

Moving MA to the Top in STEM Talent: A Campaign to Lead the Nation

Twenty-first century employment requires a 21st century education. STEM skills are 21st century skills. STEM occupations constitute a large proportion of all occupations in MA. In addition, many companies in non-STEM fields need people with the necessary STEM skills to fulfill their business obligations.

The Problem

On behalf of a multinational technology company with a major presence in the greater Boston area, a contact said: "...we are looking for people with 2-year-college degrees or 10 year military experience. We hire between 20 and 30 employees at a time depending on the business climate...and are expanding the number of positions."

On behalf of an international communication company headquartered also in the greater Boston area, the Director of Global Employment said: "...We need people with very strong math, engineering and computer science skills. ... We have too few students pursuing these degrees, and the ones who are, are often from other nations... We have on average 50 openings at any given time that cannot be filled as quickly as they arise."

Our state's economic future depends on development of a highly skilled, internationally competitive workforce to attract and retain STEM businesses. Within the next ten years, the Commonwealth's STEM talent pipeline must be strengthened and moved to a position of national leadership. We cannot afford not to act on this imperative through planning, coordination, investment and innovation.

The Solution

Vision

STEM education to be hands-on, best practice-based and started in the elementary school. Career counseling about 21st century skills needed for STEM and all other careers and jobs. The STEM innovation economy supported by highly trained workers.

Getting There

Study other states' best practices and replicate them. Use all appropriate strategies:

Cultivate a comprehensive, cross-disciplinary and experiential approach to PreK-16 education that values scientific, technical, engineering and mathematical knowledge and skills. Promote a holistic liberal arts education at all levels.

Increase the number of Massachusetts PreK-16 STEM educators and educational programs, both school-based and non-school-based. Increase the training resources and teaching infrastructure available to PreK-16 school-based and non-school-based educators and institutions.

Assist every Massachusetts high school in encouraging, preparing, and graduating additional students each year who are interested in, and committed to, pursuing STEM majors in college. Create incentives for colleges students to study STEM subjects and pursue STEM aligned careers.

Track high school student interest in STEM college majors via responses to the SAT registration questionnaire. Track the number of college students who complete STEM degrees at all levels. Improve MCAS science scores.

Measuring the STEM Talent Pipeline

The STEM talent pipeline can be measured in gross terms by the percentage of college graduates completing STEM degrees and the percentage of high school students interested in STEM fields.

| Percentage of 2005-2006 Bachelor's Degrees That Were Completed in STEM Fields ⁱ | | | % of STEM Bachelor's Degrees That Were Granted by Public Colleges / Universities | |
|--|----------------------------|--------|--|-------|
| State | Type of College/University | | | |
| | All | Public | Private | |
| Massachusetts | 20.6% | 18.8% | 21.4% | 26.6% |
| North Carolina | 22.1% | 24.9% | 15.8% | 77.6% |
| Virginia | 22% | 23.2% | 15.4% | 81.3% |

How Does Massachusetts Measure Up?

Additional measures of the Commonwealth's progress toward a 21st century economy concern the amount of financial investment in STEM education in Massachusetts, the number of students/communities in Massachusetts reached through this investment, and the number of STEM job vacancies that persist in Massachusetts. Our current status in these areas is as follows:

Financial Investment: The US DOE spent \$56.7 billion nationally on education in 2006 – of this, only \$57.4 million went toward STEM education in MA. The MA DESE (formerly DOE) spent \$1.1 billion statewide on education during the 2006-2007 school year – of this, only \$3.3 million went exclusively toward STEM education.ⁱⁱ The MA DHE as administrator of the STEM Pipeline FUND has awarded \$4.9 million in grants since 2005. Current NSF grants to MA total about \$650 million – of these only 5% of the grants are for PreK-12 teacher or student programs.ⁱⁱⁱ

Students/Communities Reached: Since 2005, STEM Pipeline Fund projects have reached 267,000 students – less than 30% of MA public school enrollment (962,000). Since 2005, STEM Pipeline Fund projects have reached 98 school districts – less than 33% of all local and regional districts (299).^{iv}

The Science & Technology Caucus is working with legislative, executive and industry leaders on strategies, policies and legislation that would strengthen Massachusetts STEM education and position Massachusetts for economic growth. The Caucus welcomes all members to join in this important bi-partisan initiative. Please contact Natalie Kaufman in Representative Cory Atkins' office or Rob McLaughlin in Senator James Timilty's office.

Service Gaps

ⁱ *Massachusetts Statewide STEM Indicators Project: Year Two Report.* MA Department of Higher Education and UMass Donahue Institute. 2008.

ⁱⁱ This was comprised of \$2 million for Title IIB Math & Science Partnerships, \$750,000 for summer professional development institutes, and \$550,000 for the Intel Math Initiative.

ⁱⁱⁱ There are 1001 grants: 102 are for professional development or student programs (one-half of the 102 focused on PreK-12 education) while the other 899 are for research and development.

^{iv} This includes both local and regional districts, but not vocational, agricultural, or charter schools that overlay local or regional districts.