



Position Statement



Introduction

Science, technology, engineering, and mathematics (STEM) are viewed as fundamental elements to prepare the next generation for economically viable careers. This is reflected by President Obama’s goal of “moving our nation from the middle to the top of the pack in math and science education” and his focus on (a) hiring additional STEM teachers; (b) enhancing STEM literacy so students can think critically in key subjects; (c) improving the quality of instruction to help U.S. students perform competitively with those in other nations; and (d) expanding STEM education and career opportunities for women, minorities, and other underrepresented groups (The White House, 2010).

To begin laying this foundation for students as they compete in the 21st century economy, educators and decision makers must continue to increase their understanding and implementation of STEM education opportunities. A number of economic analyses suggest that if the United States is to regain its prominence in STEM fields, the current number of undergraduates with STEM degrees will need to increase by approximately one million—nearly 34%—over the next decade (President’s Council of Advisors on Science and Technology, February 7, 2012).

Does it seem feasible for the U.S. to produce one million more STEM professionals over the next 10 years? In 2013 SEDL founded the STEM XXI Network, along with IBM, the Thinkery, and Central Texas Discover Engineering. Together, we have pondered this question and developed this position statement. Our definition of STEM, our focus, and our initial activities to seek solutions to address this challenge via collaboration among entities in the field of STEM learning are described below. We are committed to convening a variety of stakeholders to discuss how we can collectively address the issues around STEM teaching and learning in Texas and nationally.

Defining STEM

The acronym STEM is used by the National Science Foundation and other organizations to refer to a “meta-discipline” that combines science, technology, engineering, and mathematics subject areas. This integrated approach to STEM disciplines was designed to transform classrooms into inquiry-based, problem-solving discovery zones where children engage with content to find solutions to problems (Fioriello, 2010).

Below is a graphic representation of this definition of STEM.

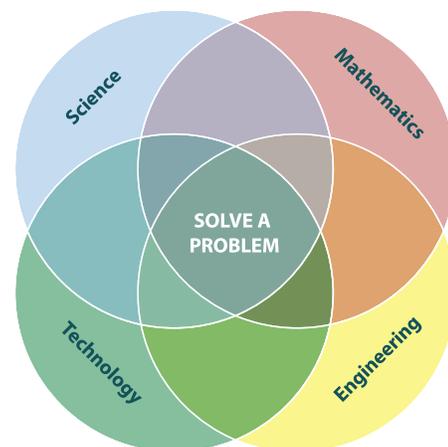
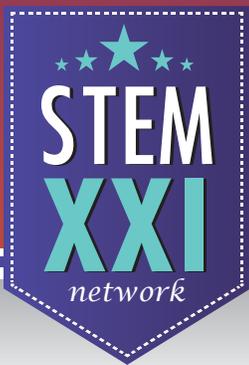


Exhibit 1: Conceptualization of STEM

The Role of Engineering in STEM

The four parts of STEM are now often taught separately and independently from one another. The STEM XXI Network views the iterative problem-solving process inherent in engineering as an essential integrating element to the STEM field and one that provides unique opportunities for STEM learning. We would like to explore the use of the engineering design process as a platform for more broadly integrating the four disciplines of STEM in teaching and learning environments.





Position Statement



Initial Focus on Expanded and Informal Learning Environments

Expanded and informal learning opportunities such as afterschool, summer camp, mentoring, and museum programs all provide an ideal space in which to explore this approach. These settings provide a variety of flexible structures and an experimental space to implement and evaluate innovative STEM instructional strategies in a setting that is not restricted by K–12 school structures, standards, and high-stakes testing. Expanded learning and informal learning environments can also address non-academic outcomes such as creativity, perseverance, motivation, interest, engagement, and team problem solving. In this sense, expanded and informal learning environments can be used as a test bed as we work to enhance and augment STEM education. In particular, we want to focus our efforts on what out-of-school programs can do to complement what hardworking teachers are already doing during the school day.

STEM in Texas

The STEM XXI Network is committed to enhancing the landscape of STEM teaching and learning in Texas. We are interested in exploring—with a collaborative group of other like-minded people—possible partnerships and strategies to improve STEM teaching, learning, and life experiences for Texas students.

First Steps

The STEM XXI Network will host a summer gathering of diverse STEM experts, afterschool program leaders, teachers, administrators, industry leaders, and funders in Texas. Our purpose is to identify programs that provide high-quality STEM education, survey the scope and reach of these existing programs, and identify gaps in services for unserved or underserved student communities. We envision the creation of a systematic approach to STEM learning that includes all grade



levels and addresses the needs of all stakeholders—students, families, schools, colleges and universities, and employers.

By bringing a diverse group of stakeholders together to increase understanding of the current landscape of STEM programs in Texas, we hope to avoid duplication, identify gaps, and propose new partnerships and strategies to address those gaps and strengthen STEM education in Texas and beyond.

References

- Fioriello, P. (2010, November). *Understanding the basics of STEM education*. Retrieved from <http://drpfconsults.com/understanding-the-basics-of-stem-education>
- President's Council of Advisors on Science and Technology. (2012, February 7). *Engage to excel: Producing one million additional college graduates with degrees in science, technology, engineering, and mathematics. A Report by the President's Council of Advisors on Science and Technology*. Retrieved from http://www.whitehouse.gov/sites/default/files/microsites/ostp/fact_sheet_final.pdf
- The White House, Office of the Press Secretary. (2010, September 27). *President Obama announces goal of recruiting 10,000 STEM teachers over the next two years* [Press release]. Retrieved from <http://www.whitehouse.gov/the-press-office/2010/09/27/president-obama-announces-goal-recruiting-10000-stem-teachers-over-next>

What is STEM XXI Network?

The STEM XXI Network was founded by SEDL, IBM, Central Texas Discover Engineering, and the Thinkery. The STEM XXI Network is committed to enhancing the landscape of STEM (science, technology, engineering, and mathematics) teaching and learning in Texas.

For information about STEM XXI or to partner with us on similar initiatives, please visit www.sedl.org/stemxxi or email stemxxi@sedl.org.

