



Alliance District Convening May 25, 2016

Breakout Session

Connecticut Center for Advanced Technology
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Education for Tomorrow's STEM Careers...Today!



Shrinking Pipeline

STEM

Experiential Learning

Skills Gap



Real-World

Student Engagement

Silver Tsunami

Workplace Skills

NGSS

Inquiry

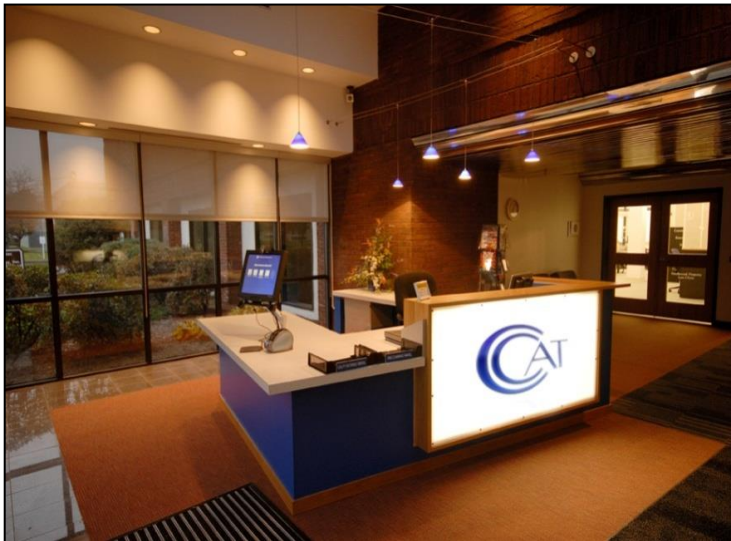
Achievement Gap



Introduction to CCAT

Who we are...

A unique, not-for-profit organization that combines expertise in cutting-edge technology with specialized centers of excellence in manufacturing, education, workforce development, energy, and information technology

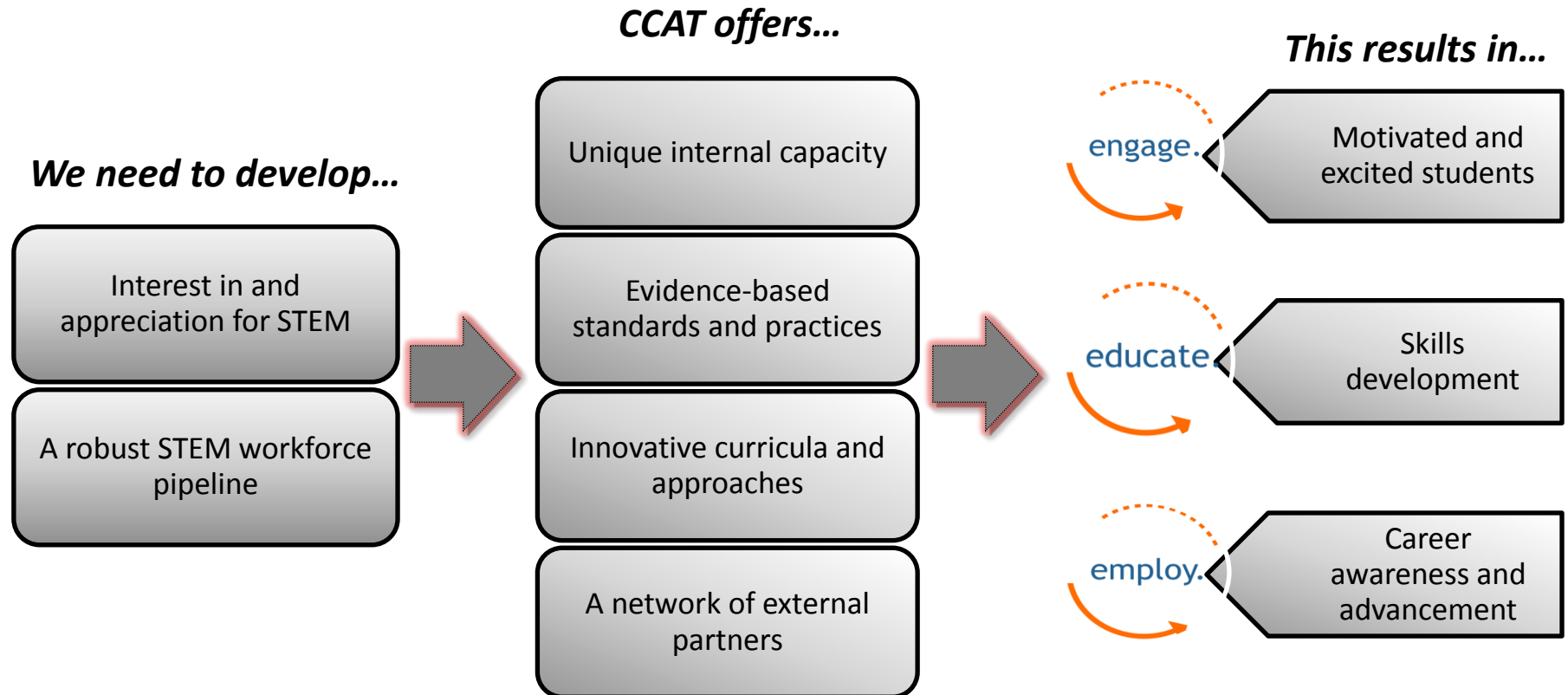


What we do...

