

MetroWest STEM Education Network

Five Year Plan (2011 – 2016)

The MetroWest STEM Education Network (MSEN) is comprised of K-12 school districts, regional vocational technical schools, private schools, institutions of higher education, economic competitive organizations, and businesses located in the forty-three cities and towns west of Boston known as MetroWest. It was established with funding support from the STEM Pipeline Fund administered by the Massachusetts Department of Higher Education. MSEN derives its mission and purpose directly from the STEM Pipeline founding legislation, the Economic Stimulus Act of 2003, which directs that funding will be used *"to increase the number of Massachusetts students who participate in programs that support careers in fields related to mathematics, science, technology, and engineering...to increase the number of qualified mathematics, technology, engineering and science teachers in the Commonwealth and to improve the mathematics, technology, engineering and science educational offerings available in public and private schools."* [Chapter 141 of the Acts of 2003, Section 13, paragraph (c)]

Mission

The MetroWest STEM Education Network brings together key stakeholders from K-12 school districts (including private schools and regional vocational technical schools), institutions of higher education, economic competitive organizations, and businesses to collaboratively address regional education and workforce needs relating to science, technology (including information technology), engineering and mathematics (STEM) careers.

Strategic Objectives

1. Increase the number of MetroWest preK-16 students who participate in programs that promote awareness of and preparation for careers related to science, technology, engineering, and math.
2. Increase the number of qualified science, technology, engineering, and math teachers in MetroWest preK-12 schools.
3. Enhance STEM content knowledge and pedagogy of MetroWest in-service and pre-service teachers.
4. Improve the science, technology, engineering, and math educational offerings available in public and private schools located in MetroWest.

Alignment with Massachusetts STEM Plan

The intent of this plan will be to align with and support the implementation of the Massachusetts state STEM plan "A Foundation for the Future: Massachusetts' Plan for Excellence in STEM Education – Science, Technology, Engineering, and Mathematics" dated September 28, 2010. The plan's **Theory of Action** describes core elements of the PreK-16 education system aligned and integrated with

applied “real world” learning opportunities to excite, and sustain student awareness, interest and motivation for STEM applications, and to promote and support rigorous academic preparation for STEM post-secondary education and careers. These elements include: community engagement, academic coherence, educator development and STEM employer and professional support.

In the summer of 2009, Massachusetts business leaders from fifteen industrial and professional organizations issued a call to action regarding the state of the Massachusetts’ STEM workforce in their report titled “Tapping Massachusetts’ Potential – The Massachusetts Employers’ STEM Agenda.” The report asserts that Massachusetts students rank among the best in the world on standardized math and science tests; however, our students choose STEM college majors and careers at a rate that trails the rest of the nation. Their call to action challenges the state to close that gap by doubling the number of STEM college graduate by 2020. The state STEM plan responds in part to that challenge.

The MetroWest region shares disproportionately in overall Massachusetts trends relating to STEM opportunities and shortfalls. Over 26% of the “knowledge cluster” industry employment (professional, scientific and technical services; health care, information technology, and knowledge creation) is located in the loosely define area immediately west of Boston known as MetroWest. Not surprisingly, 48% of the residents in this region have at least a bachelor’s degree, the largest concentration of highly educated workers in the state. MetroWest schools educate over 16% of the state’s preK-12 student population with many of the districts scoring among the highest on state standardized testing.

As a region, MetroWest is uniquely positioned to close the demand/supply gap for STEM skills by simply improving awareness and motivating students to pursue STEM college majors. Data indicates that well over half of MetroWest students who score well on math and science SAT and MCAS tests are entering college with undesignated or non-STEM majors. National evidence suggests that students lack sufficient information about STEM careers to be choosing STEM college majors. School leaders in the region have confirmed the need for programs that will provide students with real world experiences and information about STEM careers. Programs strengthening teacher pedagogy are a key component of efforts to increase student awareness and motivation.

This plan will build on regional strengths while leveraging best practices statewide to drive achievement of the goals laid out in the state STEM plan. Initiatives are categorized as “sustaining” or “investing”. Sustaining initiatives are existing programs that operate through various in-kind or grant sources but continue to need strengthening and incremental levels of funding. Investing initiatives are new projects or expansion of projects to new applications that require development and funding, either locally or through collaboration with designated statewide initiatives.

