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Massachusetts Statewide STEM Indicators Project (MASSIP)

2015 Massachusetts STEM Data Dashboard

Prepared for the Massachusetts Department of Higher Education's STEM Pipeline Program and the Massachusetts STEM Advisory Council

September 2015

Contents

Introduction 1
State STEM Goals 3
Executive Summary 7
Primary Indicators 11
Sub-Indicators 1: Student STEM Interest 23
Sub-Indicartors 2: Student K–12 STEM Achievement 33
Sub-Indicators 3: Effective Educators 47
Sub-Indicators 4: STEM College Certificates & Degrees 53
Sub-Indicators 5: STEM Workforce Alignment 85
Data Notes 93

Introduction

The Massachusetts Mathematics, Science, Technology & Engineering Grant (Pipeline) Fund was established under the Acts of 2003 Economic Stimulus Trust Fund. The Massachusetts Department of Higher Education (DHE) was directed to administer the Pipeline Fund, with a focus on three goals:

(1) To increase the number of Massachusetts students who participate in programs that support careers in fields related to mathematics, technology, engineering, and science;

(2) To increase the number of qualified mathematics, technology, engineering, and science teachers in the Commonwealth; and

(3) To improve the mathematics, technology, engineering, and science educational offerings available in public and private schools.

The DHE created Regional Pre-K–16 Networks to plan and implement teacher and student activities that address the Pipeline Fund's goals. In addition, the DHE contracted with the University of Massachusetts Donahue Institute to develop a statewide science, technology, engineering, and mathematics (STEM) indicators system that would serve to benchmark Massachusetts' progress in key educational and economic areas associated with the Pipeline Fund's goals.

Recognizing the vast number of initiatives in place across Massachusetts to address STEM educational issues, this indicators system is not intended to specifically evaluate the impact of those activities directly supported by the Pipeline Fund. Rather, it serves as a reflection of the overall state of the combined efforts across the Commonwealth to increase the "flow" of students through a STEM educational "pipeline." Indicators' reports provide a basis for charting the Commonwealth's progress as a whole in promoting STEM education at all levels.

The purpose of the Massachusetts Statewide STEM Indicators Project (MASSIP) is to collect, analyze, and present a set of measurements that reflect a range of educational and economic conditions that are indicative of the state of the Massachusetts STEM Pipeline. Data collected in support of MASSIP are to be publicly available, be free of charge, and meet four criteria:

A. Be Focused: Each indicator should speak directly to Massachusetts' educational and workforce status in STEM-related areas.

B. Be Meaningful: Data should be useful to a wide variety of audiences and purposes.

C. Be Accessible: Data should be available at no cost through currently existing secondary sources.

D. Be Perennial: Data should be consistently available on an annual (or other cyclical) basis.

Please note that MASSIP uses a broad definition of STEM that incorporates all of the following subject/ employment areas: (1) agriculture, agriculture operations and related sciences, (2) natural resources and conservation, (3) architecture and related services, (4) computer and information sciences and support services, (5) engineering, (6) engineering technologies and engineering-related fields, (7) biological and biomedical sciences, (8) mathematics and statistics, (9) military technologies and applied sciences, (10) physical sciences, (11) science technologies/technicians, (12) mechanic and repair technologies/technicians, (13) precision production, and (14) health professions and related programs.

In 2010, MASSIP evolved to focus on the five Quantitative STEM Goals central to the Commonwealth's Statewide STEM Plan. The intention of these Goals was threefold: (1) to help focus state initiatives as well as stakeholders in general; (2) to help inform policy at state, regional, and local/school levels; and (3) to help inform in-depth research. In selecting the indicators for the Plan, the following aims were taken into consideration:

I. Data associated with the Goals should, at a minimum, be able to be tracked at state and regional levels and, ideally, also at the local or district/school level.

II. Data should be able to be tracked for the total group (e.g., "all students" or "all employed persons") and, ideally, also for major subgroups, including by gender, race/ethnicity, and/or income.

III. Data for each Goal should track both progress of the whole group toward a statewide target, as well as gaps that may or may not exist between different subgroups.

IV. Data associated with the Goals should cover a minimum of five years in order to facilitate trend analysis.

V. The Goals should be a living system—to be updated if/when improved data are available.

The following report represents the latest iteration of data presentation related to MASSIP and the Statewide STEM Goals. Information about the data associated with each chart/indicator can be found at the end of this report (in the "Data Notes" section).

Massachusetts State STEM Goals

The Massachusetts State STEM Plan has five quantitative goals associated with it. These goals were originally developed as part of the Commonwealth's first Statewide STEM Plan 1.0 in 2010. They were then updated as part of the Statewide STEM Plan 2.0 in 2013. To see the full Statewide STEM Plan 2.0 please go to:

http://www.mass.edu/stem/home/stemplan.asp

Below are the current formulations of the five goals.

Goal 1: Increase student interest in STEM areas.

Benchmark: Increase interest in STEM college majors among college-going MA public school graduates from 35% in 2009 to 45% by 2016.

Priority Areas:
(1) Break through the interest gap: Increase interest among the underrepresented gender and underrepresented races/ethnicities in fields where data indicate interest gaps.
(2) Highlight STEM career opportunities: Increase interest in fields where STEM knowledge and skill are expected to expand across occupations/industries in the future.

Goal 2: Increase student achievement among all pre-K–12 students in order to prepare graduates to be civically and college and/or career ready.

Benchmark: Increase the percentage of all students who score proficient or advanced on the MCAS mathematics tests and science and technology/engineering tests by 20 points by 2016.

Priority Areas:
(1) Increase exposure:
- Increase the percentage of schools that require three years of science and four years of mathematics for graduation, in accordance with MassCORE, to 100%.
- Increase the percentage of elementary students who receive at least three hours of science per week from 32% in 2009 to 50% by 2016.
- Increase the percentage of students who report taking advanced mathematics (precalculus or higher) from X% to Y% as reported to the Department of Elementary and Secondary Education by schools.
- Increase the percentage of students who take at least one technology-, computing-, or engineering-based course between grades 7 and 12 from X% to Y%.

(2) Increase proficiency:
- Increase the percentage of all 5th and 8th grade students scoring proficient or advanced on MCAS mathematics tests and science and technology/engineering tests by 20 percentage points between 2009 and 2016.
- Increase the percentage of all students scoring proficient or advanced on high school MCAS mathematics tests and science and technology/engineering tests by 15 points between 2009 and 2016.
- Reduce the percentage of recent high school graduates who require remedial or developmental mathematics courses at community colleges from 57% to 45% by 2016.

- Reduce the percentage of recent high school graduates who require remedial or developmental mathematics courses at publically funded state universities from 18% to 10% by 2016.

(3) Reduce the achievement gap: Reduce the achievement gaps for race, special needs, ELL, SES, and gender in 5th grade, 8th grade, and high school students on the MCAS mathematics tests and science and technology/engineering tests by 25 percentage points between 2010 and 2016.

Goal 3: Increase the percentage of skilled educators who teach pre-K–16 STEM classes.

Benchmark: Increase the number/percentage of STEM classes led by skilled educators from pre-K–16 by 2016.

Priority Areas:

(1) Early Childhood Educators:
- Increase the number and percentage of certified or credentialed early education providers.
- Increase the percentage of early childhood providers who follow the Massachusetts Early Childhood Science, Technology, and Engineering Standards.
- Increase the number of hours early childhood educators report taking STEM-focused professional development.
- Increase the percentage of early educators who are trained on QRIS and implement the science, technology, and engineering standards after ratification.

(2) Elementary Educators:
- Increase pass rates of K–5 educators on the mathematics subtest of the elementary Massachusetts Tests for Educator Licensure (MTEL).
- Encourage K–5 educators to become certified in science.
- Increase number of STEM teacher practitioner programs, as measured by an increase in specific elementary mathematics and science methods courses.
- Increase the number of students enrolled in STEM teacher practitioner programs.
- Increase the number of hours pre-K–5 teachers report taking STEM.

(3) Secondary Educators:
- Increase the percentage of STEM secondary educators rated exemplary or proficient in the Massachusetts Educator Evaluation system.
- Increase the percentage of STEM secondary teachers with at least five years of experience who move from being rated proficient to exemplary.
- Increase student achievement growth rates. This factor is locally determined by the school district and is reported as part of the Educator Evaluation Tool.
- Increase MTEL pass rates for STEM subject tests.
- Increase the number of STEM educators with multiple STEM certifications and in the number of technology/engineering endorsements granted.
- Decrease the number and percent of waivers for teachers teaching STEM who do not have an appropriate STEM license.

(4) Post-Secondary Educators:
- Increase the percentage of faculty members who report that they participate in professional development on annual faculty reviews.
- Use professional development participation for tenure review decisions.
- Increase in retention rates of students in freshman STEM courses.
- Increase the number of pre-K–12 teachers who are deemed exemplary or proficient that come out of MA teacher practitioner programs.

(5) Out-of-School-Time (OST) Educators.
- Increase the number of professional development hours OST providers spend in STEM-based training.
- Increase the number of hours OST programs report providing STEM support.

Goal 4: Increase the percentage of students completing post-secondary degrees or certificates in STEM subjects.

Benchmark: Increase the percentage of students who complete STEM-related post-secondary degrees and certificates at public and private institutions by 50% from 2008 to 2016.

Priority Areas:

(1) Increase and support STEM post-secondary credential attainment:
- Increase the percentage of bachelor's degrees awarded in STEM fields from 23% in 2009 to be 50% of all degrees awarded in 2016. Increase the percentage of associate's degrees and "less-than-bachelor's" certificates in STEM fields by 50% by 2015.
- Inform students of local or regional vocational and technical education programs to increase access and awareness of STEM career opportunities.

(2) Bridge the credential attainment gap:
- Increase the percentage of bachelor's and associate's degrees in STEM majors granted from 4% to 10% for African Americans and from 4% to 10% for Latinos of all STEM degrees conferred.
- Increase the percentage of computer science and engineering bachelor's degrees earned by women from 17% to 25% in computer science and from 23% to 35% in engineering.
- Increase the percentage of health science degrees earned by men from 15% to 25%.

Goal 5: STEM degrees and certificate attainment will be aligned with corresponding opportunity in STEM-related fields to match the state's workforce needs for a STEM talent pipeline.

Benchmark: No less than 50% of degrees (associate's, bachelor's, and doctorate) and certificates earned will provide transferrable knowledge, skills, and work habits for entry into STEM-enabled occupations, ensuring the supply of talent will meet demands of the Massachusetts economy.

Priority Areas:

(1) Robust STEM post-secondary preparation for STEM careers:
- Double the number of degrees in computer and information science earned from 4% of degrees to 8%.
- Increase certificates and degrees earned in biology and healthcare to 18% of degrees by 2016.
- Increase Asian, Latino and African American college STEM student participation in internship, co-op, practicum, or clinical experiences to equal the average for all New England students (61%).
- Increase proportion of Massachusetts students who score on par with their national peers on the Deep Learning Scale in all STEM fields, as measured by the National Survey of Student Engagement.

(2) Build a diverse innovation workforce:

- Diversify the workforce in STEM occupations to mirror the diversity of the Massachusetts workforce. Increase African-American and Latino employment in STEM jobs from 12% to 15% of STEM employment.
- Increase women employed in engineering, computer science, and information technology careers from 13% and 27% of employment to 40%.
- Increase the number of workforce retraining programs focused on STEM.

Executive Summary

The Massachusetts State STEM Data Dashboard began tracking information in 2010 as part of *Massachusetts STEM Plan 1.0: Building the Pipeline of STEM Professionals to Fuel Massachusetts' Innovation Economy*. The object of the dashboard was to track and analyze indicators relevant to the state's STEM Plan, allowing policymakers and other stakeholders to assess progress toward State STEM goals. These goals were most recently revised in 2014 with the announcement of the *Massachusetts STEM Plan 2.0: Expanding the Pipeline for All*. The goals are as follows:

Goal 1: Increase student interest in STEM areas.

Goal 2: Increase student achievement among all pre-K–12 students in order to prepare graduates to be civically and college and/or career ready.

Goal 3: Increase the percentage of skilled educators who teach pre-K–16 STEM classes.

Goal 4: Increase the percentage of students completing post-secondary degrees or certificates in STEM subjects.

Goal 5: STEM degrees and certificate attainment will be aligned with corresponding opportunity in STEM-related fields to match the state's workforce needs for a STEM talent pipeline.

The current dashboard consists of five primary indicators (one for each goal—organized together within their own chapter) and 29 sub-indicators (in separate chapters for each goal area). Where possible, data are broken out by gender, race/ethnicity, and income. With the exception of Goal 3: Skilled Educators (for which data are more limited), each indicator consists of two pages: Page one has a summary table of the indicator and commentary on the state's progress, and page two shows trend data for everyone as well as available subgroups.

Massachusetts has made progress with regard to increasing STEM interest (Goal 1) and increasing STEM student achievement (Goal 2). Most groups have had positive increases over the past five years (2010–2014) with interest among all students increasing from 38% to 41% (the 2016 target is 45%) and the percentage of all students scoring proficient or advanced on the grade 10 MCAS Mathematics exam rising from 75% to 79% (the 2016 target is 85%). However, while we have seen increases, most of the indicators underlying these goals are not displaying sufficient progress for the state to meet its targets for 2016 with regard to all populations. Certain populations, such as Asian and not-low-income students, have met or surpassed goals in various areas while other populations, such as low-income, Black, and Latino students, remain significantly behind.

Race/ethnicity and income are important factors related to performance on Goals 1 and 2 in general, but in different ways for each goal. With regard to interest (Goal 1), minority race/ethnicity and low-income status are positive factors with Asian, Black, and Latino students all expressing higher levels of interest in STEM college majors than White students, and low-income students expressing higher levels of interest than non-low-income students. With the exception of Asian students, this is the opposite of the trend seen with regard to achievement (Goal 2). While Asian students have higher levels of achievement than other racial/ethnic subgroups, the relationships for other groups are reversed; that is, with regard to achievement, low-income, Black, and Latino students all perform at lower levels than White or not-low-income students. This leads to a major concern that the state may be stimulating STEM interest within particular populations, but is not yet adequately preparing those students to achieve in those areas. Further, among some other student subgroups, achievement is high but interest is comparatively low.

Gender becomes an important factor when examining specific sub-indicators for Goals 1 and 2. For example, large gender gaps exist with regard to interest in health professions (dominated by female students) and engineering (dominated by male students). Gender is also an increasingly strong factor with regard to achievement, but not in the traditional sense. We are beginning to see the emergence of a "reverse gender gap" associated with math performance where female students are now generally scoring higher on the MCAS math tests than male students. If this gap continues to grow, we may see the same kind of matrix of STEM interest versus achievement that we see with regard to race/ethnicity and income emerge with regard to gender; that is, males will be interested but not prepared, while females will be prepared but not interested (with the exception of biology- and health-related fields).

Massachusetts uses two different data sources for Goal 3, which focuses on the supply of skilled educators. The first is rates of highly qualified teachers at different types of schools while the second is results from the Massachusetts Tests for Educator Licensure (MTEL) exams. The primary indicator for Goal 3 features the findings of some new data analysis undertaken in 2015: a correlation of schools' percentage of highly qualified teachers with their percentage of minority students or percentage of low-income students. These data show that, in most cases, the higher the percentage of minority or low-income students at a school is, the lower that school's percentage of highly qualified teachers. This finding suggests a possible contributing factor to the lower achievement levels of low-income students, as presented in the discussion of Goal 2. The sub-indicators for Goal 3 reflect the MTEL STEM exam passing numbers and rates. In general, the number of individuals taking the MTEL STEM subject tests has declined over time while the passing rate has varied, sometimes strongly, from year to year. This variation is possibly due to modification of test content, changes in teacher preparation curricula, or some variation in the population taking the exams (especially where the number of test takers is small).

Massachusetts has also made some progress with regard to Goals 4 (post-secondary certificate/degrees) and 5 (workforce alignment). Progress toward Goal 4: Post-Secondary Certificates and Degrees is measured by the percentage of all certificates and degrees that were earned in STEM fields, both overall and by various student subgroups. These percentages show some positive change over time (increasing from 30% in 2009 to 32% in 2013), with spikes (either upward or downward) within some subgroups. These spikes are the result of effects of two competing trends: (1) a sharp decrease in the percentage of STEM certificates/degrees below the bachelor's level (hence below-bachelor's level) beginning in 2012, and (2) a steady increase in the percentage of STEM bachelor's degrees over the entire period.

Looking more closely at subgroups, different populations are represented to varying extents at each level, with Black and Latino students overrepresented at the below-bachelor's level, and White and Asian students overrepresented at the bachelor's level. Consequently, the spikes seen for STEM certificates and degrees overall are more reflective of below-bachelor's degree trends for Black and Latino students and bachelor's degree trends for White and Asian students. The sharp decrease in below-bachelor's certificates and degrees beginning in 2012, while a pattern among all populations, is much greater for Black and Latino subgroups than for White and Asian subgroups. Changes of this magnitude (a decrease of nine percentage points over two years among Black and Latino students) are usually indicative of some kind of widespread change (e.g., policy—such as access to financial aid) or a major localized change (e.g., the ending of a program). Accordingly, the causes behind this trend bear further study.

The gender patterns in certificate and degree completion mirror those of high school interest (Goal 1) with female students strongly represented in biology and health professions while male students are strongly represented in computer science, engineering, and math. At the most general level, race/ethnicity patterns also mirror high school interest trends with minority students completing a higher percentage of certificates/degrees in STEM than White students. When examining specific certificate/degree levels (e.g., below-bachelor's certificate/ degrees versus bachelor's versus above-bachelor's), distinct differences are evident. Specifically, Black and Latino

students have a higher proportion of their certificate/degree completions in STEM fields than White students at the below-bachelor's level, but lower ones at the bachelor's and above-bachelor's levels.

In 2014, when the state adopted STEM Plan 2.0, a goal was added concerning the alignment of certificates/ degrees with workforce needs (Goal 5: Workforce Alignment). For the purposes of evaluating the alignment between STEM education in higher education and workforce demands, this analysis starts with a list of occupations that require a high level of proficiency in a STEM discipline or a moderate level of proficiency across several STEM disciplines then looks at the production of graduates in fields that prepare students for those occupations. As a result, it includes some academic programs outside of STEM departments. Data suggest that Massachusetts has made progress (and increase of three percentage points) with regard to the alignment of post-secondary certificates and degrees with STEM careers, but still remains a long way from reaching the 2016 target for workforce - alignment. Currently 39% of certificates/degrees are aligned with STEM careers—the 2016 target is for 50% of all certificates/degrees to be aligned.

Just as with interest and education indicators, there are some strong gender and racial/ethnic differences within the broader trends. For example, while Asian students have surpassed the 50% target for certificates/degrees aligned with STEM careers, no other subgroup is close to meeting that goal (the next closest are male students in general at 44%). These alignment data show the same gender gaps seen in interest and certificate/degree completion: females have surpassed the target for certificate/degree alignment in biology and health careers (with males significantly lower) while males have surpassed the target for certificate/degree alignment in engineering, math, and physical sciences (with females significantly lower). It is important to note that there is one sub-indicator for which no group is on track to meet the state goal: alignment of certificates/degrees with computer science and information technology careers. While gender and racial/ethnic gaps exist in these areas, even relatively "high performers" such as male or Asian students will not reach the 2016 target of 8%.

The information included in the 2015 Massachusetts STEM Data Dashboard presents a promising but mixed picture of progress toward statewide goals, with increases in many areas but also abundant challenges. The state has improved overall in relation to a number of indicators, but faces persistent disparities with regard to gender, race/ethnicity, and income. The state needs to be conscious that, in its pursuit of increasing interest, preparation, and certificate/degree completion, it does not leave certain groups behind. Present trends show Black, Latino, and low-income students as possessing the greatest interest in STEM but below average achievement. On the other hand, White and not-low-income students demonstrate less interest in STEM but above average achievement.

This mismatch between interest and readiness to pursue STEM subjects and careers suggests that different populations require different, targeted interventions and investments. To effect sustainable change at the later stages of the pipeline (e.g., college certificate/degree completion or employment), the state may need to adjust its approach to catalyzing and supporting change at the K-12 level. STEM majors or jobs are not something one can easily switch into late in the pipeline: students need to fulfill certain knowledge or skill requirements first. While efforts at the post-secondary level can have a beneficial impact on the pipeline, the greatest returns will be derived by simultaneous interventions/investments at earlier points in a student's development.

Primary Indicators

Indicator 1: Percentage of Students Whose First Choice of Major was STEM	13
Indicator 2: Percentage of Students Scoring Proficient or Advanced on the Grade 10 MCAS Mathematics	15
Indicator 3: Percentage of Highly Qualified Teachers	17
Indicator 4: Percentage of Certificates and Degrees Granted in STEM Fields	19
Indicator 5: Workforce Development – Degrees Aligned with STEM Careers	21

Indicator 1 – Statewide
SAT Test-Takers: Percentage whose First Choice of College Major was STEM
(Public School Students Only)

2016 Goal = 45%

SAT Test-Takers: Percentage whose First Choice of College Major was STEM

Group	Trend Direction	5 Year Change	2014 Percentage	2014 Difference from All
All		+3 percentage points	41%	--
Female		+3	39%	-2 percentage points
Male		+3	44%	+3
Fee Waiver*		+4	45%	+4
No Fee Waiver*		+4	40%	-1
Asian		+3	57%	+16
Black		+4	45%	+4
Latino		+3	43%	+2
White		+3	39%	-2

*Note: Only four years of data

 = Met Goal and Increasing  = Met Goal but Decreasing  = Met Goal but No Change

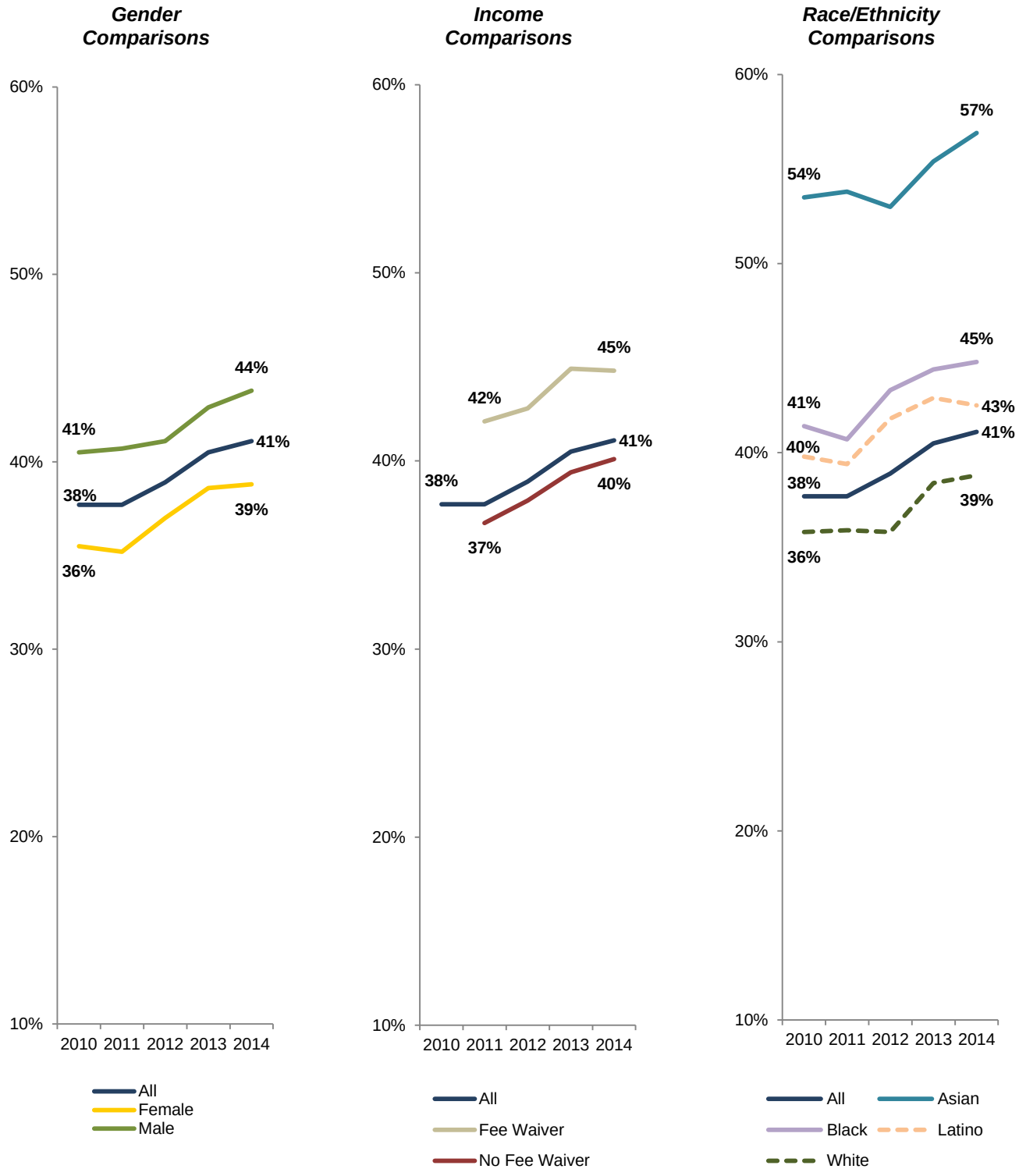
 = Increasing & Will Meet Goal  = Increasing but Will Not Meet Goal  = Decreasing  = No Change

Interest in STEM college majors has slowly increased among MA public school SAT takers over the past five years. However, differences according to gender or race/ethnicity are still persistent: males are more interested in STEM majors than females, and Asian students are more interested than other racial/ethnic groups. While interest is increasing, it is unlikely the state will meet its 2016 goal. In looking at the distribution of interest by subgroups, it is noteworthy that the spread of interest by race/ethnicity is much wider than the spread of interest by gender or by income. It is also noteworthy that the trend lines for different subgroups are not necessarily parallel, especially among racial/ethnic groups. It is possible that this could be because of variations in specialized programming dedicated to specific groups.