Partner with and serve industry, education, government, and other forward-thinking agencies to address 21st century challenges



Challenges, Solutions and Outcomes





Education and Workforce Development

Enhance and grow the 21st century STEM talent pipeline

Focus

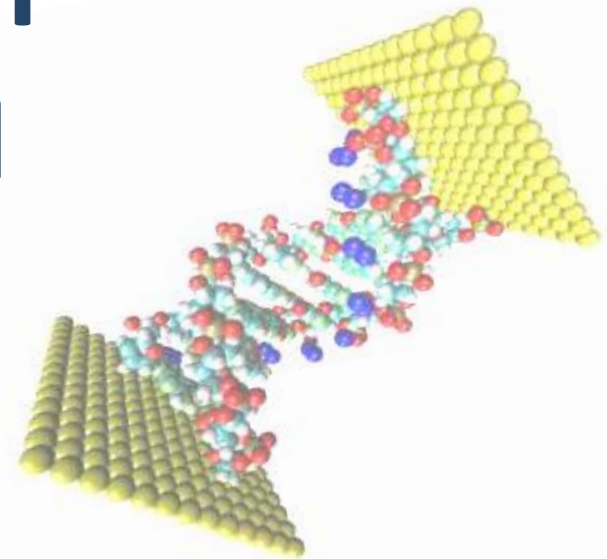
- Promote student engagement and achievement in STEM
- Develop awareness of educational and career pathways
- Research and develop policies/programs to address workforce challenges
- Support skill enhancement and assessment programs

Activities

- Experiential, context-based student programming
- Educator professional development
- Curriculum development/consulting and standards alignment



How do we develop the next generation highly skilled STEM workforce?

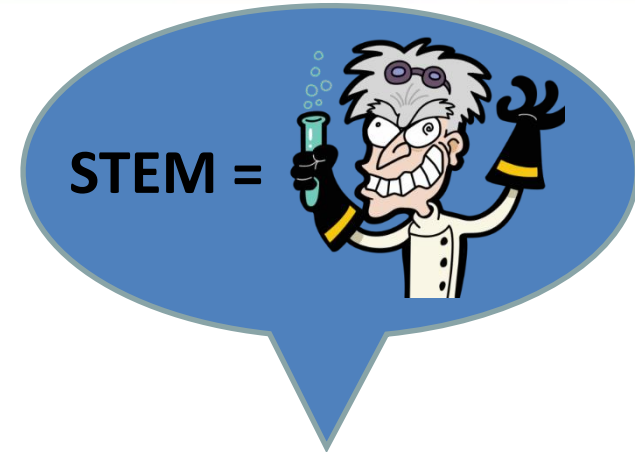


Lack of **interest** in STEM careers – especially among underrepresented groups

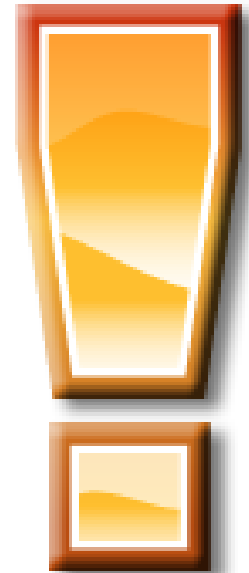
Lack of **awareness** of educational and career pathways – particularly in emerging high-tech areas

- *85% of students today are not considering careers in STEM*
- *More parents encourage their daughters to become actresses than engineers*
- *44% cited a lack of knowledge as the top reason they would not pursue a STEM career*
- *Another 30% listed the “geek” perception as their top reason*

- Survey by the American Society for Quality (ASQ)



- 70% believe the U.S. is not now the world leader in science achievement
- Only 35% believe the U.S. will be the world science leader in the next 20 years
- 79% agree that science is not receiving the attention it deserves in school
- Only 26% believe they have a good understanding of science
- 44% couldn't name a single scientist, living or dead, they would consider a role model for the nation's young people





Declining Achievement

Trends in International Mathematics and Science Study (TIMSS)

- No significant improvement in performance from 1995+
- The most recent assessment shows the U.S. position has increased only slightly in both fourth and eighth grade

Program for International Student Assessment (PISA)

- The most recent results (2012) placed the U.S. an unimpressive 35th out of 64 countries in math and 27th in science.
- Among the 34 members of the Organization for Economic Cooperation and Development, which sponsors the PISA initiative, the U.S. ranked 27th in math and 20th in science.

