MCAS Student Growth Percentiles: Interpretive Guide

March 2011

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Introduction

The information in this guide is designed for educators, parents, and other interested stakeholders who would like to understand the Massachusetts MCAS growth model. For K-12 education in Massachusetts, the phrase "growth model" describes a method of measuring individual student progress on statewide assessments (the MCAS) by tracking student scores from one year to the next. Each student with at least two consecutive years of MCAS scores will receive a *student growth percentile*, which measures how much the student changed relative to other students statewide with similar scores in previous years. Student growth percentiles range from 1 to 99, where higher numbers represent higher growth and lower numbers represent lower growth. This method works independently of MCAS performance levels. Therefore, all students, no matter the scores they earned on past MCAS tests, have an equal chance to demonstrate growth at any of the 99 percentiles on the next year's test. Growth percentiles are calculated in ELA and mathematics for students in grades 4 through 8 and for grade 10.

Background

Since 1998, Massachusetts has provided students, families, educators, and the general public with valuable information about student, school, and district achievement based on the Massachusetts Comprehensive Assessment System (MCAS). This information has been invaluable in helping schools and districts engage in program evaluation activities—understanding, for example, how well district instruction and curriculum are aligned with the state's curriculum frameworks—or how well a particular subgroup of students is performing by school and district, and across the state.

Until now, however, we have been unable to answer the question, "How much academic progress did a student or group of students make in one year as measured by MCAS?" With the development of the student growth percentile model, it is now possible to answer this question. Measuring student achievement and improvement in this manner will help anyone involved in education examine why results differ for certain groups of students and support the identification of effective practices that help students attain higher levels of academic performance.

Student Growth Percentiles – Individual Student Growth

Measuring student performance relative to standards specific to each grade level is useful in determining whether a student has met the standards for that grade. There are, however, several obstacles to using this approach to measure students' academic growth. **This is why we have developed "student growth percentiles," a measure of student progress that compares changes in a student's MCAS scores to changes in MCAS scores of other students with similar scores in prior years**. A *student growth percentile* measures student progress by comparing one student's progress to the progress of other students with similar MCAS performance histories. We refer to students with similar score histories as "academic peers."

Percentiles are commonly understood values that express the percentage of cases that fall below a certain score. 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% of her academic peers grew more in math than she did.

or

- A student with a growth percentile of 23 in 8th grade English language arts grew as well or better than 23 percent of her academic peers (students with similar score histories) from the 7th grade ELA MCAS to the 8th grade ELA MCAS. This student grew less in ELA than 77% of her academic peers.

Because growth is measuring change in performance rather than absolute performance, it doesn't matter how a student performed on the MCAS last year. In any given testing year, each student has an equal opportunity to grow at the 99th percentile. In other words, even though a student may not *achieve* a score of 278 out of 280 this year, it is possible for a student to have *grown* at the 99th percentile from last year to this year. Although a student may perform well below the proficiency mark, that student could potentially have a high growth percentile. Such an occurrence could indicate that a program, a new approach, or something else is working for this student.

It is helpful to think of growth as a statistic that puts MCAS achievement into greater context. MCAS achievement scores answer one thing: how did a student fare relative to grade level standards in a given year. MCAS student growth percentiles add another layer of understanding, providing a measure of how a student changed from one year to the next relative to other students with similar MCAS test score histories.

Massachusetts will initially report growth for English language arts/reading and mathematics for grades 4 through 8, and grade 10. The state's growth model uses students' historical MCAS results to calculate growth percentiles and currently requires results from at least two grades. Therefore, no results will be available for grade 3 (the first grade of MCAS testing) or for science (because science is tested only in grades 5, 8, and high school).

Although there is no 9th grade MCAS test in ELA or mathematics, the Department has developed a way of calculating grade 10 growth percentiles. Interpreting 10th grade growth percentiles is complicated by the extra time between MCAS administrations. Please refer to the "Growth Model Frequently Asked Questions" at the end of this guide (specifically, question 13) for a more detailed discussion of the 10th grade growth measure.

While student growth percentiles enable educators to chart the growth of an individual student compared to that of academic peers, student growth percentiles can also be aggregated to understand growth at the subgroup, school, or district level.

Student Growth Percentiles in the Aggregate

To summarize student growth rates by 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 one ranks the individual student growth percentiles 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, school, or district level, the statistic and its interpretation remain the same. For example, if the students with disabilities in your district have a median student growth percentile of 53, that particular group of students, on average, achieved higher than their academic peers—a group of students who may or may not be students with disabilities. The median student growth percentile does not indicate that your students with disabilities improved more than 53 percent of other students with disabilities. It does not indicate that your students with disabilities improved more than 53 percent of students without disabilities. The comparison group is always the students' academic peers: students with similar MCAS test score histories.

Interpreting Growth Reports

Traditional student assessment reports provide information about a student's performance, whereas growth reports provide information about how much change or "growth" there has been in performance from year to year. In interpreting these data, it is important to note that differences in growth scores from year to year less than 10 points should not be considered meaningful or significant.

Sample reports 1-6, which appear on the following pages, show the range of information that can be provided by the various growth reports the Department produces. Each report describes a different aspect of student growth. In each case, there are certain ways to use the data, and certain ways in which the data should not be used.

It is important to keep in mind that the student growth percentile is useful to the extent that it is simply another piece of data that educators may use to better understand their students' performance. There is a story behind every student growth percentile, and educators are encouraged to seek out these stories. 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. Set aside time to explore the causes for high and low levels of growth and learn to recognize the characteristics of students performing at the poles of the growth spectrum.

Accessing Growth Reports

All of the following growth reports are best viewed in the Education Data Warehouse, which allows users to "drill down" into the data in a more dynamic fashion. In order to access the Education Data Warehouse, please visit the Department's Security Portal (https://www4.doemass.org/auth/Login). You must have an authorized login ID and password in order to access the warehouse. If you do not have access or are unsure whether you have access to the Security Portal, please contact your district's directory administrator (http://www.doe.mass.edu/InfoServices/data/diradmin/list.asp) or data warehouse contact (http://profiles.doe.mass.edu/search/search.aspx?leftNavId=11239). For additional information to help you access and navigate the Data Warehouse, please see the Department's Student Growth Percentiles Quick Start Guide located at http://www.doe.mass.edu/mcas/growth.

