

# Mass Math + Science Initiative (MMSI)

United States  
Melanie Winklosky

public school students in Massachusetts passed an AP science exam.

The Mass Math + Science Initiative (MMSI), the state's largest high school math and science program aimed at underserved students, has expanded access to Algebra, college-level Advanced Placement courses in 45 high schools across the Commonwealth. Since 2008, the program has resulted in:

- a doubling of new enrollees in AP classes, with more than 4,800 added and
- a nearly 200% increase in the number of students earning qualifying scores in math, science and English AP exams.

By 2013, the program will engage more than 18,000 high school students annually, greatly increasing their likelihood of college enrollment and completion.



### ABOUT MMSI

Massachusetts is one of six states selected to participate in an innovative program led by the National Math and Science Initiative to address the chronic decline in math and science education in the United States. A five-year, \$30 million initiative, MMSI was organized by **Mass Insight Education** in partnership with the Commonwealth of Massachusetts and private funders.

MMSI drives a school culture of **high expectations** and stimulates increased participation and performance in Advanced Placement courses, particularly among **underserved populations**. It prepares students for college and career success in science, technology, engineering, and mathematics (STEM).

### EXPANDING EXCELLENCE

- Theresa Fisher Smith, Esq.**, President and CEO, Boston Public Schools
- William Dunbar**, President, Mass Insight Education
- John T. Kelle**, President and CEO, Boston Public Schools
- Charles A. Lombardi**, Chief Executive, Boston Public Schools
- George A. Russell**, Executive Vice President, State Street Corporation
- Maria W. Huer**, Director of Program and External Relations, City of Boston
- Joseph Smith**, Senior Vice President, Commonwealth Energy
- Robert Smith**, CEO, Boston Medical Center
- Colleen Sargent**, CEO, Boston Medical Center
- Stephanie Condon**, President, Boston Medical Center
- Michael...**

### OUR PERFORMANCE-BASED, INTEGRATED PROGRAM

MMSI works in partnership with schools and districts to set high expectations and increase student participation and performance in AP classes. The components of the program are:

- Program Agreement:** A signed agreement with every participating school and district that includes annual performance targets.
- Teacher Support:** Up to 75 hours of teacher training per year with ongoing support.
- Student Support:** 18 hours of extra instruction and support, for every student, through industry study sessions.
- Awards:** Privately funded financial incentives for successful students and teachers.

### OUR GOAL: STUDENTS READY FOR COLLEGE

The program's success is evaluated in three measurable ways:

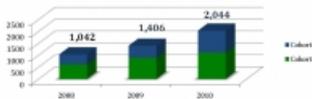
- Increased participation:** greater student enrollment in math, science and English AP courses.
- Increased performance:** more qualifying scores (scores of 3, 4, or 5) on AP examinations.

Nationally, six-year college graduation rates among African American and Hispanic students are 15% to 60% of those of their white counterparts.

- MMSI has helped **Northampton High School** more than double the number of math, science and English AP passing scores in two years, from 177 in 2008 to 366 this year. In AP Physics alone, passing scores have risen from 27 prior to MMSI (2008) to 181 this year. MMSI just over 400 papers and writers, enrollment in AP classes this year is 438.
- Today, **Northam High School's** AP participation is more than six times higher than it was two years ago, with a jump from 59 to 364 enrollments. As a result, AP passing scores soared from 42 to 141 in one year. Last year, Northam High posted only two AP passing scores in math, science and English among Black and Hispanic students, but this year, the school posted 28 passing scores among those student populations.
- Easthampton High School** posted the highest one-year increase in passing scores statewide (among schools with more than five passing scores), with six in 2009 and 41 this year – a seven-fold gain.
- All the **John D. O'Brien School of Math in Science** in Boston, passing scores on AP math, science and English courses among African American and Hispanic students have increased 40% since 2008. Passing scores in AP Chemistry jumped from 9 to 24 since last year; a one-year increase of 166% in one of the most challenging AP courses. This year, five other **Boston Public Schools** have joined MMSI, adding more than 350 AP enrollments to the district-wide AP enrollment increase.
- AP enrollment at **South High Community School** in Worcester more than doubled in two years, from 166 to 348, with passing scores increasing by nearly 45%. In AP Statistics alone, passing scores rose from 6 to 21 in just one year – a 250% increase.
- In one year, **Attitash High School** increased AP passing scores from 93 to 150, and while doubling the number of students passing AP English Language and Composition, 17 out of 25 students achieved passing scores.
- All **Central High School in Springfield**, AP enrollment has increased significantly in three years, from 166 before MMSI to 373 enrollments today. The number of passing scores has increased by more than 50% since 2008.

