



MCAS Student Growth Percentiles: State Report

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Massachusetts Department of Elementary and Secondary Education
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For years, educators across the Commonwealth have called for the state to develop a way to measure student *progress* as a complement to the measures of student *achievement* already available through the MCAS testing system. As a result of the efforts of educators around the state, I am pleased to release the first round of student growth reports statewide and for all districts and schools.

The public now has access to school and district results by going to the “School and District Profiles” (http://profiles.doe.mass.edu/state_report/mcas.aspx) on our Department’s website. Support materials, including a tutorial video, as well as this report are available at: <http://www.doe.mass.edu/mcas/growth>.

As part of the development of the methodology used to generate growth data, the Department conducted a field test with a diverse group of nine districts from April 29th to July 2, 2009. The participating districts were: Community Day Charter Public School, Franklin, Lowell, Malden, Newton, Northampton, Sharon, Springfield, and Winchendon. I want to thank these nine districts for their generous contributions of time, talent and insights during one of the busiest periods in the school year. Districts and schools across the state will benefit from what our staff learned from this process including important refinements to reports, training and interpretive materials.

I am optimistic about the potential that this measure of student growth presents for the improvement of curriculum and instruction in all districts. While in no way do I want the growth measure to obscure our goal of getting all students to proficiency and beyond, I am confident that used in combination with MCAS achievement data, growth will provide a more robust profile of school and district performance. I am looking forward to our discussion of the student percentile growth model and the insights we are gaining about performance.

Mitchell D. Chester, Ed. D.
Commissioner of Elementary and Secondary Education

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Introduction

This report describes a new method of interpreting student achievement using results from the Massachusetts Comprehensive Assessment System (MCAS). In the traditional view, measures of student performance reflect the extent to which students have mastered the standards contained in the English Language Arts (ELA) and Mathematics Massachusetts Curriculum Frameworks each school year.

In order to complement the traditional MCAS scaled scores and performance levels, we have designed Student Growth Percentiles (SGPs) to measure how much a student's or group of students' achievement has grown or changed over time. For K–12 education in Massachusetts, the phrase “growth model” describes a method of measuring individual student progress on statewide assessments by tracking student scores from one year to the next. Each student in grades 4 through 8 and 10 with at least two consecutive years of MCAS scores will receive a *student growth percentile*, which measures how much the student gained from one year to the next relative to other students statewide with similar MCAS test score histories. Student growth percentiles range from 1 to 99, where higher numbers represent relatively higher growth and lower numbers represent relatively lower growth.

The Importance of Measuring Growth

Making sense of results over time

In 2006 the Department began testing all students each year in ELA and Mathematics in Grades 3–8 and 10. Naturally, educators and parents with access to student results wanted to compare each student's performance from one year to the next. Although the tests and the curriculum frameworks for each grade are adjusted to cover different content in each subject each year, the scaled score results were not designed to allow direct comparisons of student scores from one year to the next.

The typical¹ “growth” or change in a typical student's score from one year to another varies widely depending on three factors: the student's grade level; the subject; and where on the MCAS scale each student started. So while it may be common for high performing 3rd graders to score lower when they move on to the more challenging 4th grade frameworks, the opposite can be true for tests in the other grades and other subjects. In order to accurately measure growth, we developed a method that accounted for all three factors.

Fairness

Student growth percentiles capture growth from each student's starting point. The growth percentile is not dictated by student performance on the MCAS in previous years, because growth is measuring change in performance rather than absolute performance.

¹ “Typical,” throughout this document, means: “neither high growth nor low growth, but growth that was somewhere in the middle of the distribution.”

In this way, all students at all performance levels are provided an equal chance to demonstrate growth at any percentile on the next year's test. Similarly, all districts, schools, grades, programs, or groups also have an equal opportunity to demonstrate growth regardless of the populations they serve.

What Is a Student Growth Percentile (SGP)?

A student growth percentile is a measure of student progress that compares changes in a student's MCAS scores to changes in MCAS scores of other students with similar achievement profiles. The model establishes cohorts of students with "similar performance profiles" by identifying all students with the same (or very similar) MCAS scores in prior years; all MCAS data for a student since 2006 are used (where available) to establish academic peers.

