How to Maximize Your Participation During the STEM Forum & Expo

Presented by: Margie Hawkins, Tanisha Wesby, John Quinn, Chris Triolo, Michele Williams and Mike Heinz

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Why a STEM Forum?

By Margie Gifford-Hawkins, 6th Grade Science & Extend Teacher
Winfrey Bryant Middle School, Lebanon, TN
STEM Forum & Expo Steering Committee Chairman
2009 - President Obama’s “Educate to Innovate”
A plan to initiate a nationwide campaign to move American students from the middle to the top of the pack in science and math achievement over the next decade.

Voiced concern about having enough scientists, engineers, and mathematicians to keep the United States in the forefront of research, innovation, and technology.

2008 - The Mathematics and Science Study (TIMSS) Report
Stated that during the next decade, U.S. demand for scientists and engineers is expected to increase at four times the rate for all other occupations.

The report aimed to “provide information that leaders at the school district, state, and national level can use to make strategic decisions about improving STEM education.

Their Recommendations:

➢ Establish a coherent set of STEM standards and curriculum.
➢ Hire teachers with a high capacity to teach in their discipline.
➢ Provide a system of assessment and accountability to promote learning of content and understanding of STEM practices.
➢ Provide adequate instructional time for STEM subjects.
➢ Provide equal access to high-quality STEM learning opportunities to eliminate the disparities between advantaged students and minority and low-income students.
➢ Promote school conditions and cultures that support STEM learning.
➢ Increase frequency of state-wide and national STEM assessment exams.
What is STEM Education?

The integration & application of science, technology, engineering, & mathematics knowledge and skills, to produce solutions for real-world problems.
We have always seen STEM integration depicted as the 4 disciplines overlapping. Crossing into each other at different points.

Now we are hearing the term “STEM Education” instead of “STEM Integration” because the modern world has changed.

Instead of occasionally overlapping, Science, Technology, Math, and Engineering are becoming one in the workforce - working in concert to answer contemporary questions and solve problems.

Our students need to see them as one and be able to apply skills of all four in order to be competitive in the future!
For STEM Education to be Successful...

- It must strengthen and reinforce existing student knowledge.
- It must be “seamless” not “forced.”
- Teachers must be more focused on “How can the concepts best be taught?” rather than “How can they be integrated?”
How to Design Successful STEM Lessons

- Try to identify lessons that allow students to collect and analyze data and/or utilize math skills to better understand the science concept being taught and to give real-life relevance to the math skills they are learning.

- Use any technology that would bring more relevance to the concept being taught – tools for data collection, computer generated graphs for more accurate data analysis…

- Instill the over-riding spirit of the Engineering Process – Ask, Imagine, Brainstorm, Design, Test, Analyze, Redesign.
Let’s pause for questions from the audience.
Overview of the STEM Forum & Expo

Session Strands:
• PreK-2 (Early Childhood)
• Grades 3-5
• Grades 6-9
• Community/After School/Outreach Program
• Administrators

Special Events:
• Family STEM Night
• Higher Ed/Business Roundtable
• Keynote Speakers:
  • Kenneth Wesson
  • Mary Ellen Weber

Vendors:
And an exhibit hall full of STEM education product vendors
Strand Leaders

- **PreK-2 -- Tanisha Wesby**
  - Elementary Teacher
  - Hattie Cotton Elementary STEM Magnet School, Nashville, TN

- **Grades 3-5 -- John Quinn**
  - Executive Director, Science, Technology, Engineering, & Mathematics
  - Baltimore County Public Schools, Towson, MD

- **Grades 6-9 -- Chris Triolo**
  - Principal
  - Riverwood International Charter School, Atlanta, GA
  - Former Principal
  - John M. Morehead STEM Academy, Charlotte, NC (2009-2011)

- **Community/After School/Outreach Program -- Michele Williams**
  - Interim Executive Director, SECME, Inc.
  - Georgia Institute of Technology, Atlanta, GA

- **Administrators -- Mike Heinz**
  - PAEMST Coordinator, Office of STEM
  - New Jersey Department of Education, Trenton, NJ
PreK-2 Strand
STEM Forum Proposal Criteria

• Developmentally and age-appropriate lessons
• Inquiry-based lessons
• Promotes higher order thinking (Bloom’s Taxonomy)
• Integration of Science, Technology, Engineering & Mathematics
• Constructivist approach to learning through the 5 E’s
5 E’s of Learning

- Engage
- Explore
- Explain
- Extend/Elaborate
- Evaluation
What is the biggest obstacle PreK-2 teachers face when implementing or integrating STEM lessons?

a. Administrative support
b. Lack of professional development
c. Limited resources or funding
d. District demands
Grades 3-5 Strand
STEM Forum Proposal Criteria

