Using a Framework for **Understanding** STEM

What's the Issue?

STEM is a phrase that has numerous and diverse meanings to individuals. Some individuals may see STEM as a set of skills that include critical thinking and problem solving. Others may include an emphasis on content related to science and mathematics. While, some may simply be wondering what STEM means at all.

As diverse stakeholders come together to form STEM alliances, it is essential to ensure that those initiating the alliance work together to gain a better understanding of what STEM is so they can better think about the goals they want to set for the work of the STEM alliance.

Because developing a shared definition has proved to be somewhat challenging, a framework is provided here to support developing, first, shared language about STEM. Through the activities recommended in this brief, emerging alliances will apply their new framework for understanding STEM to scenarios around them.

This brief provides information and guidance for better understanding the individual disciplines that make up STEM and the many versions of STEM in K-12 and beyond.

Why It Matters To You

⤵ The most significant challenges facing STEM education are a lack of clarity relative to the acronym's meaning and the need to develop shared understandings of STEM.[1]

⤵ STEM is a complex concept; multiple isolated and potentially interacting components can make it difficult to define. However, shared understandings can be reached and extremely valuable for a STEM alliance to consider.

⤵ Shared understandings of STEM within an alliance can:

- focus conversations;
- improve alignment of goals to identified needs;
- support determination of STEM drivers in communities; and
- lead to a better understanding of learning experiences that improve access to STEM career pathways.

Recommended Actions

To develop a shared understanding as individual disciplines and the cross-application designated by the acronym of STEM, complete the following activities:

- **Read** the blog post Turning It Up: A Framework for STEM Education.[2]
- **Analyze** the following videos and determine which version of STEM the activities represent using the STEM Sound Board.
  - ★ **Watch** the Teaching Channel video, Energy and Matter Across Disciplines[3]
  - ★ **Watch** the Teaching Channel video, Fun with STEM: The Catapult Project[4]
- **Talk** with a few STEM professionals in local industries and use the STEM Sound Board to determine which version of STEM occurs in their day-to-day work.
- **Become familiar** with an out-of-school program aimed at engaging K-12 students in STEM and use the STEM Sound Board to determine which version of STEM the program is targeting.

Reflection Questions

- Has your perspective of STEM shifted upon reading the blog post and analyzing the videos, professions and/or out-of school programs? If so, how?
- If not, how did the vision of STEM from the blog post support your original perspective of STEM?
- How can it be valuable for diverse stakeholders invested in the STEM Alliance to have a common framework, like the STEM Sound Board, to move alliance work forward?
- How do K-12 science or mathematics classes categorized as S_ _ _ or _ _ _ M support student pathways into STEM careers?
- How would an after-school program that incorporates mostly _ _ e _ versions of STEM fit within your STEM alliance goals?

Things to Consider

How might the the National Research Council's report[5] inform the work of a STEM alliance? The report provides an analysis of existing approaches to integrated STEM education, identifying impact of integrated approaches on a number of significant factors.

What versions of STEM exist in K-12 STEM Education? STEM education includes the individual disciplines of mathematics and science as well as the purposeful integration and application of mathematics and science with technology and engineering. STEM Education is driven by problem solving, discovery, exploratory project/problem-based learning, and student-centered development of ideas and solutions.

What version of STEM experiences do local businesses and colleges/universities believe will prepare students for pathways to careers or degrees in STEM? Better understanding the STEM needs of local businesses coupled with what colleges/universities believe will prepare students for careers or degrees in STEM will allow an alliance to better pin-point efforts to support students filling the STEM pipeline.

References

1: Bybee, R. (2013). The Case for STEM Education: Challenges and Opportunities.
2: Neill, T. & Patrick, L. (2016). http://okmathteachers.com/stemframework
3: https://www.teachingchannel.org/videos/cross-discipline-lesson-achieve
4: https://www.teachingchannel.org/videos/stem-lesson-ideas-catapult-project
5: http://www.nap.edu/catalog/18612/stem-integration-in-k-12-education-status-prospects-and-an