

Massachusetts Statewide STEM Indicators Project (MASSIP)

The Pipeline Fund was established through a Legislative appropriation in 2003 and renewed in 2006 and 2007. The Massachusetts Department of Higher Education (DHE) is directed to administer the Pipeline Fund with a focus on three goals:

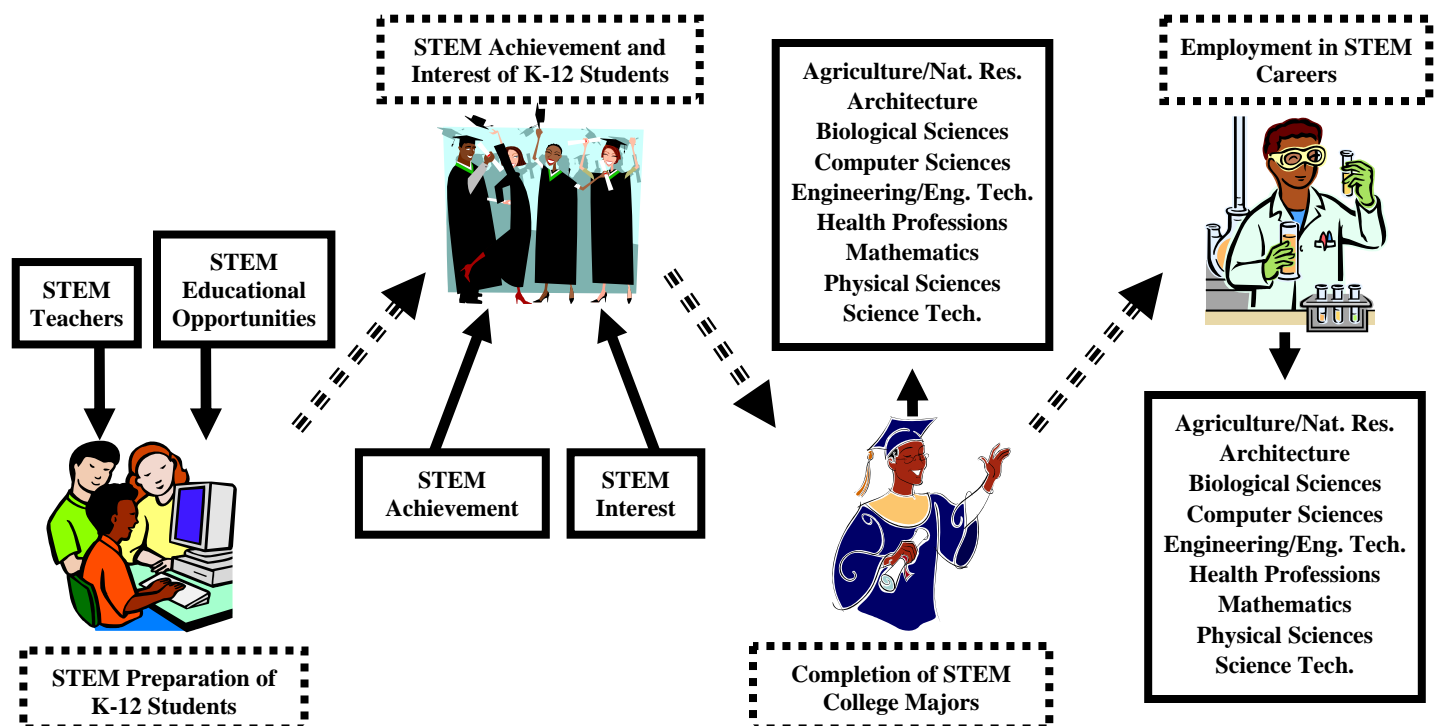
- (1) Increase the number of students who participate in programs that support STEM (science, technology, engineering & math) careers;
- (2) Increase the number of qualified STEM teachers; and,
- (3) Improve STEM educational offerings available in public and private schools.