Percentiles are familiar to most educators and parents because they are used to report performance on some national standardized tests and in other common arenas such as pediatrics, where charts put children in percentiles depending on their height and weight. The key distinction between those customary uses of percentiles and those used to measure academic progress in this report is that student growth percentiles measure change instead of an absolute quantity. For example:

- A student with a growth percentile of 90 in 5th grade mathematics grew as much or more than 90 percent of her academic peers (students with similar score histories) from the 4th grade math MCAS to the 5th grade math MCAS. Only 10 percent of her academic peers grew more in math than she did.
- A student with a growth percentile of 23 in 8th grade English language arts grew as much or more than 23 percent of her academic peers (students with similar score histories) from the 7th grade ELA MCAS to the 8th grade ELA MCAS. More than three-fourths of her academic peers grew more in ELA than she did.

Student Growth Percentiles in the Aggregate: Median Growth Percentiles

To report student growth at the subgroup, grade, school, or district level, individual student growth percentiles can be aggregated. The most appropriate measure for reporting growth for a group is the median student growth percentile: the middle score if the individual student growth percentiles are ranked from highest to lowest. The average or mean is not an appropriate measure when comparing percentiles. A typical school or district in the Commonwealth would have a median student growth percentile of 50.

No matter how student growth percentiles are aggregated, whether at the subgroup, grade, school, or district level, the statistic and its interpretation remain the same. The comparison group is always the students' academic peers: students with similar MCAS test score histories. For example, if the students with disabilities in a district have a median student growth percentile of 53, it could be stated that that particular group of students progressed at a relatively higher level than their academic peers—a group of

students who may or may not be students with disabilities. The measure does not indicate that students with disabilities improved more than 53 percent of other students with disabilities.

Statewide trends in 2009

It is important to note that growth statistics are norm-referenced, therefore they will always be centered around 50. The figures below are designed to show how common or uncommon it is for schools to grow at various median percentiles. The first pair of graphs shows the distribution of median growth percentiles statewide at the school level. Figures 1 and 2 depict how many schools are growing at relatively higher (above 60), typical (between 40 and 60), or lower rates (below 40) on both the ELA and mathematics MCAS tests. Consistent with the nature of percentiles, the majority of schools (63 percent in ELA; 60 percent in mathematics) had medians between 40 and 60.

Figure 1: Distribution of School Median Student Growth Percentiles for ELA, 2009 (all grades)