SAT Test-Takers: Percentage whose First Choice of College Major was STEM

(Public School Students Only)

2016 Goal = 45%



Indicator 2 – Statewide
Grade 10 MCAS Mathematics: Percentage Scoring Proficient or Advanced
(Public School Students Only)

2016 Goal = 85%

Grade 10 MCAS Mathematics: Percentage Scoring Proficient or Advanced

Group	Trend Direction	5 Year Change	2014 Percentage	2014 Difference from All
All	↑	+4 percentage points	79%	--
Female	↑	+4	80%	+1 percentage point
Male	↑	+2	77%	-2
Low-Income	↑	+4	61%	-18
Not-Low-Income	★	+4	88%	+9
Asian	★	+3	90%	+11
Black	↑	+7	60%	-19
Latino	↑	+7	56%	-23
White	★	+4	85%	+6

★ = Met Goal and Increasing ★ = Met Goal but Decreasing ★ = Met Goal but No Change

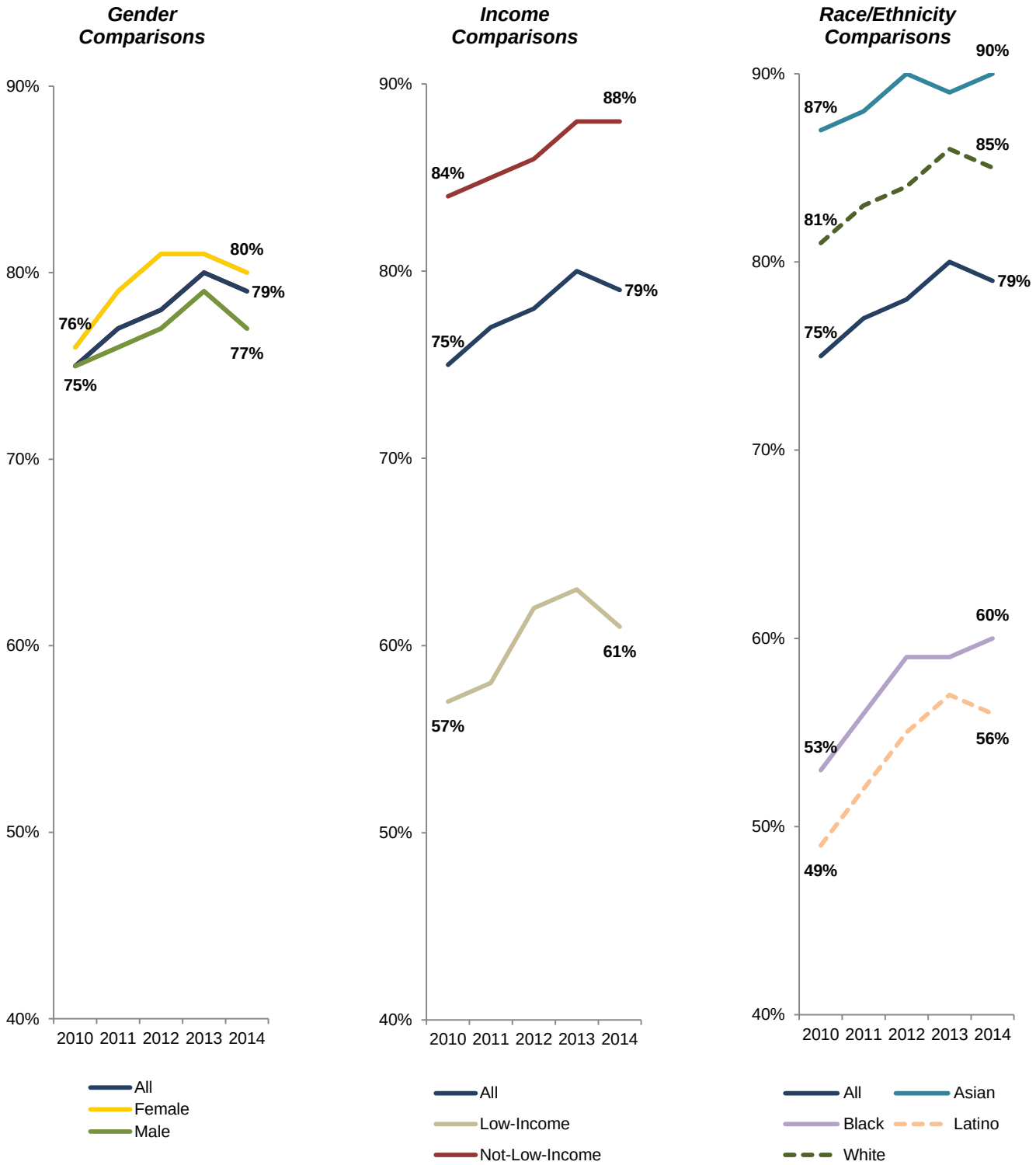
↑ = Increasing & Will Meet Goal ↑ = Increasing but Will Not Meet Goal ↓ = Decreasing ↔ = No Change

The five year trends for all students for the grade 10 MCAS Mathematics test, as well as for all gender, race/ethnicity, and income subgroups, have shown a small increase in the percentage scoring proficient or advanced. This has ranged from two percentage points for male test-takers to seven percentage points for Black and Latino test-takers. The increases for Black and Latino test-takers were greater than those of Asian or White test-takers, indicating a decrease in the gap among racial/ethnic subgroups. However, the gender gap between males and females has grown slightly, with females' scores increasing more than males' scores. The target for the grade 10 MCAS Mathematics test is for 85% of all students to score proficient or advanced by 2016. The state is not currently on track to achieve this goal.

Grade 10 MCAS Mathematics: Percentage Scoring Proficient or Advanced Statewide

(Public School Students Only)

2016 Goal = 85%



Indicator 3 – Statewide
Percentage of Highly Qualified Teachers
(Public Schools Only)

2016 Goal = Increase the number/percentage of STEM classes led by skilled educators from pre-K–16 by 2016

Table A: 2013 Percentage of Highly Qualified Teachers by Subject, School Level, and Percentage of Low-income Students in a School

Subject	School Level	Percentage of Low-income Students in a School	Percentage of Highly Qualified Teachers
Mathematics	Elementary School	0 – 24%	97.8%
		25 – 49%	97.0%
		50 – 74%	93.8%
		75 – 100%	84.0%
	Middle School	0 – 24%	98.2%
		25 – 49%	92.6%
		50 – 74%	96.3%
		75 – 100%	93.8%
	Secondary School	0 – 24%	99.4%
		25 – 49%	97.6%
		50 – 74%	96.3%
		75 – 100%	90.6%
Science	Elementary School	0 – 24%	99.4%
		25 – 49%	100.0%
		50 – 74%	100.0%
		75 – 100%	99.2%
	Middle School	0 – 24%	98.4%
		25 – 49%	95.7%
		50 – 74%	96.1%
		75 – 100%	88.2%
	Secondary School	0 – 24%	98.9%
		25 – 49%	96.7%
		50 – 74%	96.9%
		75 – 100%	87.0%

Table B: 2013 Percentage of Highly Qualified Teachers by Subject, School Level, and Percentage of Minority Students in a School			
Subject	**School Level**	**Percentage of Minority Students in a School**	**Percentage of Highly Qualified Teachers**
Mathematics	Elementary School	0 – 24%	99.3%
		25 – 49%	92.7%
		50 – 74%	95.5%
		75 – 100%	80.3%
	Middle School	0 – 24%	98.2%
		25 – 49%	92.6%
		50 – 74%	93.5%
		75 – 100%	93.0%
	Secondary School	0 – 24%	98.3%
		25 – 49%	97.8%
		50 – 74%	97.7%
		75 – 100%	90.1%
Science	Elementary School	0 – 24%	99.5%
		25 – 49%	100.0%
		50 – 74%	100.0%
		75 – 100%	97.9%
	Middle School	0 – 24%	99.1%
		25 – 49%	93.4%
		50 – 74%	94.2%
		75 – 100%	86.8%
	Secondary School	0 – 24%	98.3%
		25 – 49%	97.5%
		50 – 74%	97.1%
		75 – 100%	85.2%

2013 represents a baseline year for the development of this new measure. Year-to-year comparison data will be provided in the future.

These tables show that the percentage of highly qualified teachers in a school generally varies according to the percentage of low-income or minority students in a school. The exception is elementary school science. The greatest amount of difference was the percentage of highly qualified teachers in elementary school mathematics for schools with a low percentage of minority students versus schools with a high percentage of minority students: a 19 percentage point difference.

Indicator 4 – Statewide
Percentage of Certificates and Degrees Granted in STEM Fields
(Both Public and Private Schools)

2016 Goal = 45%

Percentage of Certificates and Degrees Granted in STEM Fields

Group	Trend Direction	5 Year Change	2013 Percentage	2013 Difference from All
All	↑	+2 percentage points	32%	--
Female	↑	+3	31%	-1 percentage point
Male	↑	+2	34%	+2
Asian	★	+5	45%	+13
Black	↑	+5	33%	+1
Latino	↔	0	31%	-1
White	↑	+3	31%	-1

★ = Met Goal and Increasing ★ = Met Goal but Decreasing ★ = Met Goal but No Change

↑ = Increasing & Will Meet Goal ↑ = Increasing but Will Not Meet Goal ↓ = Decreasing ↔ = No Change

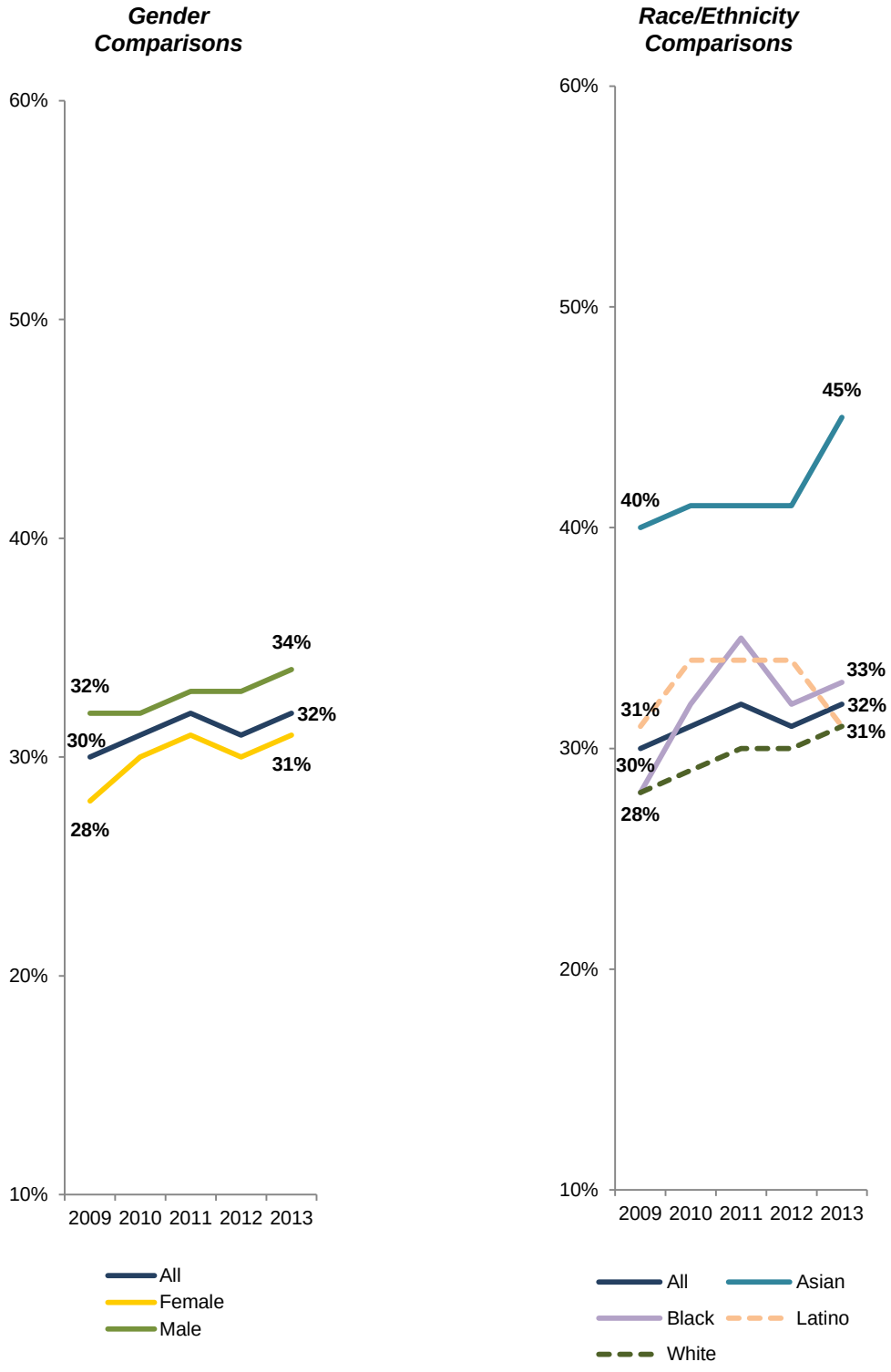
With the exception of Latino students, all student groups showed a small increase in the percentage who earned certificates or degrees in STEM (across all certificate/degree types and all STEM majors) between 2009 and 2013. Latino students had no change in their percentage over the five year timespan. The greatest amount of change was among Asian students who showed an increase of five percentage points.

While males still obtain a higher percentage of their certificates and degrees in STEM fields than females, that gap has closed slightly over the past five years (from four percentage points to three). The gap between the group earning the lowest percentage of STEM certificates/degrees (White students) and highest group (Asian students) also declined from 18 percentage points to 14.

Percentage of Post-Secondary Certificates and Degrees Granted in STEM Fields

(Both Public and Private Schools)

2016 Goal = 45%



Indicator 5 – Statewide
Post-Secondary Certificates and Degrees Aligned with STEM Careers
(Both Public and Private Schools)

2016 Goal = 50%

Please note that the data and commentary for Indicator 5 were provided by the MA Department of Higher Education.

Post-Secondary Certificates and Degrees Aligned with STEM Careers

Group	Trend Direction	5 Year Change	2013 Percentage	2013 Difference from All
All	↑	+3 percentage points	39%	--
Female	↑	+3	35%	-4 percentage point
Male	↑	+3	44%	+5
Asian	★	+5	55%	+16
Black	↑	+4	32%	-7
Latino	↔	2	31%	-8
White	↑	+3	37%	-2

★ = Met Goal and Increasing ★ = Met Goal but Decreasing ★ = Met Goal but No Change

↑ = Increasing & Will Meet Goal ↑ = Increasing but Will Not Meet Goal ↓ = Decreasing ↔ = No Change

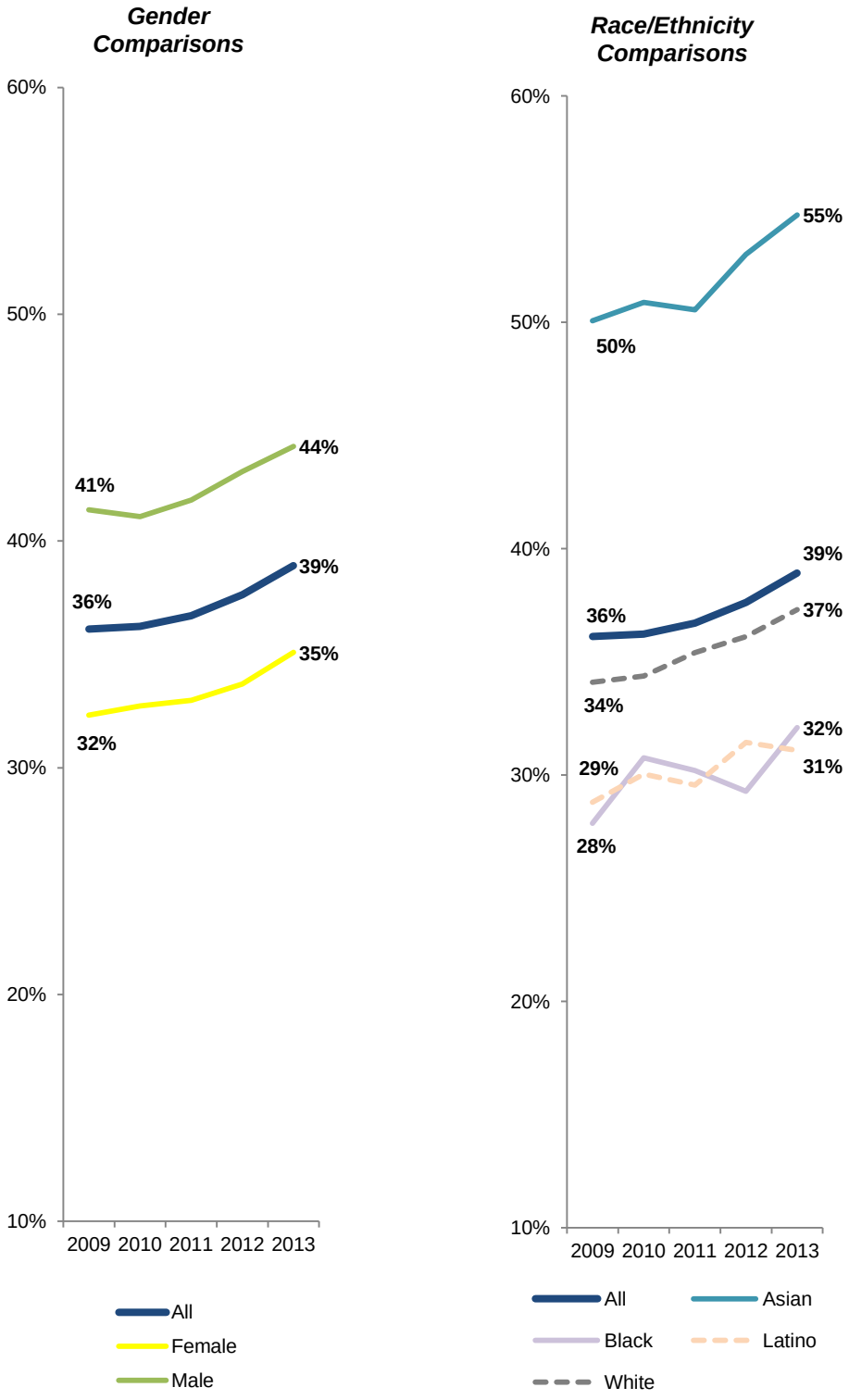
For the purposes of evaluating the alignment between STEM education in higher education and workforce demands, this analysis starts with a list of occupations that require a high level of proficiency in a STEM discipline or a moderate level of proficiency across several STEM disciplines and then looks at the production of graduates in fields that prepare students for those occupations. As a result, this includes some academic programs outside of STEM departments.

About half of jobs requiring a college degree require a high level of proficiency in a STEM field. Degrees that prepare students for STEM occupations are up from 36% to 39% in the past three years. It will take 13 years to meet the 50% goal at this rate of change. The consequences of not aligning higher education with job opportunities include elevated rates of underemployment for non-STEM majors and higher wage premiums for STEM graduates (who make 28% more than their non-STEM peers the year after earning a Bachelor's degree). Higher education STEM output is still a limiting factor for Massachusetts' Innovation Economy.

Post-Secondary Degrees Aligned with STEM Careers

(Both Public and Private Schools)

2016 Goal = 50%



Sub-Indicators 1: Student STEM Interest

Indicator 1A: Percentage of Students whose First Choice of Major was Architecture & Engineering	25
Indicator 1B: Percentage of Students whose First Choice of Major was Computer Science & Mathematics	27
Indicator 1C: Percentage of Students whose First Choice of Major was Health Professions	29
Indicator 1D: Percentage of Students whose First Choice of Major was Life & Physical Sciences	31

Indicator 1A – Statewide
SAT Test-Takers: Percentage whose First Choice of College Major was Architecture & Engineering
(Public School Students Only)

SAT Test-Takers: Percentage whose First Choice of College Major was Architecture & Engineering

Group	Trend Direction	5 Year Change	2014 Percentage	2014 Difference from All
All	⇧	+1 percentage point	11%	--
Female	⇧	+1	4%	-7 percentage points
Male	⇧	+2	20%	+9
Fee Waiver*	⇔	+0	11%	+0
No Fee Waiver*	⇧	+1	11%	+0
Asian	⇧	+2	15%	+4
Black	⇧	+2	11%	+0
Latino	⇔	+0	12%	+1
White	⇔	+0	10%	-1

*Note: Only four years of data

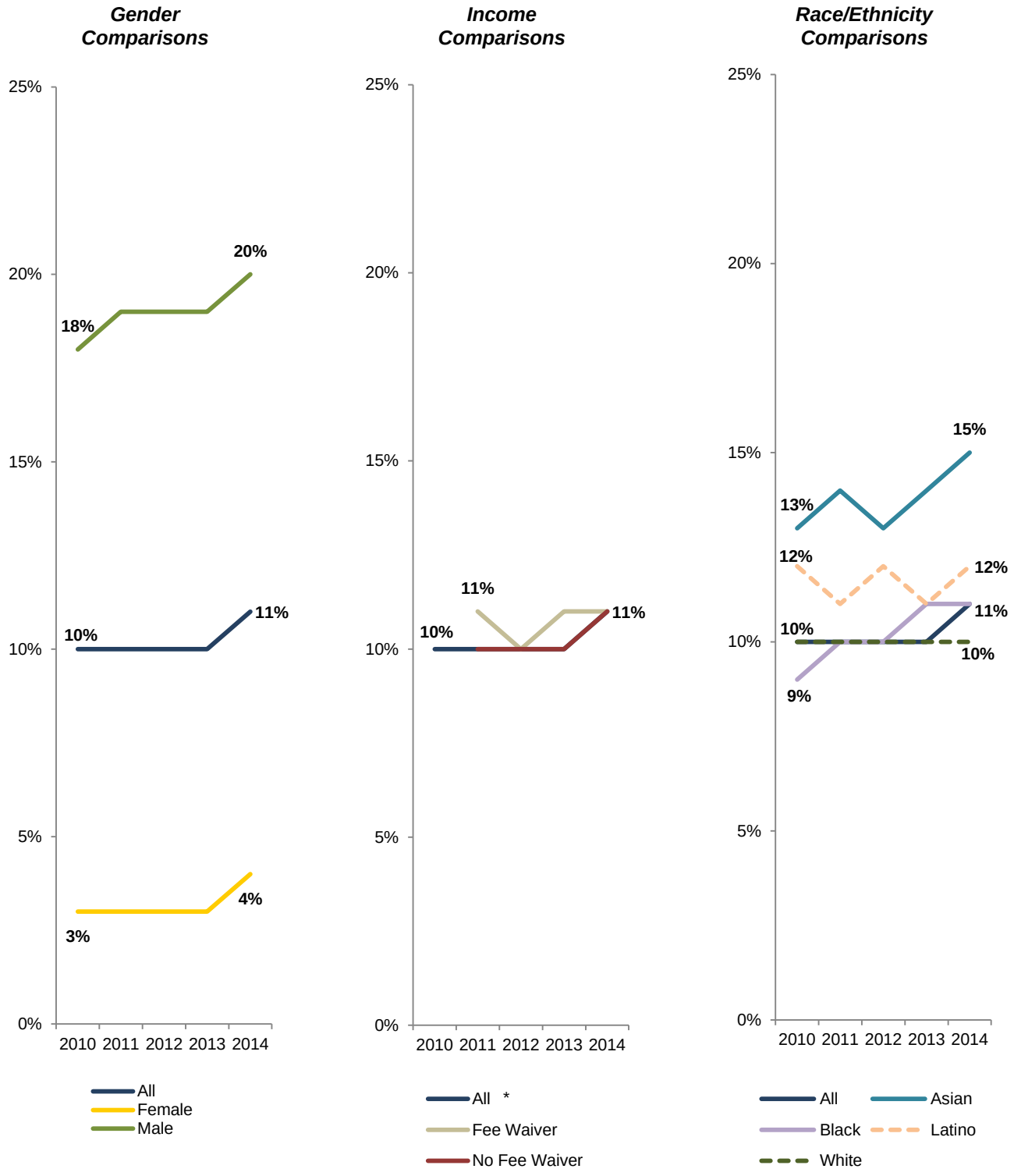
⇧ = Increasing ⇩ = Decreasing ⇔ = No Change

Interest in architecture and engineering majors among MA public school SAT takers has shown little to no change over the past five years. Interest patterns in architecture and engineering are dominated by a distinct gender gap, with a 16 percentage point difference between the level of interest of females versus males. There are moderate differences between Asian students and other racial/ethnic groups (three to five percentage points), but no difference in 2014 between students who received a fee waiver for the SAT versus students who did not receive a fee waiver.

Majors included in this group are (1) architecture and related services, (2) engineering, and (3) engineering technologies and engineering-related fields.

