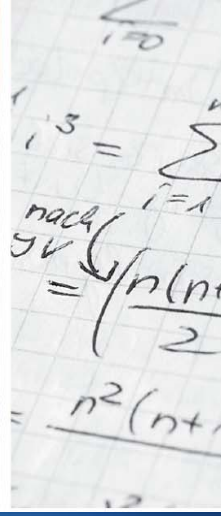
Greater Southern Tier

STEM Education

Preparing students for the 21st Century

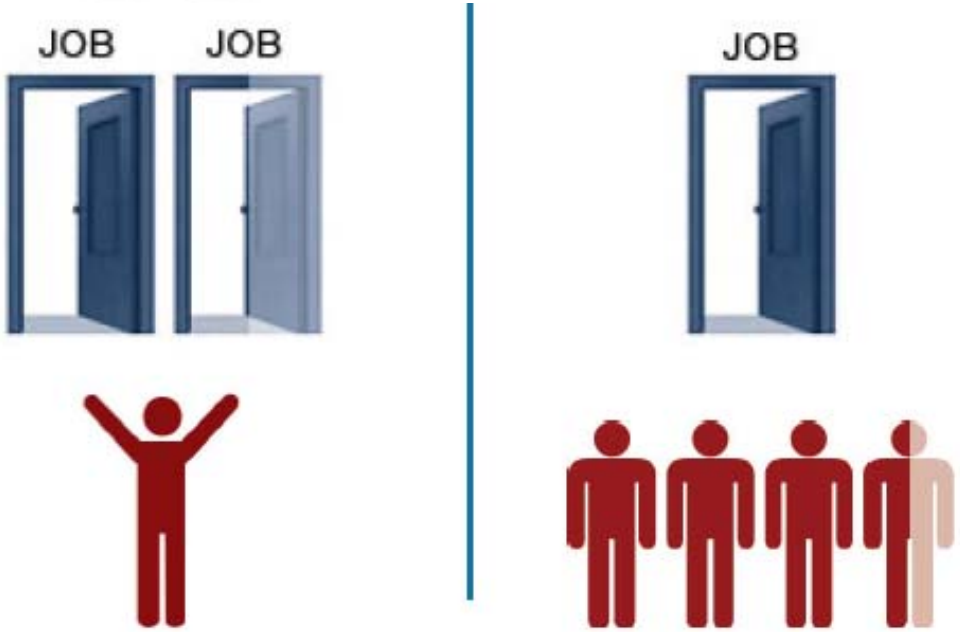
SCIENCE | TECHNOLOGY | ENGINEERING | MATH



Introduction to STEM

Why STEM?

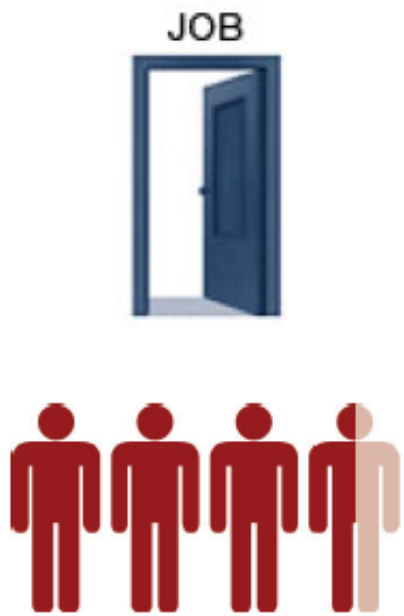
What Do You See?



What Do You Think?

STEM:
1.7 jobs for every
1 unemployed person

Non-STEM:
3.6 unemployed people for every **1 job**



What is STEM?

STEM Education

Attributes of STEM Education

- Offers students opportunities to make sense of the world holistically, rather than in bits and pieces, by coupling rigorous academic concepts within real-world contexts
- STEM education removes the traditional barriers erected between all disciplines, by integrating them into one cohesive teaching and learning paradigm. STEM education is an interdisciplinary, or even trans-disciplinary, approach to curriculum development and instruction.

STEM Instructional Strategies

- Opportunity for students to make sense of skills and content in real world contexts
- Inquiry-based
- Collaborative Learning
- Notebooking
- Multisensory Methods
- Balanced assessment system
- Discourse and Reflective Thinking

STEM Regional Program

Regional Strategic Framework

Mission:

To revitalize and refocus attention, interest and understanding of the embedded importance of science, technology, engineering and math (STEM) to life-long learning and success. To create a regional STEM pipeline that results in college and career ready students who can apply STEM practices to real world situations.