Once you gain access to the warehouse, click on the "Public Folders" tab, and look for the "ESE Growth Reports" folder. All report templates seen on the following pages will be available in this folder.

Publicly available growth data is available on the Department's School and District Profiles website at http://profiles.doe.mass.edu/state_report/mcas.aspx.

Growth Reports

Report 1: Student Growth Roster (G-602)

The student growth roster report displays a list of students in the same grade within each school or district. Next to each student are MCAS performance data and individual student growth percentile data. The following student roster report depicts a fictional grade 6.

Student Growth Roster Report, Historic Middle School, Grade 6

SASID	Last, First, MI	ELA 2007	ELA 2008	ELA 2009	2009 ELA SGP	Math 2007	Math 2008	Math 2009	2009 Math SGP
1234567890	Adams, John	252	242	266	97	246	258	250	20
1234567891	Adams, Abby, S	258	248	242	24	234	238	240	76
1234567892	Jackson, Andrew	228	232	236	40	236	236	232	62
1234567893	Carter, Rebecca	250	252	260	71	240	240	240	71

2009 ELA SGP: The student's 2009 growth percentile (SGP) in ELA. The correct interpretation of this measure is: *"From 2008 (grade 5) to 2009 (grade 6), John Adams grew as much as or more than 97 percent of his peers who had similar MCAS score histories in ELA."*

2009 Math SGP: The student's 2009 growth percentile in math. The correct interpretation of this measure is: *"From 2008 (grade 5) to 2009 (grade 6), John Adams grew as much as or more than 20 percent of his peers who had similar MCAS score histories in math."*

More Interpretations

Andrew Jackson:

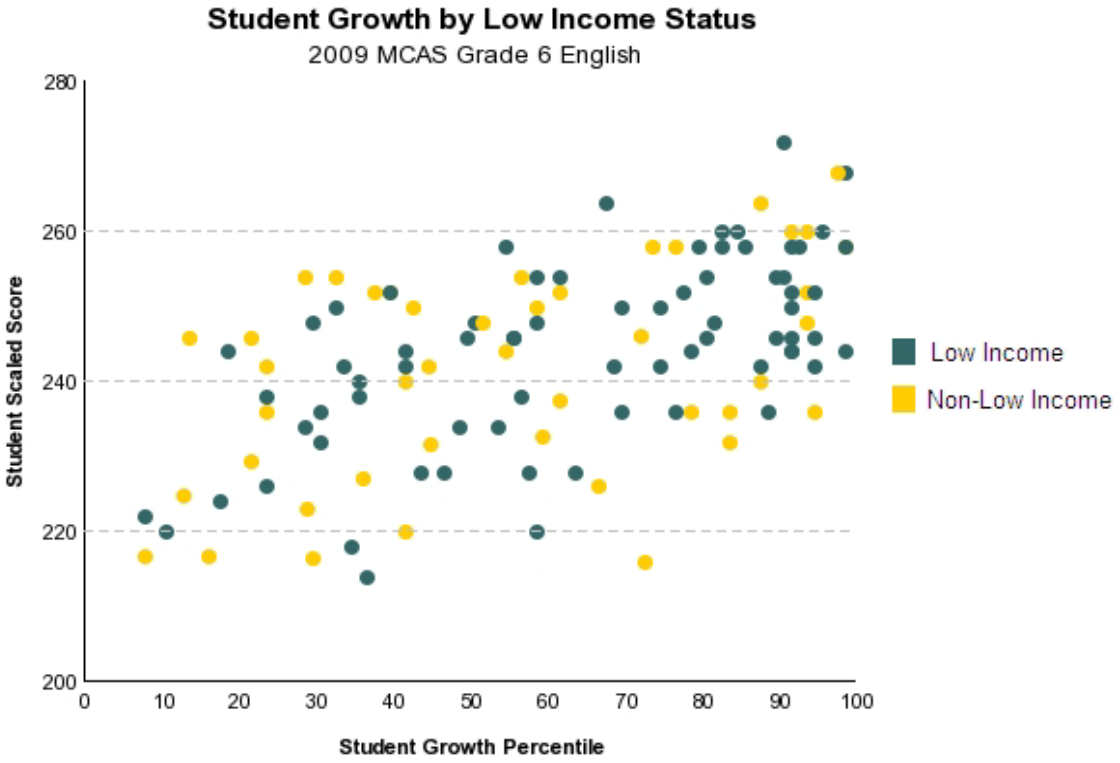
- Despite the fact that Andrew's ELA scores have increased from year to year, he grew at the 40th percentile when compared to his peers with similar MCAS score histories.
- Andrew's math scores demonstrated the opposite trend. Despite his math scores dropping from 2008 to 2009, he actually performed at the 62nd percentile when compared to his academic peers with similar MCAS score histories.

Rebecca Carter:

- Rebecca's scores in ELA have been improving, and her scores in math have remained flat. However, in both ELA and math, Rebecca grew at the 71st percentile when compared to her academic peers with similar MCAS score histories.

Report 2: Student Growth Scatter Plot (G-601)

In report 2, student growth is placed in the context of absolute student performance. This report is a graphic illustration of the information contained in the *Student Growth Roster*. In this example, each dot on the graph represents an individual student. Note that this report is most useful when viewed in the Education Data Warehouse, because moving the cursor over a dot will display the student's name.



The vertical axis represents student achievement on the grade 6 MCAS ELA test, and the horizontal axis represents student growth from the grade 5 MCAS ELA test to the grade 6 MCAS ELA test. Therefore, students shown in the upper right quadrant of the graph demonstrated higher growth and higher achievement than their peers with similar score histories. By contrast, students toward the lower left demonstrated lower growth and lower achievement than their peers with similar MCAS test score histories.