On the 2010 math, science and English AP exams, students in the 21 MMSI schools posted 2,644 passing scores, compared to only 1,042 passing scores in 2008 – a 94% increase in just two years.

Number of scores of 3 or higher on AP math, science and English exams among MMSI schools (2008-2010)



Between 2008 and 2010, the 21 MMSI schools significantly outperformed two-year state and national increases in passing scores on AP math, science and English exams.

Two-year increases in scores of 3 or higher on AP math, science and English exams (2008-2010)



**Organization type:**  
nonprofit/ngo/citizen sector  
**Budget:**  
\$1 million - \$5 million

**Website:**  
<http://www.massinsight.org>

SHARE

- At risk youth
- Boys' development
- Economic development
- Education
- Education reform
- Girls' development
- Youth development

### Project Summary

#### Elevator Pitch

**Concise Summary:** Help us pitch this solution! Provide an explanation within 3-4 short sentences.

The Mass Math + Science Initiative (MMSI) seeks to change the world by inspiring diverse students to pursue STEM majors and careers by engaging them in academically rigorous courses in high school. In doing so, we are implementing a replicable excellence agenda that addresses both the long-term needs of employers and our moral imperative to close persistent race, income, and gender achievement gaps. MMSI is replicating and scaling a program with proven results. We have doubled passing scores on Advanced Placement math and science exams in two years, from 581 to 1164 in our first 21 schools, while nearly doubling enrollment. As we work with teachers and students, we insist on high standards, and assist them in meeting those standards, both in and out of the classroom.

#### About Project

##### **Problem: What problem is this project trying to address?**

MMSI focuses on schools that serve a higher proportion of low income and minority students than the state average. Because we are a replication program, we have made a concerted effort to prove that the program works across all types of public high schools--large and small, charter and pilot, as well as vocational-technical high schools. MMSI is currently working in 44 high schools across Massachusetts, with 14 of our schools located in our three largest urban centers: Boston, Worcester, and Springfield.

##### **Solution: What is the proposed solution? Please be specific!**

The traditional STEM challenge is that programs focus on a discrete issue without pulling multiple levers simultaneously, leading to marginal impact on student interest and achievement. MMSI is a performance partnership between an outside partner (a non-profit) and a high school. We sign a Letter of Agreement with each school which documents our shared goals and the responsibilities of the school and of MMSI. MMSI is an example of a highly effective public-private partnership, focused relentlessly on student achievement outcomes. MMSI focuses on providing access to AP math, science, and English courses to underserved students, and we target schools with a higher percentage of low income and minority students than the state average. One disheartening statistic illustrates the challenge and the rationale for the initiative: In 2008, only 65 African American public school students in Massachusetts passed an AP science exam. By ensuring that minority students have access to AP courses, and by supporting their achievement, MMSI partners with schools to ensure that diverse students are prepared for future STEM careers. Across 21 MMSI schools, the number of minority students who took an AP exam increased by 48% (from 285 to 542), and the number of minority students who received a qualifying score on an AP exam increased by 46% (from 68 to 126).

#### Impact: How does it Work

##### **Example: Walk us through a specific example(s) of how this solution makes a difference; include its primary activities.**

MMSI works because it is a comprehensive program, organized around a performance partnership with mutual obligations between school districts and MMSI. Program results in Texas and across the six states implementing the program demonstrate that the number of Massachusetts students entering college prepared for and interested in pursuing STEM careers dramatically increases when:

- Schools expand access to and encourage participation in Advanced Placement (AP) and other rigorous courses in grades 6-12.
- Teachers are expected, and trained, to engage a broader range of middle and high school students into college preparatory classes.
- Students are supported with tutoring and extra time, and are rewarded for success.

#### About You

##### **Organization:**

Mass Insight Education

##### About You

##### **First Name**

Melanie

##### **Last Name**

Winklosky

#### About Your Organization

##### **Organization Name**

Mass Insight Education

##### **Organization Phone**

(617) 778-1500

##### **Organization Address**

18 Tremont Street, Suite 930 Boston MA 02108

##### **Organization Country**

Country where this project is creating social impact

##### **How long has your organization been operating?**

More than 5 years

##### **Is the project that you are entering related to this organization?**

Yes

The information you provide here will be used to fill in any parts of your profile that have been left blank, such as interests, organization information, and website. No contact information will be made public. Please uncheck here if you do not want this to happen..