STEM SKILLS ARE IN DEMAND

In Connecticut, STEM skills have stayed in demand even through the economic downturn.

STEM:
2.8 jobs for every
1 unemployed person



Non-STEM:
2.2 unemployed
people for every 1 job



Plus, two-thirds of workers who have STEM training but are working outside of STEM fields *still* end up in jobs that relate to STEM.



Without **engagement, awareness, and interest...**
...many students do not even ***consider, enter, or remain in*** the STEM workforce pipeline.

Even when they do all three, without the right **knowledge and skills...**

...many students who enter the workforce are ***unprepared*** for 21st century, high-tech careers.



Increase *Quantity* in the Pipeline

- Provide information to increase student/educator knowledge of STEM educational and career pathways
 - ➔ *Dispel misconceptions about careers and work environments*
= Increased Engagement
- Expose students to authentic, contextual activities and directly relate them to career opportunities
 - ➔ *Develop an appreciation for the value of science and math achievement*
= Increased Participation



Increase *Quality* in the Pipeline

- Increase student understanding of core, standards-based science, math and engineering concepts
 - ➡ *Go beyond memorization to promote higher-level understanding*
= Increased Achievement
- Develop scientific inquiry, engineering design, and 21st century skills informed by real-world needs
 - ➡ *Meet industry aptitude requirements*
= Increased Skills



What Employers Say

According to employers, these are among the top skills considered “very important” for new employees to have:

Skill or Knowledge	% of Employers		
	HS	2-yr	4-yr
Oral Communication	70.3	82.0	95.4
Teamwork/Collaboration	74.7	82.7	94.4
Professionalism/Work Ethic	80.3	83.4	93.8
Critical Thinking/Problem Solving	57.5	72.7	92.1
Ethics/Social Responsibility	63.4	70.6	85.6
Leadership			81.8



CCAT Programs

providing context-based
experiential curricula



supporting NGSS and 21st
century skills development

promoting participation
and achievement in STEM



increasing awareness of
future high-tech careers



Experiential Learning

"Who cares?"

"How is this important?"

"I think I get it, but I can't explain it on the test!"

"This doesn't make sense. I can't relate it to anything."

"Why am I learning this?"

"What does this have to do with my life?"

Themes:

- *Advanced Manufacturing*
- *Engineering Design*
- *Aerospace*
- *Sustainable Energy*

Tools:

- *Hands-on workshops*
- *Simulations*
- *Design software*
- *Multimedia*
- *3-D Printing*
- *Technology*
- *Robotics*
- *Industry Partners*



Career Awareness & Interest!



Engineering, Technology, and the NGSS



According to the NRC Framework authors:

Using science during engineering design (ED) and making connections to technology:

- enhances student appreciation of the science regarding its importance in practical applications
- enhances student understanding of science
- enhances student interest in science





Authentic Tasks

- connect learning to the real-world
- reveal what students know *and* can do
- provide opportunities for students to demonstrate a wide range of skills

Engineering design requires the application of science and math.

It can probe for deeper understanding of science concepts, gauge readiness for college and careers, and inform future instruction.





Programs and Clients

Instructional day, after-school and summer experiential, context-based programming



Educator professional development



Next-Gen Science CT

A PD/PLC project to explore and develop a state toolkit for:



STEM CAREERS:
*PREPARING THE 21ST CENTURY
WORKFORCE*

Sample District Clients

- Hartford Public Schools • East Hartford Public Schools • Windsor Public Schools
- Middletown Public Schools • Naugatuck Public Schools • New Britain Public Schools
- Waterbury Public Schools • Torrington Public Schools • Lisbon Public Schools



Middletown Public Schools

Richard Pelczar

6-12 Science Department Head

Phase I: Development of Grade 6-8 STEM Elective



Phase II: Implementation of CATALYST Aerospace In-School Curriculum to support NGSS



Value of a Resource Collaborative:

- Consortium purchasing of hands-on supplies rotated through schools results in substantial cost savings
- Increases school/district capacity for implementing high quality STEM programming
- Provides access to materials and associated curricula that directly address NGSS
- Creates a Professional Learning Community that shares expertise and best practices
- Lowers individual cost of professional development

