

5th Annual STEM Forum & Expo, *hosted by NSTA*

Denver, Colorado

June 27–29, 2016

Strand One

Lower Elementary/Early Childhood

Students in the lower elementary grades are beginning to understand the world around them and the role they play in it. They are curious and want to make sense of their surroundings. By providing students with inquiry-based experiences in Science, Technology, Engineering, and Mathematics, we can unlock each student's natural curiosity and help them understand the world in an engaging way. The foundational skills learned and mastered through the integration of STEM during the early years, if done right, will help these students be critical thinkers and makers that can innovate the future they will be a part of. Sessions in this strand will emphasize open-ended and active exploration, play, and investigation of the real world through the lens of NGSS.

Goal:

To provide workshops and presentations that focus on the following:

- Identifying effective and developmentally appropriate strategies to help integrate components of STEM education into the core elementary preK–2 curriculum.

Criteria:

Proposals will be evaluated on the extent that they:

- Align with the strand goal.
- Meet the learning needs of students from diverse backgrounds.
- Support or identify specific goals from the NRC *Framework*, NGSS, or state standards.
- Include presentations and activities that are developmentally and age appropriate.
- Are based on current and available research and issues in STEM education.
- Engage participants through activities or discussion.
- Show evidence of integration with *Common Core State Standards*.
- Show evidence of inquiry-based learning and the 5Es of learning (Engage, Explore, Explain, Elaborate, and Evaluate).
- Include lessons and activities showing evidence of Bloom's Taxonomy questioning and critical-thinking skills.
- Demonstrate STEM as an interdisciplinary approach to learning that removes traditional barriers between Science, Technology, Engineering, and Mathematics.
- Apply STEM learning through authentic, meaningful, and relevant experiences and open-ended exploration.

Strand Two

Upper Elementary

How do we respond to research that indicates that by the time our students reach the fourth grade, a third of them will lose interest in science? How do we ensure that our students develop a solid foundation in the STEM areas so that they are prepared to both work and live in the 21st century? To reverse this trend and ignite their interest in future STEM careers, elementary students need quality learning activities and experiences that spark curiosity, promote confidence, support the rigor of current standards, and develop competence in STEM subjects. The sessions in this strand showcase programs and instructional strategies that support STEM and have been successfully integrated into the elementary core curriculum.

Goal:

To provide workshops and presentations that focus on the following:

- Identifying effective strategies and resources that actively engage students and help integrate components of STEM into the core grades 3–5 elementary curriculum.

Criteria:

Proposals will be evaluated on the extent that they:

- Align with the strand goal.
- Support or identify specific goals from the NRC *Framework*, *NGSS*, or state standards.
- Integrate and support the *Common Core State Standards*, in English language arts and mathematics.
- Are based on current and available research and issues in STEM education.
- Engage participants through activities or discussion.
- Identify research-supported effective strategies and resources that actively engage students, including innovative uses of current technologies.
- Provide examples of authentic or real-world applications and connections.
- Promote integration of STEM components into the core upper elementary curriculum.
- Demonstrate STEM as an interdisciplinary approach to learning that removes traditional barriers between Science, Technology, Engineering, and Mathematics.
- Encourage participants to justify and cite evidence from findings or investigations, which offer student an opportunity to increase fluency through authentic communication.
- Apply STEM learning through authentic experiences and open-ended exploration.

Strand Three

Middle Level

Engaging students through opportunities to explore STEM fields of study that support the NRC *Framework* and the *Next Generation Science Standards* is a top priority at the middle school level. A successful middle school STEM program allows students to create, innovate, communicate, and collaborate on projects that are driven by their own interests. The sessions in this strand showcase learning environments where Science, Technology, Engineering, and Mathematics interconnect to serve as a vehicle for discovery, innovation, and independent problem solving while also meeting rigorous content standards.

Goal:

To provide workshops and presentations that focus on the following:

- Identifying learning environments that foster confidence, creativity, and capacity to innovate in middle-level students.

Criteria:

Proposals will be evaluated on the extent that they:

- Align with the strand goal.
- Support or identify specific goals from the NRC *Framework*, *NGSS*, or state standards.
- Align with rigorous content standards.
- Are based on current and available research and issues in STEM education.
- Engage participants through activities or discussion.
- Demonstrate STEM as an interdisciplinary approach to learning that removes traditional barriers between Science, Technology, Engineering, and Mathematics.
- Apply STEM learning through authentic experiences and open-ended, student-directed exploration.

