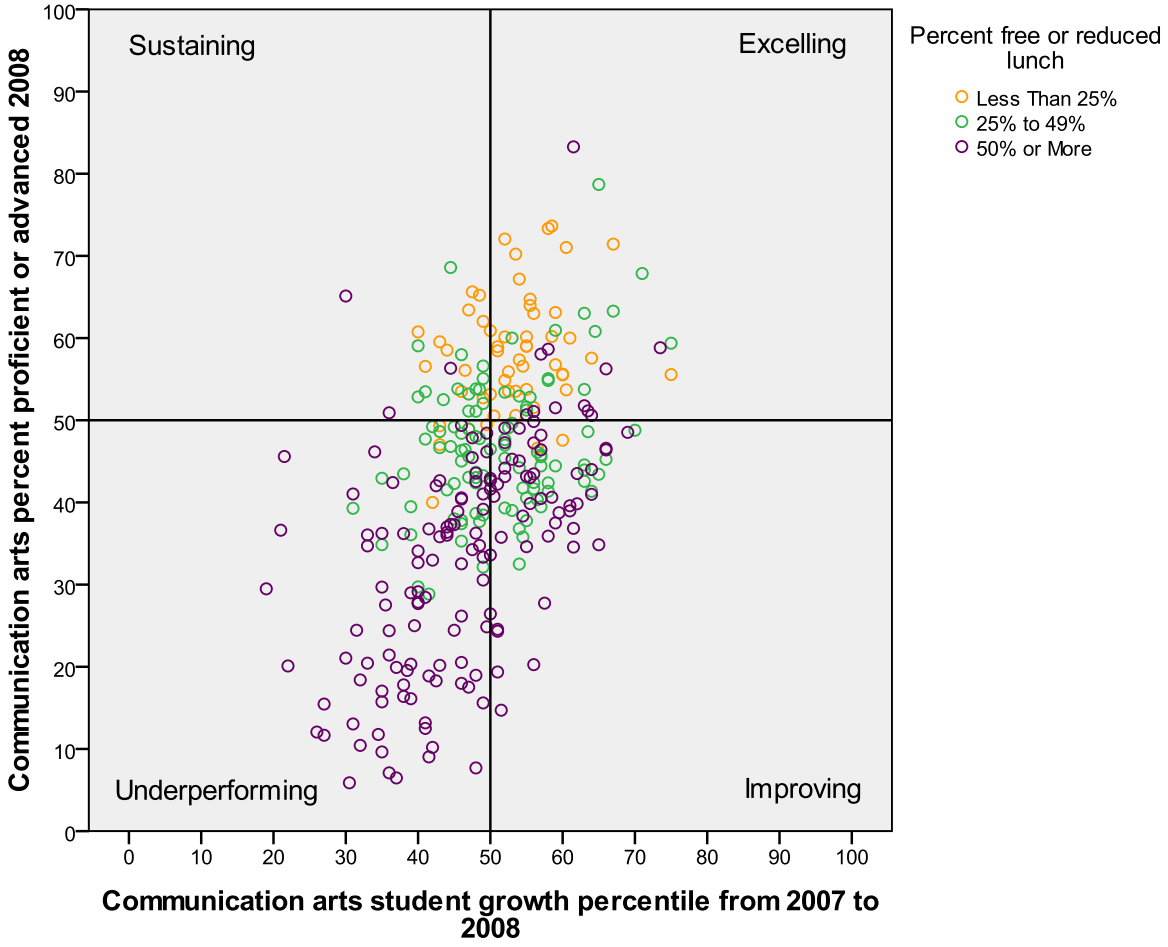


Figure 4. MAP Communication Arts



Using communication arts achievement data, resource variables are compared for schools in the quadrants of Excelling, Improving, and Underperforming. The previous graphs reinforce the influence of socioeconomic status on achievement. In order to draw comparisons independent of socioeconomic status, only those schools with a population of 50% or higher free or reduced lunch eligibility are included.