Vision:

Our region will be a model for generating math, science, technology and engineering interest, excitement and marketable skills.

STEM Deployment Team

- GST BOCES
- Corning Incorporated
- Syracuse University
- Alfred University, Alfred State, Corning Community College
- Wings of Eagles
- Consortium of school districts
  - Addison, Arkport, Bath, Bradford, BOCES Special Ed**,** Campbell-Savona, Canaseraga, Canisteo-Greenwood, Corning-Painted Post, Elmira, Elmira Heights, **Fillmore**, **Hammondsport**, Hornell**,** Horseheads, Notre Dame, **Odessa Montour**, Watkins Glen

STEM - Primary Grades

K	Grade 1	Grade 2
Materials in Our World	Balance and Motion	Air and Weather
Engineering Design: Paper Table	*Engineering Design: Roller Coaster Design*	Insects
Animals 2x2	Pebbles, Sand, and Silt	Solids and Liquids
	Engineering Design: Building a Wall	*Engineering Design: Play Dough Formula*

STEM – Elementary Grades

Grade 3	Grade 4	Grade 5	Grade 6
Measurement	Matter and Energy	Mixtures and Solutions	Variables
Engineering Design: Packaging Design	*Engineering Design: Rocket Challenge*	Levers and Pulleys	*Engineering Design: Lifejacket Design*
Water	Magnetism and Electricity	*Engineering Design: Trebuchet Challenge*	Weather and Water
Engineering Design: Water Wheel	Sun, Moon, and Stars	Environments	*Engineering Design: Save the Penguins*
Structures of Life	*Engineering Design: Moon Lander Challenge*	*Engineering Design: Water Filter*	Planetary Science
Engineering Design: Potato Chip Factory			

STEM – Secondary Grades

Middle School Life Science	Middle School Physical Science	STEM Regents Chemistry	STEM Forensics	Technology
Diversity of Life	Chemical Interactions	Movie Special Effects Design	Observational Skills	*Low Tech Engineering*
Populations and Ecosystems	Earth Systems	Periodic Table Game Development	Fingerprinting	*ROV*
Human Body	Force and Motion	Artist as Chemist	DNA Extraction	*Vex Robotics*
		Chemical Dominoes	Blood Evidence	
		Ideal Toy	Trace Evidence	
STEM Regents Earth Science		Cool Chemistry Show		
Nanotechnology		Cookin' Chem		

