

**U.S. House of Representatives  
Committee on Science and Technology**

Field Hearing on  
*STEM Education Before High School:  
Shaping our Future Science, Technology, Engineering and Math Leaders of Tomorrow by  
Inspiring our Children Today*

Martha and Josh Morriss Mathematics & Engineering Elementary School  
May 12, 2008

Testimony of  
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**1. *What is the overall state of STEM education in Texarkana?***

We are excited about science, technology, engineering, and mathematics education in the Texarkana Independent School District. Our goal is to offer challenging mathematics and engineering concepts by providing a rigorous and seamless STEM curriculum.

The Martha and Josh Morriss Mathematics & Engineering Elementary School is a state-of-the-art facility that serves as a national model for how young children can become engaged and educated in mathematics and engineering.

At Texas Middle School we will provide these opportunities through our new Math, Science, and Engineering Academy. This academy, designed for sixth grade students, is a model that will be extended to seventh and eighth grades during the next two years.

Students at Texas High School may earn both high school and college credits in a myriad of courses, including 38 semester credit hours in math, science, and engineering.

The following value-added elements are included in our STEM program:

- Engineering Encounters/Academy Showcases - cross grade level, theme-based authentic assessment projects completed and presented by students to the public;
- An engaging engineering curriculum supported by the National Center for Technological Literacy and the Museum of Science, Boston;

- A math curriculum in which the K-8<sup>th</sup> grade and Algebra I Texas Essential Knowledge and Skills (TEKS) are accelerated;
- Dual credit courses, including advanced mathematics, science, and engineering;
- Extended school-year enrichment activities, such as a two-week summer Circuitry Camp and after-school Robotics.

***Why is it important for all students to achieve proficiency in these subjects?***

In an increasingly technological society, it is imperative for students to achieve proficiency in science, technology, engineering, and mathematics. Student proficiency is necessary to close the gap between participation and success in secondary and higher education in a manner that effectively addresses a growing professional and career demand. As Bill Gates recently testified before the House Committee on Science and Technology, statistics project two million job openings in science, technology, engineering, and mathematics-related fields by 2014. The decline in students pursuing STEM-related careers could stifle innovation and economic growth. In the words of the STEM Education Coalition, "We believe that excellence in STEM education at all levels, among all populations, is vital to our nation's long-term economic prosperity, global competitiveness, and homeland security."

***2. What was the motivation behind establishing the Martha and Josh Morriss Mathematics & Engineering Elementary School?***

A growing gap between the supply and demand for professionals in engineering and mathematics careers has alerted stakeholders across the nation. At the national level, resolution of this dilemma has been identified as a federal priority via appropriation of the Science, Technology, Engineering, and Mathematics (STEM) project and the American Competitiveness Initiative unveiled by President Bush in his January 2006 State of the Union Address. Texas Senator Kay Bailey Hutchison publicly recognized the growing need for engineering education and research in Texas when she announced the creation of the Texas Academy of Science, Engineering, and Medicine in San Antonio in January 2004. The regional need for more engineers was documented in the late 1990s when Texarkana area businesses (e.g., International Paper, Domtar Paper Mill, and Alcoa) identified the need for an engineering program at Texas A&M-Texarkana as the number one community priority. The need for more regionally available

engineers, coupled with the need for an increase in the quantity and quality of United States grown and educated engineers, sparked the development of the Texas A&M University-Texarkana – Texarkana ISD K-16 Engineering Collaborative.

Although the effectiveness of a K-16 engineering collaborative as a means of ameliorating the supply and demand gap of engineers is a very logical, research-based approach, a comprehensive search has not identified another partnership of this kind across the United States. The Texas A&M University-Texarkana – Texarkana ISD K-16 Engineering Collaborative is a unique, sustainable, and replicable model that sets a gold standard for public schools and universities.