#### Innovation

##### What stage is your project in?

Operating for 1-5 years

##### Share the story of the founder and what inspired the founder to start this project

Morton Orlov II, the President of MMSI, describes himself as an "accidental educator." After a successful career in the United States Army, Mort became the principal of Chelsea High School, an urban high school outside of Boston. Through his leadership roles in the Army and his three years as principal at Chelsea High, Mort's commitment to demanding high expectations for all young people--regardless of their zipcode--and providing them the support that they need to succeed were perfectly aligned with the goals of the National Math & Science Initiative.

Over the past four years, Mort has been in hundreds of our high schools, and has made countless presentations to teachers, school committees, students, parents, and legislators. His tireless drive to bring MMSI to scale is inspired by the incredible results that our students have achieved. Mort's belief that all students deserve to be held to high standards is reflected in all of MMSI's work.

#### Social Impact

##### Please describe how your project has been successful and how that success is measured

MMSI measures our success in STEM against our goals:

**Increasing AP math and science enrollment:** In schools implementing MMSI, thousands of new students are engaged in rigorous STEM courses, and are better prepared for college-level work. Using PSAT data and a College Board tool called "AP Potential," MMSI works closely with school leaders, guidance counselors, and AP math, science, and English teachers to significantly expand enrollment in AP courses. The current 44 MMSI schools have increased AP math and science enrollment from 2,400 to 4,600 over three years (2008-2011), which represents a 92% increase in enrollment in these courses. The AP math and science courses are Biology, Calculus AB, Calculus BC, Chemistry, Computer Science A, Environmental Science, Physics B, Physics C (Electricity & Magnetism), Physics C (Mechanics) and Statistics.

**Increasing AP math and science success:** Many higher education institutions grant college credit for AP qualifying scores; this is one of the only quantitative measures of readiness for college-level study in STEM that we have. In terms of AP performance, after two years of program implementation in 21 schools, MMSI schools increased AP math and science qualifying scores from 581 to 1,164 over two years (2008-10). This represents a 100% increase. In our first ten high schools, female students had a 94% increase in AP math and science qualifying scores in the same time period. In addition to the students who have earned qualifying scores, 380 students earned a score of "2" or "maybe qualified" on AP math and science courses in 2010.

##### How many people have been impacted by your project?

1,001- 10,000

##### How many people could be impacted by your project in the next three years?

More than 10,000

##### How will your project evolve over the next three years?

MMSI was funded initially through a generous \$13.2 million grant from the National Math & Science Initiative, which ends in 2013. In order to sustain the project beyond the scope of the initial funding, MMSI has begun its work on "MMSI 2.0" which will:

- Strengthen the grade 6-12 integrated program. We are expanding our focus on the "pipeline" from middle to high school to ensure AP readiness. We are also examining the feedback and evaluation metrics we are using, particularly as we seek to measure college readiness and success.
- Build corporate partnerships. We are working with our partners on a plan to engage corporations more deeply in our initiative.
- Sustain the initiative through a new mix of public, corporate, and foundation funding.

#### Sustainability

##### What barriers might hinder the success of your project and how do you plan to overcome them?

NMSI's funding is essentially venture capital funding, designed to launch the program and prove that it is both scalable and replicable. The NMSI funding begins to decrease this year (2011-12), with the goal of each state sustaining and institutionalizing the program. During the current school year (2011-12), MMSI needs to raise 50% of its total budget in order to match the NMSI funds; in 2012-13, the fundraising match is 75%.

To date, MMSI has raised more than \$3 million to match the NMSI funds and to support the operation and delivery of services to schools. Our partners include foundations, corporations, public funding, and individuals.

In order to sustain our model through scale-up, which we envision as maintaining 50 schools by 2013-14 and beyond, MMSI will require a \$5 annual million investment, which will include both public and private funding.

We are launching community campaigns, described in the proposal, to make the case for public funding to support MMSI. In addition, we are investing in additional research, including a partnership with the National Student Clearinghouse to track our students into college, to further demonstrate the impact of our program on students.

##### Tell us about your partnerships

Mass Insight Education is the parent organization of MMSI. Mass Insight's key operating principle is partnership. MMSI's partnership with the National Math & Science Initiative is critical, not only because of the funding that they have committed, but also because of their support and assistance as we replicate their program model. We communicate regularly, both through formal monthly conference calls and informally, with the other five NMSI-funded states to share best practices.

