Engaging, Educating and Employing a STEM-Capable Workforce

Jennifer McNelly, Senior Vice President
Manufacturing Institute

Margaret Ashida, Project Director
Empire State STEM Learning Network

Joseph Vargo, Executive Director
Partners for Education and Business
An affiliate of MACNY (Manufacturers Association of Central New York)
Webinar Logistics

- Please mute your phone line. If you are unable to manually mute your line press *6 and your line will be muted.

- If you have a question, you can raise or lower your hand by clicking the Raise Hand icon and selecting Raise Hand from the drop down menu at the top of your screen.

- Please change your information to your full name and state by clicking on the Attendee List drop down and selecting ‘Edit My Info’.

- All questions will be addressed following the presentation.

- We would like to remind everyone that this call is being recorded and will be available on The Manufacturing Institute website shortly following the webinar.
Agenda

- Welcome and Purpose of Webinar
- Setting the Context: Policy framework for applied-STEM in manufacturing education
- STEM in practice:
  - Empire State STEM Learning Network
  - Manufacturers Association of Central New York (MACNY)
- Q&A
Critical Components Driving Success

1. Identify Regional Economic Demands (Data Validation)
2. Develop Advanced Manufacturing Career Pathways
3. Develop a Timeline for Action
4. Engage Industry Leaders/Building Demand
5. Engage Faculty and College Leadership
6. Audit Programs of Study
7. Align and Map Certifications to Programs
8. **Align to STEM; Emphasize/Integrate STEM Skills**
9. Assess Faculty and Implement Professional Development
10. Develop Certification Partnerships
11. Deploy Dream It. Do It. (Student Recruitment)
12. Develop Feeder Systems (WIA, Adult Basic Education)
13. Develop Benchmarks
14. Drive a Policy Agenda
15. Sustain the Certification System (Administrative, Staffing & Fiscal Realities)
STEM Pipeline — Leaking Badly

In 2001, there were a bit more than 4 million 9th graders. Four years later, 2.8 million of them graduated and 1.9 million went on to two- or four-year college; only 1.3 million were actually ready for college work. Fewer than 300,000 are majoring in STEM fields and only about 167,000 are expected to be STEM college graduates by 2011.

Source: NCES Digest of Education Statistics; Science & Engineering Indicators 2008
Manufacturing Jobs are Increasingly High-Skill

- **Manufacturing is STEM:** Manufacturing skills—designing and creating the materials that we use every day—are applied skills in science, technology, engineering and math (STEM)

- **And, STEM skills bring value and demand:** By 2018, 92 percent of traditional STEM jobs (including Advanced Manufacturing) will be for those with at least some postsecondary education and training

  (Source: Anthony Carnevale, “Help Wanted,” 2010)
And higher earning potential
Applied STEM Pathways

Addressing the Challenge; Creating the Opportunity
Tenets of the NAM-Endorsed Skills Certification System

The nation needs an immediate renaissance of manufacturing education, including:

• Skillfully integrated academic and technical learning paths;
• A heightened focus on Science, Technology, Engineering and Math skills (STEM);
• More available alternatives for learning, with more “on” and “off” ramps to higher education and lifelong learning systems to acquire new skills as technology advances; and,
• The integration of nationally portable, industry-recognized credentials with educational pathways, leading to postsecondary credentials with real value in the workplace.
# Core Workplace Skills
- Innovation/ Creativity
- Critical Thinking/ Problem Solving
- Communications
- Information Technology Application
- Teamwork/ Collaboration
- High Performance/Lean
- Sustainability

# Applied Academics/ Personal Management
- Applied math
- Reading for Information and Locating Information
- Applied Science
- Ability to learn
- Agility
- Comfortable with ideas
- Self direction/organization
- Entrepreneurship

# Cross Cutting Technical Skills
- Process Design and Development
- Production
- Maintenance, Installation and Repair
- Supply Chain Logistics
- Quality Assurance and Continuous Improvement
- Health, Safety and the Environment
- Sustainability and Green Manufacturing
Pathways to Academic and Workplace Achievement
Impacting the Investment in Education

Impact the $8 billion spent in education (K-12) and the $18 billion in workforce to support nationally-portable, industry recognized certifications

America Works (H.R. 1325 / S. 1243)
- WIA
- Perkins
- Pell

Funding
- TAACCT
- H-1B

Impacting State Action
- Model policy and legislation
- Organizing state manufacturing call to action (Lumina/Gates)
Impacting Policy

- President’s Jobs and Competitiveness Council
- President’s Export Council
- Advanced Manufacturing Partnership
- OSTP
- PCAST
- U.S. Department of Education
- National Academy of Sciences
- National Governors Association
STEM in Practice

Margaret Ashida, Project Director
Empire State STEM Learning Network
Mission: Advance STEM education to prepare all students in New York State for success in school, work and life.