The use of shading allows one more data element to be included in this graph that does not appear in the *Student Growth Roster*: low income status. The green (darker) dots represent students with low-income status, while the yellow (lighter) dots indicate students without low-income status. In addition to low income status, the Data Warehouse enables users to filter by: gender, LEP status, race/ethnicity, and special education status.

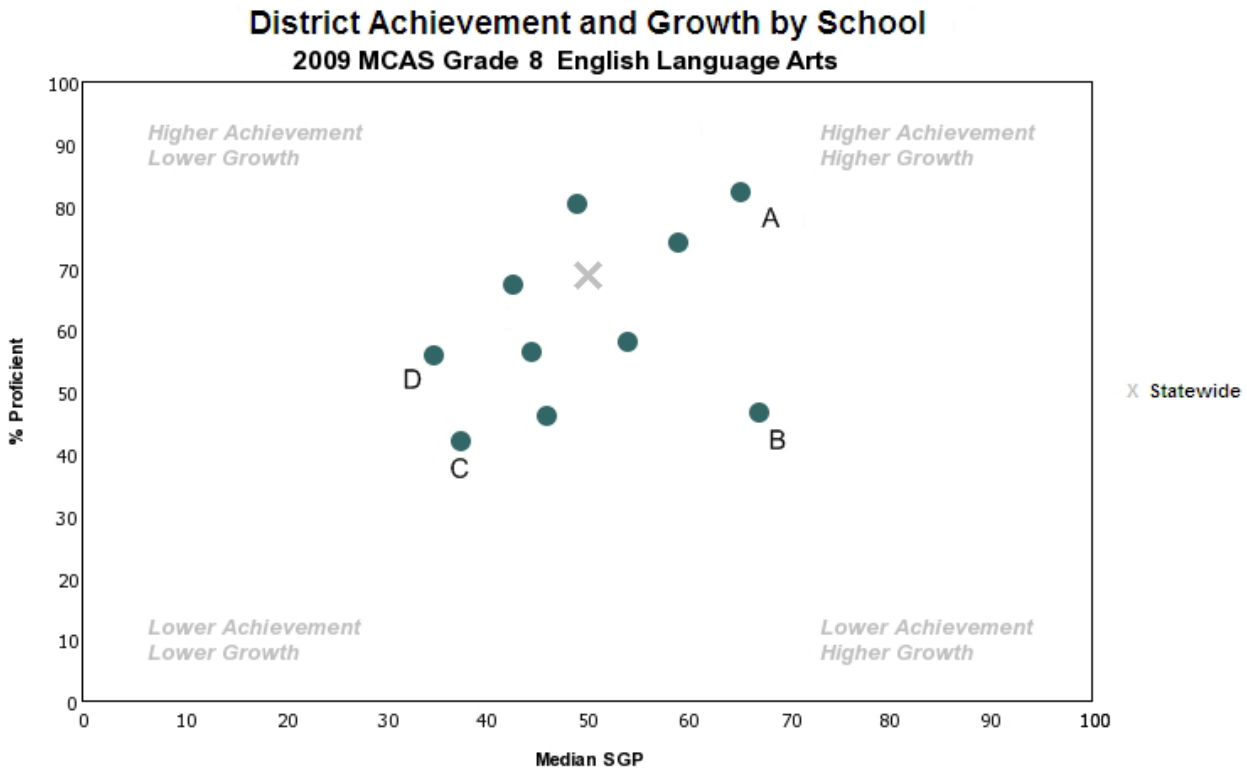
Interpretations of Student Growth Scatter Plot (above graphic):

- More students in grade 6 are above *Proficient* than below *Proficient* at the school.
- There appears to be little correlation between low income status and achievement.
- There appears to be little correlation between low income status and growth.

Report 3: District Growth Scatter Plot: by School (G-301)

Report 3 is much like the scatter plot of the information provided about individual students shown in report 2, only the dots represent *school* achievement and growth. As noted previously, this report is best viewed in the Education Data Warehouse, where mouse-over and drill-down options are available.

Each dot on the graph represents a particular school. School achievement, displayed on the vertical axis, is determined by the percentage of students who scored at or above *Proficient* in that specific school. Growth, which is placed on the horizontal axis, is determined by finding the median student growth percentile in a school. The gray X on the graph represents the percentage of students at or above *Proficient* statewide, and the median student growth percentile statewide on the grade 8 ELA MCAS test.



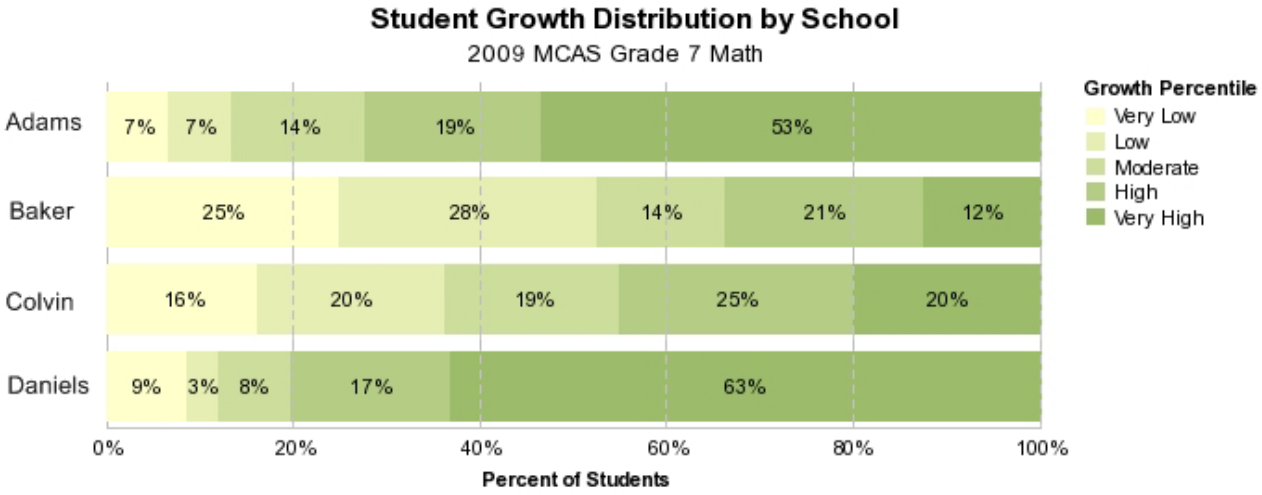
The Data Warehouse enables users to filter districts or schools by: gender, grade level, LEP status, low income status, race/ethnicity, special education status, Title I status, and school.