SAT Test-Takers: Percentage whose First Choice of College Major was Architecture & Engineering

(Public School Students Only)



** Note: The lines for All and No Fee Waiver are identical.*

Indicator 1B – Statewide
SAT Test-Takers: Percentage whose First Choice of College Major was Computer Science & Mathematics
(Public School Students Only)

SAT Test-Takers: Percentage whose First Choice of College Major was Computer Science & Mathematics

Group	Trend Direction	5 Year Change	2014 Percentage	2014 Difference from All
All	⇧	+1 percentage point	4%	--
Female	⇔	+0	1%	-3 percentage points
Male	⇧	+1	7%	+3
Fee Waiver*	⇧	+1	4%	+0
No Fee Waiver*	⇧	+1	4%	+0
Asian	⇧	+3	8%	+4
Black	⇔	+0	3%	-1
Latino	⇔	+0	3%	-1
White	⇧	+1	4%	+0

*Note: Only four years of data

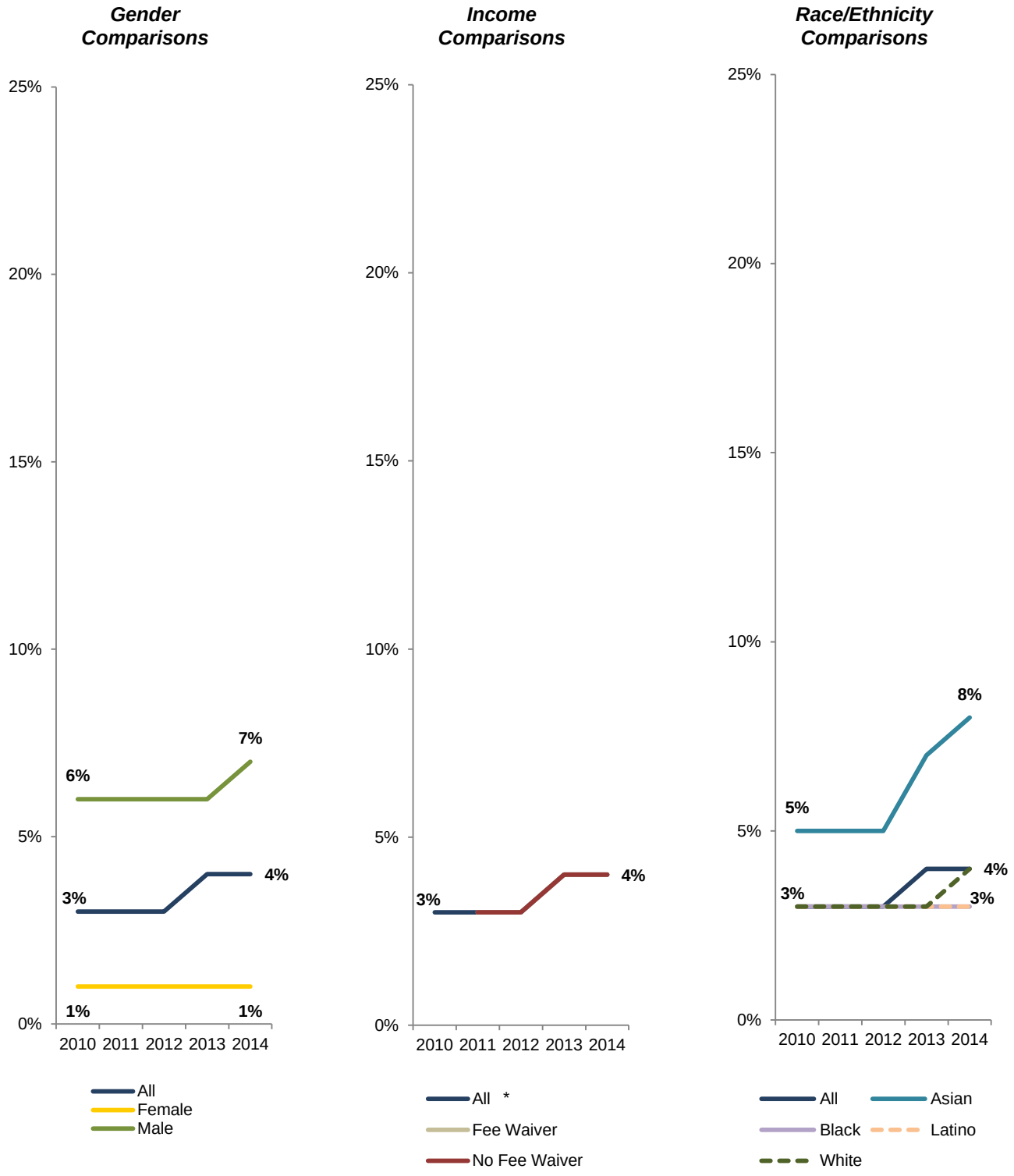
⇧ = Increasing ⇩ = Decreasing ⇔ = No Change

Interest in computer science and mathematics majors among MA public school SAT takers has shown little to no change over the past five years. Interest patterns in computer science and mathematics are dominated by a distinct gender gap, with a six percentage point difference between the level of interest of females versus males. There are moderate differences between Asian students and other racial/ethnic groups (four to five percentage points), but no difference in 2014 between students who received a fee waiver for the SAT versus students who did not receive a fee waiver.

Majors in this group are (1) computer and information sciences and support services, and (2) mathematics and statistics.

SAT Test-Takers: Percentage whose First Choice of College Major was Computer Science & Mathematics

(Public School Students Only)



** Note: The lines for All, Fee Waiver and No Fee Waiver are identical.*

Indicator 1C – Statewide
SAT Test-Takers: Percentage whose First Choice of College Major was Health Professions
(Public School Students Only)

SAT Test-Takers: Percentage whose First Choice of College Major was Health Professions

Group	Trend Direction	5 Year Change	2014 Percentage	2014 Difference from All
All	⇧	+1 percentage point	16%	--
Female	⇧	+1	23%	+7 percentage points
Male	⇔	+0	7%	-9
Fee Waiver*	⇔	+0	21%	+5
No Fee Waiver*	⇧	+1	15%	-1
Asian	⇩	-5	18%	+2
Black	⇧	+1	22%	+6
Latino	⇩	-1	18%	+2
White	⇧	+1	15%	-1

*Note: Only four years of data

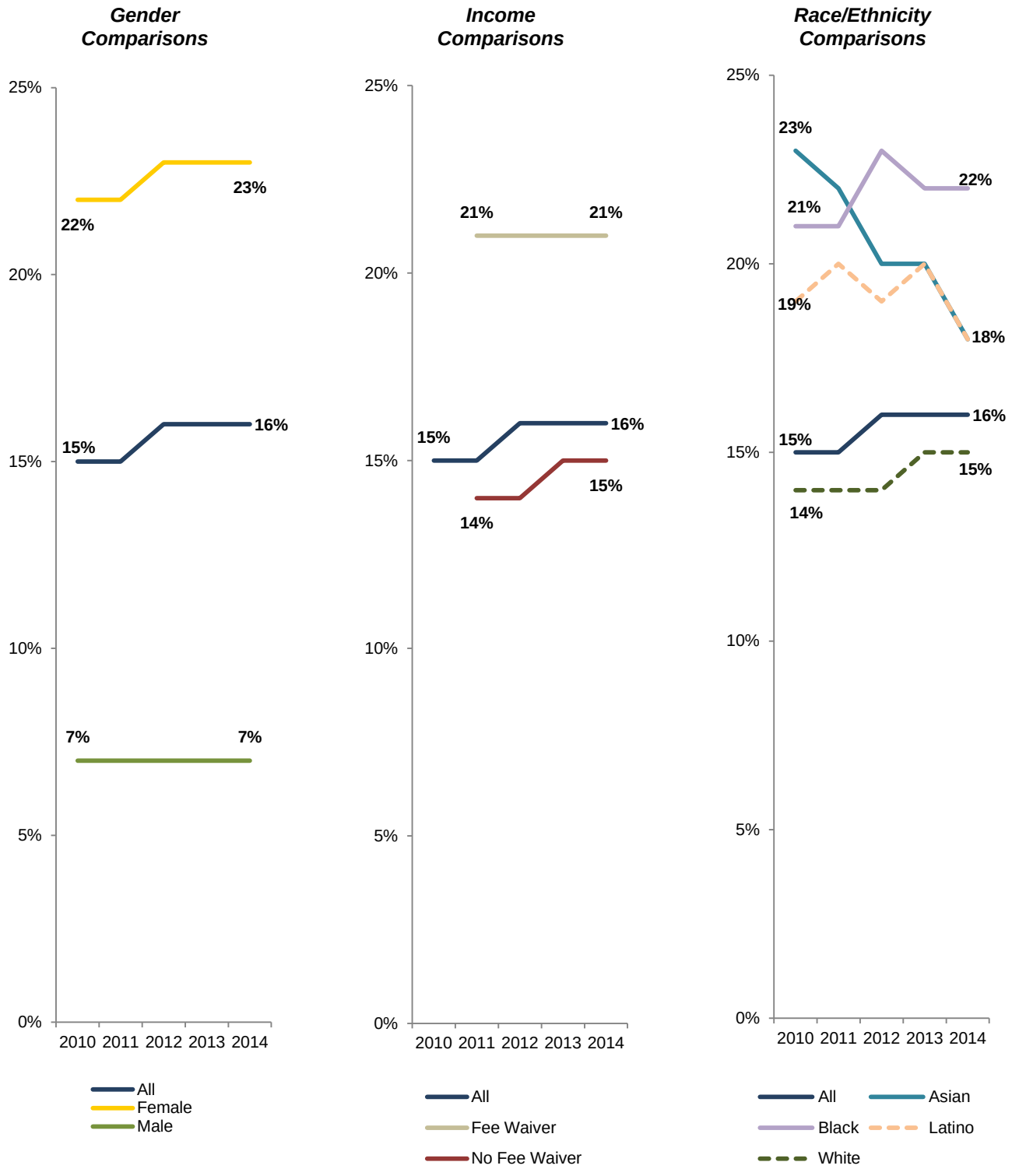
⇧ = Increasing ⇩ = Decreasing ⇔ = No Change

Interest in health professions majors among MA public school SAT takers has shown little to no change over the past five years, with the exception of interest among Asian test-takers. Interest patterns in health professions are dominated by a gender gap, but also show differences among the other two demographic areas: females are 16 percentage points higher than males, test-takers who receive a fee waiver are 6 percentage points higher than those who do not, and Black test-takers are four to 7 percentage points higher than other racial/ethnic groups.

Majors in this group are health professions and related programs.

SAT Test-Takers: Percentage whose First Choice of College Major was Health Professions

(Public School Students Only)



Indicator 1D – Statewide
SAT Test-Takers: Percentage whose First Choice of College Major was Life & Physical Sciences
(Public School Students Only)

SAT Test-Takers: Percentage whose First Choice of College Major was Life & Physical Sciences

Group	Trend Direction	5 Year Change	2014 Percentage	2014 Difference from All
All	⇧	+1 percentage point	10%	--
Female	⇧	+2	11%	+1 percentage point
Male	⇧	+1	9%	-1
Fee Waiver*	⇧	+1	8%	-2
No Fee Waiver*	⇧	+1	10%	+0
Asian	⇧	+4	16%	+6
Black	⇧	+1	8%	-2
Latino	⇧	+3	8%	-2
White	⇧	+1	10%	+0

*Note: Only four years of data

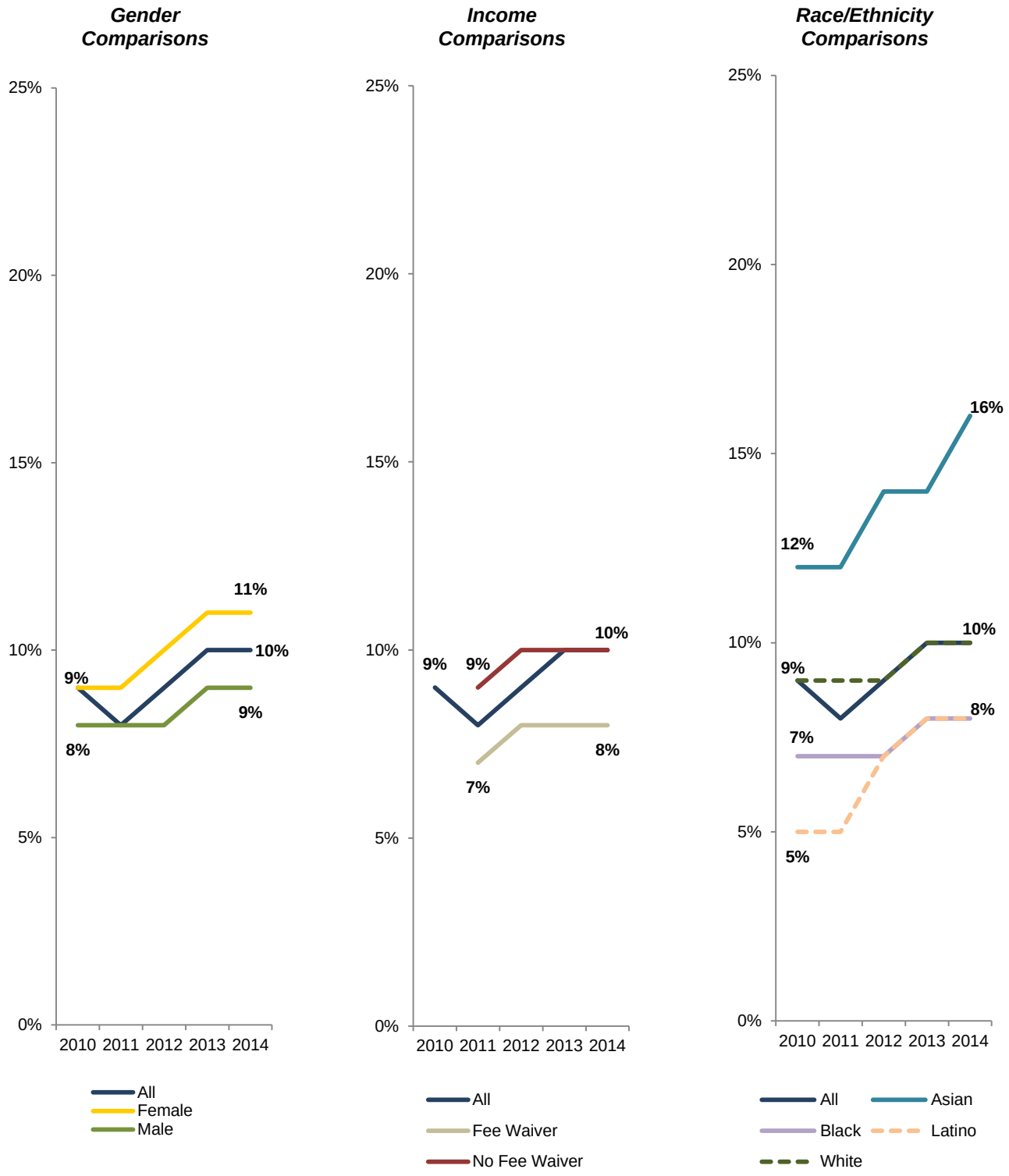
⇧ = Increasing ⇩ = Decreasing ⇔ = No Change

Interest in life and physical sciences majors among MA public school SAT takers has shown little change over the past five years, with the exception of interest among Asian test-takers. Interest patterns in life and physical sciences show little difference by gender or fee waiver status. Asian test-takers, however, had a rate of interest that was six to eight percentage points higher than other racial/ethnic groups.

Majors in this group are (1) agriculture, agriculture operations and related sciences, (2) natural resources and conservation, (3) biological and biomedical sciences, (4) physical sciences, and (5) science technologies/technicians.

SAT Test-Takers: Percentage whose First Choice of College Major was Life & Physical Sciences

(Public School Students Only)



Sub-Indicartors 2: Student K–12 STEM Achievement

Indicator 2A: Grade 10 MCAS Science & Technology/Engineering: Percentage Scoring Proficient or Advanced	35
Indicator 2B: Grade 8 MCAS Mathematics: Percentage Scoring Proficient or Advanced	37
Indicator 2C: Grade 8 MCAS Science & Technology/Engineering: Percentage Scoring Proficient or Advanced	39
Indicator 2D: Grade 5 MCAS Mathematics: Percentage Scoring Proficient or Advanced	41
Indicator 2E: Grade 5 MCAS Science & Technology/Engineering: Percentage Scoring Proficient or Advanced	43
Indicator 2F: Percentage of SAT takers who Reported Completing Four or More Years of Math and Three or More Years of Science	45

Indicator 2A – Statewide
Grade 10 MCAS Science & Technology/Engineering: Percentage Scoring Proficient or Advanced
(Public School Students Only)

2016 Goal = 72%

Grade 10 MCAS Science & Technology/Engineering: Percentage Scoring Proficient or Advanced

Group	Trend Direction	5 Year Change	2014 Percentage	2014 Difference from All
All	↑	+6 percentage points	71%	--
Female	★	+8	72%	+1 percentage point
Male	↑	+5	70%	-1
Low-Income	↑	+9	49%	-22
Not-Low-Income	★	+8	83%	+12
Asian	★	+9	81%	+10
Black	↑	+10	47%	-24
Latino	↑	+9	42%	-29
White	★	+6	79%	+8

★ = Met Goal and Increasing ★ = Met Goal but Decreasing ★ = Met Goal but No Change

↑ = Increasing & Will Meet Goal ↑ = Increasing but Will Not Meet Goal ↓ = Decreasing ↔ = No Change

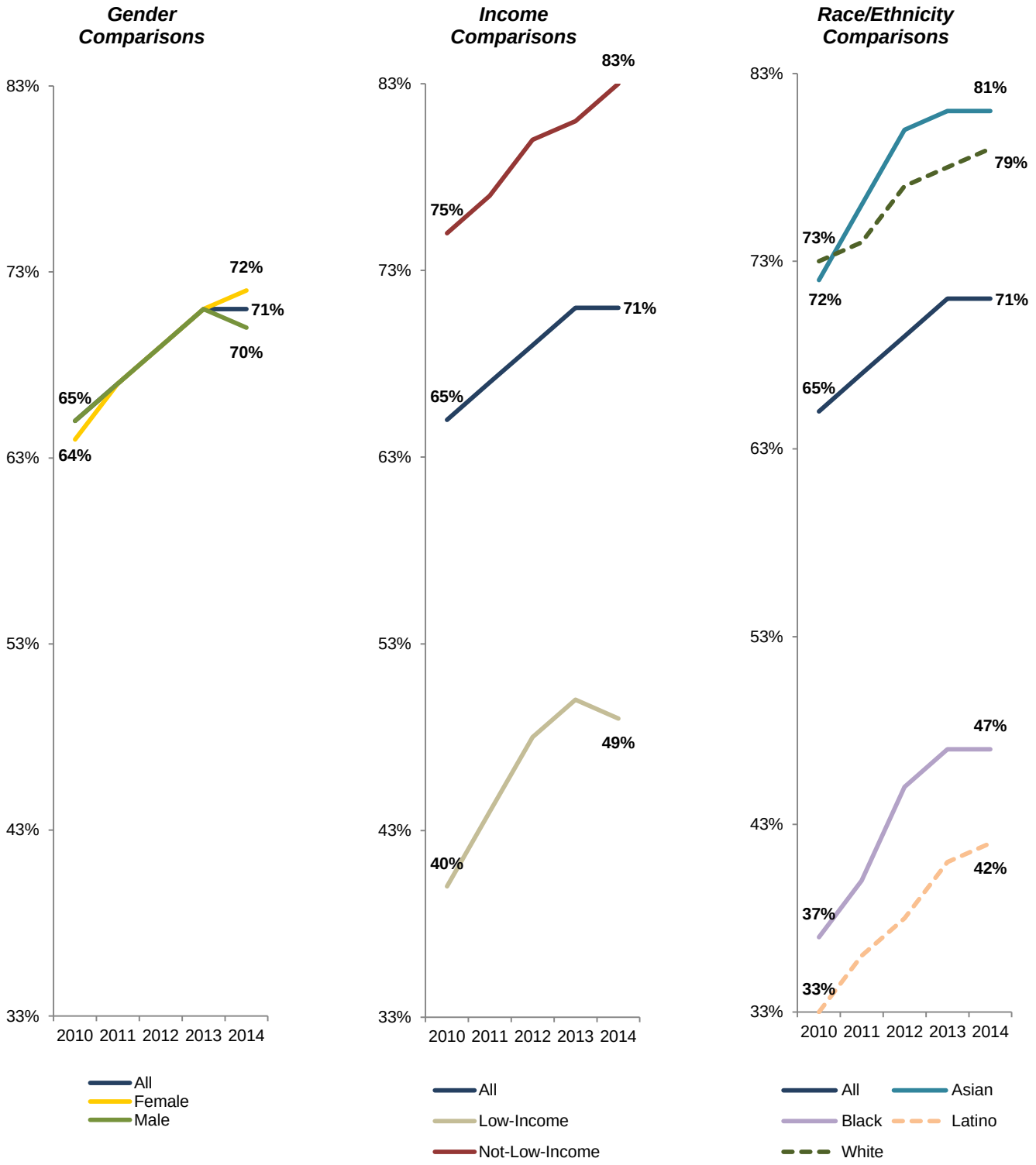
The five year trends for all students for the grade 10 MCAS science and technology/engineering tests, as well as for all gender, race/ethnicity, and income subgroups, have shown increases in the percentage scoring proficient or advanced. This has ranged from five percentage points (65% to 70%) for male test-takers to ten percentage points (37% to 47%) for Black test-takers. The increases for Black, Latino, and Asian test-takers were greater than those of White test-takers, indicating a decrease in the gap among racial/ethnic subgroups. However, a slight gender gap between males and females has appeared, with females' scores increasing more than males' scores.

The target for the grade 10 science and technology/engineering MCAS tests is for 72% of all students to score proficient or advanced by 2016. The state is currently on track to achieve that when all students are considered. But while some subgroups (Asian, White, and not-low-income students) have surpassed this goal, others (Black, Latino, and low-income students) remain significantly below the target.

Grade 10 Science & Technology/Engineering MCAS: Percentage Scoring Proficient or Advanced

(Public School Students Only)

2016 Goal = 72%



Indicator 2B – Statewide
Grade 8 Mathematics MCAS: Percentage Scoring Proficient or Advanced
(Public School Students Only)

2016 Goal = 70%

Grade 8 Mathematics MCAS: Percentage Scoring Proficient or Advanced

Group	Trend Direction	5 Year Change	2014 Percentage	2014 Difference from All
All	↑	+1 percentage point	52%	--
Female	↑	+1	53%	+1 percentage point
Male	↓	-1	50%	-2
Low-Income	↑	+2	32%	-20
Not-Low-Income	↑	+2	64%	+12
Asian	★	+1	75%	+23
Black	↑	+2	30%	-22
Latino	↑	+4	29%	-23
White	↔	+0	58%	+6

★ = Met Goal and Increasing ★ = Met Goal but Decreasing ★ = Met Goal but No Change

↑ = Increasing & Will Meet Goal ↑ = Increasing but Will Not Meet Goal ↓ = Decreasing ↔ = No Change

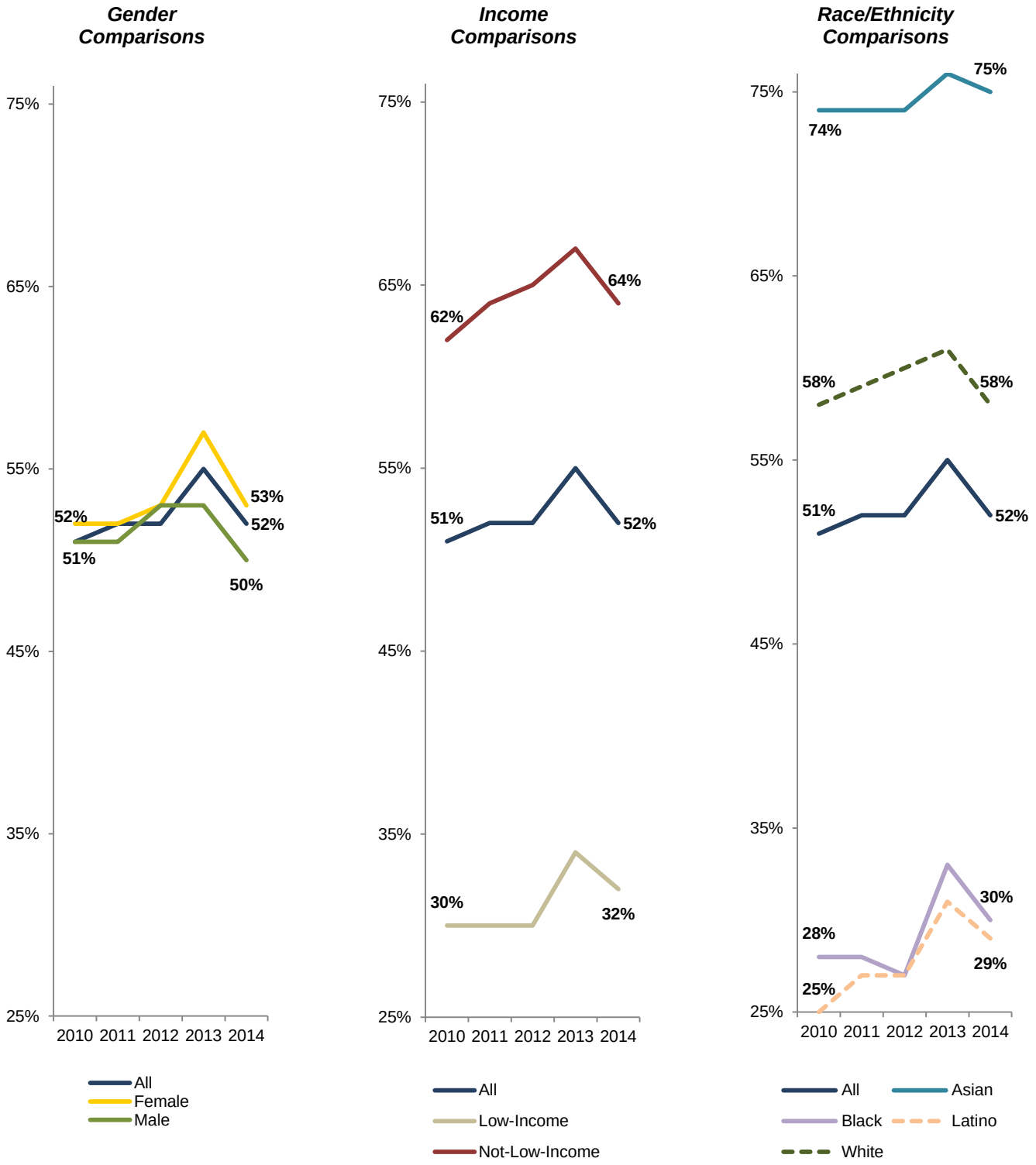
The five year trends for most students for the grade 8 MCAS Mathematics test have shown a small increase in the percentage scoring proficient or advanced. The two exceptions are for males, whose scores decreased by one percentage point, and White students, whose scores remained unchanged. Increases ranged from one percentage point (52% to 53%) for female test-takers to four percentage points (25% to 29%) for Latino test-takers. The increases for Black and Latino test-takers were greater than those of Asian or White test-takers, indicating a small decrease in the gap among racial/ethnic subgroups. However, the gender gap between males and females has grown slightly with females' scores increasing more than males' scores.