Vision:
• Policy support
• Program/practice portfolios
• Platforms for innovation
• Partnerships over the long term

Design Principles:
• STEM for all
• Systemic model
• Evidence-based approach
• Open collaborative innovation
• Committed stakeholders

“Advance”: to accelerate the growth or progress of a cause

“STEM education” refers to the interdisciplinary teaching and learning of science, technology, engineering and mathematics, to a level of rigor sufficient to produce critical thinkers and problem solvers across all fields of endeavor who can thrive in the 21st century economy

The value proposition: innovation and economic vitality
Why STEM, why here, why now?

Only 72% of the NYS high school class of 2009 graduated
- 92% graduated in wealthy districts
- 74% in rural school systems
- 48% in large city districts

24% NYS college students took remedial coursework in 2007
- The percentage was 44% in 2-year institutions, 13% in 4-year
- 31% took remedial math in 2-year institutions, 7% in 4-year
- 23% took remedial writing in 2-year institutions, 5% in 4-year

Low income and under-represented minority group members comprise a majority of high school graduates but have not kept pace in college enrollment

Yet ...

Are We Beginning to See the Light?
“Public and parents buy into the need to ramp up math and science education but most still think their local schools are doing fine.”

Source: STEM State-Level Analysis, Georgetown University Center on Education and the Workforce, Report Release October, 2011

Source: Public Agenda
Why STEM, why here, why now?

Source: nyworks.ny.gov

Home to a wide range of economic sectors ranging from health care to manufacturing, financial services to transportation. Syracuse is 5th largest city in NYS.

International center of higher education, medical and technological development; agriculture also an important economic driver. Rochester is 3rd largest city in NYS.

Diverse array of local industries includes heavy and light manufacturing, technology, agriculture, service-oriented private sector companies, and tourism; bioinformatics and human genome research centered in Buffalo, 2nd largest city in NYS.

Transforming traditional manufacturing and other sectors to niche industries within those sectors.

Industry clusters include distribution, materials processing, industrial machinery and services, agriculture, and financial services.

The center of NY’s “Tech Valley, industry clusters include bio life sciences, nanotechnology, chemical manufacturing, semiconductor development and clean energy production. Albany, the state capital, is 6th largest city in NYS.

Over 60 biotech companies and the Hudson Valley Research Park (home to IBM’s 300mm semiconductor fabrication facility). Yonkers is 4th largest city in NYS.

The largest city in the U.S. and a global center for financial services, life sciences, entertainment, media, fashion and the arts.

A world leader in technology development, home to research labs and the largest industrial park on the East Coast.
Network Nodes and Hub Concept

The Network is envisioned to be a system of regional and statewide “hubs” strategically positioned across New York State where sufficient clusters of “network nodes” exist to enable communities to achieve a tipping point in the advancement of STEM education. Hubs and nodes will be interconnected by network coordination resources which also provide a gateway to other states’ and national networks.

Objectives:
- Grow STEM teaching and learning capacity
- Accelerate knowledge capture and sharing of effective policies and practices
- Stimulate ongoing collaborative innovation
Building a Regional STEM Hub

1. **Convene a regional dialogue** to build awareness, interest and shared belief in the burning issue
   - If sufficient interest, identify a regional Hub Steward to help convene, co-coordinate the startup of a regional hub of the Empire State STEM Learning Network

2. **Develop Regional STEM Hub Goals and enabling Statement of Work** that balances between prescription (design principles, stakeholder types and roles, goals framework) and flexibility (focusing on regional needs, leveraging regional capabilities)
   - Define initial Regional STEM Hub Goals
     - STEM goals and objectives specific to the region – short term, longer-term
     - Regional needs versus existing capabilities (asset mapping)
   - Formalize action plans, measures of success and participants in the partnership
     - Schools/districts serving as platforms at the center of the design
     - Capacity builders (business, higher education, cultural institutions, community-based organizations, etc.)

3. **Establish management system**
   - Regional hub meetings, metrics and reporting, decision-making
   - Connection to the statewide Network

4. **Announce and Implement** - coordinate announcement timing for maximum impact

5. **Measure and refine** the process
Momentum is increasing – a sampler

Race to the Top
American Graduation Initiative
“Educate to Innovate” Campaign

Launching Today:

www.empirestem.org
www.ristem.org
www.pasteminiinitiative.org
www.ed.gov/programs/racetothetop/
www.whitehouse.gov/issues/education/educate-innovate

www.washingtonstem.org
www.ndstem.com
www.osln.org
www.coloradostemeducation.com
www.csinet.org
www.sfaz.org/live/page/stem-network
www.innovate-educate.org
www.ncstem.org
www.tstem.org
www.osln.org
www.ristem.org
www.pasteminiinitiative.org
www.ndstem.com
www.coloradostemeducation.com
www.csinet.org
www.sfaz.org/live/page/stem-network
www.innovate-educate.org
www.ncstem.org
www.tstem.org
STEM in Practice

Joseph Vargo, Executive Director
Partners for Education and Business
An affiliate of MACNY (Manufacturers Association of Central New York)
Association Overview
Who We Are... The Mission

• The Manufacturers Association of Central New York (MACNY), founded in 1913, combines the expertise of staff with the experience, wisdom and clout of members to help employers, especially manufacturers, become stronger.