Interpretations of School Growth Scatter Plot (above graphic):

- School A was the highest achieving school on the grade 8 ELA MCAS compared to other schools in the district with an eighth grade.
- School B, despite being one of the lowest achieving schools in grade 8 ELA, was the highest growing school in the district.
- While School D exhibited higher achievement on the grade 8 ELA MCAS compared to School C, it did not exhibit as much growth as School C.

Report 4: District Growth Stacked Bar Chart: by School (G-302)

The District Growth Stacked Bar Chart looks back on how much students grew over the past year relative to their academic peers, with the individual data grouped by school. This report displays the proportion of students who grew in five clusters of growth percentile values in each school. The vertical dashed lines indicate the state student growth percentile distribution, with 20% of the students statewide falling in each of the five growth percentile ranges. The following example shows four middle schools in a district.



Vertical lines at 20%, 40%, 60%, 80% and 100% represent the Statewide distribution for very low, low, moderate, high and very high

Number of students in growth percentile ranges. Math MCAS. Grade 6 (2008) to Grade 7 (2009) growth.

	N Students	Very Low	Low	Moderate	High	Very High	% Proficient+
Adams	143	10	10	20	27	76	65
Baker	212	53	59	30	45	25	50
Colvin	168	26	34	32	42	34	33
Daniels	135	12	4	11	23	85	56

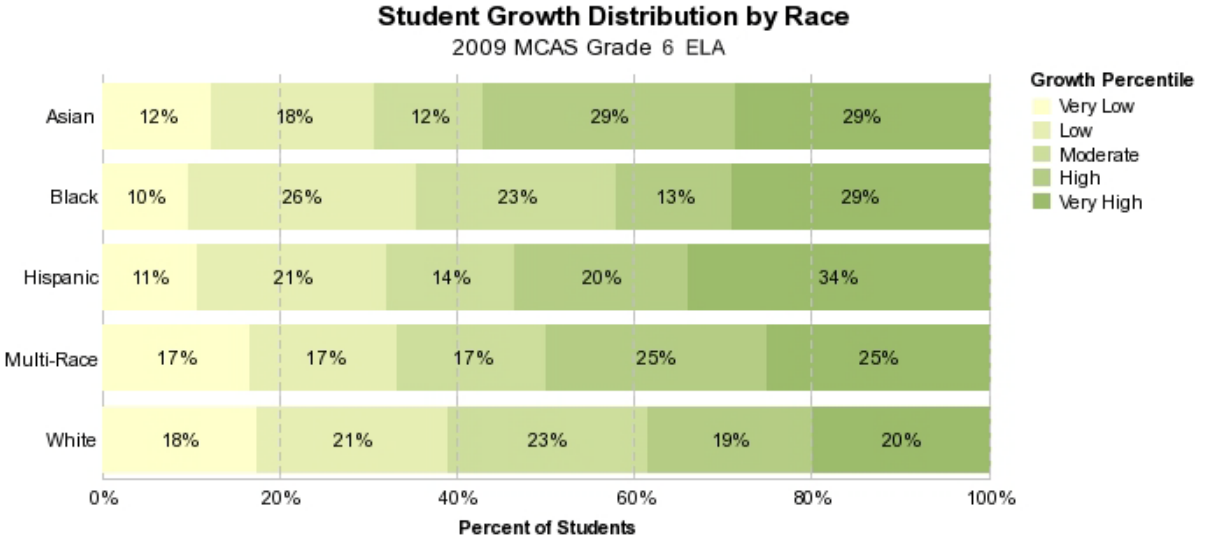
Note: Only students assigned a growth percentile are included.

Interpretations of District Growth Stacked Bar Chart (above graphic):

- In the Adams School, more than half of the students grew at a *very high* rate on the 2009 grade 7 mathematics test relative to students across the state with similar MCAS test score histories.
- While 53% of the students at the Baker School grew at or below a *low* level in 2009, 50% of the students in that school were proficient or advanced.
- In 2009, the student growth in the Colvin School was fairly evenly distributed across each of the growth percentile ranges, almost mirroring the state distribution exactly.
- Eighty percent of students in the Daniels School (108 out of 135) grew at or above a *high* rate in 2009 relative to students across the state with similar MCAS test score histories.

Report 4: District Growth Stacked Bar Chart: by Student Group (G-302)

This is another example of the District Growth Stacked Bar Chart, where the individual data is arranged by student group rather than by school. It is important to remember that, for example, Asian students in this district were not compared to all other Asian students in the state. Each individual Asian student was compared to students with similar MCAS test score histories, regardless of their race or ethnicity. This report simply groups students who were compared to their statewide academic peers by their racial or ethnic group. The following example shows the racial/ethnic groups within a district, and the proportion of students in each group who grew in five growth percentile ranges.



Vertical lines at 20%, 40%, 60%, 80% and 100% represent the Statewide distribution for very low, low, moderate, high and very high growth.

Number of students in growth percentile ranges. ELA MCAS. Grade 5 (2008) to Grade 6 (2009) growth.