Table 7. Comparison of Resource Data Across Achievement Subgroups

	EXCELLING Proficiency and Growth ***greater*** than 50% and FRL > 50% (n=11)	IMPROVING Proficiency ***less*** than 50%; Growth ***greater*** than 50% and FRL > 50% (n=48)	UNDERPERFORMING Proficiency and Growth ***less*** than 50% and FRL > 50% (n=89)	All schools in sample (n=308)
Resource data				
Teachers with regular certification (%)	98.5	97.3	97.2	97.8
Highly qualified teachers (%)	96.4	96.7	96.8	97.2
Teachers with master's degree (%)	38.4	46.1	42.5	48.7
Teachers average years of experience	11.1	12.8	13.2	12.5
Average teacher's salary	$36,442	$42,391	$43,787	$43,520
Student attendance rate	94.8	94.3	92.8	94.5
Student-classroom teacher ratio	16.5	15.1	16.8	16.1
Per pupil expenditure (median)	$7,953	$9,152	$9,290	$8,484

Table 8. Discipline Incident Rate by Achievement Subgroup[11]

	EXCELLING Proficiency and Growth ***greater*** than 50% and FRL > 50% (n=11)	IMPROVING Proficiency ***less*** than 50%; Growth ***greater*** than 50% and FRL > 50% (n=48)	UNDERPERFORMING Proficiency and Growth ***less*** than 50% and FRL > 50% (n=89)	All schools in sample (n=308)
Discipline Incidents (rate per 100 students)				
Alcohol	.045	.000	.018	.023
Drug	.255	.081	.067	.092
Violence	.000	.079	.034	.052
Weapon	.009	.133	.184	.095
Tobacco	.000	.000	.011	.004
Out-of-school suspension	.582	1.283	2.426	1.261
Expulsion	.000	.012	.000	.004

[11] A graphic representation of these data has been appended to this report. See page 17.

Observations

- The percentage of teachers with regular certification was slightly higher in the Excelling subgroup than in other subgroups as well as higher than the average of the full sample.
- The percentage of highly qualified teachers was roughly equivalent across all three subgroups, but slightly lower than the average of the full sample.
- The percentage of teachers with a master's degree or higher is lower in the Excelling group. However, this should be interpreted with caution due the small number of schools in the sample and the locale of those schools which may make continuing education less accessible. Worth noting is that all of the three higher poverty school subgroups have a lower percentage of teachers with master's degrees than in the sample as a whole.
- The attendance rate for the Excelling and Improving subgroups was roughly equivalent to the attendance rate of the full sample and slightly higher than the attendance rate of the Underperforming subgroup.
- The student to classroom teacher ration was roughly equivalent across the full sample, the Excelling subgroup, and the Underperforming subgroup. Student to classroom teacher ratios were lowest in the Improving subgroup.
- *The per pupil expenditure is included but is **not** a valid measure in this context.* Per pupil expenditures are a reflection of the property values and the tax rate of the school district. In the Excelling subgroup, the majority of schools are rural schools with a lower tax base. In addition, factors such Title 1 federal funding and extra weighting in the foundation formula for some populations of students (e.g., English language learners) affect the bottom line on a district's per pupil expenditure.
- Similar to the per pupil expenditure, the difference in teacher salary can be attributed in part to locale of the schools in terms of tax base, cost of living, etc.
- The discipline incident rate shows the most distinction between achievement subgroups in the rate of out-of-school suspensions (OSS). The Underperforming group has twice the OSS rate of the Improving group and more than four times greater an OSS rate than the Excelling schools.

On the AQ, respondents rated a series of individual items related to the learning environment of their school from 1 (strongly disagree) to 5 (strongly agree). Mean scores are calculated for each responding group for each school. Those school means within each category are then averaged to determine a mean for the subgroup.[12]

Table 9. Comparison of Process Data Across Achievement Subgroup

	EXCELLING Proficiency and Growth ***greater*** than 50% and FRL > 50% (n=11)	IMPROVING Proficiency ***less*** than 50%; Growth ***greater*** than 50% and FRL > 50% (n=48)	UNDERPERFORMING Proficiency and Growth ***less*** than 50% and FRL > 50% (n=89)	All schools in sample (n=308)
Process data (AQ scale 1-5)				
FAC – School leadership	4.4	4.2	4.0	4.1
FAC – Parental involvement	4.4	4.2	4.1	4.2
FAC – Safe, orderly environment	4.3	4.0	3.8	4.0
FAC – School climate	4.4	4.3	4.1	4.3
FAC – Guaranteed, viable curriculum	4.2	4.0	3.9	4.0
FAC – Professional development	4.2	4.1	3.9	4.0
FAC – Community capital	4.3	3.9	3.7	4.0
STU – Classroom management	3.9	3.7	3.7	3.8
STU – Efficacy, expectations	4.5	4.5	4.5	4.5
STU – Equity	4.0	4.1	4.0	4.1
STU – Feel safe	4.1	4.1	4.0	4.1
STU – Instructional strategies	3.2	3.2	3.3	3.2
STU – School climate	4.0	4.1	4.0	4.1
PAR – Efficacy, expectations	4.0	3.9	4.0	4.0
PAR – Safe, orderly environment	4.0	3.8	3.7	3.9
PAR – School climate	3.8	3.7	3.8	3.8