• Over 350 members from 19 counties, a CEO-level board of directors, a full time staff of eleven and a cadre of outstanding consultants and trainers

• Serves as the primary advocacy voice for the manufacturing community in the region
Human Resource Services

Training Corner

Networking Councils

Purchasing & Technology Solutions

Government Relations & Communications
Manufacturers Alliance of NY

- Manufacturers Association of Central New York
- Council of Industry of Southeastern New York
- Chief Executive Network for Manufacturing of the Capital Region
Manufacturing Research Institute

- Research, policy and educational arm of the Manufacturers Alliance of New York, a statewide coalition led by MACNY.

- Funded through the USDOL, sponsored by Senator Charles E. Schumer.

- The MRI conducts research and analysis to effectively determine how best to help sustain and grow the manufacturing sector in New York State. 3 reports on manufacturing have been published.

- Increase public awareness of the importance of manufacturing to NYS economic development

- Will allow manufacturing companies the necessary tools and information needed to better prepare them in locating and training a skilled workforce.

- The MRI is housed at MACNY headquarters in Syracuse, NY

www.mriny.org
A pipeline approach to education/workforce development

- Greater value to respective members (*Annual Manufacturing Careers Day*)
- Provides for a further alignment of MACNY-PEB services and respective missions
- Serve more companies and schools with additional resources and talent.
- Areas of focus that are being addressed in the new partnership include:
  - Increased participation of business and education in career exploration/work readiness partnerships, with an emphasis on **STEM**
  - Increased awareness of, and expanded use of certificates and credentials (*NAM, CRC*)
  - Enhanced Teacher-in-the-Workplace Programming
- Increased talent pool in pipeline to benefit employers
- PEB maintains its mission and 501(c)3 focus.
Core Services, plus...

Human Resource Services
Training Corner
Networking Councils
Purchasing & Technology Solutions
Government Relations & Communications

✓ Education/Workforce Development

✓ PEB serves as the CNY STEM Hub Steward
Central New York (CNY) Hub of Empire STEM

**Vision:** The CNY STEM Hub will design and incubate educational models of excellence empowering all PK-20 students to excel in a rapidly changing world.

**Mission:** The CNY STEM Hub will interconnect business, higher education, community organizations and PK-12 schools to design, develop and demonstrate innovative, sustainable and transferable STEM learning experiences.

**Goals:**
- By 2014, the CNY STEM HUB will exemplify the attributes of a professional metropolitan learning community by creating and sharing knowledge and successful, innovative learning experiences that ignite and strengthen problem solving and critical thinking abilities in K-12 learners for success in our global society.
- By 2014, the CNY STEM HUB will strengthen instructional practices in K-12 STEM HUB classrooms through professional development for teachers and administrators in inquiry and design learning models.
- By 2014, the CNY STEM HUB schools will design and develop trans-disciplinary learning experiences through design and inquiry with real-world context/application.
- By 2014, the CNY STEM HUB will design, develop and incubate STEM literacy educational models that prepare students for college and career through the integration of 21st Century knowledge and skills.
- By 2014, the CNY STEM HUB will systematically document effects of new learning experiences on short term and long term student learning, student motivation, and college and career trajectories and performance, with the intent to regularly publish new findings in the education literature.
Central New York STEM Hub (Empire STEM)

The growing list of partners engaged in the work of the CNY STEM HUB currently includes:

**Business Node:**
- Bristol-Myers Squibb
- Lockheed Martin
- MACNY
- Siemens

**Government Node:**
- Department of Labor

**Informal STEM Education Node:**
- MOST: Milton J. Rubenstein Museum of Science & Technology

**PK-12 Node:**
- East Syracuse Minoa Central School District (CSD)
- Syracuse City School District
- Cincinnatus CSD

**Community College Node:**
- Onondaga Community College

**College / University Node:**
- LeMoyne College
- SUNY-ESF - SUNY College of Environmental Science and Forestry
- Syracuse University

**Non-Government Org Node:**
- Center of Excellence (CoE)
- Partners for Education & Business
Manufacturing Careers Day
&
Launch of the CNY STEM Hub

October 13, 2011
Contact info:

Joe Vargo
Partners for Education & Business
joev@pebcny.org
315-448-1012
Discussion Forum and Questions
The 2012 Community of Learners Webinar schedule will be released in January 2012