

ORANGE COUNTY
BOARD OF EDUCATION

AGENDA ITEM ABSTRACT

Meeting Date: January 28, 2013

AGENDA ITEM No. 13-01-(2)- 09

ACTION ITEM: (Y/N) N

SUBJECT: Science, Technology, Engineering, and Math (STEM) Report

INFO. CONTACT: Dr. Denise Morton PHONE: (919) 732-8126

ATTACHMENTS: 1. Orange County Schools STEM Initiatives Report

PURPOSE: To provide the Board of Education a report on the K-12 STEM activities occurring in the school district.

BACKGROUND: The goal of STEM education is to help students become: problem solvers, innovators, inventors, self-reliant, logical thinkers, and technologically literate. To that end, the Board of Education and Superintendent have focused on implementing STEM educational initiatives throughout the district. Examples of these initiatives are:

- Implementation of Engineering is Elementary at Central Elementary for grades K-5
- Project Lead the Way pre-engineering coursework is offered at all three middle schools and one high school
- Development of a district-wide STEM business advisory council
- Providing laptops for all students 6-12 (with plans to expand to the fourth and fifth grades at the elementary school) and every regular classroom is equipped with a Smart board and projector
- Purchase of K-12 Science Tech Book (from Discovery Education)
- Comprehensive K-12 curriculum maps for science and math have been developed
- Math and science formative assessments for K-12 have been developed
- Funding provided for each school to purchase materials for hands on and virtual science labs.
- Purchase of one classroom set of calculators for each middle and high school
- Participation in a multiyear grant entitled "Assessing Math Concepts" that provides funding for professional development and classroom materials to train elementary teachers on how to teach young children math at a more conceptual level

It should also be noted that the 2011-2012 state accountability testing results improved in the areas of grades 3-8 in math, grades 5 and 8 in science, as well as Biology and Algebra I.

FINANCIAL IMPACT:	Calculators	\$5,060.03
	K-12 Science Techbook (6-year contract)	\$242,599.00
	Elementary Science Labs Materials (\$1,200 ea.)	\$8,400.00
	Middle Science Labs Materials (\$5,000 ea.)	\$15,000.00
	High School Science Labs Materials (\$5,000 ea.)	\$10,000.00
	K-12 Teacher Training and Materials for AIG, AP and IB	\$50,000.00
	Professional Development and Materials for STEM	\$50,000.00
	High School Robotics Club	<u>\$3,000.00</u>
	Total	\$384,059.03

RECOMMENDATION: The Superintendent recommends that the Board of Education receive for information the report on K-12 STEM activities.

Orange County Schools STEM Initiatives

Engineering is Elementary (EiE)

- **Curriculum**
 - 6 out of 15 EiE Units completed for grades 1-5
 - 4 EiE Units in Progress
 - 11 (+) smaller design challenges completed in grades K-5

- **Special Projects/Events**
 - Completed PRISM grant funded solar car STEM activities with all 5th grade students.
 - Completed PRISM grant funded light related STEM activities with all 4th grade students.
 - Piloting STEM education advocacy kit from the American Society for Engineering Education with 4th and 5th grade students. (Completed 3 out of 6 activities)
 - Currently working with Science Olympiad team- tournament date is March 23, 2013.
 - Held Scholastic Book Fair in November, 2012. Raised \$2,000.00 to purchase STEM related books for Media Center.
 - 5 STEM related field trips completed.
 - 7 more STEM related field trips planned.

- **Partnerships**
 - Established partnership with Duke University Pratt School of Engineering to create an after school Engineering club for 45 students.
 - Submitted proposal to Summit Engineering to create partnership. One aspect of proposal included professional engineers from Summit "mentoring" Central teachers.

- **Grants**
 - Awarded Biogen Idec Foundation Micro-Grants in Science Education for \$1,525.00
 - Submitted NCTIES grant application for \$3,000.00 to create a Kindle home use program at Central.

- **Presentations**
 - Presented to parent/teacher group in Chatham County.
 - Presented w/ DPI staff at NC School Counselors Conference in Greensboro, NC - November, 2012.
 - Accepted to present at the STEM National conference in Durham, NC - March 12, 2013.
 - Submitted presentation proposal for NSTA conference in Charlotte, NC - October 2013.

- **Professional Development**
 - 2 teachers attended NSTA Conference in Atlanta, GA.
 - 2 teachers attended NCTM conference in Chicago, IL.

STEM Coursework in Career-Technical Education

Project Lead the Way (PLTW)

PLTW is offered at all three middle schools and Orange High School.

- Middle school PLTW coursework:
 - 7th grade – Design and Modeling
 - 8th grade – Automation and Robotics
- High School PLTW coursework:
 - 9th/10th grades – Introduction to Engineering
 - 10th/11th grades – Principles of Engineering
 - 10th/11th grades – Digital Electronics
 - 12th grade – Engineering Design and Development
 - Computer Engineering/Networking
 - SAS Programming
 - Introduction to Biotechnology

The high school PLTW program is seeking to become a nationally certified site this year. The process involves a self-assessment, a site visit and the development of a certification report. To help guide these efforts, a parent/teacher/business STEM Advisory Board was formed. The members are: Kristin Bedell, Robin Blanton, Donna Coffey, Dr. Patrick Coin, Rene Daughtry, Liz Day, Jared Goodnite, Eric Jeffries, Jason Johnson, Dr. Denise Morton, James Parker, Liz Parry, Debbie Piscitelli, Claire Porter, Brandon Thompson, Terri Varnado, Myron Wilson, and Jerry Yale.

- Re-establish AP Computer Science at the high schools

K-12 Science Techbooks (Discovery Education)

The district purchased a six-year contract to provide the K-12 Science techbook. The software is an instructional resource that provides dynamic interactive science resources and hands-on and virtual labs. Anna Strassner, the Discovery Education representative, recently provided the district with a first semester usage report. She is extremely impressed with the usage rate thus far.

District Benchmark Assessments and Curriculum Maps

Science and math teacher leaders have worked to develop district curriculum maps and common formative assessments that are administered every nine weeks.

Virtual and Hands-on Science Labs

In the past, teachers used grade level science kits to help deliver science instruction. With the purchase of the K-12 Discovery Education Science Techbook, teachers have shifted to using the virtual and hands-on labs provided by the Science Techbook. The curriculum division provided funding to each school to help purchase the needed supplies for the labs.

Math Resources

Middle and high schools expressed their need for new calculators. The curriculum division purchased a new classroom set of 30 calculators for each middle and high school.

Involvement in a Multi-district Federal Math/Science Program (APlus Grant)

This grant funds three years of professional development for K-3 teachers. This training helps teachers further students' understanding of foundational number concepts and determines hands-on math strategies to strengthen and extend a student's skill mastery in math. Total funding for Orange County Schools for the 2012-2013 school year is \$154,640.00.

NCSU Life Science School of Ants Partnership with Orange County Schools

The Orange County Schools elementary science leadership team will participate in a free workshop at NCSU on ants on February 18th.

District Funding Support

Professional development for AP/IB Math and Science teachers

Providing funding for 12 teachers to attend the National STEM Conference in March, 2013

Funding to support high school Robotics Team