	N Students	Very Low	Low	Moderate	High	Very High	% Proficient+
Asian	270	32	50	32	78	78	71
Black	28	3	7	6	4	8	52
Hispanic/Latino	162	18	34	23	32	55	42
Multi-Race	34	6	6	6	8	8	54
White	226	40	47	52	42	45	69

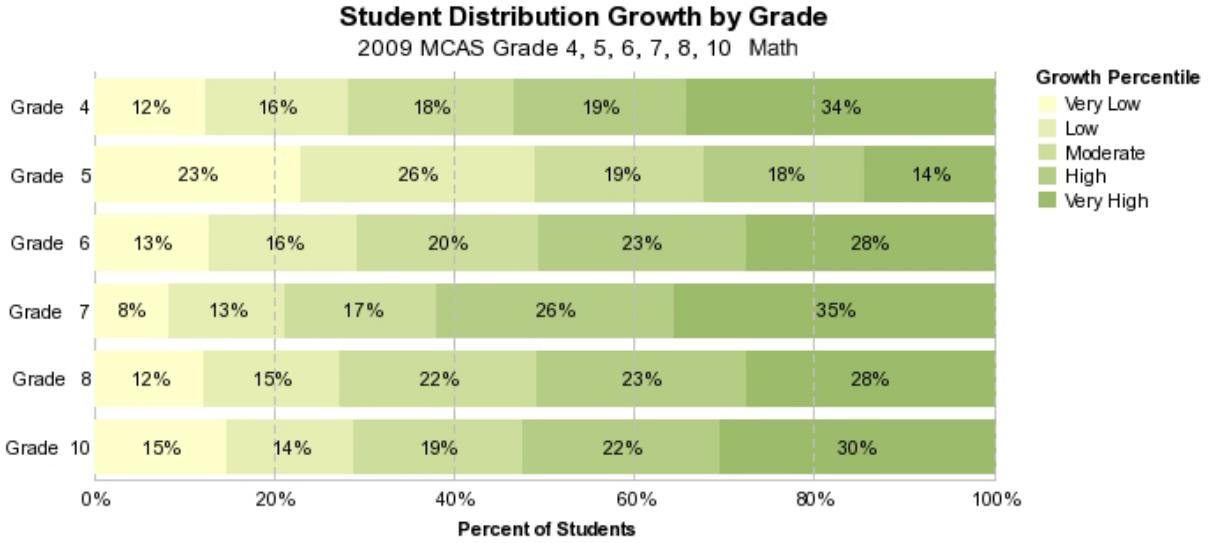
Note: Only students assigned a growth percentile are included.

Interpretations of District Growth Stacked Bar Chart (above graphic):

- Between 2008 and 2009, approximately 58% of Asian students in the district grew at or above a high level in ELA relative to students across the state with similar MCAS test score histories.
- 29% of African American students in the district grew at a very high rate on the ELA MCAS test from 2008 to 2009, while only 10% grew at a very low rate relative to students with similar MCAS test score histories.
- The growth distribution of white students mirrors the state growth distribution. That is, students are almost equally split among the five growth percentile ranges.

Report 4: District Growth Stacked Bar Chart: by Grade (G-302)

In another example of the District Growth Stacked Bar Chart, these data are grouped by grade. In this view, it is possible to determine how much students changed (relative to their academic peers) between grade level MCAS tests. The following graph looks at student growth percentiles in math by grade within a school.



Vertical lines at 20%, 40%, 60%, 80% and 100% represent the Statewide distribution for very low, low, moderate, high and very high growth.

Number of students in growth percentile ranges. Math MCAS growth from 2008 to 2009.

	N Students	Very Low	Low	Moderate	High	Very High	% Proficient+
Grade 4	97	13	16	17	18	33	78
Grade 5	98	23	25	19	18	13	80
Grade 6	94	12	15	19	22	26	86
Grade 7	102	8	13	18	27	36	88
Grade 8	104	12	16	23	24	29	94
Grade 10	90	14	13	17	19	27	96

Note: Only students assigned a growth percentile are included.

Interpretations of District Growth Stacked Bar Chart (above graphic):

- Between 2008 and 2009, more than 60% of the students in the 7th grade grew at or above a high rate.
- Approximately half of the fifth graders grew at or below a low level compared to their academic peers statewide.

Questions to Ask:

- *What is happening in fifth grade?*
  - *What mathematics program is being implemented in the fifth grade?*
  - *What is the transition like between grades 4 and 5?*
- *Why is student growth relatively high in grade 7?*

Report 5: District Summary (R-310)

The District Summary provides a top-level view of a district's overall performance (achievement and growth scores). The chart shows the number of students who were tested, the percentage of students in each MCAS performance level, the Composite Performance Index (CPI), the median student growth percentile, and the number of students for whom we were able to calculate a valid growth percentile. In addition to this "all students" level view, the District Summary report allows users to filter by gender, LEP status, low income status, race/ethnicity, and special education status.

District 2009 MCAS: All Students

Grade and Subject	N Students	% Adv.	% Prof.	% NI	% W/F	CPI	Median SGP	N Students (SGP)
Grade 3 - English	103	8	53	29	10	82.3		
Grade 3 - Math	103	24	41	18	17	80.7		
Grade 4 - English	111	13	54	24	9	85.2	62	104
Grade 4 - Math	111	18	36	37	9	81.4	56	104
Grade 5 - English	87	28	46	22	4	90.8	57.5	79
Grade 5 - Math	87	43	28	20	9	85.6	56.5	79
Grade 5 - Science	87	30	34	28	7	85.0		
Grade 6 - English	98	18	56	22	4	88.4	36	90
Grade 6 - Math	98	21	36	27	16	76.6	19	90
Grade 7 - English	99	12	59	23	6	90.5	50	92
Grade 7 - Math	99	32	34	27	7	86.3	77.5	92
Grade 8 - English	91	4	79	11	5	93.1	31	85
Grade 8 - Math	91	5	33	46	16	70.8	42	85
Grade 8 - Science	91	4	34	56	6	75.6		
Grade 9, 10 - Biology	130	16	61	14	9	89.4		
Grade 9, 10 - Physics	10	20	40	40	20	84.2		
Grade 10 - English	85	48	38	10	5	93.1	80.5	79
Grade 10 - Math	85	69	22	5	4	94.0	67	79

Interpretations of the District Summary Report (above chart):

- While student achievement in grade 6 English is good (only 4% of students are at the *Warning/Failing* performance level), growth was below average (Median SGP: 36).
- Student growth in 10th grade English is extraordinarily high (Median SGP: 80.5) compared to all other students with similar score histories.
- Student achievement in grade 8 English is excellent, with 83% of the students *Proficient* or *Advanced*. However, student growth was well below average, at 31. On average, these high achieving students did not grow as much as their academic peers statewide from 2008 to 2009.