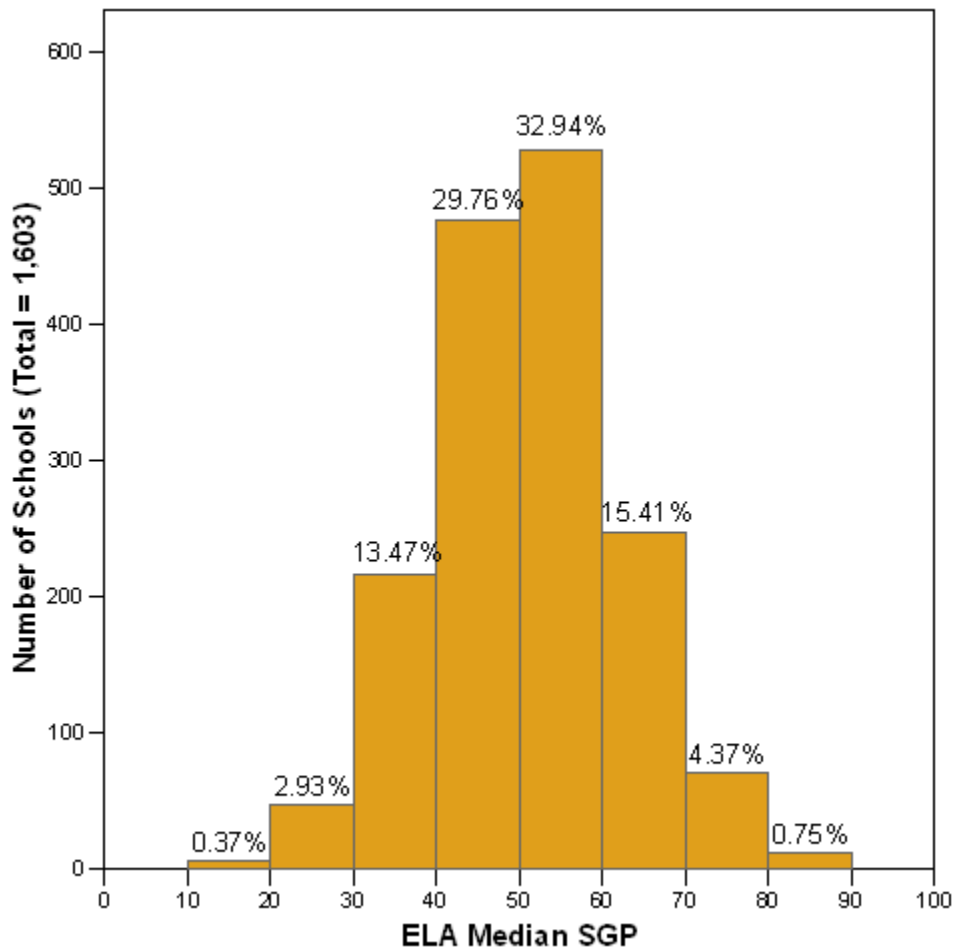
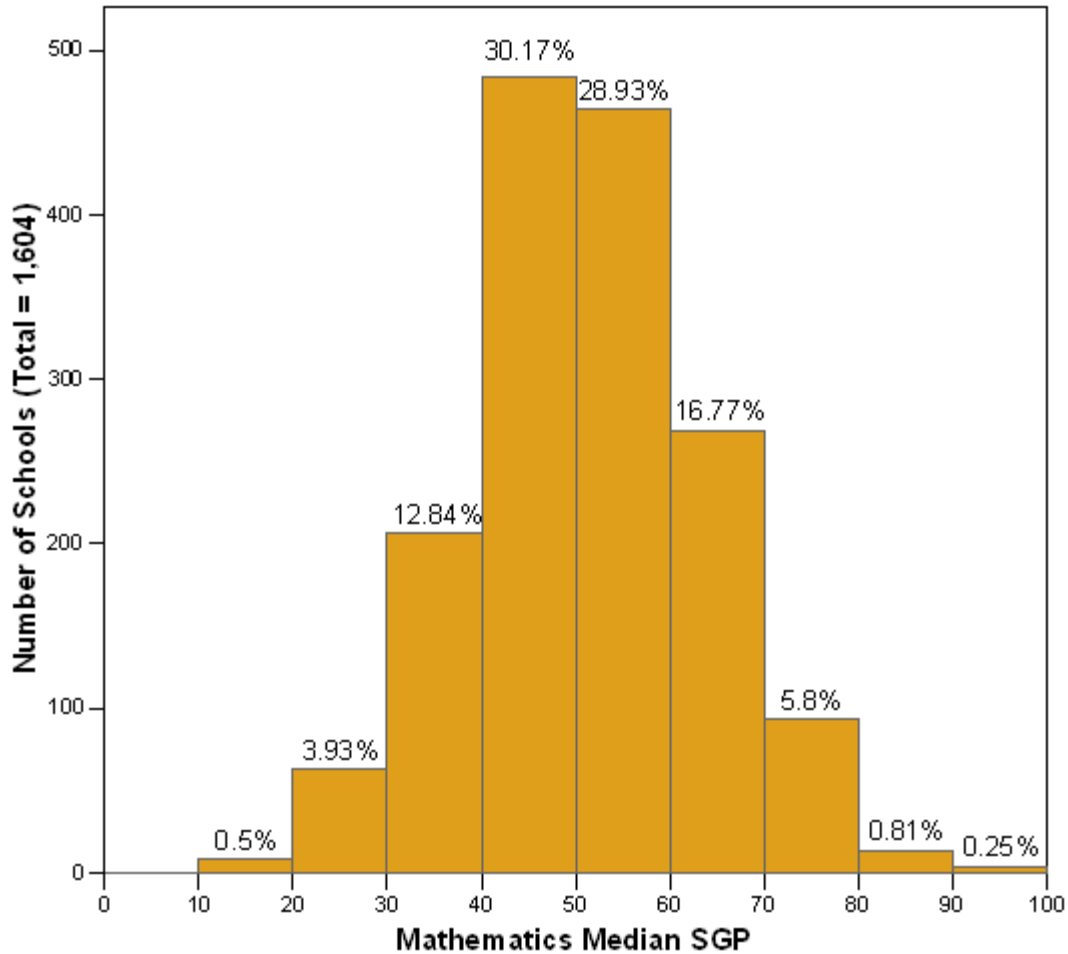


