**2016 College Success/STEM Program Research Brief**

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**Program Overview**

Mass Insight Education’s College Success/STEM program is a research-based replication program that has been implemented[[1]](#endnote-1) in 98 schools across Massachusetts. The program is designed to dramatically increase low income, diverse, and minority students’ participation and performance in Advanced Placement® (AP®) math, science, and English courses, leading to increased college attendance, persistence, and success in college[[2]](#endnote-2). First started in 2008 through a grant from the National Math and Science Initiative, the program has expanded each year through a strategic mix of private and public funding and is now funded in part through the state’s *Advancing STEM through and Advanced Placement Science and Mathematics Program*.

**Increasing Access and Reducing Achievement** **Gaps**. The College Success/STEM program employs a system-based approach that uses multiple levers to drive improvement in teaching and learning[[3]](#endnote-3), leading to increased numbers of students taking advanced coursework and then attending and succeeding in college. The College Success/STEM program is focused on increasing access and success among low income and minority students and thereby reducing persistent achievement gaps between low income and non-low-income students.

**External Evaluation of the**

**College Success/STEM Program**

Since 2011, Mass Insight has contracted for annual external evaluations of the impact of its program and used evaluation data to inform continuous improvement and refinement of program components.

Evaluation data has been collected through eight cohorts of schools, beginning with the first cohort in 2008-09. AP® participation and performance data is available for schools through the 2014-15 school year. Similarly, college success data is available for schools and for students graduating high school through 2014-15.

As a highlight of this research brief, we present college attendance and college persistence data for students from six high school graduating cohorts (SY09 through SY14) inclusive of almost 18,000 students.

The program includes four key program components[[4]](#endnote-4): (1) teacher support; (2) student support; (3) incentives; and (4) program management (e.g., setting goals and benchmarks). Evaluation metrics and indicators have been developed for each program component and are tracked on an annual basis, to ensure that the program is being implemented with fidelity. Information regarding implementation metrics (e.g., student participation in study sessions, teacher training) is available upon request. The following summary of impact data is focused primarily on program outcomes.

**Program Outcomes[[5]](#endnote-5)**

The College Success/STEM program sets performance goals for four key outcomes that define our success in reducing achievement gaps and increasing access to, and successful completion of, advanced coursework among low income and minority students.

* **Expanding Access and Increasing Performance in High School**. In high school, goals and related benchmarks are set for (1) increasing the number and percent of students participating in AP® math, science, or English courses (AP® Participation) and (2) increasing the number and percent of students scoring 3 or higher on an AP® exam (AP® Performance).
* **Achieving College Success**. Mass Insight Education’s theory of action holds that increasing AP® participation and success among greater numbers of students (and especially among low income and minority students) will lead to improved long-term outcomes. College success goals and benchmarks include (1) increasing the number and rate of students attending 2- and 4-year colleges (College Attendance) and (2) increasing the number and rates of students persisting in college (e.g., on track to graduate) or who have graduated from college (College Persistence).

**Program Scope and Participation**

Through 2015-16, 98 schools have implemented Mass Insight’s College Success/STEM program for 2 or more years. An additional 11 schools began implementation in 2016-17. Of these 109 schools, 34 are currently implementing the core program (in 2014-15); 44 are sustaining the work in partnership with Mass Insight; and 31 exited after 3+ years in the program, but continue to implement portions of the program on their own.

**Table 1. Number of Mass Insight Program schools by cohort year and overall, 2008-09 to 2016-17.**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 08-09 | 09-10 | 10-11 | 11-12 | 12-13 | 13-14 | 14-15 | 15-16 | 16-17 |
| Number of schools by cohort year | 8 | 11 | 25 | 7 | 11 | 13 | 14 | 9 | 11 |
| Number of total schools | 8 | 19 | 44 | 51 | 62 | 75 | 89 | 98 | 109 |

**Report Organization and Evaluation Questions**

The evaluation report is organized is two parts, focusing on the following research questions:

**Part 1: AP Participation and Performance in High School**

1. What is the impact of Mass Insight’s College Success/STEM program on:
   1. students’ access to AP® STEM courses in high school, particularly low income and minority students?
   2. students’ performance on AP® STEM courses in high school, particularly low income and minority students?
2. To what extent has the College Success/STEM program contributed to statewide gains in students’ access to and performance on AP® STEM exams/courses?

**Part 2: College attendance, persistence, and completion**

1. What is the impact of Mass Insight’s College Success/STEM program on the percentage of students attending college in the fall after high school graduation?
2. What is the impact of Mass Insight’s College Success/STEM program on the percentage of students persisting and/or graduating from college after 4 years?
3. How do the college enrollment, persistence, and completion rates of Mass Insight students compare with AP® course-takers nationally?
4. What is the relationship between students’ performance in AP® courses and college attendance and completion, in 2- and 4-year colleges?

**Part 1. AP® Participation and Performance in High School**

Beginning in 2008-09, Mass Insight Education's College Success/STEM initiative has served over 31,000 students in over 100 schools. The impact of the initiative is immediate and sustainable, especially in urban mid- and high-need schools[[6]](#endnote-6) with high proportions of African American and Hispanic students.