MCAS Student Growth Percentiles

Frequently Asked Questions (FAQ)

If you have a question that is not answered here, please email growth@doe.mass.edu.
or visit the ESE growth model website: http://www.doe.mass.edu/mcas/growth

Overview

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8. Will all students be included in growth reports?
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11. Will growth data be used for accountability (AYP) determinations?
12. How will growth data be disseminated to districts, schools, teachers, and the community at-large?
13. Will the state provide growth data for high schools? If so, how are the calculations made and how should the data be interpreted?
14. What additional information will the Department provide to teachers, administrators, and other education stakeholders on how growth data is calculated and how to use it effectively? Where can I find this information?

Technical

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20. Can the student growth percentile be interpreted the same way regardless of the test's subject matter?
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26. How does the median student growth percentile relate to the Composite Performance Index?
27. If my school's Composite Performance Index and/ or percent *Proficient* are increasing, will its median student growth percentile increase to?
28. If my school made AYP, does that mean my students are growing faster than their academic peers?

1. **What is a growth model?**

   For K-12 education, the phrase "growth model" describes a method of measuring individual student progress on statewide assessments (tests) by tracking the scores of the same students from one year to the next.

   Traditional student assessment reports tell you about a student's achievement, whereas growth reports tell you how much change or "growth" there has been in achievement from year to year.

2. **What questions can a growth model help answer?**

   The growth model allows districts and schools to more easily identify promising, or potentially struggling, programs and practices—and therefore to look deeper into what may or may not be working. A growth model can help answer such questions as:

   a. How much academic progress did an individual or group of students make in one or more years?
   b. How does an individual student's growth compare to that of students with similar prior MCAS test scores?
   c. Is a student's, school's or district's growth higher than, or lower than, or similar to typical[1] growth?
   d. Which schools or districts demonstrate better than (or less than) typical growth for their students as compared to schools or districts with similar overall MCAS achievement?

3. **Why did Massachusetts develop a growth model to measure student progress?**

   Annually, since 1998, Massachusetts has provided students, families, educators, and the general public with information about student, school and district performance based on the Massachusetts Comprehensive Assessment System (MCAS). This information has been invaluable in helping schools and districts engage in program evaluation activities—understanding, for example, how well district instruction and curriculum are aligned with the state's curriculum frameworks, or how well a particular subgroup of students is performing by school, district, and across the state.

   Until now, however, we have been unable to answer the question, "How much academic progress did a student or group of students make in one year, as measured by MCAS, in relation to their academic peers?" With the development of the growth model, it is now possible to answer this question. This method of examining student performance and improvement will help districts and schools to look into why results differ for certain groups of students and support discovery of which approaches are working best to help more students to higher levels of academic performance.

[1] "Typical," throughout this document, means: "neither high growth nor low growth, but growth that was somewhere in the middle of the distribution; moderate."

4. **How does Massachusetts measure student growth?**

Massachusetts measures growth for *an individual student* by comparing the change in his or her MCAS achievement from one year to a subsequent year to that of all other students in the state who had similar historical MCAS results (the student's "academic peers"). This change in achievement is reported as a student growth percentile (abbreviated SGP) and indicates how high or low that student's growth was as compared to that of his/her academic peers (See Questions 15 and 16 for technical details).

For a *school or district*, the growth percentiles for all students are aggregated to create a median student growth percentile for the school or district. The median student growth percentile is a representation of "typical" growth for students in the school or district.

5. **Why didn't Massachusetts report growth previously?**

Massachusetts needed three things to be able to measure and report student growth:

- A statewide individual student tracking system (SIMS);
- Statewide assessments administered in consecutive grades in the same subjects (MCAS ELA and mathematics, grades 3-8);
- A technically sound and understandable method for measuring growth that was compatible with the MCAS system.

The state had all three of these components in place as of 2008.

6. **When do growth reports become publicly available?**

Massachusetts releases public growth reports for schools and districts along with the other MCAS achievement results in the fall of each school year. The state issues individual student growth reports to parents and guardians in the MCAS Parent Report shortly after the public release.

7. **For which grades and subjects does Massachusetts report growth?**

Massachusetts reports growth for ELA and mathematics for grades 4 through 8, and grade 10.

The Massachusetts growth model uses students' historical MCAS results to calculate growth percentiles.. As such, no results will be available for grade 3 (the first grade of MCAS testing) or for science (because science is tested only in grades 5, 8, and high school).

- While there is no 9th grade testing in ELA or mathematics, the Department does release 10th grade growth percentiles.

8. **Will all students be included in growth reports?**

   No. As noted above, students in grades 4 through 8 who have two or more consecutive years of MCAS results will be included in growth reporting. In addition, students in grade 10 who have attended Massachusetts public schools in 8th, 9th, and 10th grade will be included. School-level growth reports give users the option of including students who were tested in the same school in which they were enrolled at the beginning (October 1) of the school year, and students who were enrolled after October 1st.

   Any student who took the MCAS-Alt at any point during the student's two most recent MCAS administrations will not be included in growth reports. Additionally, MCAS retests are not included in the calculation of student growth percentiles.

9. **What do growth reports show that standard MCAS and AYP reports don't?**

   School and district growth reports display information about how much academic progress students made in relation to their academic peers (students with a similar MCAS test result history).

   MCAS reports present information about the performance of students at the end of each school year, displaying the distribution of students performing at each of the MCAS performance levels.

   Adequate Yearly Progress (AYP) reports display information about how close a school or district is to helping all students reach or exceed proficiency. While the measure of improvement on AYP reports is correlated with individual student growth, it is focused on comparisons of grade-level cohorts (e.g., this year's 4th graders compared to last year's 4th graders). In addition, AYP reports do not measure any change in performance for students at or above the *Proficient* performance level.