Goals and Initiatives

1. Increase student interest in STEM

Increase statewide from 37.6% (2011) to 48% (2016)

Increase MetroWest from 32.7% (2011) to 48% (2016)

Source: SAT registration questionnaire (data collected and prepared by UMass Donahue Institute)

Sustaining and Strengthening Existing Initiatives:

- LIFT² (MetroSW Regional Employment Board).
- BioTeach (Massachusetts BioEd Foundation).
- BioTech Careers Pathways (Norfolk Agricultural HS).
- WOW and DIGITS programs – extend into more MetroWest communities.
- Robotics teams (FIRST, Sea Perch, etc.) sponsored by Lincoln Labs, PTC, Natick Army RD&E Center, Raytheon, etc.
- McAuliffe Challenger Learning Center programs.
- Science Fairs – regional middle school fair sponsored by Regis College.
- Future Problem Solving Program – expand to more area schools.
- Science content enrichment for preK16 curriculum with inquiry and hands-on learning.

Investing and Expanding New Initiatives:

- MetroWest STEM Academy: A Systemic Approach (Saturday STEM Academy).
- Regional communication program that celebrates national weeks i.e. National Engineers Week, National Chemistry Week, National Mathematics Week, etc. Include description of jobs, labor statistics and salary data for STEM careers.
- Internships and short-term career sampling opportunities in STEM careers to improve individual exposure and mentorship.
- Collaborate with GBRC to enrich STEM content in out-of-school and early child care programs.

2. Increase STEM achievement of PreK-12 students

Increase % of students that score proficient or advanced in math

Statewide: 77.6% (2011) to 84.2% (2016)

MetroWest: 90.1% (2011) to 95% (2016)

Source: MCAS (data collected and prepared by UMass Donahue Institute)

Note: Although MetroWest overall performance exceeds state goals, various demographic categories in MetroWest are below goal. Initiatives need to focus on these underserved student populations.

Sustaining and Strengthening Existing Initiatives:

- Mass Math & Science Initiative.
- Tutoring STEM MCAS prep in underserved areas.
- STEM vacation camps.

Investing and Expanding New Initiatives:

- MetroWest STEM Academy: A Systemic Approach (Saturday STEM Academy).

3. Increase the percentage of students who demonstrate readiness for college-level study in STEM fields

Increase % of students that report taking at least 4 years of math and 3 years of lab science to 100%.

Statewide: 80.3% (2011) to 100% (2016)

MetroWest: 85.9% (2011) to 100% (2016)

Source: SAT registration questionnaire (data collected and prepared by UMass Donahue Institute)

Sustaining and Strengthening Existing Initiatives:

- Dual enrollment college programs.
- Early college high school (Marlborough).
- Mass Math & Science Initiative.

Investing and Expanding New Initiatives:

- MetroWest STEM Academy: A Systemic Approach (Saturday STEM Academy).

4. Increase the number of students who graduate from post-secondary institutions with a degree in a STEM field. Measurement and data source TBD.

Investing and Expanding New Initiatives:

- MetroWest STEM Academy: A Systemic Approach (Saturday STEM Academy).

5. Increase the number/percentage of STEM classes led by effective educators for PreK-16. Measurement and data source TBD.

Sustaining and Strengthening Existing Initiatives:

- FSU STEM Masters Degree program for elementary teachers.
- FSU STEM Teacher Certificate programs.
- McAuliffe Challenger Learning Center programs.
- STEM professional development workshops for teachers sponsored by the Natick Army RD&E Center (MWM training), Museum of Science, MIT, Wellesley College, etc.
- LIFT² (MetroSW Regional Employment Board).
- Curious Minds Initiative (CMI) sponsored by Mass Science & Engineering Fair.

Investing and Expanding New Initiatives:

- MetroWest STEM Academy: A Systemic Approach (Saturday STEM Academy).
- NASA Resource Center at FSU.
- Collaboration with Greater Boston Readiness Center regarding STEM professional development.
- STEM workshops at professional conferences for superintendents, school committee members, STEM teachers, guidance counselors, etc.
- Clearinghouse of STEM resources to supplement instruction.

The “MetroWest STEM Academy: A Systemic Approach” will be a key investment strategy to bring significant elements of this complex issue together in a comprehensive approach. Modeled after the Saturday STEM Academy, we will create a program template that can be applied to any target audience in multiple settings, business or college campus. Developed with a “systems thinking” frame of mind,

the MetroWest STEM Academy will reach into the community to understand workforce needs and enlighten community leaders and parents while enhancing STEM education for preK16 students and professional development of effective preK16 STEM educators. Critical thinking and life skills will be key components of the program, helping bridge the gap to college and career readiness.