• Investigation based - student centered - learning activity

• Integrates aspects of Science - Technology - Engineering and/or Mathematics

• Generates student interest and curiosity

• Supports 21st Century learning skills and information literacy
Which classroom investigation best meets the criteria outlined for the Grades 3-5 STEM strand?

a. Students learn to access the internet in their school’s computer lab to do a research report.

b. Students write an individual research report on bird migration patterns.

c. Students work in teams to complete a packet that investigates mathematical number relationships.

d. Students work in teams to assess their school’s energy consumption and design solutions to conserve energy.
Let’s pause for questions from the audience.
Grades 6-9 Strand
STEM Forum Proposal Criteria

- Collaboration is key! Use of the PLC model to promote cross-curricular/thematic units of study.

- Teach inquiry. Create an environment where students are taught how to ask questions and solve problems. The scientific method is no longer isolated in Chapter 1 and the first week of school.

- Move beyond the school day. Take advantage of clubs and competitions that can reinforce science standards. The experience will support your ability to teach inquiry and provide relevance to students. Encourage members on your team to co-sponsor with you.
Often factors outside our control impact our classroom and practice as professionals. Which factor is your biggest obstacle as you implement true inquiry in your school?

a. Class size
b. Lack of lab equipment
c. Number of classes
d. Lack of common planning
e. Other
Community, After School & Outreach Programs Strand

STEM Forum Proposal Criteria

• Demonstrated success in an after-school or informal learning environment
• Integrates aspects of Science, Technology, Engineering and/or Mathematics
• Ties STEM content to career-relevant or real-world issues and opportunities
• Helps students make the connection to curricular content
• Has been or can be implemented on a broad scale
Helping Students Build STEM Pathways

- Student Interest in / Motivation toward STEM Success
- Secondary & Post-secondary Pathways to STEM Careers
- STEM Careers = Problem-Solving & Innovation
- STEM Classroom Content’s Relevance to Real-World Issues
What resources have been useful in supporting after-school and community outreach programs in your area?

a. Local STEM industry partners (or other local partners in education)

b. 21st Century Community Learning Center Grants

c. School budget allocation

d. Community organizations (i.e. Boys & Girls Clubs, YMCA, Boy/Girl Scouts)

e. Foundation/Federal Grants
Let’s pause for questions from the audience.
Administrator Strand
STEM Forum Proposal Criteria

- Focus on innovative, evidence-based ways to support educators as they transform instruction

- Unique school structures (master schedules, staffing, budgeting, etc.) that have had a positive impact on student achievement in science, mathematics and English language arts

- Innovative partnership strategies that connect classrooms with STEM professionals and organizations

- What the current state of the literature is suggesting regarding best practices in STEM education
Instructional Leadership

Current state of the literature

Teacher Effectiveness

Partnerships

School Structure

Image found at www.galileo.org/math/puzzles/Tetrahedral.html
Formative Assessment

The greatest challenge that I see for schools in transitioning from a 19th Century model to a 21st Century model is:

a. Curriculum and instruction inertia…“We have always done…”

b. Current methods of teacher observation do not provide data relevant to what the current literature suggests is best practice.

c. Disconnect between the school’s mission statement, individual professional improvement plans, and budget.

d. We tend to start professional conversations with “I think and I feel” rather than “I read an article that claimed….”
Let’s pause for questions from the audience.
Forum Highlights

- Higher Ed/Business Communities Roundtable
- Family STEM Night
- Learning Center Account
Higher Ed/Business Communities Roundtable

• Scope of work of the roundtable
• Who should apply to moderate
• How to apply to be included in the formal roundtable group
• How to be part of the informal roundtable group
Family STEM Night

- Staged example of a fun, informative venue to demonstrate this new way of teaching and learning
- Jump drive with files to organize Family Stem Nights in your community
- Livebinder resource for more activity ideas
- Prizes for participants
Let’s pause for questions from the audience.
• Over 7,700 resources

• Practical tools to help teachers organize, personalize, & document growth

• A community to share ideas, ask questions, and earn points
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Thank you to the Forum Advocates, especially those who are providing **scholarships for teachers to attend:**

ASCD (formerly the Association for Supervision and Curriculum Development)
Center for Integrative STEM Education (CISE) at the National Institute of Aerospace
Council of State Science Supervisors (CSSS)
International Society for Technology in Education (ISTE)
International Technology and Engineering Educators Association (ITEEA)
National Center for Earth and Space Science Education (NCESSE)
National Science Foundation (NSF)
**New Jersey Department of Education**
NIMBioS: National Institute for Mathematical and Biological Synthesis
Secondary and Education Programs/NASA
**Tennessee Science Teachers Association (TSTA)**

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