10. **Is growth a better measure of student performance than MCAS or AYP?**

    No. It simply answers a different question. If you want to know how well a student performed on the standards for mathematics or ELA by the end of 6th grade, the MCAS scaled score and performance level are the best indicators. If you want to know whether a school is on target for having all of its students *Proficient* by 2014, AYP reports are the right measure. If you are trying to determine how much a student's performance has changed from 2007 to 2008 relative to the student's academic peers, the growth model is the best indicator. A more complete understanding of performance can be obtained by using all three measures.

11. **Will growth data be used for accountability (AYP) determinations?**

    Not initially. As of this printing, the Department is using growth data only as a supplement to the other MCAS results we already provide. The Department may decide to submit a request to the U.S. Department of Education to use growth in accountability decisions at a later date.

12. **How will growth data be disseminated to districts, schools, teachers, and the community at large?**

    Growth data will be accessible to districts through a number of media: School and District Profiles, the District Analysis and Review Tool (DART), and the Department's Education Data Warehouse (EDW) all contain growth data. Through the EDW, districts can produce student-level reports for distribution. All other reports on Profiles and in the DART are aggregated to the subgroup, school, and district level using the median student growth percentile.

13. **Will the state provide growth data for high schools? If so, how are the calculations made and how should the data be interpreted?**

    Yes. The fall of 2009 provided the first opportunity to calculate growth for high school students, because the growth model requires at least one year of prior data (two year's prior, if available), and there is no 9th grade test. Therefore, we must use grade 7 and/or 8 tests as the prior years. The grade 7 mathematics and grade 8 ELA tests were introduced for the first time in 2006. Consequently, 2009 was our first opportunity to compute student growth percentiles for 10th graders using two prior years of data.

    Due to the extra year between grades 8 and 10 MCAS administrations, there are a few things to keep in mind when interpreting the 10th grade growth measure.

    - The individual student growth percentiles represent two years of growth for each student (from the 8th grade to the 10th grade) and are, therefore, attributable in part to experiences and variables from the end of 8th grade, through 9th grade, and through most of 10th grade.
    - The school and district level median student growth percentiles do not represent only those students who remained in the same school or district during grades 9 and 10. Thus, a student who arrived at your school or district for the first time in 10th grade will be included in the calculation. Any interpretation must therefore take into account that some of the growth or lack of growth is attributable in part to the range of student experiences since the end of 8th grade.

    Grade 10 student growth percentiles tend to vary more than growth percentiles at other grade levels. This happens because a large majority of 10th graders reach the *Proficient* performance level on the MCAS and are therefore concentrated at the top of the scale. Differentiating between these scores is challenging because relatively small differences in performance seem larger when translated into student growth percentiles.

14. **What additional information will the Department provide to teachers, administrators, and other education stakeholders on how growth data is calculated and how to use it effectively? Where can I find this information?**

    Resources including videos, links to data, this Interpretive Guide and FAQ, and a quick start guide for generating growth reports in the EDW are located both at www.doe.mass.edu/mcas/growth and within the Data Warehouse. Questions not answered by these materials should be emailed to growth@doe.mass.edu.

Technical

15. **What is a student growth percentile?**

A student growth percentile (abbreviated SGP) measures how much a student's performance has improved from one year to the next relative to his or her academic peers: other students statewide with similar MCAS test scores in prior years. The calculation answers the question, "Among other students with similar MCAS test score histories in previous years, what is the range of scores attained this year?" The model then uses the answer to determine whether a student grew at a faster or slower rate than the students' peers, or at a similar rate.

The statistic is interpreted as follows: if John Smith, currently a grade 5 student, has a student growth percentile of 65 in English language arts, that means that John improved more between grades 4 and 5 than 65 percent of students statewide with a similar historical pattern of MCAS test scores. Similarly, if John had a student growth percentile of 44 in mathematics, it means that he improved more than only 44 percent of students statewide with a similar MCAS test score history.

16. **Against whom are students being compared to generate student growth percentiles?**

Each student is being compared to his or her academic peers: other students statewide with similar MCAS test score histories. This makes for a fair comparison because it allows us to describe the likely range of scores observed among all students with a similar MCAS test score history, and therefore to see how quickly the student improved given his or her past test scores.

17. **Can students who perform at the top range of the *Advanced* level (270-280) show growth?**

Yes. One of the Department's criteria for selecting a model was that it had to measure growth even at the top (and bottom) of the MCAS performance scale. This way, all students would have the opportunity to exhibit growth. The model accounts for this by measuring each child's growth relative to his or her academic peers.

Let's suppose Jane Adams scored 280 on the grade 4 and 5 math tests. Students who scored similarly to this would comprise her comparison group—she would be compared only to other students who had performed similarly on those tests. Then, in grade 6, Jane again scores 280. She would probably have a very high student growth percentile in mathematics, as most of the students in her comparison group would likely score less than 280. In fact, most students who score 280 on one test will score less than 280 on the next year's test. Only about 5% of students repeat a 280 score from one year to the next, so Jane would likely be in the 95th percentile for growth.

18. **What does the median student growth percentile at my school represent?**

The median student growth percentile is the midpoint of student growth percentiles in the school. Half of the students had student growth percentiles higher than the median; half had lower. This is a good way of describing the typical growth of students in the school. It is not appropriate to use the average ("mean") when comparing percentiles.

19. **Can the student growth percentile be interpreted the same way regardless of grade?**

Yes. A student with a student growth percentile of 60 improved more than 60 percent of his academic peers relative to their performance the prior year, whether that student is enrolled in grade 4, 5, 6, 7, 8 or 10.

20. **Can the student growth percentile be interpreted the same way regardless of the test's subject matter?**

Yes. A student with a student growth percentile of 60 in English language arts improved more than 60 percent of his academic peers in English language arts relative to the prior year. A student with a student growth percentile of 60 in mathematics improved more than 60 percent of his academic peers in mathematics.