The target for the grade 8 MCAS Mathematics test is for 70% of all students to score proficient or advanced by 2016, but the state is currently not on track to achieve that. While one subgroup (Asian students) has surpassed this goal, others (Black, Latino, and low-income students) remain significantly below the target.

Grade 8 MCAS Mathematics: Percentage Scoring Proficient or Advanced

(Public School Students Only)

2016 Goal = 70%



Indicator 2C – Statewide
Grade 8 MCAS Science/Technology/Engineering: Percentage Scoring Proficient or Advanced
(Public School Students Only)

2016 Goal = 59%

Grade 8 MCAS Science/Technology/Engineering: Percentage Scoring Proficient or Advanced

Group	Trend Direction	5 Year Change	2014 Percentage	2014 Difference from All
All	↑	+2 percentage points	42%	--
Female	↑	+4	41%	+1 percentage point
Male	↔	+0	42%	+0
Low-Income	↑	+3	21%	-21
Not-Low-Income	↑	+4	54%	+12
Asian	↑	+3	57%	+15
Black	↑	+4	17%	-25
Latino	↑	+5	18%	-24
White	↑	+2	49%	+7

★ = Met Goal and Increasing ★ = Met Goal but Decreasing ★ = Met Goal but No Change

↑ = Increasing & Will Meet Goal ↑ = Increasing but Will Not Meet Goal ↓ = Decreasing ↔ = No Change

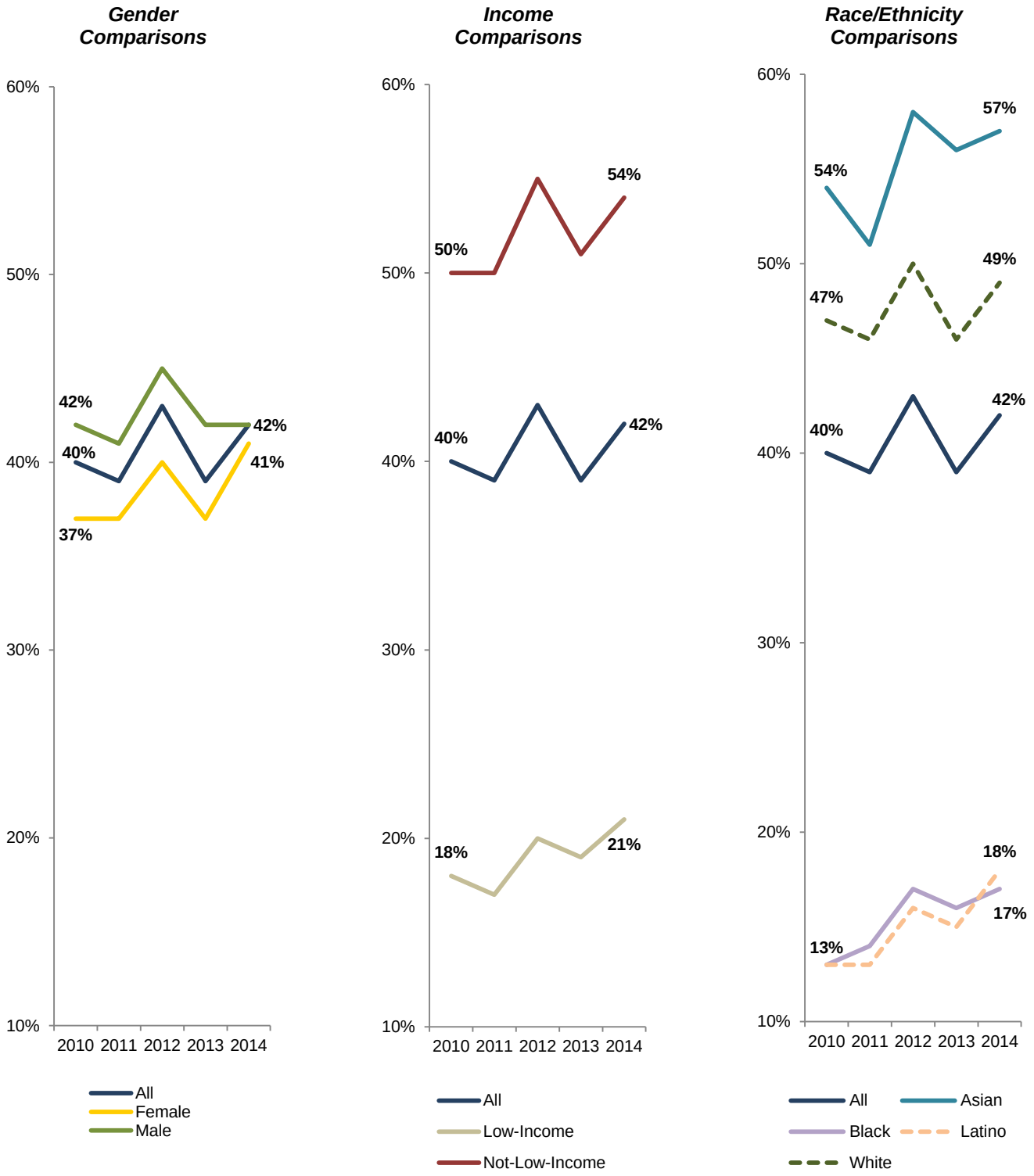
The five year trends for most students for the grade 8 MCAS science and technology/engineering tests have shown slight increases in the percentage scoring proficient or advanced. This has ranged from two percentage points (47% to 49%) for White test-takers to five percentage points (13% to 18%) for Latino test-takers. The increases for Black, Latino and Asian test-takers were greater than those of White test-takers, indicating a decrease in the gap among racial/ethnic subgroups. A slight gender gap between males and females also exists, although females' scores increased more than males' scores during the time period.

The target for the grade 8 MCAS science and technology/engineering tests is for 59% of all students to score proficient or advanced by 2016. The state is currently not on track to achieve that.

Grade 8 MCAS Science/Technology/Engineering: Percentage Scoring Proficient or Advanced

(Public School Students Only)

2016 Goal = 59%



Indicator 2D – Statewide
Grade 5 MCAS Mathematics: Percentage Scoring Proficient or Advanced
(Public School Students Only)

2016 Goal = 74%

Grade 5 MCAS Mathematics: Percentage Scoring Proficient or Advanced

Group	Trend Direction	5 Year Change	2014 Percentage	2014 Difference from All
All	↑	+6 percentage points	61%	--
Female	↑	+7	61%	+0 percentage points
Male	↑	+5	60%	-1
Low-Income	↑	+8	41%	-20
Not-Low-Income	★	+8	74%	+13
Asian	★	+5	79%	+18
Black	↑	+5	36%	-25
Latino	↑	+7	37%	-24
White	↑	+6	68%	+7

★ = Met Goal and Increasing ★ = Met Goal but Decreasing ★ = Met Goal but No Change

↑ = Increasing & Will Meet Goal ↑ = Increasing but Will Not Meet Goal ↓ = Decreasing ↔ = No Change

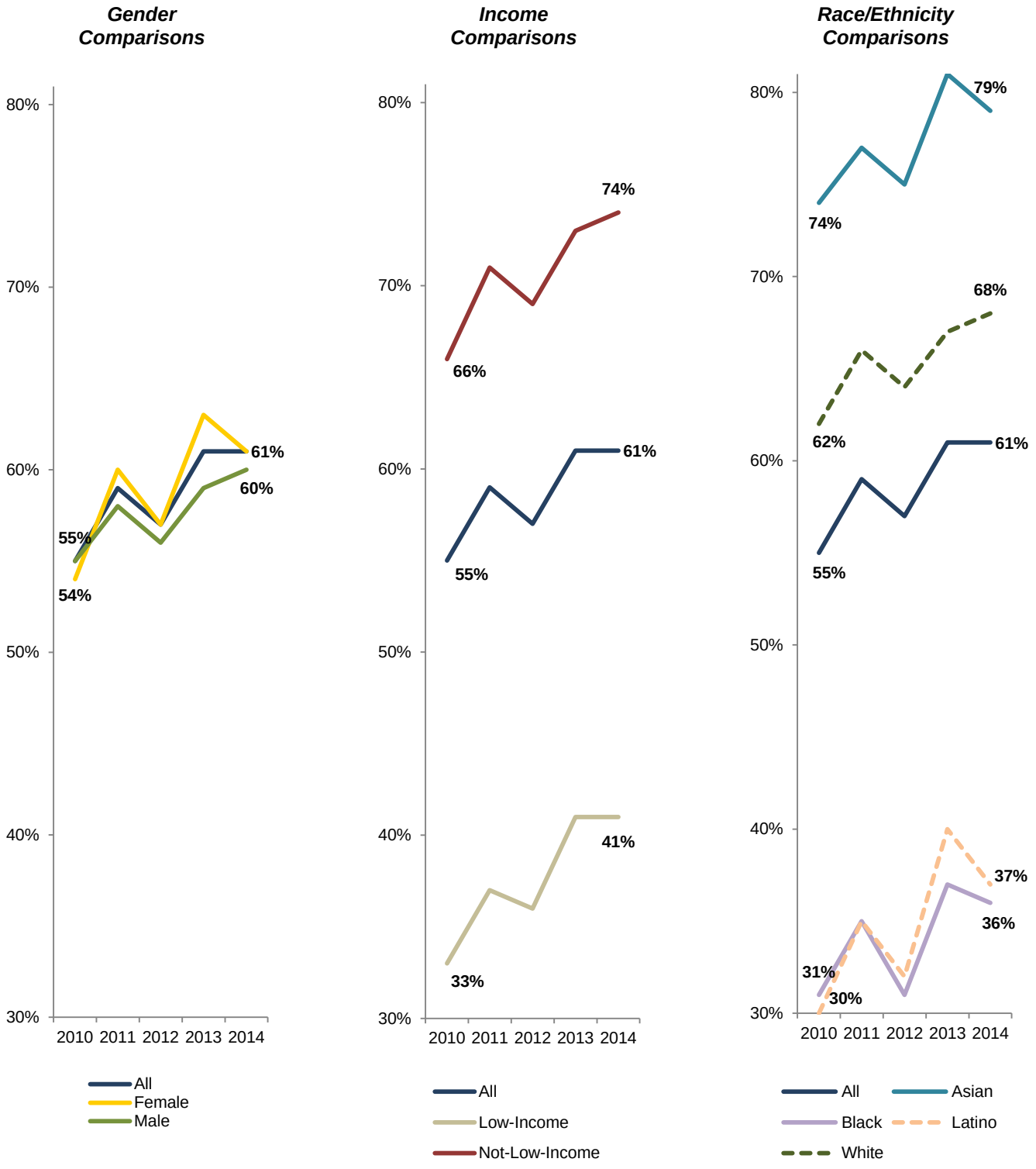
The five year trends for all students for the grade 5 MCAS Mathematics test, as well as for all gender, race/ethnicity, and income subgroups, have shown an increase in the percentage scoring proficient or advanced. This has ranged from five percentage points for male, Asian, and Black test-takers to eight percentage points for low-income and not-low-income test-takers. Asian and White students scored significantly higher than Black and Latino students. A slight gender gap has emerged, with females' scores increasing more than males'.

The target for the grade 5 MCAS Mathematics test is for 74% of all students to score proficient or advanced by 2016, but the state is currently not on track to achieve that. While some subgroups (Asian and not-low-income students) have met or surpassed this goal, others (Black, Latino, and low-income students) remain significantly below the target.

Grade 5 MCAS Mathematics: Percentage Scoring Proficient or Advanced

(Public School Students Only)

2016 Goal = 74%



Indicator 2E – Statewide
Grade 5 MCAS Science & Technology/Engineering: Percentage Scoring Proficient or Advanced
(Public School Students Only)

2016 Goal = 69%

Grade 5 MCAS Science & Technology/Engineering: Percentage Scoring Proficient or Advanced

Group	Trend Direction	5 Year Change	2014 Percentage	2014 Difference from All
All	⇔	+0 percentage points	53%	--
Female	↑	+1	53%	+0 percentage points
Male	↓	-1	53%	+0
Low-Income	↑	+5	30%	-23
Not-Low-Income	↑	+1	66%	+13
Asian	↑	+10	51%	+2
Black	↓	-3	34%	-19
Latino	↑	+5	27%	-26
White	⇔	+0	61%	+8

★ = Met Goal and Increasing ★ = Met Goal but Decreasing ★ = Met Goal but No Change

↑ = Increasing & Will Meet Goal ↑ = Increasing but Will Not Meet Goal ↓ = Decreasing ⇔ = No Change

The five year trends for all students for the grade 5 MCAS science and technology/engineering tests have shown little change. There have been some small changes among subgroups. For example, scores for females increased by one percentage point while scores for males decreased by two percentage points. Scores for Asian, Black, and Latino students all increased by three percentage points. The increases for Asian, Black, and Latino test-takers were greater than those of White test-takers, indicating a decrease in the gap among racial/ethnic subgroups.

The target for the grade 5 MCAS science/technology/engineering tests is for 69% of all students to score proficient or advanced by 2016. The state is currently not on track to achieve that. Some groups (not-low-income and Asian students) will come close to meeting the goal, but others (low-income, Black, and Latino students) remain significantly behind.

Grade 5 MCAS Science/Technology/Engineering: Percentage Scoring Proficient or Advanced

(Public School Students Only)

2016 Goal = 69%

Indicator 2F – Statewide
Percentage of SAT Takers who Reported Completing Four or More Years of Mathematics and Three or More Years of Science
(Public School Students Only)

Percentage of SAT Takers who Reported Completing Four or More Years of Mathematics and Three or More Years of Science

Group	Trend Direction	5 Year Change	2014 Percentage	2014 Difference from All
All	⇧	+1 percentage point	81%	--
Female	⇧	+2	81%	+0 percentage points
Male	⇧	+1	81%	+0
Fee Waiver*	⇧	+5	72%	-9
No Fee Waiver*	⇧	+3	84%	+3
Asian	⇧	+2	83%	+2
Black	⇧	+2	70%	-11
Latino	⇧	+1	72%	-9
White	⇧	+1	83%	+2

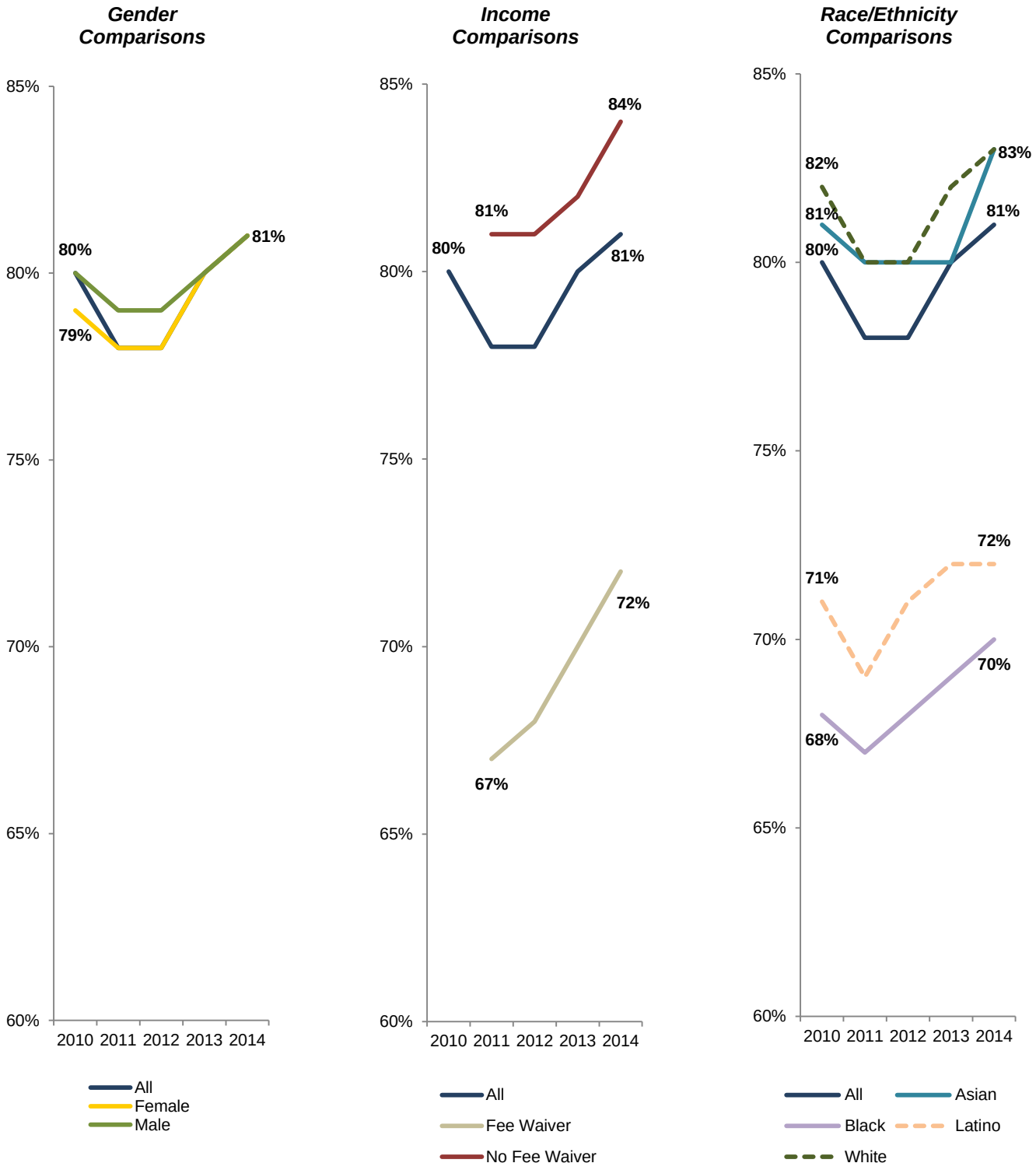
*Note: Only four years of data

⇧ = Increasing ⇩ = Decreasing ⇔ = No Change

The five year trend for all SAT-takers who reported taking four or more years of math and three or more years of science is one of little change. In 2014, there was no gender gap for this measure. However, there were significant gaps based on fee waiver status and race/ethnicity. Test-takers who did not receive a fee waiver had a rate of completing four or more years of math and three or more years of science that was 12 percentage points higher than that for test-takers who did receive a fee waiver. Asian and White test-takers had rates that were 13 percentage points higher than Black test-takers and 11 percentage points higher than Latino test-takers.

Percentage of SAT Takers who Reported Completing Four or More Years of Mathematics and Three or More Years of Science

(Public School Students Only)



Sub-Indicators 3: Effective Educators

Indicator 3A: Percentage and Number of First-time Test-takers Passing STEM MTEL Exams	49

Indicator 3A – Statewide
Percentage and Number of First-time Test-takers Passing STEM MTEL Exams

Percentage of First-time Test-takers Passing STEM MTEL Exams

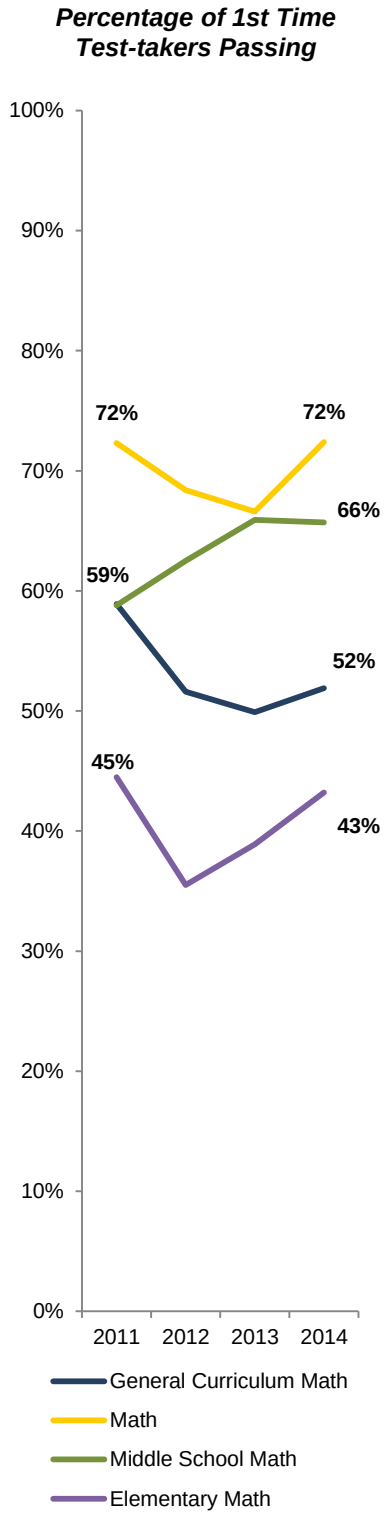
Group	Trend Direction	2011 Percentage	2014 Percentage	5 Year Change
General Curriculum Mathematics	⇩	59%	52%	-7 percentage points
Mathematics	⇔	72%	72%	+0
Middle School Mathematics	⇧	59%	66%	+7
Elementary Mathematics	⇩	45%	43%	-2
General Science	⇧	83%	84%	+1
Biology	⇩	73%	72%	-1
Chemistry	⇔	57%	57%	+0
Physics	⇧	68%	75%	+7
Middle School Mathematics /Science	⇧	37%	42%	+5
Earth Science	⇧	40%	59%	+19
Technology/ Engineering	⇧	66%	74%	+8

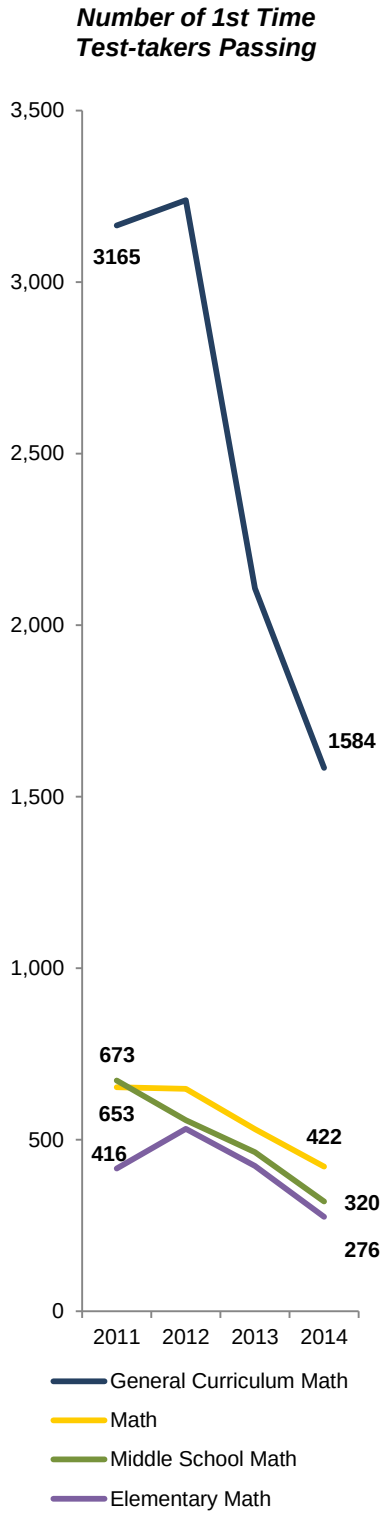
⇧ = Increasing ⇩ = Decreasing ⇔ = No Change

In general, the number of test-takers passing the Massachusetts Tests for Educator Licensure declined over the past four years. This was due, however, to a declining number of test-takers rather than declining passing rates. The percentage of first-time test-takers who have passed the MTEL shows a mixed trend, varying according to the specific subject test. For some tests the passing rate increased over time, some remained the same, and others declined.