Strand Four

High School

As we move forward in the 21st century and begin preparing high school students to enter the workforce and college, students should be exposed to a variety of careers in STEM fields. Traditionally, high school STEM content would be taught in isolation of other areas of study. Now, Science, Technology, Engineering, and Mathematics must be effectively integrated and delivered in impactful and meaningful ways. Using an integrated approach that includes real-world connections and hands-on experiences will establish a solid STEM education for students in grades 9–12. The sessions in this strand will highlight strategies and curricula designed both for formal and informal learning environments that best facilitate effective STEM integration (both across STEM and non-STEM subject areas) and STEM Career Awareness.

Goals:

To provide workshops and presentations that focus on the following:

- Providing effective exposure to build increased awareness of STEM careers.
- Demonstrating instructional best practices used to deepen inquiry, solve complex problems, and integrate Science, Technology, Engineering, and Mathematics in the secondary curriculum—both within traditional STEM subject areas as well as outside of them.
- Sharing authentic approaches to foster collaboration among educators and others to teach STEM in a secondary setting.

Criteria:

Proposals will be evaluated on the extent that they:

- Align with one of more strand goals.
- Support or identify specific goals from the NRC *Framework*, *NGSS*, or state standards.
- Are based on current and available research and issues in STEM education.
- Engage participants through hands-on activities or discussion.
- Demonstrate STEM as an interdisciplinary approach to learning that removes traditional barriers between Science, Technology, Engineering, and Mathematics.
- Apply STEM learning through authentic experiences and open-ended, student-directed exploration.

Strand Five

Partnerships

Partnerships among community, business/industry, and education-focused entities often connect PK–16 schools and universities to valuable resources. Leveraging those partnerships can also be key to preparing students to meet the needs of a dynamic workforce that is constantly changing. As the Nation recognizes the importance of STEM education to our economic future, collaborations in STEM education between PK–16 and business and cultural communities are becoming increasingly prevalent. The sessions in this strand highlight select PK–16 partnership initiatives that have been successfully implemented and have demonstrated positive outcomes.

Goal:

To provide workshops and presentations that focus on the following:

- Providing examples and evidence of effective partnerships or collaborations between community, business/industry, and education-focused entities and PK–16 schools and universities.

Criteria:

Proposals will be evaluated on the extent that they:

- Align with the strand goal.
- Support or identify specific goals from national science standards (NRC *Framework* and the *Next Generation Science Standards*), national math standards, national technology standards, or core strands across the STEM curriculum.
- Provide specific examples and describe how such partnerships were developed and why they are successful.
- Are based on current and available research and issues in STEM education.
- Engage participants through activities or discussion.
- Demonstrate STEM as an interdisciplinary approach to learning that removes traditional barriers between Science, Technology, Engineering, and Mathematics.
- Apply STEM learning through authentic experiences and open-ended, student-directed exploration.

Strand Six

Administrators

The STEM fields are collectively considered the core technological underpinnings of an advanced society, and the strength of the STEM workforce is viewed as an indicator of a nation's ability to sustain itself. Successful STEM programs at the primary and secondary levels align the interrelated nature of science and mathematics education with an emphasis on technology and engineering through hands-on and real-life applications for students. The integration of STEM content to answer complex questions, to investigate global issues, and to develop solutions for challenges and real-world problems requires the use of practices such as making sense of problems and persevering in solving them; reasoning abstractly and quantitatively; constructing viable arguments and critiquing the work of others; modeling with mathematics; using appropriate tools strategically; attending to precision; looking for and making use of structure; and looking for and expressing regularity in repeated reasoning.

Goals:

To provide workshops and presentations that focus on the following:

- Describing and demonstrating how administrators have effectively supported and built STEM programs at their schools or in their school districts.
- Describing and demonstrating how schools work *Common Core State Standards*, successful STEM practices, the *Next Generation Science Standards*, and the Standards for Mathematical Practice in tandem to create college- and career-ready graduates.
- Describing and demonstrating how administrators have effectively leveraged external support for STEM programs within their schools or districts.

Criteria:

Proposals will be evaluated on the extent that they:

- Align with one or more strand goals.
- Support or identify specific goals from the NRC *Framework*, *NGSS*, or state standards.
- Are based on current and available research and issues in STEM education.
- Engage participants through activities or discussion.
- Describe and demonstrate how an administrator has effectively supported and built STEM programs.
- Demonstrate STEM as an interdisciplinary approach to learning that removes traditional barriers between Science, Technology, Engineering, and Mathematics.
- Demonstrate how STEM courses were aligned, incorporated, and supported at the school site.
- Apply STEM learning through authentic experiences and open-ended, student-directed exploration.