ORANGE COUNTY
BOARD OF EDUCATION

AGENDA ITEM ABSTRACT

Meeting Date: June 10, 2013

AGENDA ITEM No. 13-06-18

ACTION: (Y/N) N

SUBJECT: Science, Technology, Engineering and Math (STEM) Program Proposal

INFO. CONTACT: Dr. Denise Morton, Anne Purcell **PHONE:** (919) 732-8126

ATTACHMENTS:
1. Overview of STEM Proposal
2. STEM Power Point Presentation

PURPOSE: To provide the Board of Education for their review and discussion, a proposal from C.W. Stanford requesting board approval to become a STEM themed school for the 2013-2014 school year.

BACKGROUND: STEM is the acronym for science, technology, engineering and mathematics. STEM education is an interdisciplinary approach to learning where rigorous academic concepts are coupled with real-world lessons as students apply science, technology, engineering and mathematics in contexts that make connections between school, community, work and the global enterprise enabling the development of STEM literacy and with it the ability to compete in the new economy. (Tsupros, 2009).

The importance of STEM education focuses on two concerns. There is a growing concern that the United States is not preparing a sufficient number of students, teachers, and practitioners in the STEM career fields. Another concern is that our industries need more workers in these fields due to an aging workforce and an increasingly innovative world market. (Gerlach, 2012) The goal is to provide a pipeline of student talent in the United States to respond to these concerns.

To that end, the C.W. Stanford principal and interested staff began discussions during the latter part of the 2012-2013 school year about having their school become a STEM themed school for the 2013-2014 school year. They spent the past school year investigating STEM schools, attending STEM conferences, discussing the idea with CWS staff, etc.

Another primary objective for implementing a middle school STEM theme-based site is to continue the process of establishing a K-12 seamless pipeline for the Central Elementary students where the Engineering is Elementary program was taught this school year. Central's rising sixth graders will attend C.W. Stanford as their middle grades feeder school. C.W. Stanford and the curriculum division's goal is to be able to continue to offer a STEM instructional emphasis for these students during their middle grades years.

FINANCIAL IMPACT:	$5,000.00	Professional Development
	$4,000.00	Materials & Supplies
	$1,000.00	STEM Theme Items
	$4,000.00	Exploring Biotechnology Materials & Supplies
	$14,000.00	**Total**

*Funding will be provided through state CTE and local curriculum funds.

RECOMMENDATION: The Superintendent recommends that the Board of Education hear and discuss the C.W. Stanford STEM proposal, and provide direction to staff as to next steps.

C. W. Stanford 2013-2014 STEM Proposal

Becoming a Science, Technology, Engineering and Math (STEM) Theme School

Objective 1 – Focus on STEM to better prepare students for high school and higher education.

Objective 2 – Expand Orange County Schools' commitment to STEM education and continue the process that began with Engineering is Elementary (EIE) at Central Elementary.

Objective 3 – Expand the use of technology and engineering while making learning more student centered, less teacher centered instruction.

Objective 4 – Connect student learning to careers.

Objective 5 – C.W. Stanford (CWS) STEM Framework is comprised of the following components:

- One math/science teacher per grade level dedicated to STEM instruction
- Open an Exploring Biotechnology program – close Family and Consumer Science program
- Assign STEM coordinator from Central as needed to help with STEM curriculum and training
- Develop STEM programming for the Middle School Afterschool
- Establish a partnership with NC State for *Project Engage* – a National Science Foundation funded project to increase computational thinking abilities for 8th grade students
- Host an annual middle school summer engineering camp at the CWS campus
- Cluster Central's rising 6th graders with dedicated 6th grade math/science team who will teach via the Engineering process

The following tasks have been completed at C.W. Stanford during this school year to prepare for the 2013-2014 school year:

- Attended two STEM conferences with CWS staff
- Discussed possibilities of STEM programs at CWS with staff and School Improvement Team
- Visited one STEM school in Winston Salem with CWS staff, BOE members and Central Office staff
- Discussed/formed teacher teams for CWS for 2013-14 – 1 math and 1 science teacher from each grade level
- Met with Liz Daye, STEM coordinator to discuss science needs of rising sixth graders entering C.W. Stanford from Central Elementary. This included some of the teachers who would be paired together and the Project Lead the Way teacher

- Discussed the possibility of converting the Family and Consumer Sciences classroom at CWS to an Exploring Biotechnology classroom with Dr. Morton and Patricia Harris
- Working with a UNC-CH doctoral intern to determine what a model STEM classroom would look like as well as potential professional development
- Planned dates for summer professional development for affected staff
- Met with Project Lead the Way staff at Duke University for ideas on how to implement the STEM theme
- Discussed possibilities of working with NCSU Dept. of Science, Engineering, Tech. and Math on a project called *Engaging Project* next year. Will meet with a professor from NCSU in June of 2013 to finalize this project
- Will offer an Engineering Summer Camp at C.W. Stanford during the summer of 2013
- Supported Communities in Schools in a grant proposal for STEM After School program for 2013-2014
- Worked closely with Dr. Morton and Patricia Harris to plan and create a strong program that will grow and spread through the curriculum and grade levels at C.W.Stanford.