Percentage and Number of First-time Test-takers Passing STEM MTEL Exams

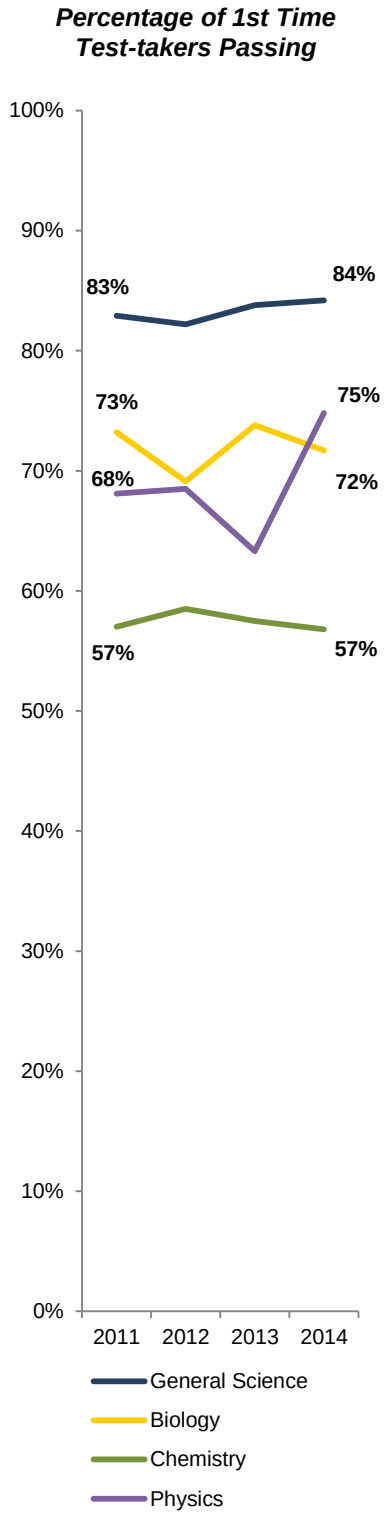
General Curriculum Mathematics, Mathematics, Middle School Mathematics, & Elementary Mathematics

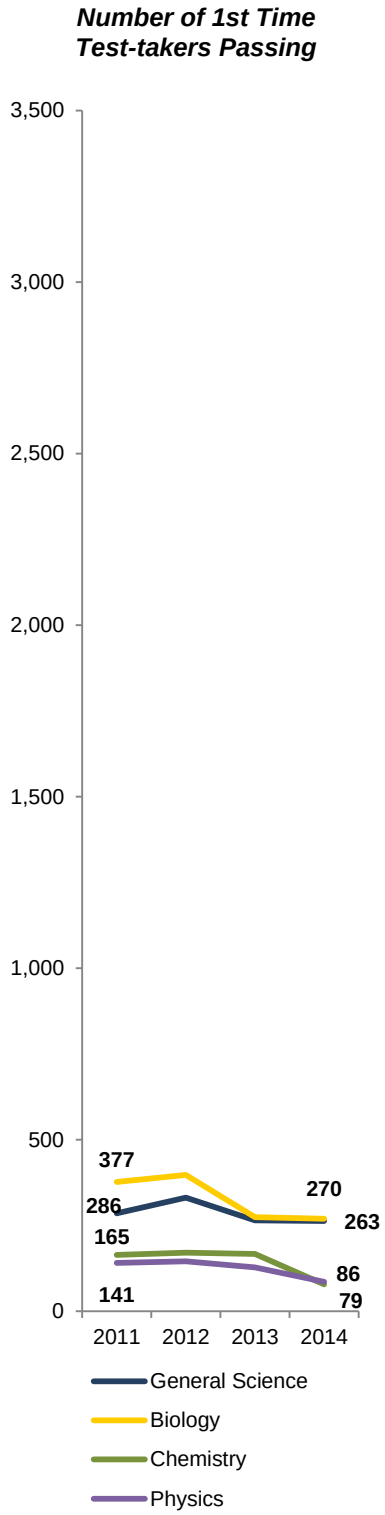




Percentage and Number of First-time Test-takers Passing STEM MTEL Exams

General Science, Biology, Chemistry, & Physics

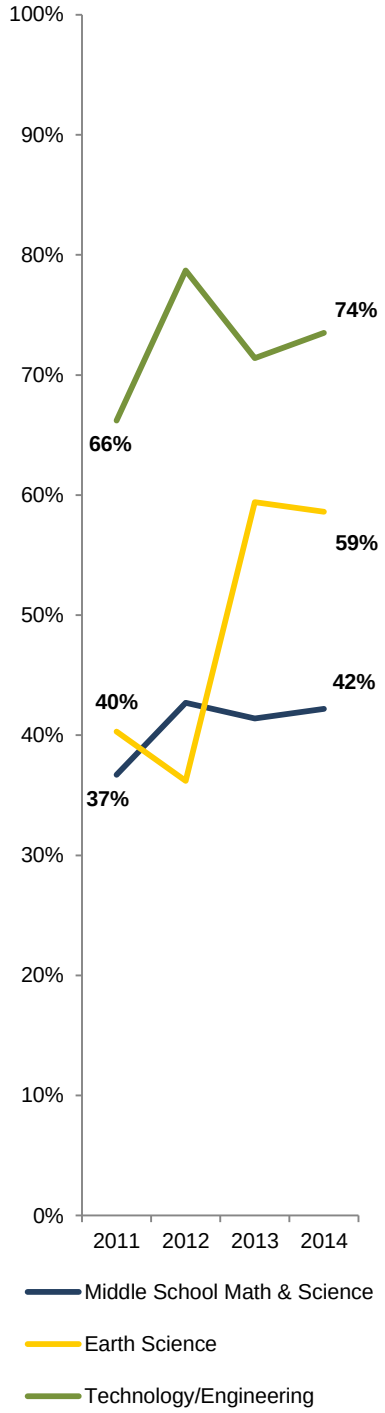




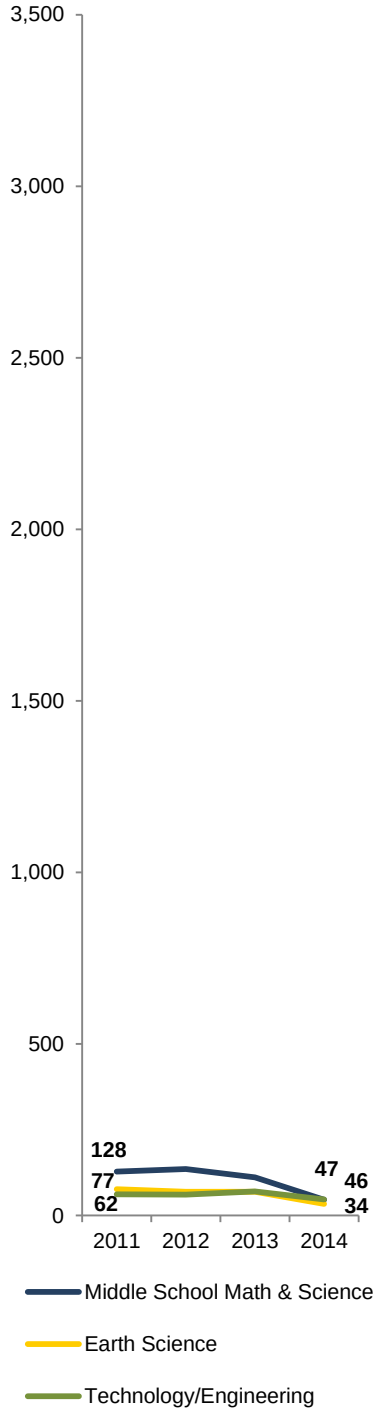
Percentage and Number of First-time Test-takers Passing STEM MTEL Exams

Middle School Mathematics/Science, Earth Science, & Technology/Engineering

Percentage of 1st Time Test-takers Passing



Number of 1st Time Test-takers Passing



Sub-Indicators 4: STEM College Certificates & Degrees

Indicator 4A:	Percentage of Below-Bachelor's Certificates and Degrees Granted in STEM Fields	55
Indicator 4B:	Percentage of Bachelor's Degrees Granted in STEM Fields	57
Indicator 4C:	Percentage of Above-Bachelor's Certificates and Degrees Granted in STEM Fields	59
Indicator 4D:	Percentage of Below-Bachelor's Certificates and Degrees Granted in Architecture and Engineering Fields	61
Indicator 4E:	Percentage of Below-Bachelor's Certificates and Degrees Granted in Computer Science and Mathematics Fields	63
Indicator 4F:	Percentage of Below-Bachelor's Certificates and Degrees Granted in Health Fields	65
Indicator 4G:	Percentage of Below-Bachelor's Certificates and Degrees Granted in Life and Physical Sciences Fields	67
Indicator 4H:	Percentage of Bachelor's Degrees Granted in Architecture and Engineering Fields	69
Indicator 4I:	Percentage of Bachelor's Degrees Granted in Computer Science and Mathematics Fields	71
Indicator 4J:	Percentage of Bachelor's Degrees Granted in Health Fields	73
Indicator 4K:	Percentage of Bachelor's Degrees Granted in Life and Physical Sciences Fields	75
Indicator 4L:	Percentage of Above-Bachelor's Certificates and Degrees Granted in Architecture and Engineering Fields	77
Indicator 4M:	Percentage of Above-Bachelor's Certificates and Degrees Granted in Computer Science and Mathematics Fields	79
Indicator 4N:	Percentage of Above-Bachelor's Certificates and Degrees Granted in Health Fields	81
Indicator 4O:	Percentage of Above-Bachelor's Certificates and Degrees Granted in Life and Physical Sciences Fields	83

Indicator 4A – Statewide
Percentage of Below-Bachelor's Certificates and Degrees Granted in STEM Fields
(Both Public and Private Schools)

2016 Goal = 45%

Percentage of Below-Bachelor's Certificates and Degrees Granted in STEM Fields

Group	Trend Direction	5 Year Change	2013 Percentage	2013 Difference from All
All	★	-4 percentage points	45%	--
Female	★	-3	45%	+0 percentage points
Male	★	-6	45%	+0
Asian	★	-3	45%	+0
Black	★	-3	48%	+3
Latino	↓	-7	43%	-2
White	★	+0	46%	+1

★ = Met Goal and Increasing ★ = Met Goal but Decreasing ★ = Met Goal but No Change

↑ = Increasing & Will Meet Goal ↑ = Increasing but Will Not Meet Goal ↓ = Decreasing ↔ = No Change

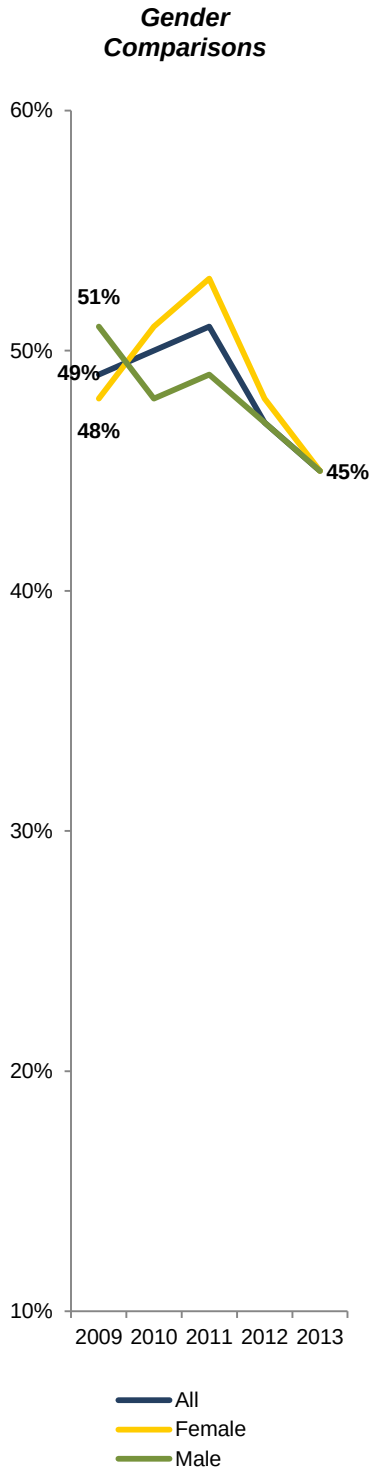
With the exception of Latino students, all student groups reached the goal of 45% of certificates and degrees being in STEM fields (across all below-bachelor's certificate/degree types). Latino students were two percentage points away from meeting the goal. With the exception of White students, all subgroups had decreases in their percentages over the five-year time span.

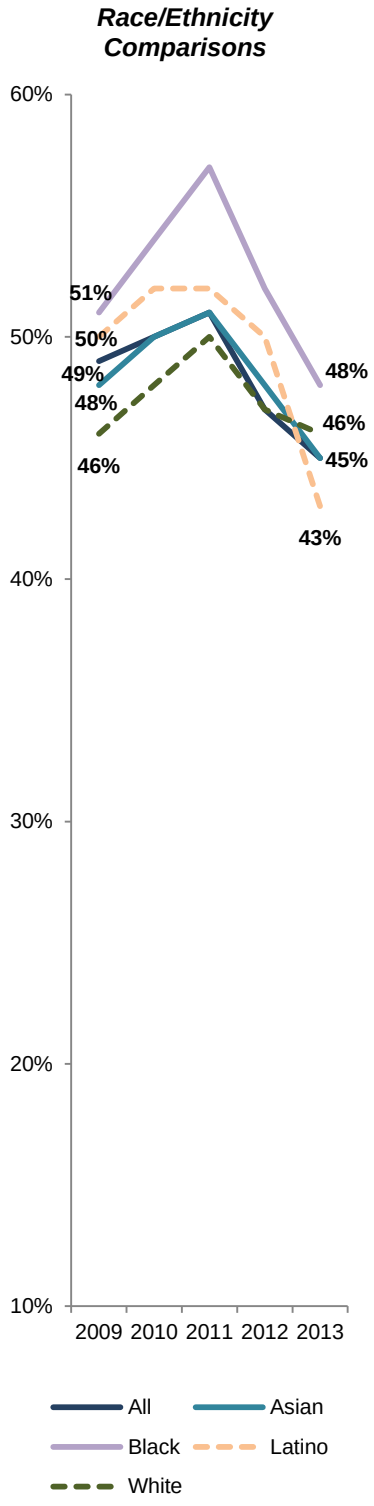
There was no gender gap in the percentage of below-bachelor's certificates and degrees earned and only a small race/ethnicity gap (five percentage points between the highest group—Black students—and the lowest group—Latino students).

Percentage of Below-Bachelor's Certificates and Degrees Granted in STEM Fields

(Both Public and Private Schools)

2016 Goal = 45%





Indicator 4B – Statewide
Percentage of Bachelor's Degrees Granted in STEM Fields
(Both Public and Private Schools)

2016 Goal = 45%

Percentage of Bachelor's Degrees Granted in STEM Fields

Group	Trend Direction	5 Year Change	2013 Percentage	2013 Difference from All
All	↑	+5 percentage points	28%	--
Female	↑	+5	26%	-2 percentage points
Male	↑	+4	30%	+2
Asian	↑	+9	44%	+16
Black	↑	+7	26%	-2
Latino	↑	+5	23%	-5
White	↑	+4	27%	-1

★ = Met Goal and Increasing ★ = Met Goal but Decreasing ★ = Met Goal but No Change

↑ = Increasing & Will Meet Goal ↑ = Increasing but Will Not Meet Goal ↓ = Decreasing ↔ = No Change

With the exception of Asian students, no subgroup is on track to meet the 2016 goal of 45% of bachelor's degrees being granted in STEM fields. However, all subgroups have shown increases in the percentage of bachelor's degrees that are in STEM fields over the five-year period, ranging from four to nine percentage points.

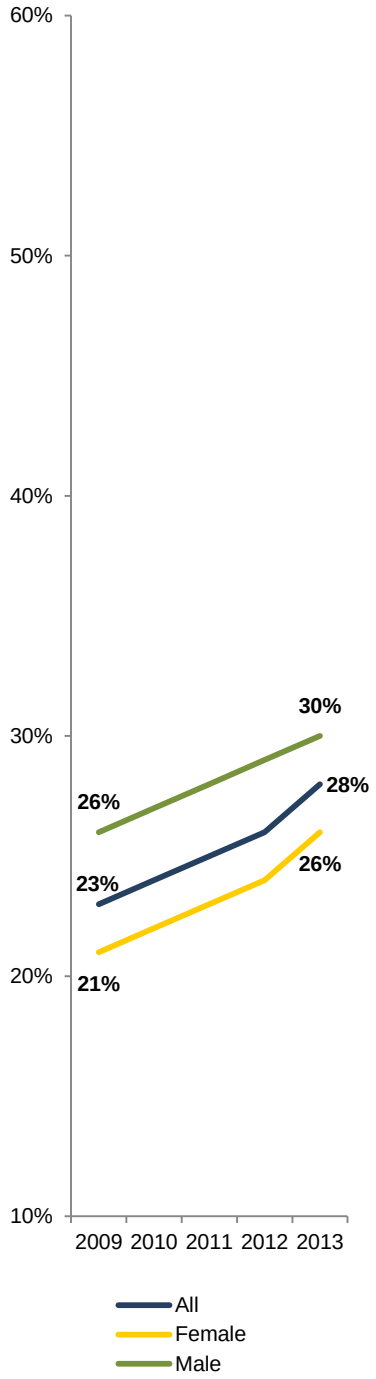
A small gender gap (four percentage points) exists in the granting of bachelor's degrees in STEM fields. The gap is much larger for race/ethnicity: 21 percentage points between the highest group (Asian students at 44%) and the lowest group (Latino students at 23%). However, Asian, Black, and Latino students all showed greater increases in their percentage of bachelor's degrees that are granted in STEM fields over the five-year period than White students.

Percentage of Bachelor's Degrees Granted in STEM Fields

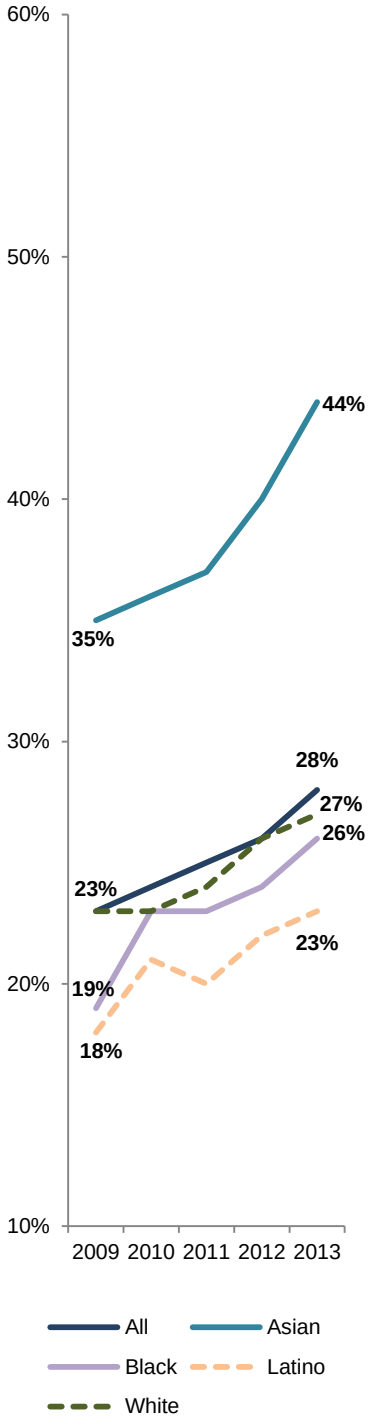
(Both Public and Private Schools)

2016 Goal = 45%

Gender Comparisons



Race/Ethnicity Comparisons



Indicator 4C – Statewide
Percentage of Above-Bachelor's Certificates and Degrees Granted in STEM Fields
(Both Public and Private Schools)

2016 Goal = 45%

Percentage of Above-Bachelor's Certificates and Degrees Granted in STEM Fields

Group	Trend Direction	5 Year Change	2013 Percentage	2013 Difference from All
All	↑	+3 percentage points	30%	--
Female	↑	+3	28%	-2 percentage points
Male	↑	+3	34%	+2
Asian	★	+1	48%	+16
Black	↑	+7	21%	-2
Latino	↑	+2	24%	-5
White	↑	+2	26%	-1

★ = Met Goal and Increasing ★ = Met Goal but Decreasing ★ = Met Goal but No Change

↑ = Increasing & Will Meet Goal ↑ = Increasing but Will Not Meet Goal ↓ = Decreasing ↔ = No Change

With the exception of Asian students, no subgroup is on track to meet the 2016 goal of 45% of above-bachelor's certificates and degrees being granted in STEM fields. However, all subgroups have shown increases in the percentage of above-bachelor's degrees that are in STEM fields over the five-year period, ranging from one to seven percentage points.

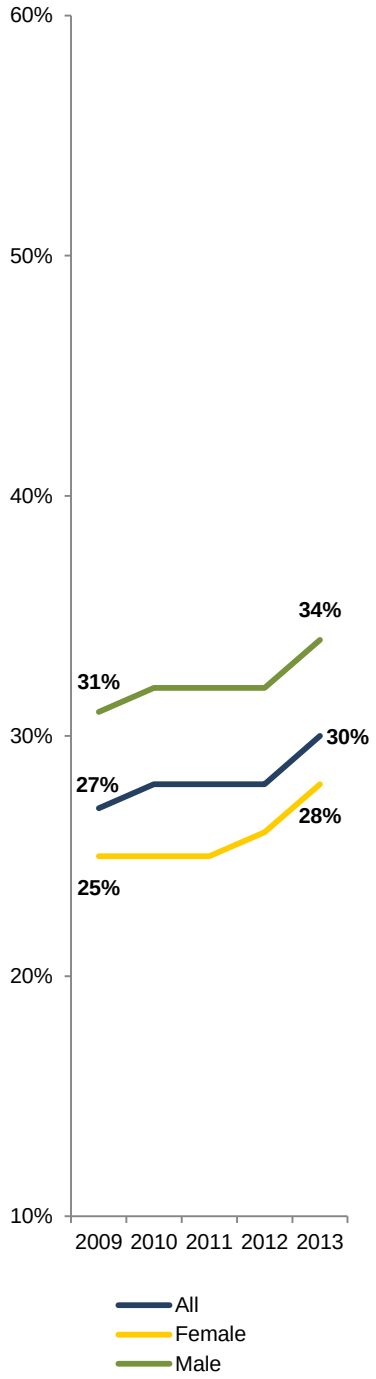
A gender gap (six percentage points) exists in the granting of certificates and degrees above the bachelor's level in STEM fields. The gap is much larger for race/ethnicity: 27 percentage points between the highest group (Asian students at 48%) and the lowest group (Black students at 21%). However, Black students showed the greatest increase in their percentage of above-bachelor's degrees that are granted in STEM fields over the five-year period, with an increase of seven percentage points.

Percentage of Above-Bachelor's Certificates and Degrees Granted in STEM Fields

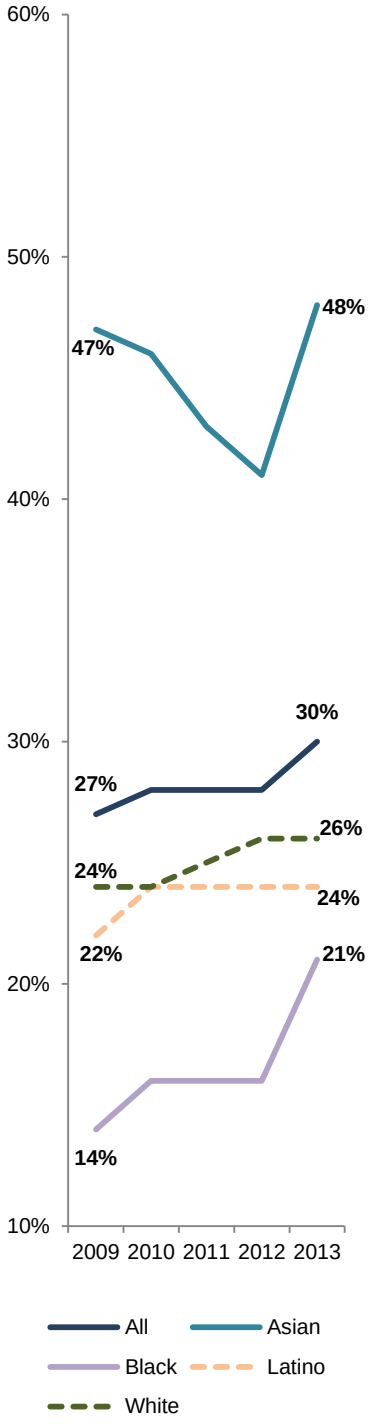
(Both Public and Private Schools)

2016 Goal = 45%

Gender Comparisons



Race/Ethnicity Comparisons



Indicator 4D – Statewide
Percentage of Below-Bachelor's Certificates and Degrees Granted in Architecture and Engineering Fields
(Both Public and Private Schools)

Percentage of Below-Bachelor's Certificates and Degrees Granted in Architecture and Engineering Fields

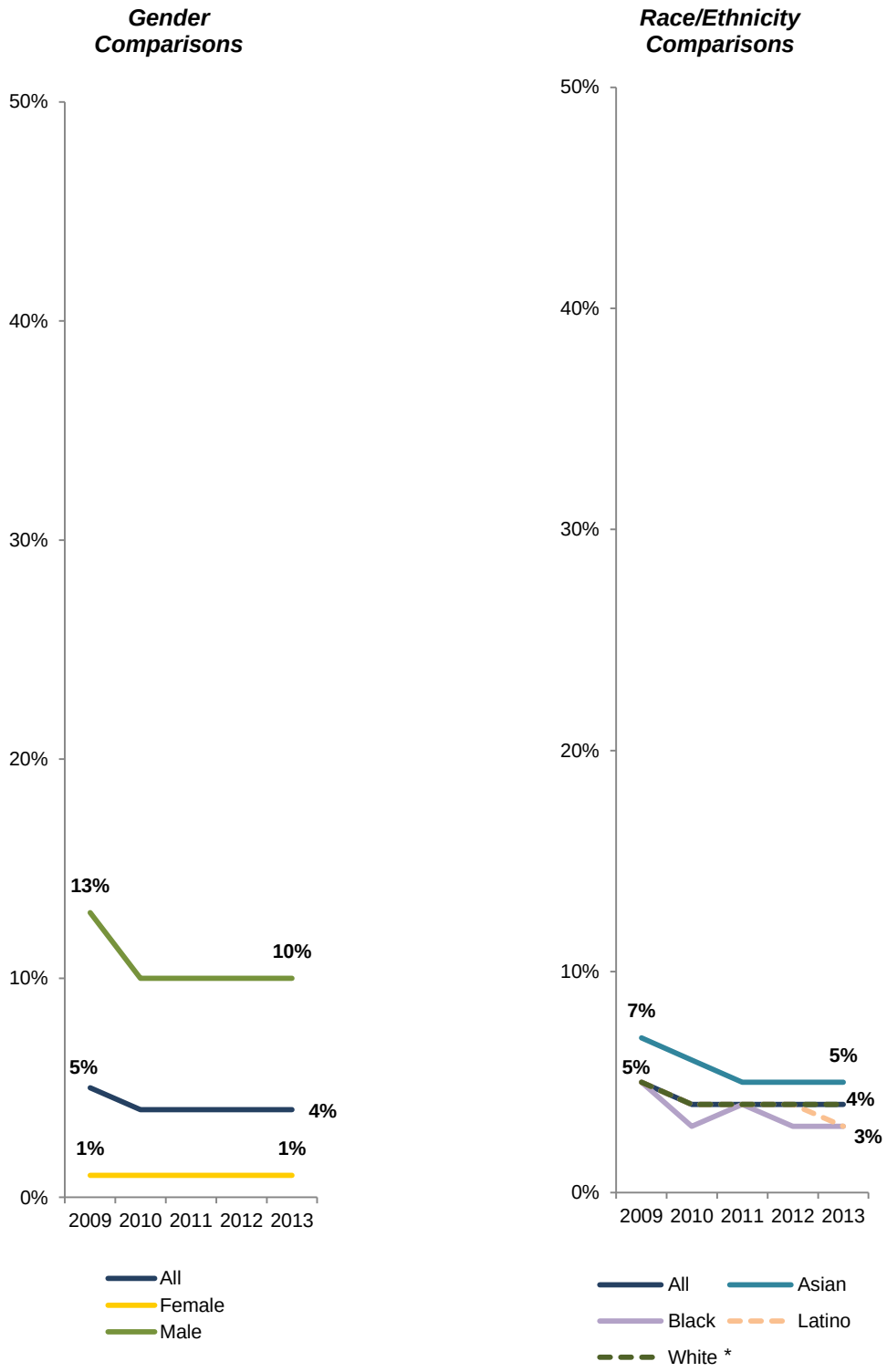
Group	Trend Direction	5 Year Change	2013 Percentage	2013 Difference from All
All	⇩	-1 percentage point	4%	--
Female	⇔	+0	1%	-3 percentage points
Male	⇩	-3	10%	+6
Asian	⇩	-2	5%	+1
Black	⇩	-2	3%	-1
Latino	⇩	-2	3%	-1
White	⇩	-1	4%	+0

⇧ = Increasing ⇩ = Decreasing ⇔ = No Change

The five-year trend for below-bachelor's certificates and degrees in architecture and engineering was downward for all subgroups except females, who remained at the same level. The percentage of certificates and degrees granted below the bachelor's level in architecture and engineering is characterized by a large gender gap of nine percentage points. However, due to a decline in the percentage of males earning below-bachelor's certificates and degrees in architecture and engineering, the gender gap is smaller than it was five years ago. There was little variation among racial/ethnic groups, with a difference of only two percentage points between the groups with the highest (Asian students at 5%) and lowest (Black and Latino students at 3% each) percentages.