**Key Finding #1: The College Success/STEM program leads to immediate, significant, and sustained growth in students’ access to and performance in math, science, and English AP® courses,** **especially among low income students, minority students, and in Gateway Cities.**

In the first two years of implementing the College Success/STEM program, schools exhibit a 2- to 3-fold increase in the number of math, science, and English AP® exams taken and typically double the number of qualifying scores. After three years in the program, schools have not only increased the number of exams taken and scoring a 3 or better, but continue to sustain these increases over time, even when the school exits the initiative after 3 or 4 years (See exhibits 1 and 2 for data).

After three years and sustained over time:

* Among African American students, the number of exams taken triples (from 150 to 400 exams taken per 1000 students) and the number of exams scoring 3 or higher more than triples in size, from 30 to 100 exams scoring 3 or higher, per 1000 students.
* Among Hispanic students, the number of exams taken almost triples (from 91 to 243 exams taken per 1000 students) and the number of exams scoring 3 or higher increases from 23 to 66 per 1000 students.
* Among high need schools (schools with a low-income population of 65% or higher), the number of exams more than doubles (from 120 to 275 exams taken per 1000 students) and the number of exams scoring 3 or higher increases from 60 to 114 per 1000 students. And notably, the rate of exams scoring a 3 or higher in MIE high need schools is higher than the rate of exams being taken, in non-MIE high need schools.

Performance: Scores of 3 or higher

**Key Finding #2: Since 2009, Mass Insight schools have been a significant driver of statewide gains in students’ access to and performance in math, science, and English AP® courses. Between 2009 and 2015, gains in AP® exam-taking and the number of exams scoring 3 or higher in Mass Insight schools exceeded similar gains made in non-Mass Insight schools**

Students’ participation and success in AP® STEM and English courses has increased throughout Massachusetts over the past 8 years, for all students and for minority students (defined here as African American and Hispanic students). Mass Insight Education schools have made a large contribution to the state’s overall increase in students’ AP® participation and success. As illustrated in Chart 1, Mass Insight Education schools have dramatically increased the number and percent of students taking AP® STEM and English courses. Increases are particularly notable among African American and Hispanic students. For instance, Mass Insight schools experienced a 395 percent increase in the number of exams taken by African American and Hispanic students from 2008 to 2015, and a 470 percent increase in the number of exams scoring a 3 or better, far outpacing the percent increase made among non-Mass Insight schools. Similarly, Mass Insight schools experienced a 463 percent increase in the number of exams taken by low income students from 2008 to 2015, and a 561 percent increase in the number of exams scoring a 3 or better.

**Key Finding #3: Annually, Mass Insight schools provide minority and low income students with increased access to AP® courses and positively contribute to the state’s overall increase in AP® course taking and performance.**

In 2014-15, Mass Insight schools accounted for 33% of all math, science, and English AP® exams taken in the state and 23% of exams scoring a 3 or greater. Keeping in mind that Mass Insight’s focus is on increasing access and performance among minority and low income students, we see that Mass Insight is accounting for a disproportionally higher number of exams taken and scoring 3 or greater among low income students by partnering with high need schools, increasing students’ access, and improving teachers’ instructional practices to support students that may not have taken AP® courses in other schools.

In 2014-15, Mass Insight schools accounted for:

* 54 percent of all exams taken by Hispanic students in Massachusetts.
* 54 percent of all exams taken by African American students in Massachusetts.
* 61 percent of all exams taken by low income students in Massachusetts.

In 2014-15, Mass Insight school accounted for:

* 39 percent of the exams scoring a 3 or greater taken by Hispanic students.
* 41 percent of the exams scoring a 3 or greater taken by African American students.
* 53 percent of the exams scoring a 3 or greater taken by low income students.

Table 2 (below) presents the overall number of AP® exams taken and the number of exams scoring 2 or 3 or higher, for all public schools in Massachusetts, for Mass Insight schools and for non-Mass Insight schools in 2014-2015, and serves as the basis for key findings #3 and #4.

**Table 2. AP® participation and performance Mass Insight school and non-Mass Insight schools, 2014-15**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | # of Math, Science, and English AP® exams… | | |
|  |  | taken | scoring a 2 or greater | scoring a 3 or greater |
|  | All schools (360)  All student groups | 55569 | 47057 (84.7%) | 35385 (63.7%) |
| Non-Mass Insight Schools | All students | 37183 | 33322 (89.6%) | 27115 (72.9%) |
| White students | 26236 | 23928 (91.2%) | 19607 (74.7%) |
| Hispanic students | 1761 | 1282 (72.8%) | 834 (47.4%) |
| African American students | 1279 | 911 (71.2%) | 527 (41.2%) |
| Low Income students | 4197 | 3143 (74.9%) | 1983 (47.2%) |
| Mass Insight Schools (n=89) | All students | 18386 | 13735 (74.7%) | 8270 (45.0%) |
| White students | 11917 | 9760 (81.9%) | 6301 (52.9%) |
| Hispanic students | 2079 | 1200 (57.7%) | 525 (25.3%) |
| African American students | 1528 | 824 (53.9%) | 363 (23.8%) |
| Low Income students | 6684 | 4367 (65.3%) | 2276 (34.1%) |

**Key Finding #4. Significant achievement gaps in AP® course-taking and performance persist across the state, despite efforts by Mass Insight and Massachusetts to increase low income and minority students’ access to high quality teaching and AP® STEM courses.**

The data and findings provided in findings #1, #2, and #3 demonstrate that the College Success/STEM program has increased students access to and performance in AP® courses, especially among low income and minority students. Non- Mass Insight schools across the commonwealth have made smaller, but still important gains in increasing access and performance among low income students. Yet despite these gains, achievement and performance gaps persist, not only AP® course-taking, but in statewide measure of student performance.