21. **Can the student growth percentile be interpreted the same way regardless of the year?**

Not necessarily. The same trajectory of scores could yield higher or lower student growth percentiles depending on the trend in performance statewide. Let's suppose a student scored 220 in mathematics in grade 4 in 2008, 222 in grade 5 in 2009, and 228 in grade 6 in 2010, and that the change from 222 to 228 represented a student growth percentile of 65. Now let's suppose that in 2011, the entire state's performance in mathematics improves quite rapidly, so that a substantially larger percentage of students are *Proficient* across all grades. In that case, the same test history might represent less than 65th percentile growth, since performance is increasing overall statewide.

22. **Can two students with different score histories have the same student growth percentiles?**

Yes. Each student's growth is compared only to that of others with a similar MCAS test score history. The performance of Student A or Student B is compared to that of their academic peers statewide with similar trajectories. Because Student A and Student B have different score histories, Student A is not compared to Student B

23. **Can two different students with the same MCAS scaled score test histories have different student growth percentiles?**

Yes. This can happen for at least two reasons. First, the growth calculation takes into account a student's entire MCAS test score history, not just that of the previous year. Therefore, two students could have the same scaled scores in 2010 but different scaled scores in 2009 or earlier and therefore receive the same student growth percentile. Second, the student growth percentile metric is calculated from a transformation of the raw scores that underlie the scaled scores, not the scaled scores themselves. As many as five different raw scores can translate into the same scaled score, especially for students at the *Warning/Failing* and *Advanced* performance levels. Students with the same scaled score history may not have the same raw scores and therefore would not receive the same student growth percentiles.

24. **If the median growth of my district's African-American subgroup is 59, does this mean that the average African-American student in my district grew at a faster rate than 59 percent of African-American students statewide?**

No. Students are compared to their academic peers—students with similar MCAS test score histories statewide—not their demographic peers. The correct interpretation of a median student growth percentile of 59 for the African-American subgroup in a district is, "The African-American students in my district improved more than 59 percent of their academic peers statewide." The fact that 59 is slightly higher than 50 means that the African-American subgroup performance in your district is improving slightly more than one would expect given the performance of its academic peers.

25. **Research shows that there are correlations between a student's demographic group and their performance on the MCAS. Is the same true with growth?**

Not necessarily. The relationship between demographics and growth is complex, much more so than the relationship between demographics and achievement. For instance, because there are numerous studies that have established a correlation between economic disadvantage and achievement level, one might expect that low income students would achieve at a lower *level* than students without such economic disadvantages. However, it is not so clear that low income students should *grow* slower once you've taken performance level into account, given the way we calculate growth.

26. **How does the median student growth percentile relate to the Composite Performance Index?**

The Composite Performance Index (CPI) describes a group of students' progress toward proficiency based on the students' current *level* of achievement. Students are assigned points based on how close they are to proficiency. All students scoring *Proficient* and above receive the same score of 100; because of this, the measure is not sensitive to changes in achievement among students who have attained *Proficient* or *Advanced*. Changes in a group's CPI over time can show its progress toward proficiency.

The median student growth percentile describes a group's progress in terms of its students' *change* in achievement relative to the prior year, as compared to that of their academic peers. Thus it is more directly related to changes in CPI than it is to the CPI level itself. It also captures growth at all levels of achievement, not just among students below *Proficient*. And finally, it is calculated for a narrower range of students—only those with at least one year of prior test history.

As a result, the two measures can sometimes show different results. For instance, in a district where most of the students achieve at *Proficient* or above, its CPI may not show much change from year to year, but its median SGP could show that its students are growing quickly relative to their academic peers. On the other hand, in a district with relatively low overall achievement, CPIs could change substantially while the median SGP held steady, especially if overall statewide achievement increased or if the district experienced a high rate of student mobility (and therefore had relatively fewer students with SGPs).

27. **If my school's Composite Performance Index and/or percent *Proficient* are increasing, will its median student growth percentile increase too?**

Not necessarily, it depends on how overall state performance is changing. If your school's achievement is increasing but not as quickly as that of the state overall, your CPI would increase but your school's median student growth percentile would be below 50.

28. **If my school made AYP, does that mean my students are growing faster than their academic peers?**

No. AYP determinations are based on absolute achievement and not related to growth measures. Therefore, it is possible for schools to make AYP and have low growth, if most of the school's students have achieved at the *Proficient* level but their performance grows more slowly than that of their academic peers. Likewise, it is possible for a school to have most of its students growing at high rates and still not make AYP.

Glossary of Terms

Growth model

For K–12 education, the phrase "growth model" describes a method of measuring individual student progress on statewide assessments (tests) by tracking the scores of the same students from one year to the next. Traditional student assessment reports tell you about a student's performance, whereas growth reports tell you how much change or "growth" there has been in performance from year to year.

Student growth percentile

A student growth percentile (abbreviated SGP) measures how much a student's performance has improved from one year to the next relative to his or her academic peers: other students statewide with a similar MCAS test score history. The calculation answers the question, "Among other students with similar MCAS test score histories in previous years, what is the range of scores attained this year?" The model then uses the answer to determine whether a student scored higher than, lower than, or similar to other students with a similar previous test score history.

The statistic is interpreted as follows: if John Smith, currently a grade 5 student, has a student growth percentile of 65 in English language arts, it means that John scored higher on the 5^{th} grade test than 65 percent of students statewide with a similar MCAS test score history. Similarly, if John had a student growth percentile of 44 in mathematics, it means that he scored higher than only 44 percent of students statewide with a similar MCAS test score history.

Academic peer

In the growth model, each student's growth is measured relative to other students who performed similarly in previous years on MCAS. This comparison group is known as the student's "academic peers."

Median student growth percentile

The median student growth percentile is the midpoint of student growth percentiles for a group of students (for example, a classroom, grade, subgroup, school, or district). Half of the students had student growth percentiles higher than the median; half had lower. This is a good way of describing the typical growth of students in the group. It is not appropriate to use the average ("mean") when comparing percentiles.

Performance

In the past, student MCAS results were described as a measure of student performance. The growth model invites us to reconceptualize performance as including both student achievement, as measured by traditional MCAS results, *and* student growth, as measured by the new growth model.