Percentage of Below-Bachelor's Certificates and Degrees Granted in Architecture and Engineering Fields

(Both Public and Private Schools)



** Note: The lines for All and White are identical.*

Indicator 4E – Statewide
Percentage of Below-Bachelor's Certificates and Degrees Granted in Computer Science and Mathematics Fields
(Both Public and Private Schools)

Percentage of Below-Bachelor's Certificates and Degrees Granted in Computer Science and Mathematics Fields

Group	Trend Direction	5 Year Change	2013 Percentage	2013 Difference from All
All	⇔	+0 percentage points	4%	--
Female	⇔	+0	2%	-2 percentage points
Male	⇧	+2	9%	+5
Asian	⇩	-1	6%	+2
Black	⇔	+0	5%	+1
Latino	⇩	-1	5%	+1
White	⇧	+1	4%	+0

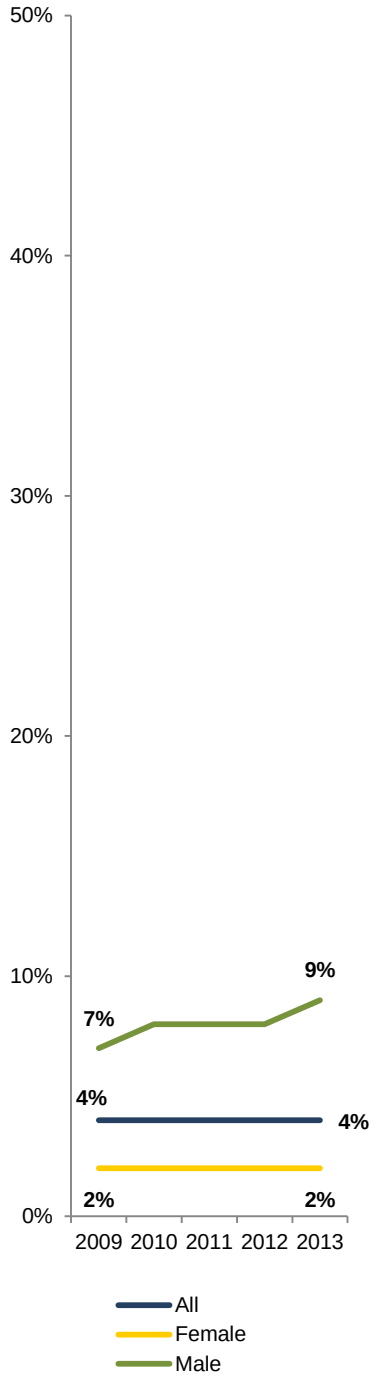
⇧ = Increasing ⇩ = Decreasing ⇔ = No Change

The five-year trend for below-bachelor's certificates and degrees in computer science and mathematics was one of no change among all students, and mixed among subgroups. However, no subgroup increased or decreased more than two percentage points over the five-year period. The percentage of certificates and degrees granted at the below-bachelor's level in computer science and mathematics is characterized by a gender gap of seven percentage points. However, due to an increase in the percentage of males earning below-bachelor's certificates and degrees in computer science and mathematics, the gender gap is larger than it was five years ago. There was little variation among racial/ethnic groups with a difference of only two percentage points between the groups with the highest (Asian students at 6%) and lowest (White students at 4%) percentages.

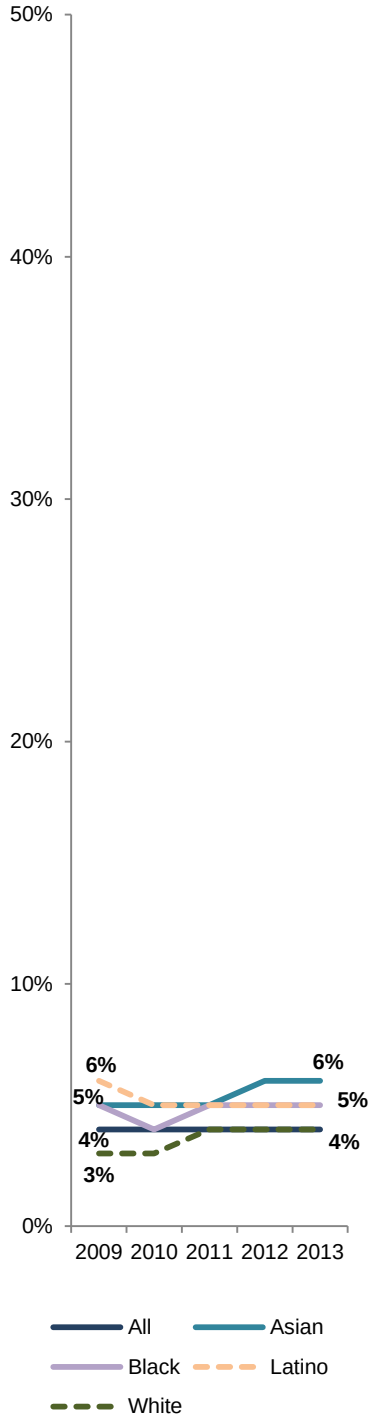
Percentage of Below-Bachelor's Certificates and Degrees Granted in Computer Science and Mathematics Fields

(Both Public and Private Schools)

Gender Comparisons



Race/Ethnicity Comparisons



Indicator 4F – Statewide
Percentage of Below-Bachelor's Certificates and Degrees Granted in Health Fields
(Both Public and Private Schools)

Percentage of Below-Bachelor's Certificates and Degrees Granted in Health Fields

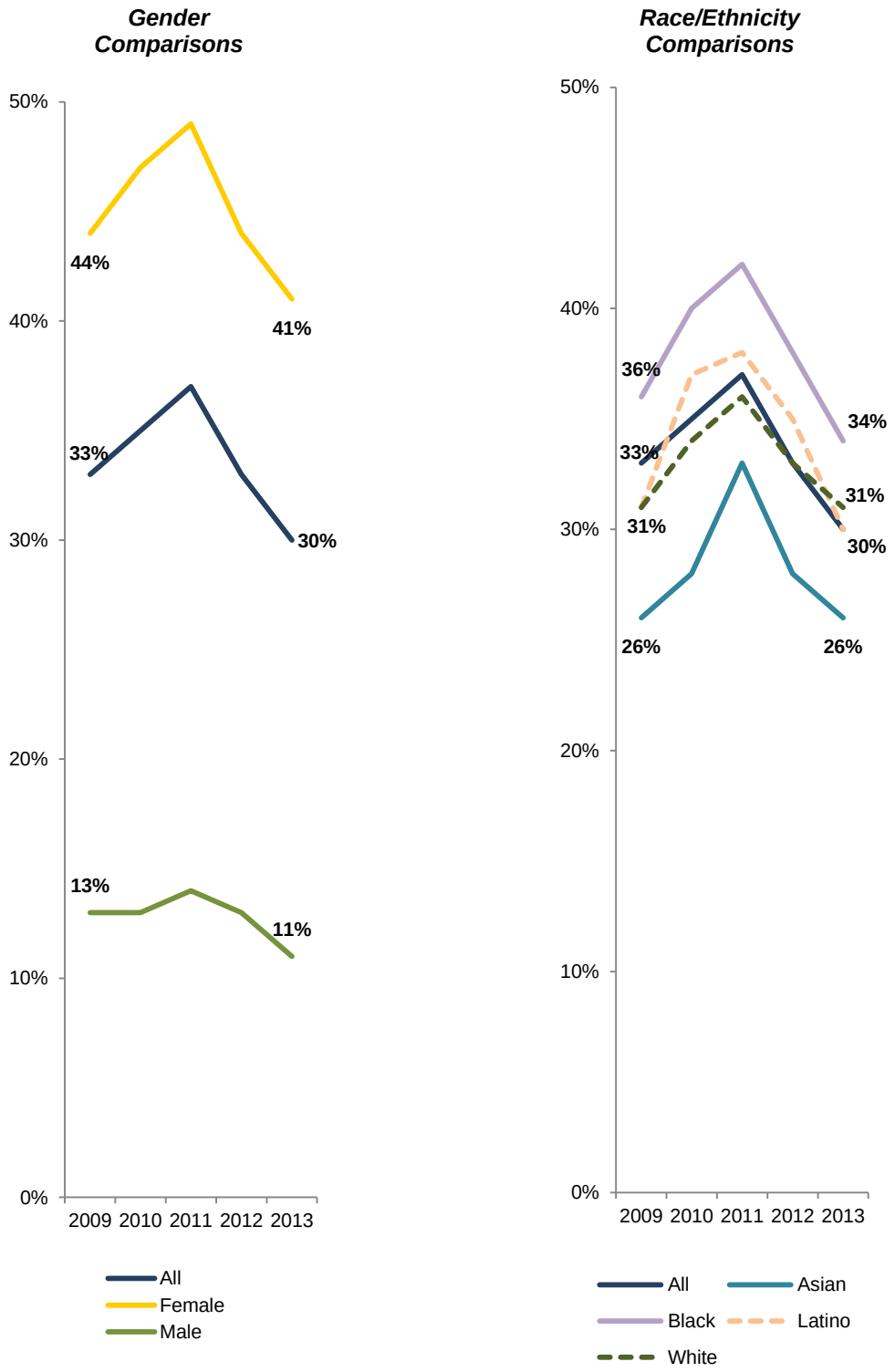
Group	Trend Direction	5 Year Change	2013 Percentage	2013 Difference from All
All	⇩	-3 percentage points	30%	--
Female	⇩	-3	41%	+11 percentage points
Male	⇩	-2	11%	-19
Asian	⇔	+0	26%	-4
Black	⇩	-2	34%	+4
Latino	⇩	-1	30%	+0
White	⇔	+0	31%	+1

⇧ = Increasing ⇩ = Decreasing ⇔ = No Change

The five-year trend for below-bachelor's certificates and degrees in health fields was one of a small decline among all students, and mixed among subgroups. The largest decrease was for females at three percentage points. Certificates and degrees below-bachelor's in health fields are characterized by a large gender gap, with females having a completion rate that is 30 percentage points higher than the male completion rate. There also exists a racial gap, with Black students having a completion rate that is eight percentage points higher than that of Asian students.

Percentage of Below-Bachelor's Certificates and Degrees Granted in Health Fields

(Both Public and Private Schools)



Indicator 4G – Statewide
Percentage of Below-Bachelor's Certificates and Degrees Granted in Life and Physical Sciences Fields
(Both Public and Private Schools)

Percentage of Below-Bachelor's Certificates and Degrees Granted in Life and Physical Sciences Fields

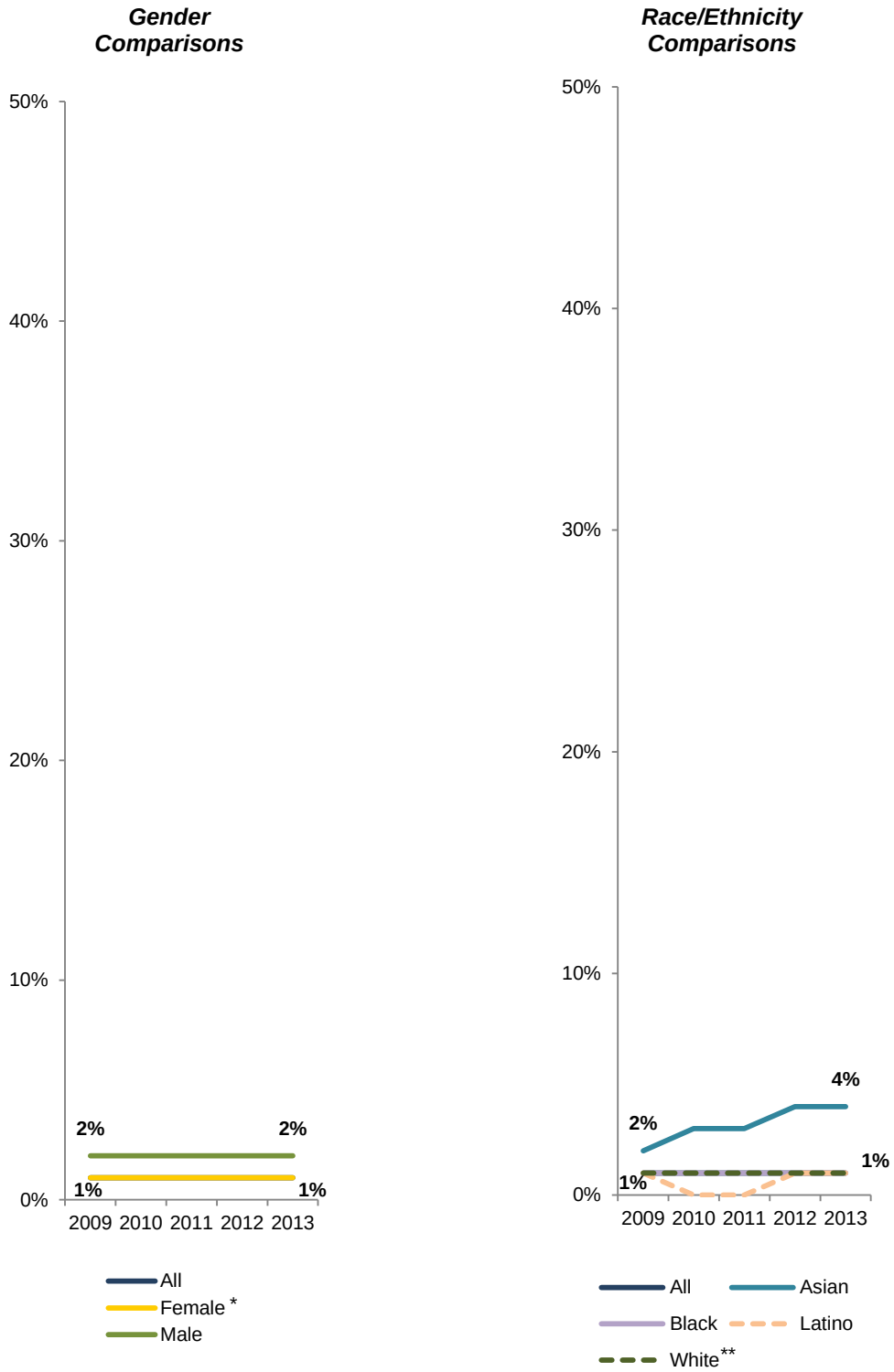
Group	Trend Direction	5 Year Change	2013 Percentage	2013 Difference from All
All	⇔	+0 percentage points	1%	--
Female	⇔	+0	1%	+0 percentage points
Male	⇔	+0	2%	+1
Asian	⇧	+2	4%	+3
Black	⇔	+0	1%	+0
Latino	⇔	+0	1%	+0
White	⇔	+0	1%	+0

⇧ = Increasing ⇩ = Decreasing ⇔ = No Change

The five-year trend for below-bachelor's certificates and degrees in life and physical sciences was one of no change among all students. The only change among subgroups was for Asian students, who increased completion by two percentage points. Certificates and degrees below-bachelor's in life and physical sciences show only a small (one percentage point) gender gap. There also exists a small racial gap, with Asian students having a completion rate that is three percentage points higher than that of Black, Latino, or White students.

Percentage of Below-Bachelor's Certificates and Degrees Granted in Life and Physical Sciences Fields

(Both Public and Private Schools)



** Note: The lines for All and Female are identical.*

*** Note: The lines for All, Black and White are identical.*

Indicator 4H – Statewide
Percentage of Bachelor's Degrees Granted in Architecture and Engineering Fields
(Both Public and Private Schools)

Percentage of Bachelor's Degrees Granted in Architecture and Engineering Fields

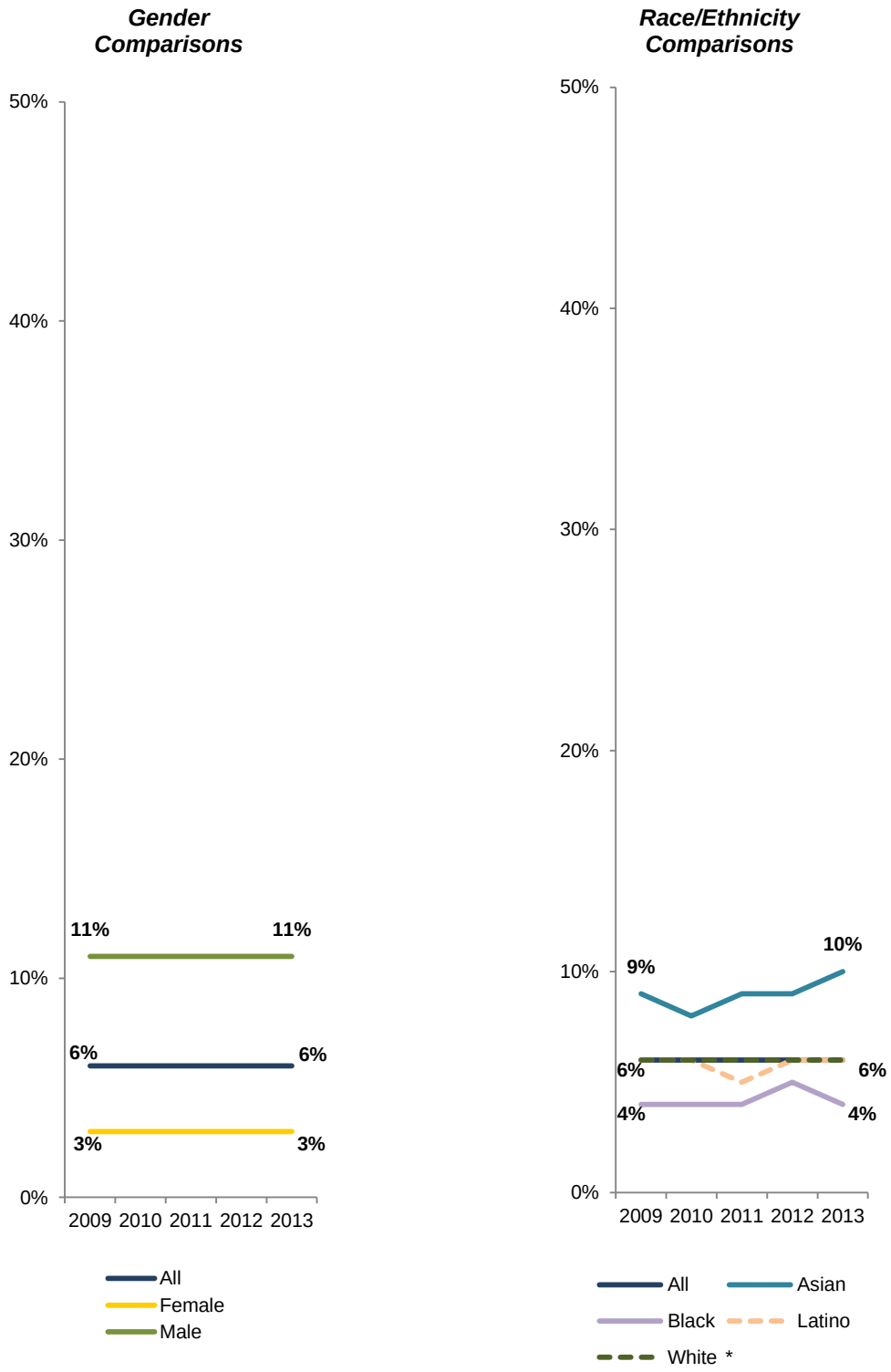
Group	Trend Direction	5 Year Change	2013 Percentage	2013 Difference from All
All	⇔	+0 percentage points	6%	--
Female	⇔	+0	3%	-3 percentage points
Male	⇔	+0	11%	+5
Asian	⇧	+1	10%	+4
Black	⇔	+0	4%	-2
Latino	⇔	+0	6%	+0
White	⇔	+0	6%	+0

⇧ = Increasing ⇩ = Decreasing ⇔ = No Change

The five-year trend for bachelor's degrees in architecture and engineering was one of no change among all students and most subgroups. The only exception was an increase of one percentage point for Asian students. There was a gender gap in bachelor's degrees granted in architecture and engineering, with males earning 11% of their bachelor's degrees in these fields compared to 3% of females. A racial/ethnic gap also existed, with Asian students earning bachelor's degrees in architecture and engineering at a rate four to six percentage points higher than Black, Latino, or White students.

Percentage of Bachelor's Degrees Granted in Architecture and Engineering Fields

(Both Public and Private Schools)



** Note: The lines for All and White are identical.*

Indicator 4I – Statewide
Percentage of Bachelor's Degrees Granted in Computer Science and Mathematics Fields
(Both Public and Private Schools)

Percentage of Bachelor's Degrees Granted in Computer Science and Mathematics Fields

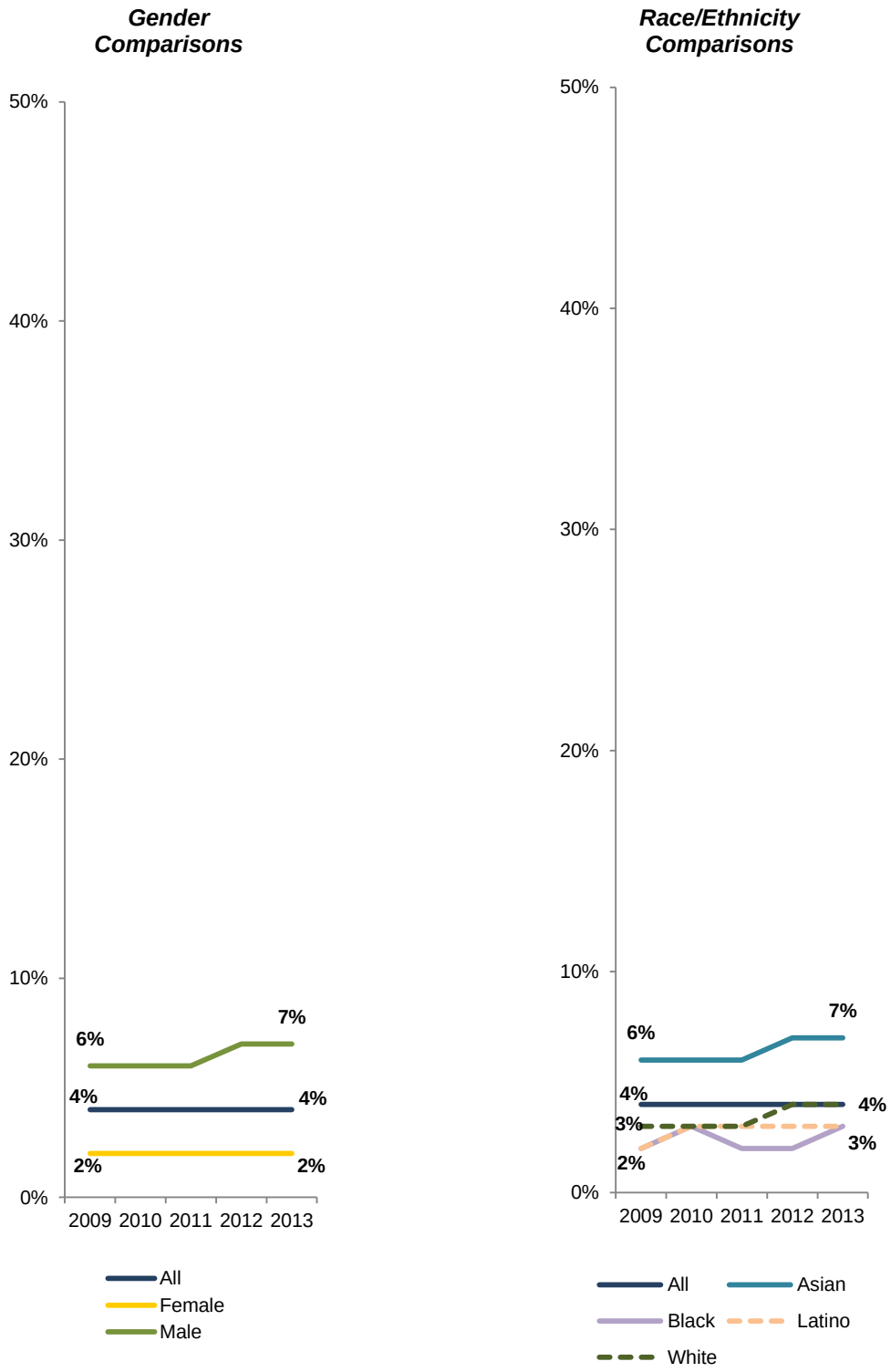
Group	Trend Direction	5 Year Change	2013 Percentage	2013 Difference from All
All	⇔	+0 percentage points	4%	--
Female	⇔	+0	2%	-2 percentage points
Male	⇧	+1	7%	+3
Asian	⇧	+1	7%	+3
Black	⇧	+1	3%	-1
Latino	⇧	+1	3%	-1
White	⇧	+1	4%	+0

⇧ = Increasing ⇩ = Decreasing ⇔ = No Change

The five-year trend for bachelor's degrees in computer science and mathematics was one of no change among all students. All subgroups with the exception of females (who had no change) increased by one percentage point. Bachelor's degrees in computer science and mathematics are characterized by a gender gap, with males earning 7% of their bachelor's degrees in these fields compared to 2% of females. A racial/ethnic gap also existed, with Asian students earning bachelor's degrees in architecture and engineering at a rate three to four percentage points higher than Black, Latino, or White students.