Two points from the data are particularly important:

1. Significant equity gaps remain between low-income and non low-income students among students from diverse background. Hispanic and African American students continue to be underrepresented in their access to AP® courses. In Massachusetts, Hispanic/Latino students are ~12.5% of all high school graduates yet account for only ~6.9% of all STEM/English exams taken. Similarly, African American students are ~8.5% of all high school graduates in the state yet account for just ~5.1% of all STEM/English exams taken[[7]](#endnote-7).
2. The success rate—the percent of exams taken that score a 3 or better—among low income and minority students continues to be much lower than the success rate among all students. Among non-Mass Insight schools, nearly 75 percent of exams taken by White students score a 3 or greater, compared to 47 percent of exams taken by Hispanic students and 41 percent of exams taken by African American students. A similar gap is evident in Mass Insight schools, although the overall success rates are substantially lower, due to Mass Insight’s push to increase access and the resultant tradeoff[[8]](#endnote-8) between access and overall rates of exams receiving a qualifying score.

**Part 2. College Attendance, Persistence, and Completion**

There are **three crucial junctures**for students to navigate as they move through high school and college—successfully graduating from high school, applying to and attending college, and then persisting through their second and third year of college and/or graduating. Shining a light on these three steps and figuring out strategies to help students successfully transition into and through college is critical if Massachusetts is to close achievement gaps so that the “new normal” is one in which all students are prepared to succeed in college. Mass Insight Education sets annual College Success goals and benchmarks for AP® exam taking, college attendance, college persistence, and college graduation, for each high school involved in the program and for the overall College Success/STEM program. The goals and benchmarks are intentionally ambitious and mirror the college attendance and persistence rates attained in more wealthy and suburban school districts. Meeting and exceeding these goals are possible and, when achieved, will dramatically improve lifelong learning and economic prosperity among Massachusetts’ students, families, and communities.

**College Success Benchmarks**

Schoolwide benchmarks

* High School Graduation: 90 percent of incoming 9th graders will graduate from high school in 5 years.

For Mass Insight Students

* College Attendance: 80 percent of Mass Insight students graduating high school will attend a 2- or 4-year college.
* College Persistence and Completion: 85 percent of Mass Insight students attending college will graduate or persist through 4 years of college.

To examine the impact of the College Success/STEM program, Mass Insight has carefully documented how its students—those taking one or more AP® courses while in high school—transition to and through college. The full data set includes over 31,000 students who have collectively taken over 60,000 exams.

|  |  |
| --- | --- |
| **The full data set (08-09 SY to 14-15 SY)**   * 104 schools * 31,514 discrete students * 60,293 AP® exams taken (students take approximately 2.1 exams while in HS) | **The analysis presented here is based on:**   * 80 schools * 17,912 discrete students who graduated high school between 2009 and 2014 and for whom we could access college data (this represents 88% of 20,252 students in our database, for these years.) |

Tracking students from high school into and through college allows us to examine the relationship between students’ AP® course taking and performance and key outcomes, such as overall college attendance and persistence, by type of college attended (2- or 4-year), and type of degree earned. We can also examine whether the College Success/STEM program contributes to a school’s overall rates of college attendance and persistence, for all student (not simply students taking AP® courses).

Data on college attendance and persistence is presented below (in Table 3) and in additional detail in [Exhibit 3](#Exhibit3_CollegeData), which together serve as the basis for the key findings and observations. Table 3 presents college attendance and persistence data[[9]](#endnote-9) for:

* Mass Insight Education students taking one or more AP® courses.
* A national sample of students having taken AP® courses in high school (Wyatt et al., 2015)[[10]](#endnote-10).

Additionally, Table 3 includes the most recent descriptive data on the college attendance and persistence rates for all students in Massachusetts and nationally.

**Table 3. Summary College Attendance, Persistence, and Completion Rates for Mass Insight Education (MIE) students and selected data sources for comparison and review.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  |  | Of students attending college… | | |
|  | **High School Graduates (#)** | **% attend college** | **% graduated or still enrolled through 4 years** | | **% graduate from college within 6 years** |
| **Mass Insight Education Students (AP Course Takers)** | 2009-2014 cohort (80 schools) | | | | 2009-2011 cohort |
| All Students | 17912 | 80.7% | 86.9% | | 61.6% |
| Hispanic/Latino | 1940 | 74.3% | 80.2% | | 57.6% |
| African American/Black | 2083 | 79.1% | 82.6% | | 50.5% |
| Low Income | 6301 | 77.4% | 81.8% | | 53.4% |
| **National Sample of**  **AP® Course Takers** |  |  | Four-Year Persistence Rate | |  |
| All Students | 438775 | 83.6% | ~85.7% | | ~76.0% |
| Hispanic/Latino | 54358 | 66.4% | ~83.3% | | ~71.2% |
| African American/Black | 30585 | 82.6% | ~85.6% | | ~74.0% |
| Low Income |  | N/A | N/A | | N/A |
| **Massachusetts Data for all students** | (2013-14 HS Graduates) | |  | | (2008 HS Graduates – 65,137 students) |
| All Students | 65540 | 76.2% | N/A | | 63.4% |
| Hispanic/Latino | 8178 | 64.5% | 40.4% |
| African American/Black | 5572 | 74.4% | 42.2% |
| Low Income | 25823 | 65.4% | 43.3% |
| **National (NCES) Data[[11]](#endnote-11) for all students** |  |  |  |  | NCES Data[[12]](#endnote-12) for 4-year college graduation |
| All Students | N/A | 67.1% | N/A | | 59.6% |
| Hispanic/Latino | 63.1% | 53.5% |
| African American/Black | 62.5% | 40.9% |
| Low Income | 52.1% | N/A |