Observations

- Across the three populations included in the survey, the differences among the responses of students and parents in Excelling, Improving, and Underachieving schools is negligible.[13] In particular, the students' sense of efficacy is exactly the same across all three subgroups. Students in these higher poverty schools shared an equal sense of their own capacity to be successful academically.

[12] The use of the mean of group means is typically not recommended in statistical analysis because the weighting element is lost. However, in this situation, the intent was to give equal weight to each school in the subgroup considering the school mean as a reflection of the overall building culture and so as not to bias the subgroup mean in favor of schools with a greater number of faculty. Subgroup means were calculated at the teacher level and are available upon request.

[13] The results of the parent AQ should be interpreted with caution. The required response rate for parents is 25% making it much easier to have biased results.

- The clearest differences across subgroups are seen in the faculty responses. Factors which describe a positive learning environment are higher across every scale variable for teachers in Excelling schools.
- The AQ scales where there is the most difference in student responses is related to teacher practices (classroom management).

Figure 5. Faculty Perspectives on the Learning Environment
in schools with >50% FRL

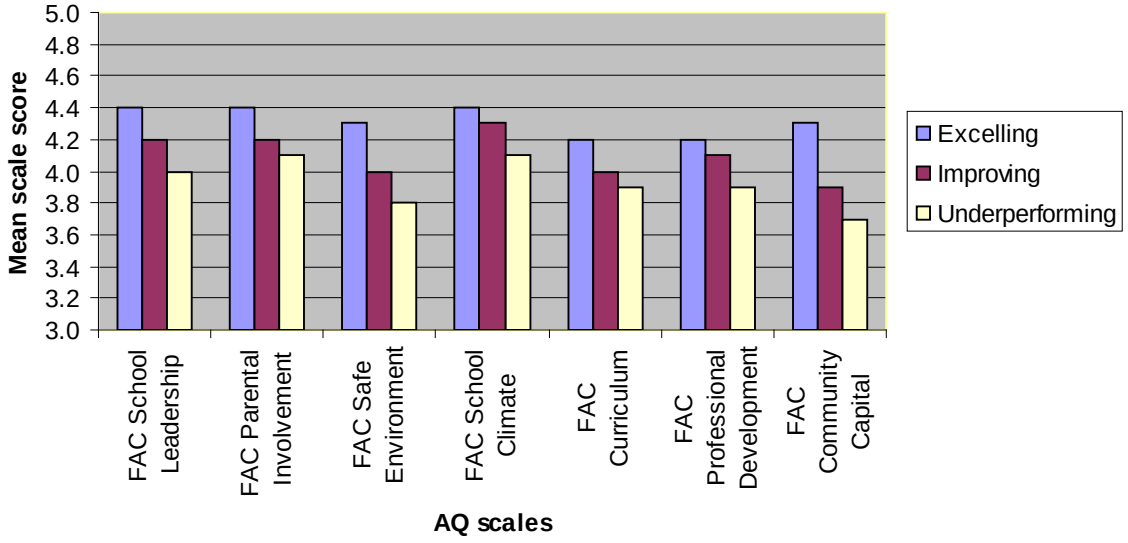
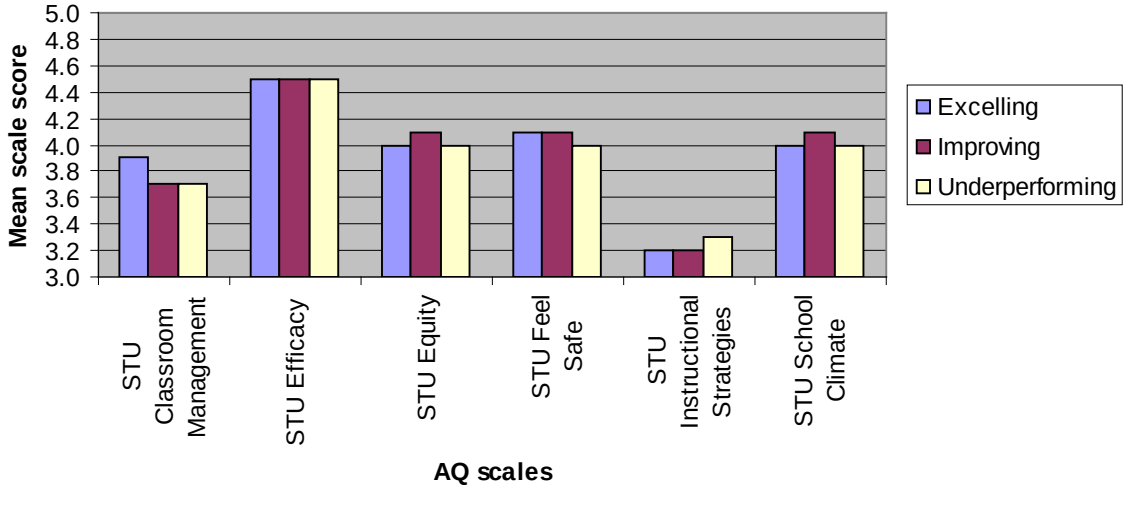