Percentage of Bachelor's Degrees Granted in Computer Science and Mathematics Fields

(Both Public and Private Schools)



Indicator 4J – Statewide
Percentage of Bachelor's Degrees Granted in Health Fields
(Both Public and Private Schools)

Percentage of Bachelor's Degrees Granted in Health Fields

Group	Trend Direction	5 Year Change	2013 Percentage	2013 Difference from All
All	⇧	+2 percentage points	8%	--
Female	⇧	+3	12%	+4 percentage points
Male	⇧	+1	3%	-5
Asian	⇧	+3	9%	+1
Black	⇧	+3	10%	+2
Latino	⇧	+2	6%	-2
White	⇧	+2	8%	+0

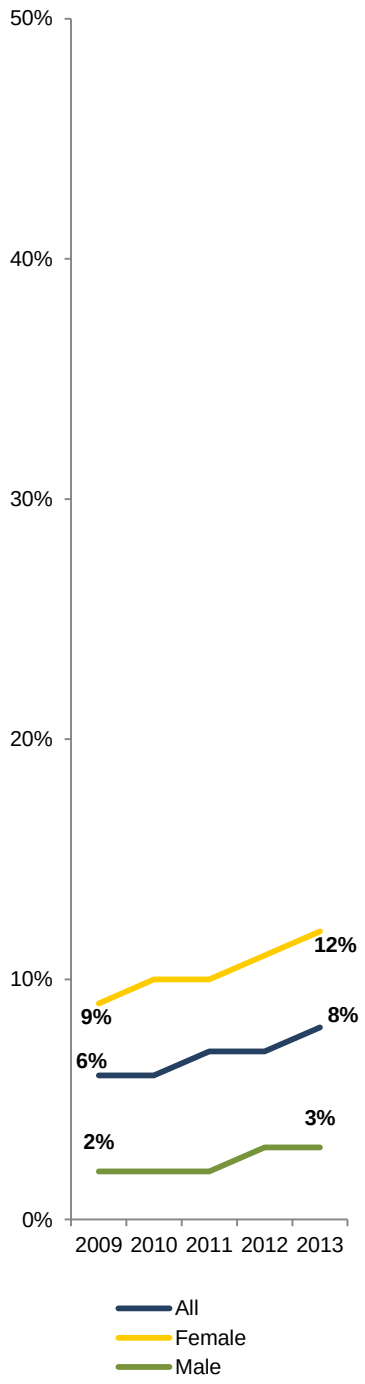
⇧ = Increasing ⇩ = Decreasing ⇔ = No Change

The five-year trend for bachelor's degrees in health was one of a small increase among all students (two percentage points). All subgroups increased by one to three percentage points. Bachelor's degrees in health are characterized by a gender gap with females earning 12% of their bachelor's degrees in the field compared to 3% of males. A small racial/ethnic gap also existed with Black (10%) students earning a higher percentage of degrees in the field than Latino (6%) students.

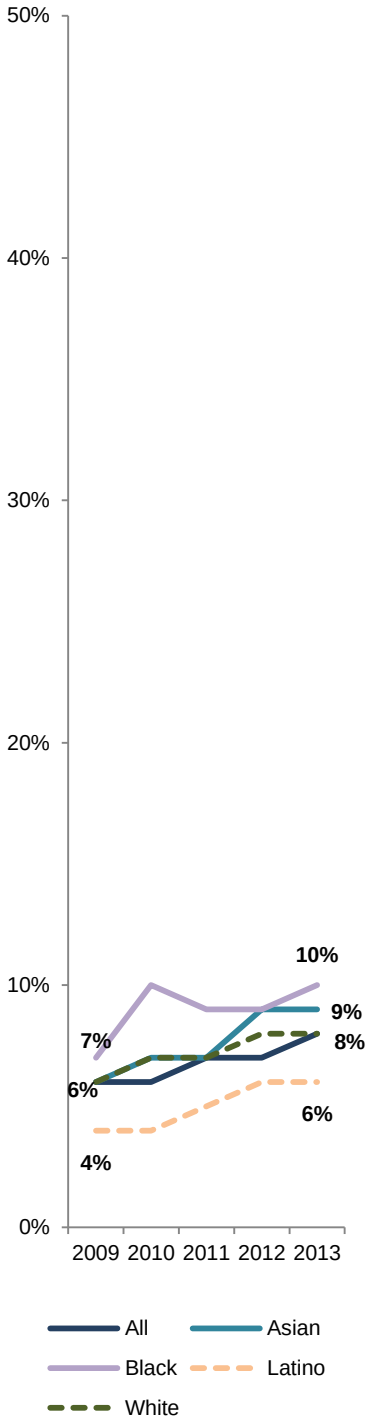
Percentage of Bachelor's Degrees Granted in Health Fields

(Both Public and Private Schools)

Gender Comparisons



Race/Ethnicity Comparisons



Indicator 4K – Statewide
Percentage of Bachelor's Degrees Granted in Life and Physical Sciences Fields
(Both Public and Private Schools)

Percentage of Bachelor's Degrees Granted in Life and Physical Sciences Fields

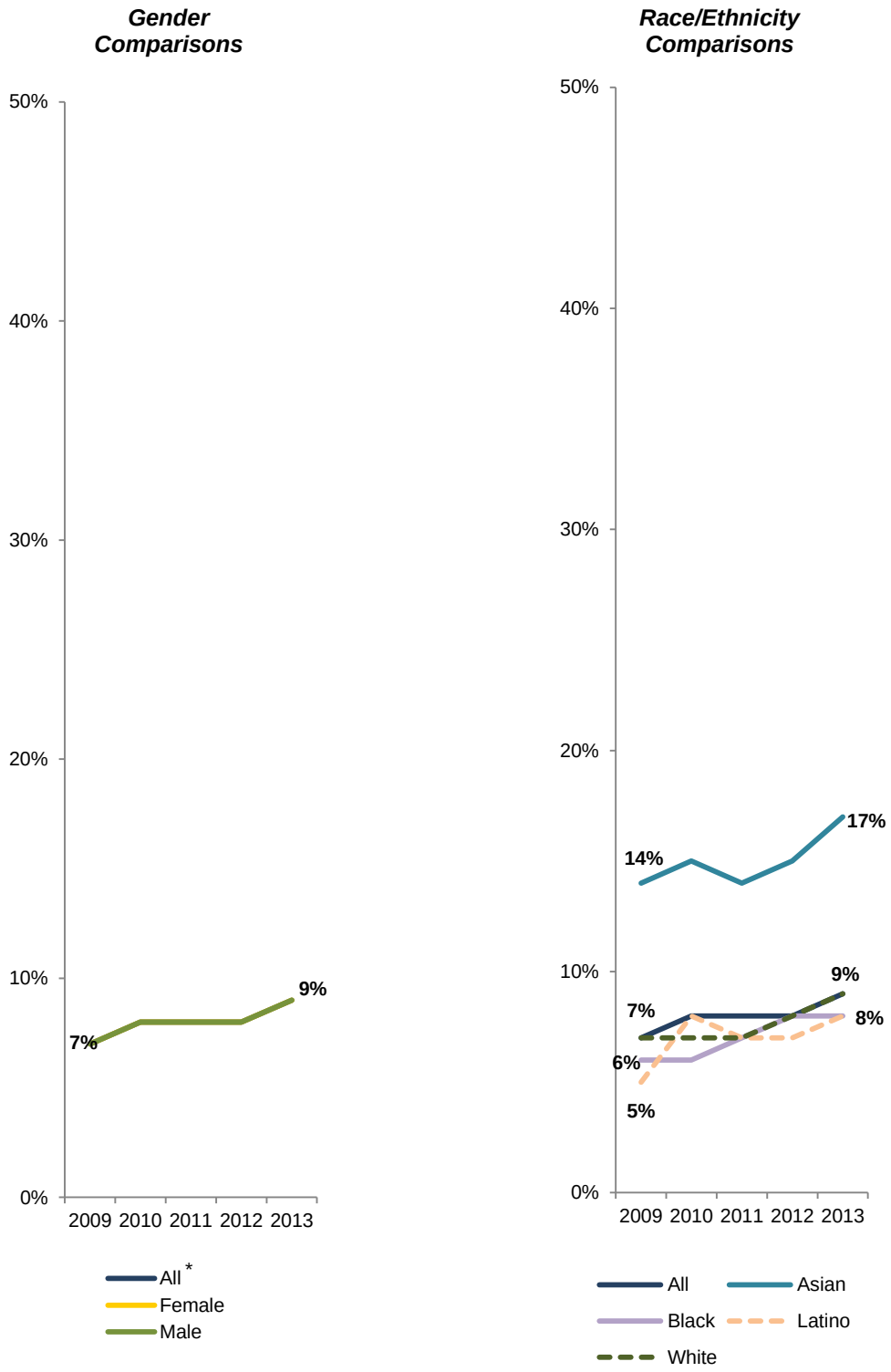
Group	Trend Direction	5 Year Change	2013 Percentage	2013 Difference from All
All	⇧	+2 percentage points	9%	--
Female	⇧	+2	9%	+0 percentage points
Male	⇧	+2	9%	+0
Asian	⇧	+3	17%	+8
Black	⇧	+2	8%	-1
Latino	⇧	+3	8%	-1
White	⇧	+2	9%	+0

⇧ = Increasing ⇩ = Decreasing ⇔ = No Change

The five-year trend for bachelor's degrees in life and physical sciences was one of a small increase among all students (two percentage points). All subgroups increased by two to three percentage points. Bachelor's degrees in life and physical sciences showed no gender gap with both females and males earning 9% of their degrees in these fields. A racial/ethnic gap existed with Asian (17%) students earning a higher percentage of degrees in the fields than White (9%), Black (8%), or Latino (8%) students.

Percentage of Bachelor's Degrees Granted in Life and Physical Sciences Fields

(Both Public and Private Schools)



** Note: The lines for All, Female and Male are identical.*

Indicator 4L – Statewide
Percentage of Above-Bachelor's Certificates and Degrees Granted in Architecture and Engineering Fields
(Both Public and Private Schools)

Percentage of Above-Bachelor's Certificates and Degrees Granted in Architecture and Engineering Fields

Group	Trend Direction	5 Year Change	2013 Percentage	2013 Difference from All
All	⇧	+2 percentage points	8%	--
Female	⇧	+1	4%	-4 percentage points
Male	⇧	+2	13%	+5
Asian	⇧	+1	9%	+1
Black	⇧	+1	3%	-5
Latino	⇧	+3	7%	-1
White	⇧	+1	6%	-2

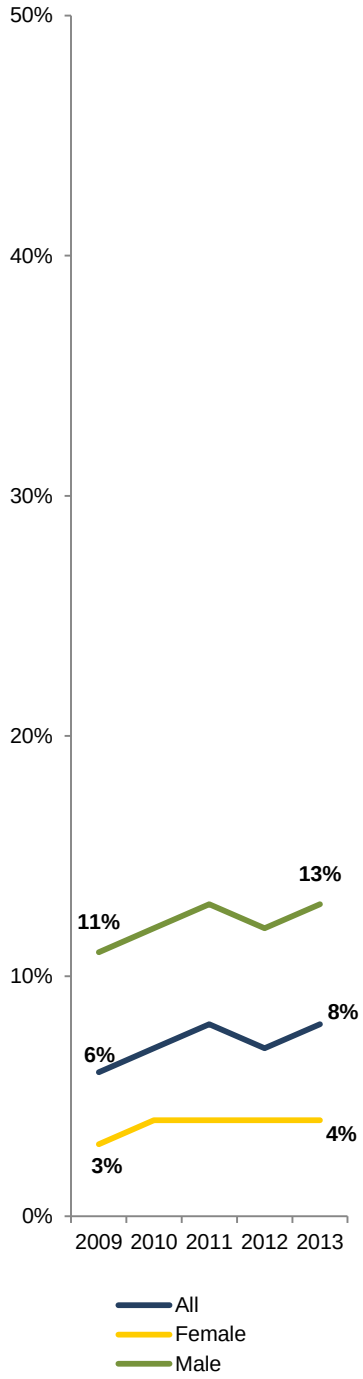
⇧ = Increasing ⇩ = Decreasing ⇔ = No Change

The five-year trend for above-bachelor's certificates and degrees in architecture and engineering was one of a small increase among all students (two percentage points). All subgroups increased by one to three percentage points. Above-bachelor's certificates and degrees in life and physical sciences show a gender gap with males earning 13% of their certificates and degrees in these fields compared to 4% for females. A racial/ethnic gap also existed with Black (3%) students earning a lower percentage of certificates and degrees in the fields than Asian (9%), Latino (7%), or White (6%) students.

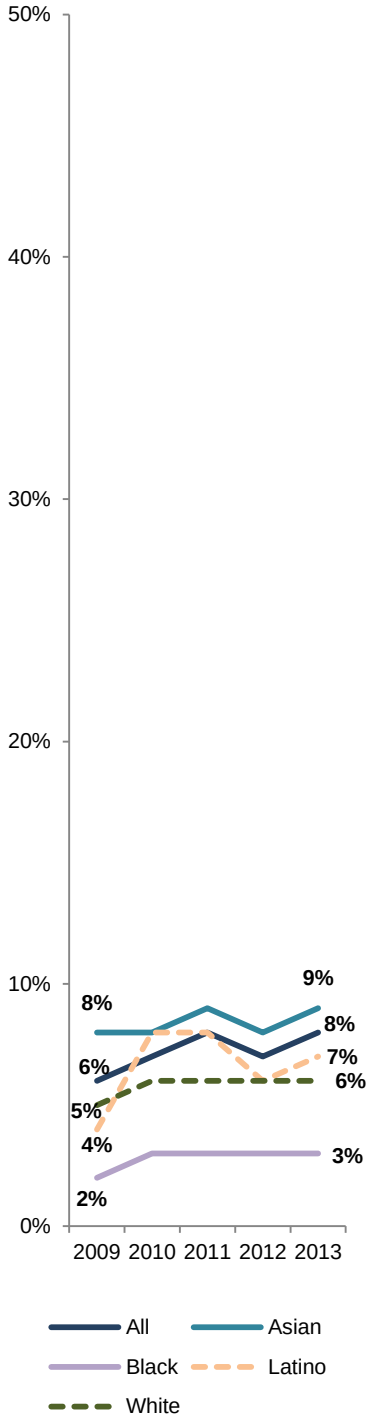
Percentage of Above-Bachelor's Certificates and Degrees Granted in Architecture and Engineering Fields

(Both Public and Private Schools)

Gender Comparisons



Race/Ethnicity Comparisons



Indicator 4M – Statewide
Percentage of Above-Bachelor's Certificates and Degrees Granted in Computer Science and Mathematics Fields
(Both Public and Private Schools)

Percentage of Above-Bachelor's Certificates and Degrees Granted in Computer Science and Mathematics Fields

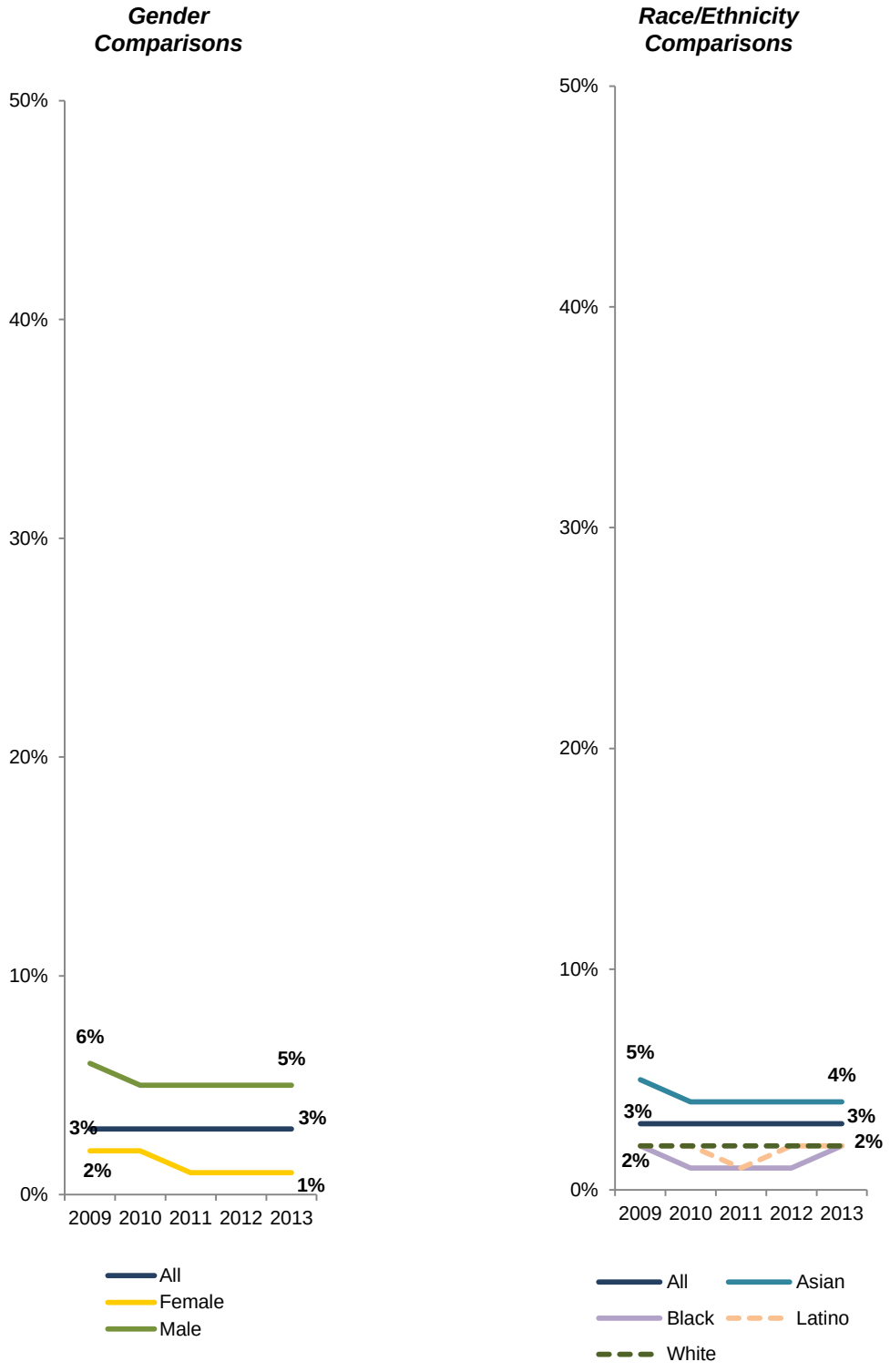
Group	Trend Direction	5 Year Change	2013 Percentage	2013 Difference from All
All	⇔	+0 percentage points	3%	--
Female	⇩	-1	1%	-2 percentage points
Male	⇩	-1	5%	+2
Asian	⇩	-1	4%	+1
Black	⇔	+0	2%	-1
Latino	⇔	+0	2%	-1
White	⇔	+0	2%	-1

⇧ = Increasing ⇩ = Decreasing ⇔ = No Change

The five-year trend for above-bachelor's certificates and degrees in computer science and mathematics was one of no change among all students. Three subgroups also showed no change: Black, Latino, and White students. Females, Males and Asian students all showed a decrease of one percentage point. Above-bachelor's certificates and degrees in computer science and mathematics show a gender gap with males earning 5% of their certificates and degrees in these fields compared to 1% for females. A small racial/ethnic gap also existed with Asian (4%) students earning a higher percentage of certificates and degrees in the fields than Black, Latino, or White students (all 2%).

Percentage of Above-Bachelor's Certificates and Degrees Granted in Computer Science and Mathematics Fields

(Both Public and Private Schools)



Indicator 4N – Statewide
Percentage of Above-Bachelor's Certificates and Degrees Granted in Health Fields
(Both Public and Private Schools)

Percentage of Above-Bachelor's Certificates and Degrees Granted in Health Fields

Group	Trend Direction	5 Year Change	2013 Percentage	2013 Difference from All
All	⇧	+1 percentage point	15%	--
Female	⇧	+2	18%	+3 percentage points
Male	⇧	+1	10%	-5
Asian	⇩	-1	27%	+12
Black	⇧	+5	14%	-1
Latino	⇔	+0	12%	-3
White	⇧	+1	15%	+0

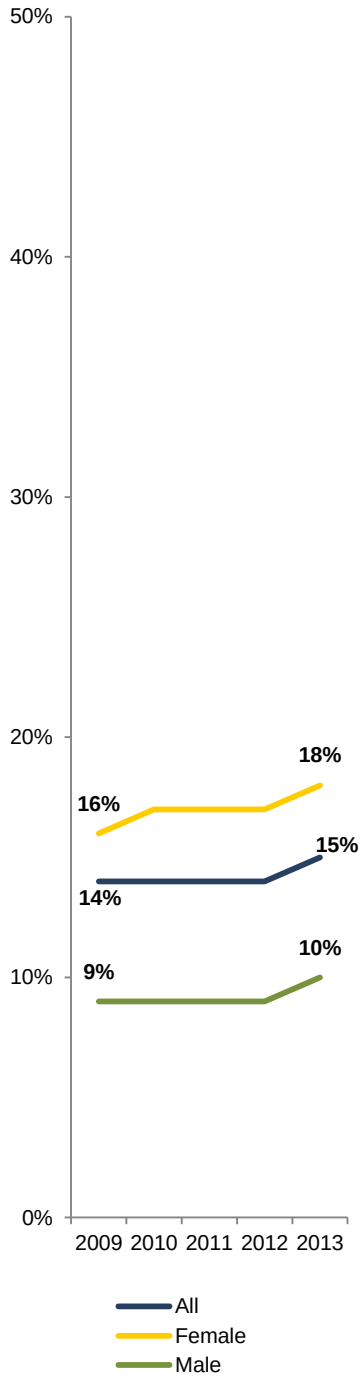
⇧ = Increasing ⇩ = Decreasing ⇔ = No Change

The five-year trend for above-bachelor's certificates and degrees in health was one of little change among all students (an increase of one percentage point). Trends among subgroups were mixed. Females, males, Black and White students all showed increases of one to five percentage points. Latino students had no change. Asian students decreased by one percentage point. Above-bachelor's certificates and degrees in health show a gender gap with females earning 18% of the certificates and degrees in this field compared to 10% for males. A distinct racial/ethnic gap also existed with Asian students earning 27% of their degrees in the field compared to 15% for White, 14% for Black, and 12% for Latino students.

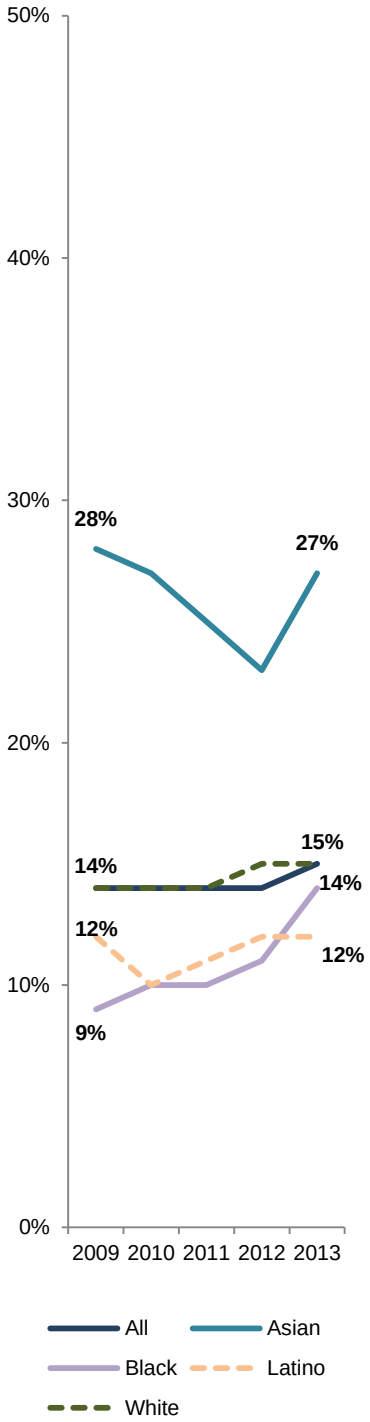
Percentage of Above-Bachelor's Certificates and Degrees Granted in Health Fields

(Both Public and Private Schools)

Gender Comparisons



Race/Ethnicity Comparisons



Indicator 4O – Statewide
Percentage of Above-Bachelor's Certificates and Degrees Granted in Life and Physical Sciences Fields
(Both Public and Private Schools)

Percentage of Above-Bachelor's Certificates and Degrees Granted in Life and Physical Sciences Fields

Group	Trend Direction	5 Year Change	2013 Percentage	2013 Difference from All
All	⇧	+1 percentage point	5%	--
Female	⇔	+0	4%	-1 percentage point
Male	⇔	+0	5%	+0
Asian	⇧	+3	8%	+3
Black	⇔	+0	2%	-3
Latino	⇔	+0	4%	-1
White	⇧	+1	4%	-1

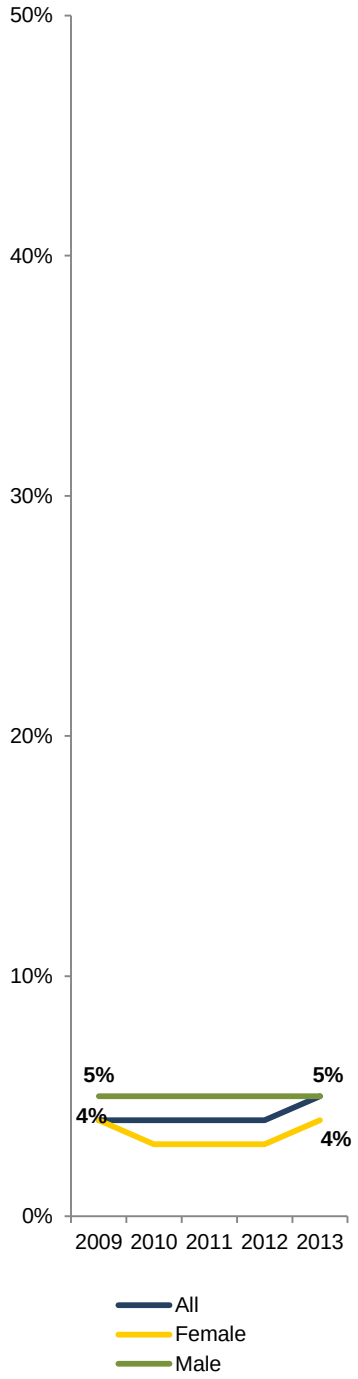
⇧ = Increasing ⇩ = Decreasing ⇔ = No Change

The five-year trend for above-bachelor's certificates and degrees in life and physical sciences was one of little change among all students (an increase of one percentage point). Trends among subgroups were mixed. Asian and White students both increased (both three and one percentage points, respectively). Females, males, Black, and Latino students all had no change. Above-bachelor's certificates and degrees in life and physical sciences showed only a small gender gap with females earning 4% of the certificates and degrees in this field compared to 5% for males. A distinct racial/ethnic gap also existed with Asian students earning 8% of their degrees in the field compared to 4% for White, 4% for Latino, and 2% for Black students.