**Key Finding #5: Overall, 81 percent of Mass Insight students attend a 2- or 4-year college. College attendance rates for low income and minority students are approaching 80 percent, our benchmark for college attendance.**

Eighty-one percent of Mass Insight students enroll in a 2- or 4-year college after graduating high school. Of those who enroll in college, 84% attend a 4-year college as their first college. College enrollment rates among White (83.6%) and Asian students (83.4%) are slightly higher than African American (79.1%) and Hispanic (74.3%) enrollment rates. Similarly, the enrollment rate for low income students (77.4%) is slightly lower than for non low-income students (83.9%).

While benchmarks for college attendance have not yet been fully achieved for African American, Hispanic, and low-income students, the data suggests that these benchmarks are truly attainable. Indeed, many individual schools are attaining these benchmarks, showcasing the importance of setting high expectations for all students.

**Key Finding #6: Overall, 87 percent of Mass Insight students are persisting in and/or graduating**[[13]](#endnote-13) **from college. College persistence rates for low income and minority students are over 80 percent, nearly meeting the benchmark of 85 percent.**

Of Mass Insight students attending college, 87% have graduated from college or are still enrolled in school. Over 80 percent of low income and minority students are persisting in or have graduated from college and over 6 out of every 10 low income students graduating from high school go on to graduate or persist through 4 years of college. Exhibit 3 (Tables 4, 5, and 6) provides a detailed display of Mass Insight students’ rates of college attendance and persistence among different student populations, and by highest score attained on one or more AP® exams.

**Analysis**

Nationally, 67 percent of high school graduates attend a 2- or 4-year college and 59 percent of college attendees go on to graduate from a 2- or 4-year college within 6 years (NCES data, Table 3). In Massachusetts, 76 percent of students graduating high school attend college, and 63 percent of college attendees go on to graduate from college. The college going rates of minority and low-income students in Massachusetts are gradually increasing (currently ranging between 65 and 75 percent), yet college graduation rates remain low; only 1 out of 5 low income students graduating from high school attend and graduate from college. In contrast, 3 out of 5 Mass Insight low income students attend and graduate (or persist) through 4 years of college.

While Mass Insight’s students do not represent all students attending college, Mass Insight’s College Success/STEM program is demonstrating that college attendance and graduation rates of 80 percent and higher are achievable and sustainable. It is important to note that many of the students taking AP® courses in Mass Insight’s urban sites (Boston, Springfield, Worcester, Chelsea, Fall River, New Bedford, and other sites across the state) are not “typical” AP® students, in that Mass Insight is dramatically increasing students’ access to AP® coursework and high quality instruction. **The high rates of college success—attendance, persistence, and success—among students that may not have had access to or taken AP® courses are evidence of untapped capacity and potential among our schools, teachers, and students**.

**Students “not likely to take AP”**

When schools begin the College Success/STEM program, one of their first actions is to remove requirements (such as teacher recommendation, grades, or PSAT scores) that restrict students’ access to AP® courses, thereby increasing students’ access to advanced classes and teaching. Highly effective Mass Insight schools not only remove barriers that restrict students’ access, but also actively target, recruit, and prepare students who would not likely be encouraged to take AP® courses, or even have access to such courses. These “not-likely to take AP” students are now attending and persisting in college at rates that far surpass comparable students across the state.

**Key Finding #7: In the aggregate, Mass Insight students enter high school with significantly lower scores on standardized assessments compared to AP® students across the country.**

To take a closer look at how Mass Insight students are doing in relation to a national sample of AP® course-takers, it is important to first examine the comparability of Mass Insight students with AP® course-takers across the nation. As noted earlier, a major goal of the College Success/STEM program is to increase low income and minority students’ access to AP® courses. Thus, Mass Insight students tend to include students that may not have had access to college track courses in middle school and in 9th grade, the effect of which can be documented by measures of student achievement, such as the PSAT[[14]](#footnote-1). Table 4 details the average PSAT scores for over 12,000 Mass Insight students in Critical Reading (CR), Math (M), and Writing (W) and the average PSAT score for AP® course-takers nationally (Zhang, Patel, & Ewing, 2014).