Figure 2: Distribution of School Median Student Growth Percentiles for Mathematics, 2009 (all grades)



The Education Data Warehouse provides districts and schools with several reports that will help them analyze their growth profile. For district and school personnel as well as the public at large, the “MCAS Student Growth Percentiles Interpretive Guide” provides examples of these reports and commentary on how to read and interpret them. The “stacked bar charts” (pages 7–10 of the Interpretive Guide) are particularly helpful in highlighting how local and statewide performance compare.

The data presented in this next set of charts shows the median student growth percentiles for selected student groups. The median student growth percentile for all students at the state level is 50.² The median growth percentiles of select populations, however, reveal that some groups are progressing at a higher or lower rate from the statewide median student growth percentile.

² In rare instances when the number of score points in the baseline is limited, as in Grade 4, the median can vary from 50 by a point or two.

Table 1. 2009 Statewide ELA Median Student Growth Percentiles

Group	All Grades # Included	Median Student Growth Percentiles						
		All Grades	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Grade 10
All Students	396,371	50	50	50	50	50	50	50
African-American/Black	30,107	48	41	44	52	47	53	51
Asian	18,925	60	58	61	62	59	62	59
Hispanic/Latino	49,717	46	42	45	49	46	51	45
Multi-race/Non-Hispanic	7,341	50	48	50	49	51	53	49
Native American	1,089	47	46	49	48	50	46	46
White	288,750	50	52	51	49	50	49	50
Non-Low Income	277,329	52	54	53	51	52	50	51
Low Income	118,989	45	41	44	47	45	49	45
LEP	13,474	48	44	46	52	49	57	50
Formerly LEP	10,008	54	50	51	58	55	59	56
Female	194,583	53	55	53	55	54	49	50
Male	201,735	47	44	47	45	46	51	49
Students w/ Disabilities	66,224	40	34	42	41	41	43	39
Non-Title 1	298,227	51	54	52	51	51	50	51
Title 1	98,091	46	42	45	49	45	51	44

Table 2. 2009 Statewide Mathematics Median Student Growth Percentiles

Group	All Grades # Included	Median Student Growth Percentiles						
		All Grades	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Grade 10
All Students	397,572	50	50	50	50	50	50	50
African-American/Black	30,260	46	40	48	46	45	50	48
Asian	18,987	60	61	62	62	58	58	60
Hispanic/Latino	50,091	44	41	43	46	45	48	45
Multi-race/Non-Hispanic	7,350	49	52	49	48	49	49	46
Native American	1,090	47	48	47	46	42	50	52
White	289,352	51	52	50	50	51	50	50
Non-Low Income	277,863	52	54	52	52	52	52	51
Low Income	119,659	44	42	44	45	45	47	46
LEP	13,727	48	40	46	51	53	55	48
Formerly LEP	10,030	52	49	50	55	53	56	52
Female	194,984	50	49	49	51	52	52	49
Male	202,538	50	51	51	49	49	49	51
Students w/ Disabilities	66,303	43	39	41	41	43	45	47
Non-Title 1	298,807	51	54	52	51	51	51	50
Title 1	98,715	46	42	46	47	46	48	49

Tables 1 and 2 help us answer questions such as:

- How did the growth of a subgroup compare to the growth of all students across all grades and in a given grade? For example,
 - The median growth percentile of 48 for African-American students in ELA across grades 3–8 and 10 is very close to the statewide median of 50 for all students.
 - The median growth percentile of 56 for formerly limited English proficient students in mathematics in grade 8 is higher than the corresponding median growth percentile of 50 for white students.
- How did the growth of a subgroup change as they progressed through the grades?
 - Hispanic/Latino students make steady progress from a lower median student growth percentile of 42 in ELA in grade 4 to an more typical median student growth percentile of 51 in grade 8, but then experienced slightly lower growth of 45 in 10th grade.
 - The 8th grade ELA results for LEP students show the typical student at that grade is growing at the 57th percentile when compared to students with similar MCAS scores in 7th grade and before. A reasonable interpretation of this median is that 8th grade LEP students are more than keeping pace with their academic peers.