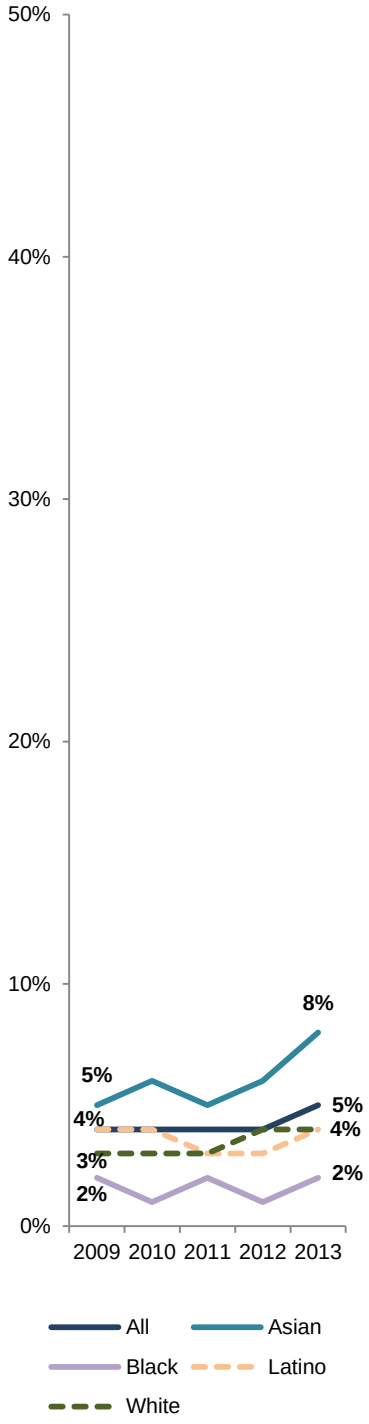
Percentage of Above-Bachelor's Certificates and Degrees Granted in Life and Physical Sciences Fields

(Both Public and Private Schools)

Gender Comparisons



Race/Ethnicity Comparisons



Sub-Indicators 5: STEM Workforce Alignment

Indicator 5A: Alignment of Undergraduate Certificates and Degrees with Biology and Health Careers	87
Indicator 5B: Alignment of Undergraduate Certificates and Degrees with Computer Science and Information Technology Careers	89
Indicator 5C: Alignment of Undergraduate Certificates and Degrees with Engineering, Math, and Physical Science Careers	91

Please note that the data and commentary for Indicators 5A, 5B, and 5C were provided by the Massachusetts Department of Higher Education.

Indicator 5A – Statewide
Alignment of Undergraduate Certificates and Degrees with Biology and Health Careers
(Both Public and Private Schools)

2016 Goal = 18%

Alignment of Undergraduate Certificates and Degrees with Biology and Health Careers

Group	Trend Direction	5 Year Change	2013 Percentage	2013 Difference from All
All	★	+2 percentage points	18%	--
Female	★	+2	24%	+6 percentage point
Male	↑	+1	10%	-8
Asian	★	+4	24%	+6
Black	★	+1	21%	+3
Latino	↑	+2	15%	-3
White	★	+2	18%	+0

★ = Met Goal and Increasing ★ = Met Goal but Decreasing ★ = Met Goal but No Change

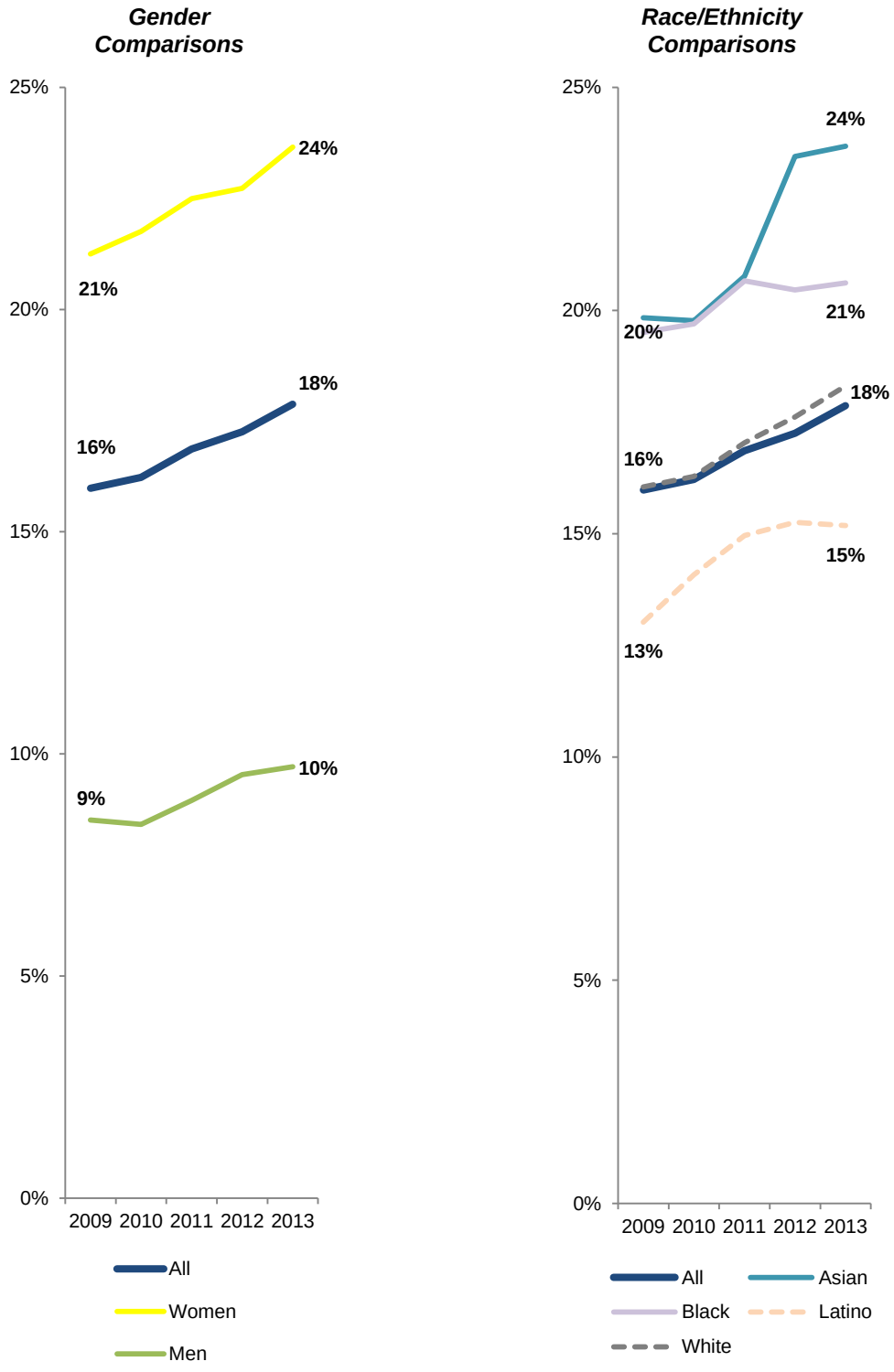
↑ = Increasing & Will Meet Goal ↑ = Increasing but Will Not Meet Goal ↓ = Decreasing ↔ = No Change

We have met the goal for undergraduate degrees and certificates in Biology and Health overall, and can focus on recruiting Latinos and Men into healthcare fields and providing opportunities for academic progression.

Alignment of Undergraduate Certificates and Degrees with Biology and Health Careers

(Both Public and Private Schools)

2016 Goal = 18%



Indicator 5B – Statewide
Alignment of Undergraduate Certificates and Degrees with Computer Science and Information Technology Careers
(Both Public and Private Schools)

2016 Goal = 8%

Alignment of Undergraduate Certificates and Degrees with Computer Science and Information Technology Careers

Group	Trend Direction	5 Year Change	2013 Percentage	2013 Difference from All
All	⟷	+0 percentage points	3%	--
Female	⟷	+0	1%	-2 percentage point
Male	↑	+1	6%	+5
Asian	↑	+4	5%	+2
Black	↑	+1	4%	+1
Latino	↑	+1	3%	+0
White	↑	+1	3%	+0

★ = Met Goal and Increasing ★ = Met Goal but Decreasing ★ = Met Goal but No Change

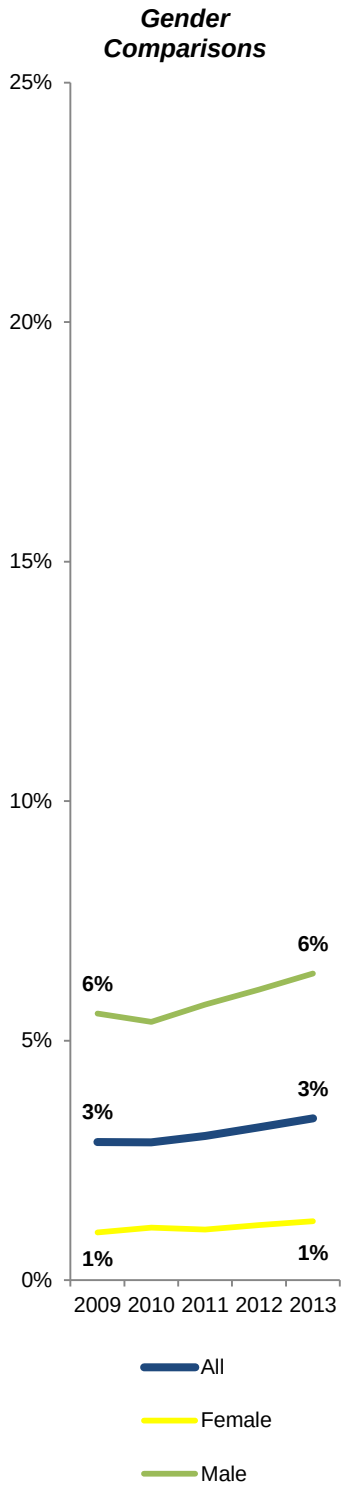
↑ = Increasing & Will Meet Goal ↑ = Increasing but Will Not Meet Goal ↓ = Decreasing ⟷ = No Change

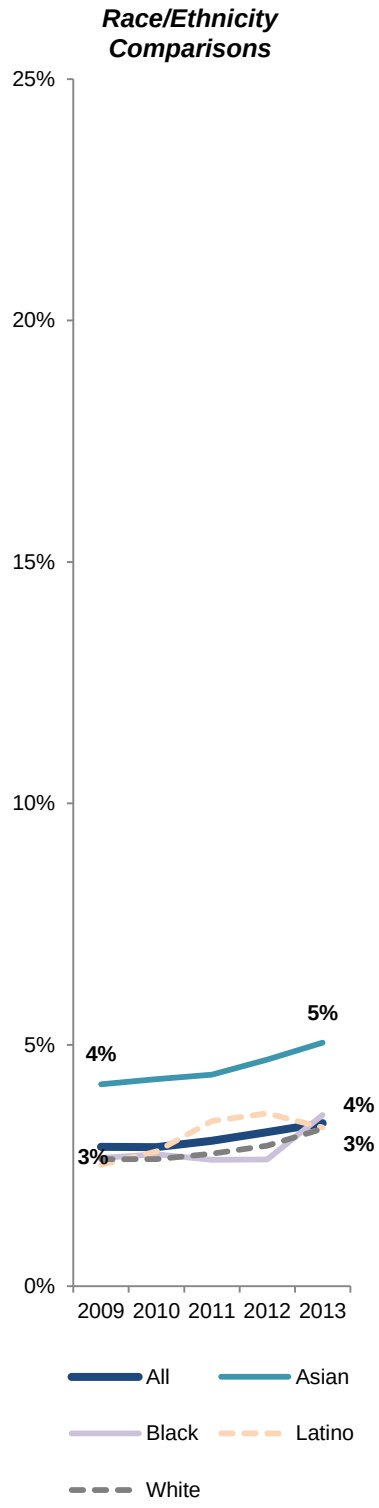
The widest gap between employer demand and higher education supply is in Computer and Information Science and Information Technology (CIS & IT). About 3,500 more undergraduate degrees and certificates per year are needed. Massachusetts is not yet on track to meet the 8% goal. The absence of women preparing for these careers is disheartening and we see no upward trend.

Alignment of Undergraduate Certificates and Degrees with Computer Science and Information Technology Careers

(Both Public and Private Schools)

2016 Goal = 8%





Indicator 5C – Statewide
Alignment of Undergraduate Certificates and Degrees with Engineering, Math, and Physical Science Careers
(Both Public and Private Schools)

2016 Goal = 12%

Alignment of Undergraduate Certificates and Degrees with Engineering, Math, and Physical Science Careers

Group	Trend Direction	5 Year Change	2013 Percentage	2013 Difference from All
All	★	+0 percentage points	13%	--
Female	⟷	+0	8%	-5 percentage point
Male	★	-1	20%	+7
Asian	★	+0	20%	+7
Black	⟷	+0	8%	-5
Latino	⟷	+0	11%	-3
White	★	+0	13%	+0

★ = Met Goal and Increasing ★ = Met Goal but Decreasing ★ = Met Goal but No Change

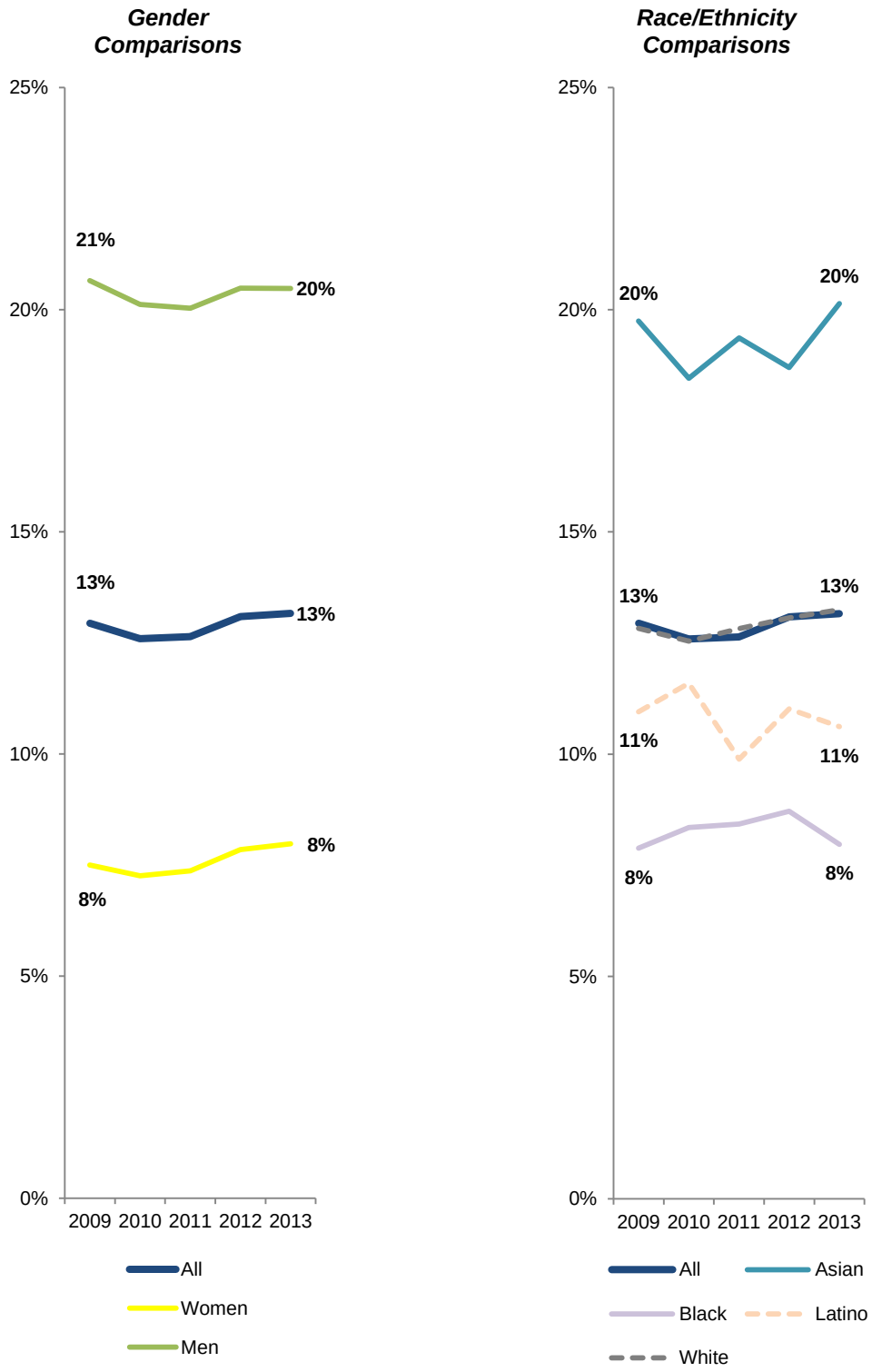
↑ = Increasing & Will Meet Goal ↑ = Increasing but Will Not Meet Goal ↓ = Decreasing ⟷ = No Change

Massachusetts appears on target with the share of undergraduate awards aligned with Engineering, Math, and Physical Science Careers. The challenge is that the tremendous gap in Computer Science and Information Technology disproportionally draws students from Engineering, Math, and Physical science because they have highly transferable skills. The result is that employers in these fields do not feel like supply is sufficient. Employment opportunities for recent graduates have been particularly strong in Computer, Chemical, and Mechanical engineering – fields linked with manufacturing. Women, Black, and Latino students are under-represented and we see no upward trend.

Alignment of Undergraduate Certificates and Degrees with Engineering, Math, and Physical Science Careers

(Both Public and Private Schools)

2016 Goal = 12%



Data Notes

Source 1: SAT Registration Questionnaire

Data used for these charts consisted of individual responses by MA public school graduates to the questions on the registration questionnaire, including graduating cohorts 2007–2014. See Appendix A for the full questionnaire, including a list of college majors from which respondents can choose. Majors included as STEM are highlighted.

Data are obtained by the UMass Donahue Institute directly from the College Board through a data sharing agreement. This data sharing agreement also includes the MA Department of Higher Education and the MA Department of Elementary and Secondary Education. The data sharing agreement stipulates that the minimum N for any public reporting must be six (6), whether students, schools, or districts (whatever the operative level of analysis is).

Information related to interest in STEM college majors, as well as STEM course-taking in high school, are all self-reported by students. In some cases, if a student took the SAT as a junior, they are projecting what courses they intend to take during their senior year, rather than reporting on actual courses taken.

Approximate N of whole dataset is 330,000. The College Board estimates that 80% of all MA public school students take the SAT prior to graduating. However, it should be noted that the percentage of students who take the test varies widely by individual school. In cases such as the vocational schools, the percentage of students who take the SAT is frequently less than 50% of the graduating cohort, while in high-performing/high-income schools, the percentage of students who take the SAT is frequently 100%. As a result, charts based on this data source are only reflective of SAT test-takers, and not necessarily of all public school students.

Girls are overrepresented in the dataset, in comparison to the MA public school population as a whole. For example, for the 2011–2012 school year, the MA public school population was approximately 51% male and 49% female. However, the 2012 SAT test-taking cohort was 46% male and 54% female. This discrepancy in gender balance, however, is in line with general high school population versus college-going population patterns in both Massachusetts and the nation as a whole. Of SAT test-takers, 99.9% identify their gender.

The SAT includes a variable for whether a test-taker receives a waiver for the cost of the test (called the "fee-waiver variable"). Information on which test-takers qualify for the fee waiver can be found at http://sat.collegeboard.org/register/sat-fee-waivers. This variable has only been included in our dataset since 2011. For the graduating cohorts of 2011 and 2012, approximately 20% of the test-takers each year received a fee waiver. We use the fee waiver variable as a proxy for low-income status, as income is the dominant criteria for receiving one. However, just because a test-taker did not receive a fee waiver does not necessarily mean that they are high income. There could be cases of low-income students who did not apply to receive fee waivers because their testing costs were covered by other agencies. While this variable has limitations, and is only a proxy, it does indicate that low-income students are likely underrepresented in the SAT test-taker population compared to higher income students. For example, for the 2011–2012 school year, approximately 35% of MA public school students were officially categorized as "low-income" (meaning they qualified for the federal free or reduced price lunch program).

On the registration questionnaire, test-takers are able to self-identify their race/ethnicity using the following options: (1) American Indian or Alaska Native, (2) Asian, Asian-American, or Pacific Islander, (3) Black or

African-American, (4) Mexican or Mexican-American, (5) Puerto Rican, (6) Other Hispanic, Latino, or Latin American, (7) White, and (8) Other. This is a single-choice/forced-option question: test-takers cannot choose more than one answer. For racial/ethnic analysis of the SAT data, test-takers were grouped into two categories: white and non-white. "White" was defined simply as test-takers who self-identified as "white" for the race/ethnicity question. "Non-white" was defined simply as all other test-takers who responded to the race/ethnicity question (test-takers who did not respond to the race/ethnicity questions were not included in any race/ethnicity analysis). On average, for all of the years covered by our dataset, 96% of test-takers respond to the race/ethnicity question. Similar to the income demographics, white SAT test-takers are overrepresented in comparison to the MA public school student population as a whole. For the 2011–2012 school year, approximately 67% of the MA public school population was officially identified as "white," compared to about 75% of the SAT test-taking population.

STEM interest, for the purposes of this report, has been defined as SAT test-takers' first choice for a college major (see question #21 on the registration questionnaire). As mentioned in the Introduction, we have defined STEM as including the following fields: (1) Agriculture, Conservation, and Natural Resources, (2) Architecture, (3) Biological and Biomedical Sciences, (4) Computer and Information Sciences, (5) Engineering and Engineering Technologies/Technicians, (6) Health Professions and Clinical Sciences, (7) Mathematics and Statistics, (8) Mechanic and Repair Technologies/Technicians, (9) Military Technologies/Technicians, (10) Physical Sciences, (11) Precision Production, and (12) Science Technologies/Technicians. On average, over the years included in our dataset, 86% of test-takers have responded to the question about their first choice for a college major. The SAT college major variable we receive from the College Board is coded with the specific major identifying code each test-taker lists. We then categorize these specific codes into groups of majors (i.e., "computer & information sciences, mathematics & statistics, engineering, and engineering technologies/technicians"), as well as "STEM" or "non-STEM," for our analysis.

The 12 major categories listed above have been collapsed into only 5 primary STEM groups for this report, as follows:

I. "Architecture and Engineering" = Architecture, Engineering, and Engineering Technologies/Technicians
II. "Computers and Math" = Computer & Information Sciences, and Mathematics & Statistics
III. "Health" = Health Professions & Clinical Sciences
IV. "Life & Physical Sciences" = Agriculture, Conservation, & Natural Resources, Biological & Biomedical Sciences, Physical Sciences, and Science Technologies/Technicians
V. "Other STEM" = Mechanic and Repair Technologies/Technicians, Military Technologies/Technicians, and Precision Production

Majors were grouped in this fashion so that information could be presented in a manner parallel to data from other sources, most notably the occupational groups used by the Bureau of Labor Statistics and the American Community Survey.

The SAT asks test-takers to self-report which classes students took during high school and when. For example, a test-taker can list that they took Algebra in 9th grade, Geometry in 10th, Algebra II in 11th, and Pre-calculus in 12th. In addition, a separate question asks test-takers to tally the total number of years of study they have had in general subject areas (i.e., total years of math). The variables for number of years of math and number of years of science are based on responses to the question about total years of study. The response options that test-takers have include: (1) ½ year, (2) 1 year, (3) 2 years, (4) 3 years, (5) 4 years, and (6) more than 4 years. The data we receive from the College Board is coded with the raw responses from each test-taker. We then group the responses into new variables as follows:

I. Math is grouped/recoded into "4 years or more" (total of 4 years and more than 4 years) and "less than 4 years" (total of all other responses)
II. Science is grouped/recoded into "3 years of more" (total of 3 years, 4 years, and more than 4 years) and "less than 3 years" (total of all other responses)

On average, for all of the years covered by our dataset, over 80% of test-takers respond to the questions concerning the total number of years of math, and total number of years of science that they took in high school. We then combine/recode these two variables (years of math and years of science) into a single variable that tallies the number of respondents who report taking both four years or more of math and three years of more of science. The response rate for this combined variable is slightly lower (79%), as some test-takers answer one question, but not the other.

Source 2: Massachusetts Department of Elementary and Secondary Education – Massachusetts Comprehensive Assessment System (MCAS) Scores

These data were based on aggregated scores for all MA public school students as reported by the Massachusetts Department of Elementary and Secondary Education via their School/District Profiles Directory, at http://profiles.doe.mass.edu/.

Source 3: Massachusetts Department of Elementary and Secondary Education – Massachusetts Tests for Educator Licensure Passing Rates

These data were based on the number of test-takers and passing rates for first-time test-takers as reported by the Massachusetts Department of Elementary and Secondary Education at http://www.doe.mass.edu/mtel/results.html/.