**Table 4. Average PSAT scores for Mass Insight students and all AP® course-takers in the country.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Critical Reading** | **Math** | **Writing** | **Combined (CR+M)** | **Combined (CR+M+W)** |
| **Mass Insight Students** |  |  |  |  |  |
| All | 47.48 | 49.72 | 47.17 | 97.20 | 144.37 |
| White | 49.55 | 51.20 | 49.13 | 100.76 | 149.88 |
| Black | 42.72 | 44.65 | 42.15 | 87.37 | 129.53 |
| Hispanic | 43.44 | 45.23 | 42.65 | 88.67 | 131.32 |
| Low Income | 44.06 | 46.95 | 43.30 | 91.00 | 134.30 |
| Not Low Income | 49.74 | 51.57 | 49.38 | 101.31 | 150.69 |
|  |  |  |  |  |  |
| **National Sample of AP Course Takers** | 52.23 | 54.26 | 51.29 | 106.49 | 157.78 |
| *Standard Deviation* | *9.98* | *10.26* | *10.15* |  |  |

**The data clearly shows that Mass Insight students that take AP courses have lower PSAT scores than a comparable national sample of AP course-takers, providing strong evidence that Mass Insight schools are dramatically increasing students’ access to advanced course work, especially for low income and minority students.** If Mass Insight schools were serving students similar in educational background and income to national AP® course-takers (e.g., students that may have been in gifted and talented tracks and granted access to accelerated course work in elementary and middle school), then we would expect the average PSAT scores of Mass Insight students to mirror the PSAT scores of AP® course-takers nationally. Instead, the average PSAT scores for Mass Insights’ Black, Hispanic, and low-income students are nearly a full standard deviation lower than PSAT scores for AP® course-takers across the country.

**PSAT (CR) score distribution, Mass Insight Low Income students and national AP course-takers**

The average PSAT score (in Critical reading, Writing, and Math) of a Mass Insight student ***is lower than 84 percent of the PSAT scores taken by AP course-takers across the country***. The chart shown here displays the real distribution of Mass Insight PSAT (CR) scores (red line, with a mean of 44.06), the national distribution of PSAT (CR) scores for AP course-takers (blue line), and one standard deviation (gray shaded area) for AP course-takers, accounting for 68.2 percent of all scores among AP course-takers nationally.

**Key Finding #8: Despite having lower PSAT scores (and thus statistically less likely to score a 3 or higher in AP courses), Mass Insight students are attending, persisting, and completing college at rates comparable to the college completion rates of AP course-takers across the nation.**

Drawing upon the data shared in Table 3 (summarized below), Mass Insight minority students and all students are nearing, or surpassing, the college completion rates of AP® course-takers nationally.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | **A** | **B** | **A\*B** |
| **Mass Insight Education Students (AP Course Takers)** | **High School Graduates (#)** | **% attend college** | **% graduated or still enrolled through 4 years** | **College Completion (Column A \* Column B)** |
| All Students | 17912 | 80.7% | 86.9% | 70.1% |
| Hispanic/Latino | 1940 | 74.3% | 80.2% | 59.6% |
| African American/Black | 2083 | 79.1% | 82.6% | 65.3% |
| Low Income | 6301 | 77.4% | 81.8% | 63.3% |
| **National Sample of AP® Course Takers** |  | | | |
| All Students | 438775 | 83.6% | ~85.7% | ~71.6% |
| Hispanic/Latino | 54358 | 66.4% | ~83.3% | ~55.3% |
| African American/Black | 30585 | 82.6% | ~85.6% | ~70.7% |

* **Nearly 60 percent (3 out of every 5) of Mass Insight Hispanic students who graduate from high school attend and persist in (or graduate from) college through 4 years.** Nationally, only 55 percent of Hispanic AP course-takers attend and persist or graduate from college.
* **Over 65 percent of Mass Insight African American students who graduate from high school attend and persist in (or graduate from) college through 4 years.** Nationally, just over 70 percent of African American AP course-takers attend and persist or graduate from college. Most of Mass Insight’s African American students attend non-magnet schools in the Boston Public School (BPS) district. Traditionally, students doing well academically tend to apply for and attend one of BPS’ three “Exam” schools, and in particular Boston Latin and Boston (need name). Boston Latin and (Name) account for XX percent of the African American AP exam taking in Boston.

**Key Finding #9. Mass Insight minority students scoring a 1 or 2 attend college at higher rates than comparable students scoring a 1 or 2 on an AP® exam.**

Key finding #4 highlighted the fact that minority and low-income students attending Mass Insight’s schools tend to have lower success rates (e.g., less likely to score a 3 or higher on an AP® exam) than students in non-Mass Insight schools. As Mass Insight schools take actions to open and increase enrollment of students not typically targeted for AP®, there is often a slight decline in the overall percentage of students taking AP® that score a 3 or higher. Basically, more students are exposed to AP® STEM courses and high quality teaching, but these students may not always perform well on AP® exams. However, there is growing evidence that being exposed to advanced course work, and scoring a 1 or 2 on an AP® course, may have a positive impact on students’ attending and succeeding in college (CITE).

One way to consider the impact of the College Success/STEM program on students not likely to take AP® is to examine the college attendance and persistence rates of students scoring a 1 or 2 on an exam, and how Mass Insight students compare with the national sample of AP® course-takers scoring a 1 or 2.

Drawing upon data provided by the College Board, there is evidence that minority students attending Mass Insight schools, and scoring a 1 or 2 on an AP® exam, attend college at rates comparable to the national sample of AP® course-takers scoring a 1 or 2.

* Among Mass Insight’s minority students scoring a 1 or 2 on an AP® exam, 80.5% of African American students go on to enroll in college and 77.4% of Hispanic students enroll in college. Nationally, 78.5% of the African Americans scoring a 1 or 2 on an AP® exam enroll in college and only 61.0% of Hispanic students scoring a 1 or 2 go onto enroll in college.