MMSI's Executive Board provides strategic guidance to the initiative. We also work closely with the Massachusetts Department of Elementary and Secondary Education. The College Board is an important partner in our work.

MMSI's program has been endorsed nationally by Change the Equation. In Massachusetts, the program is cited in Tapping Massachusetts Potential, a publication of the Massachusetts Business Roundtable.

#### **Explain your selections**

MMSI's primary funder is the National Math & Science Initiative. MMSI is funded primarily by ExxonMobil Corporation, the Bill & Melinda Gates Foundation, and the Michael & Susan Dell Foundation.

MMSI is also supported by private foundations, corporations, and state and federal funding.

#### **How do you plan to strengthen your project in the next three years?**

MMSI is piloting a college and career support program during the 2011-12 school year which will engage volunteer STEM professionals as "supporters" through a year-long commitment to specific AP classes. The volunteers will "adopt" classrooms and provide wrap-around support to students focused on college and career success. Through a series of in-school, Saturday study session, and electronic interactions, the volunteers will serve as supplementary resources and mentors to provide college and career support.

As MMSI visited nearly 100 high schools over the last four years during the annual school selection process, educators and leaders asserted that strengthening the pipeline, particularly in grades 6-12, is critical to AP success. Based on previous success with a Pre-AP training network, including work with the Regional STEM Networks in 2009-10, MMSI was selected in April 2011 as the sole vendor for the Commonwealth's Race to the Top Pre-AP program, which 80 districts have chosen to implement. Over the next three years, we will train and support 1,000 Pre-AP math, science, and English teachers in the Advancing College Readiness Pre-AP program, which will significantly strengthen our program.

#### **Partnerships and Accountability**

##### **Please tell us more about how your partnership was formed and how it functions. What specific role does each partner play? What unique resources does each partner bring to the initiative?**

As noted previously, MMSI was established as a result of a competitive grant process from the National Math and Science Initiative (NMSI). NMSI is a major new non-profit with a mission to advance math and science education in the United States by expanding programs with proven results on a national scale in order to have a positive impact on America's 50 million student public school system. NMSI provides us with training, technical assistance, data, as well as funding to support our work.

In Massachusetts, MMSI is engaging corporate, higher education, and non-profit partners in Boston, Worcester, and Springfield and other communities across the state to transform MMSI from a school program to a community commitment. MMSI has partnered with Worcester Polytechnic Institute (WPI) to pilot a community-centric model of engagement that we plan to replicate in other MMSI communities. WPI serves as the lead community partner in Worcester, convening local leaders to learn about and support the program, hosting student study sessions, staffing school kickoff events and the college and career support program, advocating for the program and leading a challenge grant for community fundraising.

##### **How are you building in accountability for students' successful STEM learning outcomes? Please provide a summary and examples.**

MMSI builds in accountability for students' successful learning outcomes by focusing relentlessly on data. In our first ten high schools, female students had a 94% increase in AP math and science qualifying scores over two years. In Massachusetts, a recent report published by Worcester Polytechnic Institute found that MMSI schools have demonstrated much more progress in closing access and achievement gaps than the state or national averages, particularly for African-American and Hispanic students. Specifically, there is a significant reduction in the race gap in AP performance (between non-minority and minority students) for MMSI vs. non-MMSI schools conditional on gender and income. The race gap for non-MMSI schools is nearly 2.5 times larger than for MMSI schools. Similarly, there is also a significant reduction in the income gap between MMSI and non-MMSI schools. The income gap for non-MMSI schools is almost 3 times larger than for MMSI schools. (Source: Bhadra, D. & Petrucelli, J. MA AP Results Analysis. WPI, February, 2011.)

#### **Needs**

Investment, Human Resources/Talent, Marketing/Media, Research/Information.

##### **Please use this space to elaborate on your selection above and/or to add needs that may not be listed.**

We are seeking partners who are interested in investing in an outcomes-based STEM program. As we develop and refine our sustainment plan beyond our initial NMSI funding, we are interested in strategic guidance around our staffing plans, as well as our plans to increase the scope and scale of our research and evaluation work, so that we can document and publish the impact of this initiative. Finally, as we launch our campaign, described above, we are interested in marketing/media support.

#### **Offers**

Innovation/Ideas, Mentorship.

##### **Please use this space to elaborate on your selection above and/or to add offers that may not be listed.**

MMSI has proven that we can replicate and scale a program across many types of high schools, in a variety of school districts. Although we (like many non-profits!) have limited staff time for projects outside of our mission, we could provide guidance to other programs that are attempting to scale, based on our experience to date.