Figure 6. Student Perspectives on the Learning Environment
in schools with >50% FRL

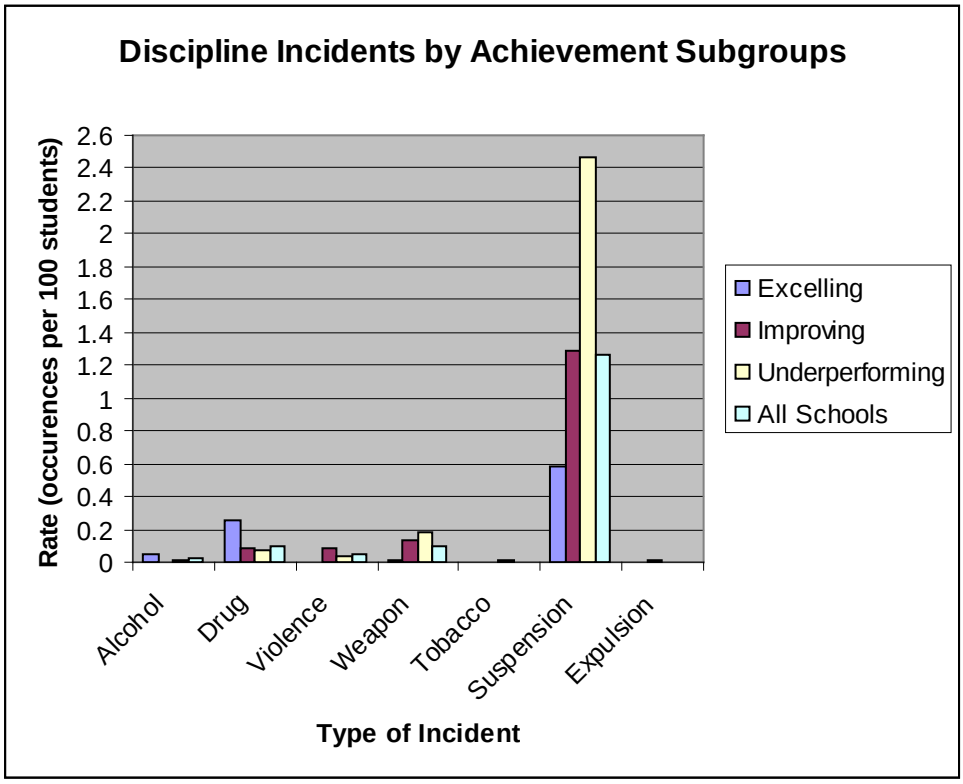


Conclusion

While the influence of socioeconomic status on student achievement is clearly seen in the data, it is worth noting the distinctions between practices within those schools that are excelling in spite of socioeconomic status and those schools that are underperforming.

Survey data show that in high-poverty, high-achieving schools, teachers report a qualitatively different learning environment than in high-poverty, low-achieving schools reflected in their responses regarding school leadership, parent and community involvement, safety, curriculum alignment, and professional development.

Appendix


Discipline Incidents by Achievement Subgroups
Rate (occurences per 100 students)
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Alcohol
Drug
Violence
Weapon
Tobacco
Suspension
Expulsion
Type of Incident
Excelling
Improving
Underperforming
All Schools