***What role did parents, the community and local businesses play in the establishment of this school?***

In January 2005, Texarkana ISD convened the first meeting of the Blue Ribbon Committee, a group of parents, community and business leaders, and school district representatives. This panel's purpose was to review the school district's facilities, finances, and curriculum, and to make recommendations concerning future plans for the district. Following a series of planning sessions, the committee recommended the establishment of a new elementary school, a school that would become a national model for K-16 collaboration in how young children can become engaged in and educated for careers in mathematics and engineering.

The first concrete step to this concept becoming a reality occurred in spring 2006 when the Josh Morriss, Jr. family donated 10.6 acres of land near the new 375 acre Texas A&M-Texarkana campus site for the new elementary school.

Along with the contributions of the Blue Ribbon Committee and the Josh Morriss, Jr. family, Texas A&M University-Texarkana became an integral partner in the school's development. The university's involvement included consultation in the floor plan and architectural design, in integrated curriculum development, and in professional development for teachers.

***Is there a plan in place to keep these students motivated in STEM subjects as they make the transition to middle school and on to high school?***

Texas A&M University-Texarkana and Texarkana Independent School District have established a vertically aligned kindergarten-16 engineering education collaborative that will be executed at four levels:

- 1) A K-5 public elementary school (Martha and Josh Morriss Mathematics & Engineering Elementary School) that provides a mathematics and pre-engineering integrated curriculum, Engineering Encounters (student-led, hands-on experiences shared with parents and the community), and pre-engineering thematic units (i.e., structures, forces, and gears) at each grade level (opened in fall 2007)
- 2) The Math, Science, and Engineering Academy, a pre-engineering school-within-a-school at Texas Middle School (planned for fall 2008)
- 3) Selected mathematics and science courses with pre-engineering content enrichment and dual credit engineering courses at Texas High School (fall 2006)

- 4) A choice of three engineering related programs of study at Texas A&M- Texarkana: BS in Computer and Information Sciences (fall 2005), BS in Electrical Engineering (planned for fall 2008), and BS in Mechanical Engineering (planned for fall 2010).

**3. *What are the major problems that limit the performance of students and teachers, and what do you feel is the single, most important step that the federal government should take to improve K-12<sup>th</sup> grade math and science education?***

The major problems that limit the performance of students and teachers in STEM education are centered around the lack of educational focus on STEM. Traditionally, teacher training in STEM has been limited; therefore, teachers often do not have confidence in their own STEM background knowledge and skills. This limitation leads to a deficiency in student awareness and interest in STEM career fields. In addition, instructional resources for STEM courses are costly, and funding is minimal. Finally, very few, if any, national models of successful, aligned STEM programs exist.

The most important step the federal government should take to improve K-12<sup>th</sup> grade math and science education is to provide strong support for STEM teacher professional development. Research consistently shows that the single most important factor in student achievement is teacher quality. We urge the federal government to provide grants and other financial assistance directly to school districts and to other public educational entities that have identified needs and priorities in the area of STEM education.

***What involvement have you had with math and science education programs at the National Science Foundation or other federal agencies as well as those in the state of Texas?***

The Texarkana Independent School District has been involved with the following STEM programs:

- ***East Texas Regional Collaborative for Excellence in Science Teaching*** – a continuing project funded since 1997; offered through grants from the Texas Regional Collaboratives for Excellence in Science Teaching
- ***Teacher-to-Teacher Initiative*** – designed by teachers for teachers in order to provide technical support, professional development opportunities, and recognition for teachers of all content areas and grade levels; offered through the U.S. Department of Education

- ***The East Texas STEM Center*** – a federal program designed to improve instruction and academic performance in science- and math-related subjects at Texas high schools; offered through a T-STEM federal grant
- ***The Teacher Quality Grants Program*** – a federally funded effort providing grants to higher education institutions and nonprofit organizations; offered through the Texas Higher Education Coordinating Board and the Charles A. Dana Center

***What are the most important and effective components of these programs?***

These programs focus on sustained professional development in both STEM content and in research-based instructional strategies for teachers. All three programs rely on federal and state funding to provide opportunities for professional development. The programs provide crucial support for teachers in preparing students for college and for entry into STEM career fields.