Through the Pipeline Fund, Regional PreK-16 Networks were created to bring together representatives from business/industry, higher education, PreK-12 education, and non-profit/community agencies to plan and implement teacher and/or student activities that address the Pipeline Fund's goals in the best manner for their geographic area. The University of Massachusetts Donahue Institute (UMDI) provides technical assistance and state-level evaluation activities in support of the Pipeline Fund. Among these tasks is the generation of a statewide STEM indicators system that benchmarks Massachusetts' progress in key STEM educational and economic areas. Recognizing the vast number of initiatives across Massachusetts which address STEM educational issues, the indicators system does not specifically evaluate the impact of Pipeline Fund activities. Rather, it serves as a reflection of the combined efforts statewide to increase the "flow" of students through a science, technology, engineering and mathematics educational "pipeline."

The purpose of the Massachusetts Statewide STEM Indicators Project (MASSIP) is to follow a set of focused meaningful, accessible, and perennial measurements that reflect a range of Science, Technology, Engineering, and Mathematics (STEM) educational and economic conditions in Massachusetts. Data collected for MASSIP are to meet four criteria:

- A. Indicators should speak directly to Massachusetts' STEM educational and economic performance.
- B. Data should be useful to a wide variety of individuals.
- C. Data should be available through currently existing secondary sources.
- D. Data should be consistently available on an annual (or other consistent cycle) basis

MASSIP Conceptual Model



Outline of Indicators

I. STEM Preparation of K-12 Students

A. STEM Teachers

1. Number of full-time equivalent STEM teachers.
2. Number of individuals who passed STEM area Massachusetts Tests for Educator Licensure.

B. STEM Educational Opportunities

3. Time per week students spend in math instruction.
4. Time per week students spend in science instruction.
5. Highest math course students take during high school.
6. Science courses students take during high school.

II. STEM Achievement and Interest of K-12 Students

A. STEM General Literacy

7. Student achievement on Mathematics Massachusetts Comprehensive Assessment System exams.
8. Student achievement on Science and Technology/Engineering Massachusetts Comprehensive Assessment System exams.

B. STEM National Attainment

9. Students' math scores on the National Assessment of Educational Progress.
10. Number of students taking the PSAT and their scores in math.
11. Number of students taking the SAT and their scores in math.
12. Number of students taking STEM Advanced Placement tests and the percentage who score three or higher.

C. STEM Interest

13. Percentage of sophomore PSAT survey respondents interested in majoring in a STEM area in college.
14. Percentage of junior PSAT survey respondents interested in majoring in a STEM area in college.
15. Percentage of SAT survey respondents interested in majoring in a STEM area in college.*

III. STEM College Completions

16. Number of college students who complete degrees in Agriculture and Natural Resources.
17. ...Architecture.
18. ...Biological and Biomedical Sciences.
19. ...Computer and Information Sciences.
20. ...Engineering and Engineering Technologies/Technicians.
21. ...Health Professions and Clinical Sciences.
22. ...Math and Statistics.
23. ...Physical Sciences.
24. ...Science Technologies/Technician.
25. ...all STEM Majors

IV. STEM Employment

26. STEM employment
27. Job vacancy rates in STEM occupational areas.

V. Multi-state Comparisons

California	New York
Connecticut	North Carolina
Illinois	Pennsylvania
Minnesota	Virginia
New Jersey	US as a whole

(The John Adams Innovation Institute at the MA Technology Collaborative lists economic competitor states in its annual *Index of the Massachusetts Innovation Economy*. The states from the 2008 report are used for MASSIP 2009 comparison states.)

Data sources:

American Community Survey www.factfinder.census.gov/

Bureau of Labor Statistics www.bls.gov/

College Board www.collegeboard.com/research/

Integrated Postsecondary Education Data System nces.ed.gov/ipeds/

MA Department of Elementary & Secondary Education www.doe.mass.edu/

MA Department of Employment and Training www.detma.org/

National Assessment of Educational Progress nces.ed.gov/nationsreportcard/

* Indicator 15 (Interest of SAT Test-Takers in STEM College Majors) is being expanded through the SAT Data Analysis Project. The Donahue Institute, on behalf of the Department of Higher Education, is analyzing four years of individual test-taker data (student responses to the SAT registration questionnaire as well as scores on the SAT and SATII tests) to see where students who are interested in STEM majors may or may not be different from students who are not interested in STEM majors.

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