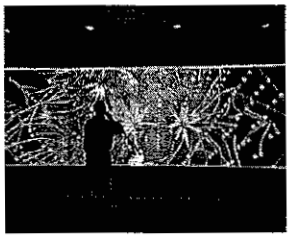
C.W. Stanford

Middle School

Engineering the Future through STEM

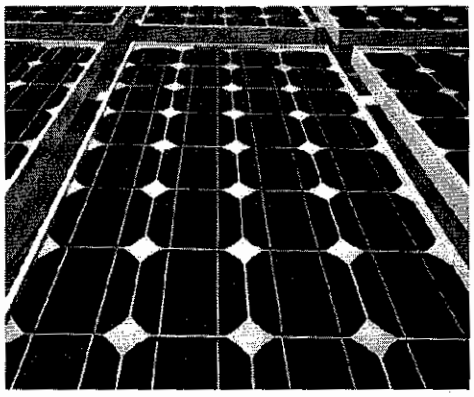
Objective

- **To provide a proposal of C.W. Stanford's vision of enhancing our students' academic journey through the implementation of a STEM theme-based school.**



What is STEM?

Science
Technology
Engineering
Mathematics



Why STEM?

In the 20th Century....

Scientists Discovered, Engineers Created and Medical Doctors Healed

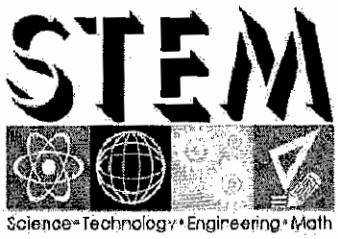
In the 21st Century....

Science, Engineering and Medicine are totally interdependent and blending together in new ways.

These intersections are creating the "jobs of tomorrow."

The "jobs of tomorrow" will require greater "technological literacy"...i.e., the ability to understand and make informed decisions about technological issues.

Integrated STEM education is a key component to making this happen.



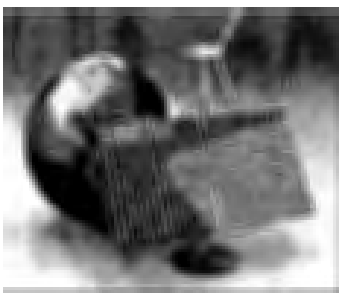
Why STEM?

- PISA 2006 results: 15 year olds in 30 member countries took an international student assessment
- U.S. students averaged 489, lower than the 500 average
- Science literacy scores of US students were lower than 16 of the other 30 countries
- U.S. students scored lower than average on explaining phenomena scientifically and using scientific evidence
- U.S. students scored lower in mathematics literacy than 23 of the countries

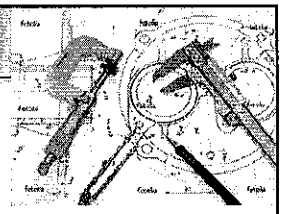
Program for International Student Assessment (PISA)

Why STEM?

- **Evidence-based**
- **Problem-solving approach**
- **Adaptable to change**
- **Technology emphasis**
- **Stronger student engagement**
- **Emphasizes critical-thinking**

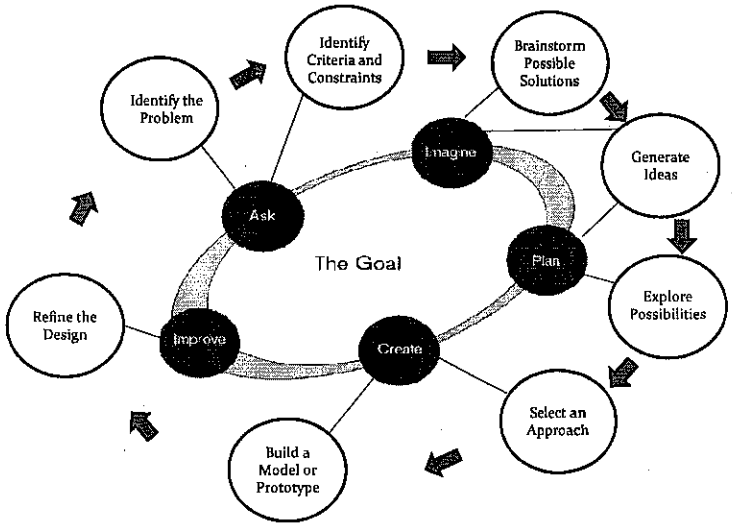


Why Engineering?



- Workforce/Global competitiveness
- National security
- Not self-selecting out of future options
- Keeping options open as long as possible
- Integrated learning/rigor and relevance and context/21st century skills development
- Transforming/contextual learning
- Leverages natural interests/proclivities of students

Design Process



C.W. Stanford STEM objectives:

- To utilize the NCDPI STEM Attributes Rubric
- Utilize STEM in individual and integrated lessons in identified math and science classes
- Train staff in "Engineering Habits of Mind" and the Design Process
- Have students actively use the design process and problem-solving skills in and out of the classroom
- Develop a community/post-secondary collaboration embracing STEM
- Use PLCs and technology to promote rigorous STEM instruction

C.W. Stanford objectives:

- Integrate the Engineering Design Process as a problem solving tool
- Summer STEM camps, after school programs, clubs
- 1:1 initiative w/ Discovery Science Techbook, etc.
- Science and Math teachers work collaboratively to implement engineering design challenges
- Summer 2013, weekly PLCs
- STEM camp, etc.

C.W. Stanford objectives:

- Include STEM in school improvement planning
- Utilize guest speakers, internships, externships, field trips
- OCS STEM Advisory Council, Chamber of Commerce, involvement
- Post secondary partners with NC State, Duke, etc.

Our future goal and vision is to earn the NCDPI designation as an official

STEM School !!!

with integrated STEM curriculum

Community, industry and post secondary engagement