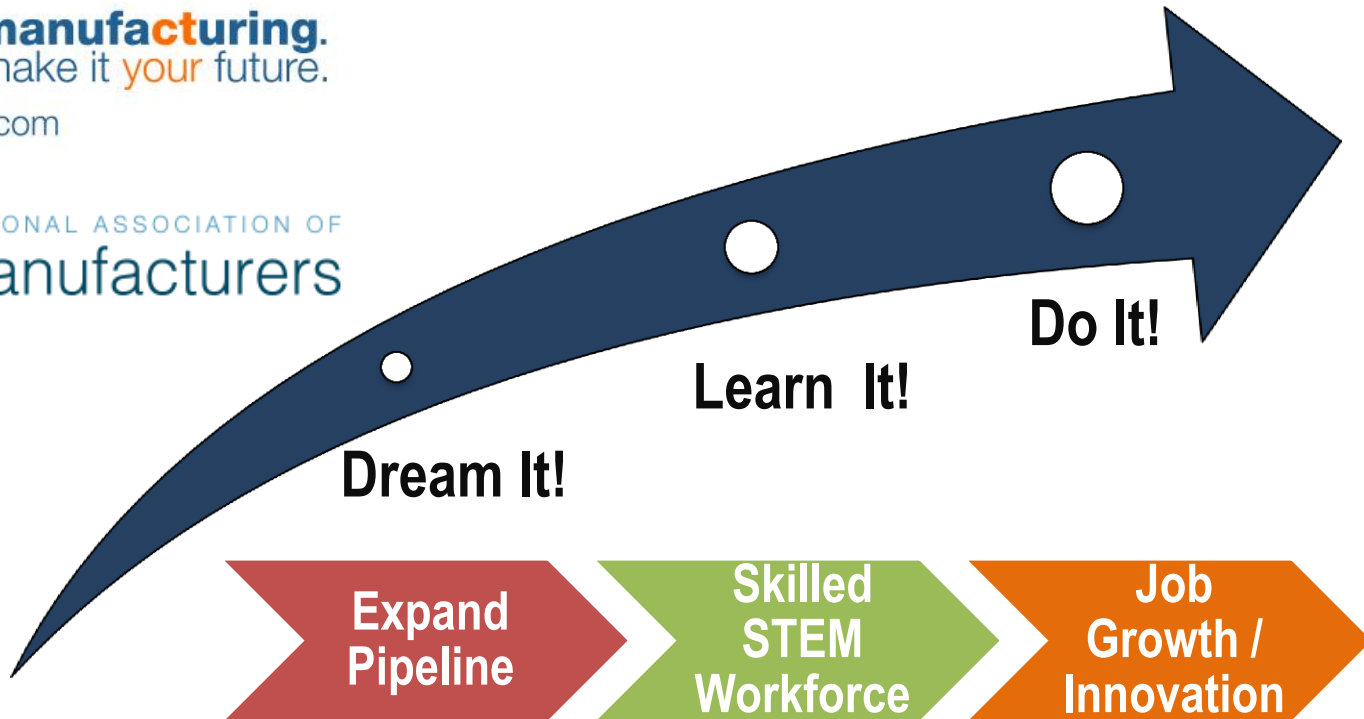
Example: Purchase price for EV3 classroom sets required for full “typical” grade implementation of robotics-based curriculum vs. Consortium member cost

Item	District Cost	CHOSEN Member Cost
Lego Mindstorms® EV3 Robots (32)	~\$14,000	Year 1 = \$3,000 Years 2+ = \$1,000





Dream It. Do It.



**MOTOROLA SOLUTIONS
FOUNDATION**

Department of Economic and
Community Development

Connecticut
still revolutionary



**TOYOTA
USA FOUNDATION**
Investing in a smarter tomorrow.



Dream It. Do It.



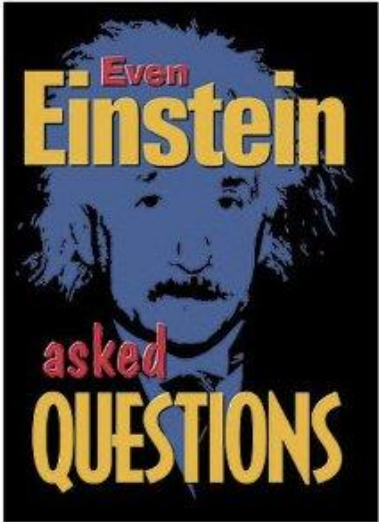
- Targets students, parents, educators, manufacturers
- Dispels misconceptions about today's manufacturing workplace
- Develops awareness about career opportunities
- Supports next-generation manufacturing talent pipeline
- Builds consensus among industry, government and education
- Offers hands-on student and teacher workshops and programs
- Introduces variety of educational pathways



Go-to resource for STEM education at the forefront of state and national initiatives.

- engaging, contextual curricula & programs
- supports 21st century skills/NGSS
- increases STEM participation and appreciation
- promotes the future highly skilled workforce





Thank you!

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