One more finding of interest is that lower than typical growth in the lower grades increases to typical (or higher) growth in the later grades for many subgroups in ELA. This trend is particularly interesting and warrants further study.

Interpreting School, District and Group-level Growth

Because student growth percentiles are normative (they describe how each student changed relative to what was normal), the medians for all districts, schools, and subgroups will be centered around 50. Therefore, statewide, there should be just about as many schools above 50 as below 50 and this will be true even if achievement levels rise. Depending on the test, between 60 and 65 percent of groups will have a median somewhere between the 40th and 60th percentile.

As with all data driven decision making, educators are advised to use caution and not overemphasize small differences. Always consider the number of students being measured, as scores for small groups are likely to change much more than for larger groups. For this reason, the tables and charts used to display growth and achievement data include an indication of the number of students included in the growth calculations. Median growth percentiles are not calculated for groups smaller than 20.

Best Practices for Using Growth Data

Don't allow growth data to obscure achievement data. Use growth data to complement achievement data.

It is the Department's goal to help every student in the state reach proficiency and beyond. Achievement data, therefore, is still an extremely important measure of how students stand relative to proficiency. Growth data is best used to add context to achievement data.

Use two years of data if it's available.

The Department has gathered two years of growth data for students in grades 4 through 8. The 10th grade results could only be calculated for the first time in 2009; hence, only one year of growth data is available for grade 10.

Look at differences across grades as well as between grades.

Because every student has an equal opportunity to grow at a relatively high or low level, regardless of their grade, it is appropriate to combine grades at the school, district, or group level. However, be sure to look at the growth of groups in schools and grades and by subgroup, because overall growth scores can often mask patterns.

Differences in medians of less than 10 points are not likely to be meaningful.

At the school level there is a correlation³ between median growth scores in 2008 and median growth scores in 2009. Despite the correlation, the average school saw its medians fluctuate by 10 points from year to year. Therefore, as a rule of thumb, differences in medians of less than 10 are not likely to be educationally meaningful at the school or district level, except in rare cases when those differences occur among particularly large numbers of students (i.e. 1,000 students or more).

Medians above 60 or below 40 are relatively unusual.

Figures 1 and 2 show that roughly one school in five had a median growth percentile higher than 60 and a slightly smaller proportion had medians below 40. About five percent had medians above 70 or below 30 and less than one percent had growth scores higher than 80 or below 20.

³ Among the 1,304 elementary and middle schools with valid growth scores in 2008 and 2009, the correlation between ELA medians was .561 (R-squared = 32%) and mathematics medians was .527 (R-squared = 28%).

Rethinking Performance

The Department conducted a field test of the growth model with a diverse group of nine districts from April 29th to July 2, 2009. The participating districts were: Community Day Charter Public School, Franklin, Lowell, Malden, Newton, Northampton, Sharon, Springfield, and Winchendon. The field test provided important feedback and recommendations to improve the clarity and usability of growth model reports.

Soon after the start of this growth model field test, we realized that we needed to revisit our notion of student performance. With this added dimension of growth, we concluded that the definition of performance needs to be expanded from solely “achievement” to “achievement plus growth.” This concept is illustrated in the following example:

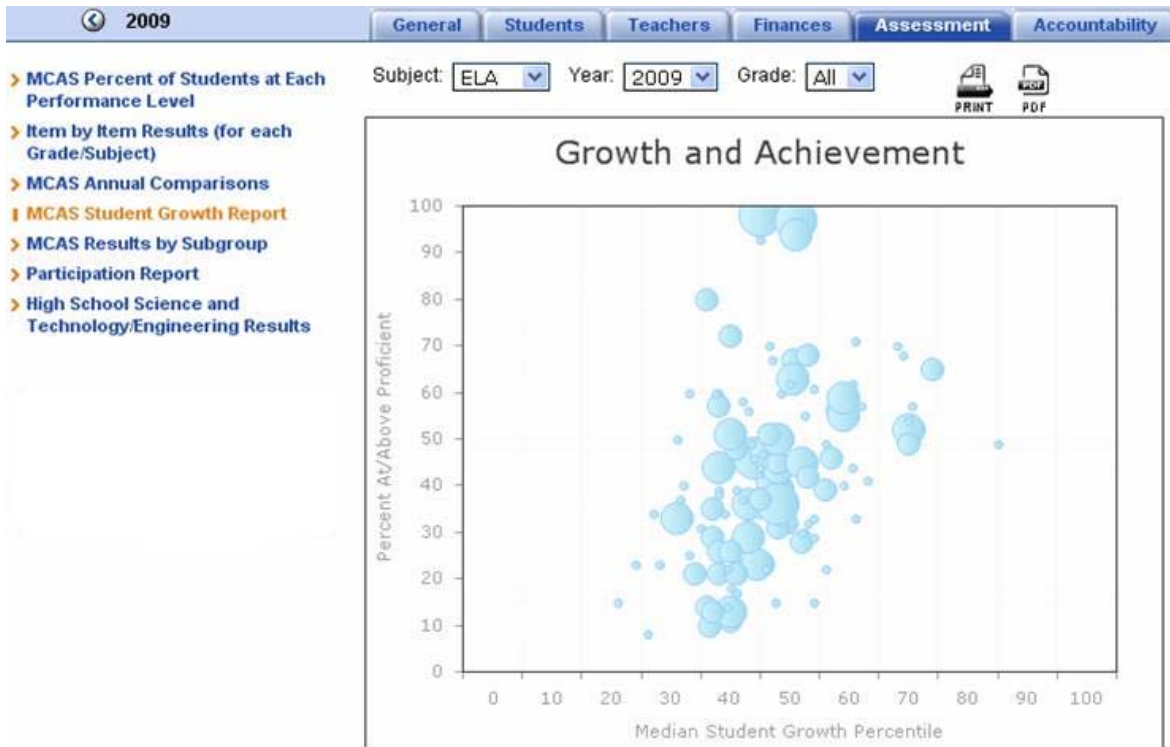
Table 3: ELA MCAS 2009: Grade 10 School Results

	ACHIEVEMENT		GROWTH
	% Proficient or Advanced	CPI	Median Growth Percentile
School A	75%	88.3	63
School B	75%	88.9	32

Schools A and B both had similar achievement profiles. They both saw exactly 75 percent of their students reach *Proficiency* or above, and their Composite Performance Index scores were virtually identical. However, School A had an unusually high median growth percentile of 63, meaning that half of its students grew at or above the 63rd percentile. Meanwhile, School B had an unusually low median growth percentile of 32, meaning that half of its students grew at or below the 32nd percentile. Therefore, while these two schools have extremely similar levels of achievement, School A, due to its high growth, is performing better than School B.

Availability of Growth Data

School and district growth reports are now available online alongside the MCAS test results posted to the Department’s “School and District Profiles” (<http://profiles.doe.mass.edu/>). Tables of results by district, by grade, by school, and by subgroup have also been appended to the 2008 and 2009 MCAS results report (http://profiles.doe.mass.edu/state_report/mcas.aspx). In addition, graphical displays like the figure below are available on each district profile by clicking the “Assessment” then “MCAS Student Growth Report” tabs.”



Moving Toward Better Conversations about Teaching and Learning

The advent of a statistically valid growth model in Massachusetts is intended to make it easier for instructional leaders to make inquiries and start meaningful conversations about good teaching and learning at the student and classroom levels, where the information can be most useful. In the Education Data Warehouse, users with access to student level data (mainly school and district administrators) can experience a dynamic interface that allows educators to identify factors associated with high growth rates.

It is important to keep in mind that the student growth percentile is another piece of data that educators may use to better understand their students' performance. There is a personal history behind every student growth percentile, a history that reflects the impact of the curricular and instructional program that the student experienced. The Department hopes that this new measure of student performance provokes high quality conversations about students, programs, schools, curriculum, and the teaching and learning that take place in every classroom across the Commonwealth.