**Key Finding #10: Mass Insight students attending a 4-year college are more likely to persist and graduate in college compared to students attending a 2-year college.**

Students who first attend a 4-year college are significantly more likely to persist and graduate from college, compared to students first attending a 2-year college. The 4-year persistence rate for students attending a 4-year college is 90%, compared to 68% for students first attending a 2-year college. It is important to note that the data on 2-year college students includes those students that transfer to 4-year colleges.

**Key Finding 11: Students with a high score of 2 on one or more AP® exams are just as likely to attend and persist in a 4-year college as students with a qualifying score of 3 or greater.**

Overall, students that score a 3 or greater on at least one AP® exam while in high school tend to enroll

and persist in college at somewhat higher rates compared to students scoring a 1 or 2 (see Exhibit 3). What is interesting and potentially important to acknowledge, however, is that students that attain a high score of 2 on one or more *AP® exams are just as likely to attend and persist in a 4-year college as students with a qualifying score of 3 or greater.*

Among Mass Insight schools, the significant impact of scoring a 1 or 2 is most pronounced among students attending 2-year colleges. Students scoring a 1 or 2 who attend a 2-year college tend to graduate or persist at much lower rates (~65%) compared to counterparts attending 4-year colleges, who persist at 87%.

**APPENDIX A. SUMMARY OF COLLEGE DATA**

The following table provides summary demographic information (in the left two columns) and college enrollment and persistence rates for students taking one or more Advanced Placement courses at one of 80 Mass Insight Education high schools[[15]](#endnote-14). College persistence is a measure of whether a student (a) graduated from college OR (b) is still enrolled in college. The college persistence metric used in this analysis is comparable to the 4-year persistence metric used by the College Board.

**Table 4. Summary Demographic, College Enrollment, and College Persistence data, Mass Insight Education schools[[16]](#endnote-15)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Descriptive Summary Data** | |  | **2009 to 2014 HS Graduates (n=17912 students)** | | **2009 to 2011 HS Graduates**  **(n=4557)** | | |
| Number | % of Total |  | Attended College | Graduated or still enrolled  (# and %) | Attended College | Graduated or still enrolled  (# and %) | Graduated  (# and %) |
| 17912 | 100% | **All Students** | 14447 | 12552 | 4059 | 3344 | 2502 |
| **80.7%** | **86.9%** | **89.1%** | **82.4%** | **61.6%** |
| 10482 | 58.5% | **Female** | 8504 | 7581 | 2391 | 2031 | 1580 |
| **81.1%** | **89.1%** | **90.2%** | **84.9%** | **66.1%** |
| 7404 | 41.3% | **Male** | 5942 | 4971 | 1667 | 1313 | 922 |
| **80.3%** | **83.7%** | **88.0%** | **78.8%** | **55.3%** |
| 6301 | 35.2% | **Low Income** | 4875 | 3988 | 1548 | 1203 | 827 |
| **77.4%** | **81.8%** | **86.9%** | **77.7%** | **53.4%** |
| 10975 | 61.3% | **Not Low Income** | 9206 | 8248 | 2488 | 2128 | 1667 |
| **83.9%** | **89.6%** | **91.8%** | **85.5%** | **67.0%** |
| 10872 | 60.7% | **White** | 9086 | 8052 | 2409 | 2045 | 1582 |
| **83.6%** | **88.6%** | **91.8%** | **84.9%** | **65.7%** |
| 2083 | 11.6% | **Black** | 1647 | 1361 | 574 | 439 | 290 |
| **79.1%** | **82.6%** | **88.4%** | **76.5%** | **50.5%** |
| 1755 | 9.8% | **Asian** | 1463 | 1295 | 501 | 422 | 328 |
| **83.4%** | **88.5%** | **87.6%** | **84.2%** | **65.5%** |
| 1940 | 10.8% | **Hispanic** | 1442 | 1156 | 417 | 326 | 240 |
| **74.3%** | **80.2%** | **87.4%** | **78.2%** | **57.6%** |
|  |  | **By High Score** |  |  |  |  |  |
| 1825 | 10.2% | **High Score=5** | 1635 | 1545 | 419 | 382 | 303 |
| **89.6%** | **94.5%** | **88.2%** | **91.2%** | **72.3%** |
| 2627 | 14.7% | **High Score=4** | 2302 | 2141 | 610 | 546 | 438 |
| **87.6%** | **93.0%** | **91.0%** | **89.5%** | **71.8%** |
| 4159 | 23.2% | **High Score=3** | 3509 | 3182 | 941 | 822 | 628 |
| **84.4%** | **90.7%** | **89.8%** | **87.4%** | **66.7%** |
| 4677 | 26.1% | **High Score=2** | 3719 | 2968 | 3163 | 798 | 584 |
| **79.5%** | **79.8%** | **85.0%** | **80.9%** | **59.2%** |
| 3832 | 21.4% | **High Score=1** | 2803 | 2177 | 1032 | 750 | 518 |
| **73.1%** | **77.7%** | **88.1%** | **72.7%** | **50.2%** |
| 792 | 4.4% | **Did not Take Exam** |  |  |  |  |  |

**Supplemental Displays and Exhibits**

Exhibit 1

Three graphs: AP Participation and Performance by school-based need status.