Curriculum Documents

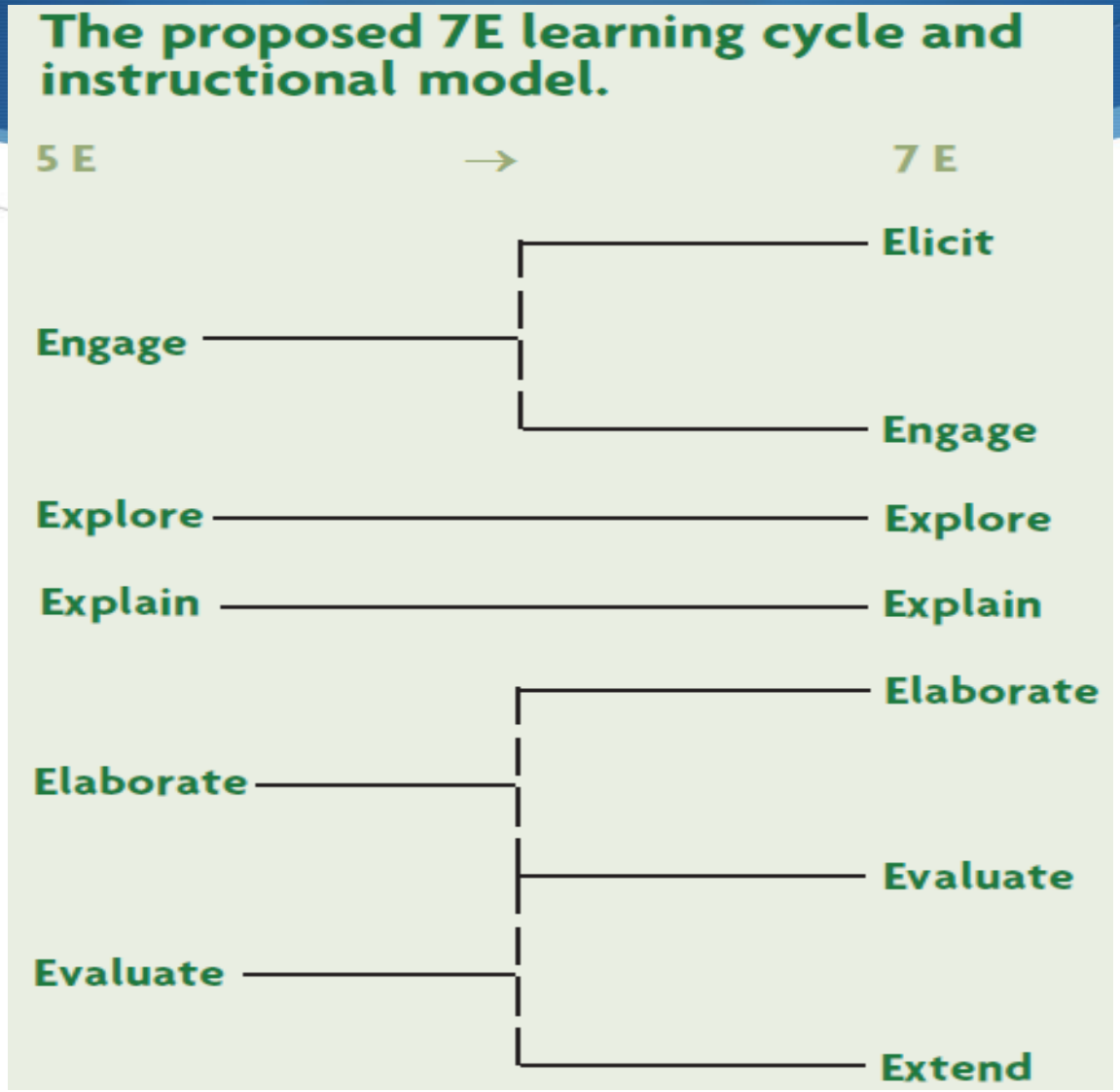
- Scope and Sequence Document
  - Aligned to NYS Core standards for science
  - K-4 and 5-8
  - Include inquiry based science and engineering modules

Update from 2010 to Present

Students Impacted by STEM Program			
Grades	**Number**	**Program**	**Projected for 2014-2015**
K-6	~15,550	**STEM Science and Engineering**	~17,000
7-8	~120	**STEM Technology-** ROV, Low Tech Engineering, VEX Robotics Engineering	~1,500
9-12	~2600	**STEM Regents Chemistry** **STEM Electives-** STEM Forensics, Intellitek Green Technology and Sustainability	~4100 **STEM Regents Earth Science** **STEM Nanotechnology**

STEM in the Classroom

What is Inquiry Based Instruction?



Why Science Notebooking?

- “Every day in our schools and colleges young people face reading and writing tasks that seem hard or unusual, that confuse them, that they fail. But if you can get close enough to their failure, you'll find knowledge that the assignment didn't tap.”

Mike Rose

"Fostering Argumentation Skills: Doing What Real Scientists Really Do"

- Douglas Llewellyn and Hema Rajesh
- Framework for Science Notebooking Templates
  - Investigate questions
  - Make a claim
  - Justify and defend the claim with supporting evidence
  - Provide a scientific explanation based on their findings

Common Core Shifts in ELA/Literacy

- Shift 1: Balancing Informational & Literary Texts
- Shift 2: Building Knowledge in the Disciplines
- Shift 4: Text-Based Answers
- Shift 5: Writing from Sources
- Shift 6: Academic Vocabulary

"Helping Students Learn Science Through Writing and Writing Through Science"

March 2012 Research Report

- Science writing improves the teaching of science and of writing
  - Participants teach more and better science
  - Greater confidence
  - Strategies translate to other subjects as well
  - Deliberate and systemic approach to developing students' writing and science skills

"Helping Students Learn Science Through Writing and Writing Through Science"

March 2012 Research Report

- Science writing improves learning for a wide range of students
  - Helps students move from investigation to concept development
  - Helps students learn expository writing starting in K
  - Levels the playing field
  - Improves test scores and meeting of standards