Participation

Performance: Scores of 2 or higher

Performance: Scores of 3 or higher

Exhibit 2

Two graphs: AP Participation and Performance by race/ethnicity

**Exhibit 3. Descriptive Data on Mass Insight Students Attending 2- and 4-year colleges**

**Table 5. College enrollment and persistence in 2- and 4-year colleges, MIE students**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Descriptive Summary Data** | |  | **2009 to 2014 HS Graduates (n= 17912 students)** | | **2009 to 2011 HS Graduates (n=4557)** | | |
| Number | % of Total |  | Attended College | Graduated or still enrolled  (# and %) | Attended College | Graduated or still enrolled  (# and %) | Graduated  (# and %) |
| 17912 | 100% | **All Students** | 14447 | 11734 | 4059 | 3502 | 2502 |
| **80.7%** | **86.9%** | **89.1%** | **82.4%** | **61.6%** |
|  | 19.4% | Did not Attend | 3466  did not attend |  | 498  did not attend |  |  |
|  | 12.8% | Attend 2-year | 2293 | 1561 | 595 | 362 | 226 |
| **68.1%** | **60.8%** | **38.0%** |
|  | 67.9% | Attend 4-year | 12154 | 10991 | 3464 | 2982 | 2276 |
| **90.4%** | **86.1%** | **65.7%** |

**Table 6. College enrollment and persistence in 2- and 4-year colleges by Highest Score attained on an AP® exam.**

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | # Attend | % Graduated or  still enrolled |
| High Score=5  N=1635 | Attend 2-year | 83 | 84.3% |
| Attend 4-year | 1552 | 95.0% |
| High Score=4  N=2302 | Attend 2-year | 154 | 87.7% |
| Attend 4-year | 2148 | 93.4% |
| High Score=3  N=3509 | Attend 2-year | 376 | 75.0% |
| Attend 4-year | 3133 | 92.6% |
| High Score=2  N=3719 | Attend 2-year | 700 | 68.0% |
| Attend 4-year | 3019 | 89.0% |
| High Score=1  N=2803 | Attend 2-year | 758 | 61.1 % |
| Attend 4-year | 2045 | 83.8% |
| Did Not Take | Attend 2-year | 222 | 60.8% |
| Attend 4-year | 257 | 81.3% |

Endnotes

1. **Implementation** is 2+ years of program involvement. [↑](#endnote-ref-1)
2. **The Advancing College Success STEM Program Theory of Action**

   The **Advancing College Success STEM Program** endeavors to close achievement gaps and improve college readiness and success in STEM through a systems-based approach that uses multiple levers to drive improvement.

   **On a programmatic level**, Mass Insight Education is replicating a research-based initiative with defined program elements that incorporate multiple levers for changing teacher and student behaviors and that is linked with specific measurable goals and targets to gauge progress. Interested schools submit a competitive proposal to participate. Once accepted, participating schools enter a ***performance partnership*** with Mass Insight Education that articulates expectations for the partnership and sets goals for program participation. Teachers receive 7 to 9 days of teacher training and students participate in up to 18 additional hours of study sessions during the school year. Teacher and student incentives, as awards for participation and success on AP exams, supplement the teacher and student support and serve as an additional lever for change.

   **At a strategic level**, Mass Insight Education employs strategies designed to ensure the scalability and sustainability of the program within and across multiple schools. In doing so, Mass Insight Education has intentionally integrated strategies that characterize successful reform efforts, including Massachusetts’ own effort to raise academic standards.

   A significant infusion of national investment, more than $16 million through 2013, will have been used to jumpstart the Advancing College Success STEM program in Massachusetts. In 2013, Mass Insight Education transitioned to in-state public/private financing. Mass Insight Education’s initial infusion of funding, combined with its intensive and ongoing focus on goals and measuring progress, has positioned Mass Insight to successfully expand to new schools and sustain efforts in schools demonstrating success. [↑](#endnote-ref-2)
3. **The following is the logic model** for the program:  [↑](#endnote-ref-3)
4. **Key Program Components**

    [↑](#endnote-ref-4)
5. **Measuring Program Outcomes**

   **AP® Participation:** The number and percent of students participating in AP® math, science, or English AP® courses. Participation rates are displayed using a standard metric of “XX number of exams taken per 1000 students in the school” which allows for comparisons across schools of different sizes.

   **AP® Performance:** (the number and percent of students scoring 3 or higher on an AP® exam. Performance rates are displayed using a standard metric of “XX number of exams scoring a 3, 4, or 5 per 1000 students in the school” which allows for comparisons across schools of different sizes.

   **College Attendance:** The number and percent of students graduating high school that attend a 2- or 4- year college within 16 months of graduating high schools

   **College Persistence:** The number and percent of students attending college who are still enrolled in college or who have graduated from a 2- or 4-year institute of higher education. [↑](#endnote-ref-5)
6. A mid-need school is a high school with a low income student population of between 35% and 65%. A high need school is a high school designated as Level 3, 4, or 5 in the state accountability system or a school with greater than 65% low income students. [↑](#endnote-ref-6)
7. Per Massachusetts’ statewide data in 2015-16 (<http://profiles.doe.mass.edu/profiles/student.aspx?orgcode=00000000&orgtypecode=0&>) 62.7% of the student population is White, 18.6% is Hispanic, 8.8% is African American, and 6.5% is Asian. The data on high school graduates attending college comes from 2013-14 data. Statewide, the population of Hispanic students is increasing. [↑](#endnote-ref-7)
8. **The tradeoff—Access for Performance.** Increasing access to AP® courses tends to have an inverse relationship with the rate at which students taking AP® courses score a 3 or higher on the AP® exam. In Mass Insight Education schools, minority and low income students are more likely to take an AP® course, compared to similar students in non-Mass Insight schools; however, students in non-MIE schools that take an AP® course are, in turn, more likely to achieve a qualifying score than students in MIE schools. For instance, 47% percent of the exams taken by Hispanic students in non-MIE schools score a 3 a higher, compared to only 25% of the exams taken by Hispanic students in MIE schools.

   By dramatically increasing AP® participation, Mass Insight increases access and opportunity to more low income and minority students. The tradeoff, however, is that low income and minority students taking AP® courses are less likely to achieve a qualifying score; as participation rates increase, performance rates tend to decline. There are, however, several MIE schools that have increased AP® participation while maintaining, or even improving performance rates. These schools will be profiled in the full College Success Evaluation Report. [↑](#endnote-ref-8)
9. **Mass Insight Education (MIE) college attendance and persistence data (MIE data**): This sample is comprised of the students taking one or more AP® STEM or English courses in a MIE program school. Based on Mass Insights’ emphasis on increasing enrollment, the students in the MIE sample include a higher percentage of low income and minority students taking AP® courses, compared to the national sample of students taking AP®. Specifically, the MIE sample includes many students that would not likely have taken AP®, if attending a non-Mass Insight school.

   **Massachusetts’ college attendance and persistence for all students and subgroups (Massachusetts data**): Inclusive of all students graduating from a public high school in Massachusetts. By default, this data includes all students taking AP® courses and those not taking AP®. Thus, we would expect the overall state college attendance and persistence rates for all college attendees in Massachusetts to be lower than the MIE rates.

   **National (NCES) data on college attendance and persistence (National data):** This data is inclusive of all students graduating high school from all states included in the NCES data set. Like the data from Massachusetts, this data includes all students taking AP® courses and those not taking AP®. Likewise, we would expect the overall national college attendance and persistence rates to be lower than the MIE rates.

   **National sample of High School graduates having taken AP courses in high schools (AP Course Takers):** This data set comes from the College Board’s 2016 study analyzing the college outcomes of students taking AP® courses and Dual Enrollment. The data is based on a national sample of students taking the SAT that graduated High School in 2006 and presents data on college enrollment, college persistence (e.g., 4-year persistence) students taking AP® courses, by the highest AP® score attained by students in high school.

   **National sample of High School graduates taking the SAT but not taking AP courses, adjusted by income, ethnicity, and SAT (Comparison Sample of non-AP Course Takers):** This data set also comes from the College Board’s 2016 study analyzing the college outcomes of students taking AP® courses and Dual Enrollment. As part of the study, the College Board examined students not taking AP® courses and determined a hypothetical college persistence rate for these students, adjusting for income, ethnicity, and SAT score. [↑](#endnote-ref-9)
10. Wyatt, J. N., Patterson, B. F., & Di Giacomo, T. (2015) *A Comparison of the College Outcomes of AP® and Dual Enrollment Students. College Board; the sample of students includes students that took the SAT*. (College Board Research Report No. 2015-3). New York: The College Board. Retrieved from: http://research.collegeboard.org/sites/default/files/publications/2015/10/a-comparison-of-the-college-outcomes-of-ap-and-dual-enrollment-students.pdf.pdf [↑](#endnote-ref-10)
11. See: <https://nces.ed.gov/fastfacts/display.asp?id=51>, <https://nces.ed.gov/programs/digest/d15/tables/dt15_302.20.asp>, and <https://nces.ed.gov/programs/digest/d15/tables/dt15_302.30.asp>. [↑](#endnote-ref-11)
12. See: <http://nces.ed.gov/programs/digest/d15/tables/dt15_326.10.asp> and <http://nces.ed.gov/programs/coe/indicator_ctr.asp>. [↑](#endnote-ref-12)
13. Note: College persistence is defined as students that have graduated or are still enrolled in college. In previous studies, we have defined “persistence” as persisting through 2 years of college. Based on our ongoing analysis of college data, many students first attend a 2-year college and then go on to attend a 4-year college, sometimes having received an associated degree but sometimes not. Additionally, many students are taking 5, 6, or even 7 years to graduate from college. To more accurately represent the persistence rate of students, we have redefined our measure of persistence, to include students that have graduated from a 2- or 4-year college OR who are still enrolled in college. Raw measures of 4-year (or even a 6-year) graduation rates is not as accurate or meaningful as in the past. [↑](#endnote-ref-13)
14. The PSAT (formally, the preliminary SAT/National Merit Scholarship Qualifying Test) is administered by the College Board and is typically taken by 10th graders as preparation for the SAT. [↑](#footnote-ref-1)
15. A high school that is participating in the Mass Insight Education’s College Success Achievement Program (formally known as the Mass Math + Science Initiative. The 80 schools included in this analysis are schools involved in the initiative between 2009 and 2014. [↑](#endnote-ref-14)
16. Through the 2014-15 SY, 26,591 students have taken one or more AP courses and graduated from Mass Insight partner high school.

    The data in Table 4 focused on 17,912 discrete students that graduated high school between 2009 and 2014 for whom we have valid dates of birth (DOBs), as needed to collect college data from the National Student Clearinghouse (NSC). Also included is data on a cohort of student graduating high school in 2009, 2010 or 2011 (displayed in the right three columns) that allows us to examine preliminary 4-year college graduation rates. [↑](#endnote-ref-15)