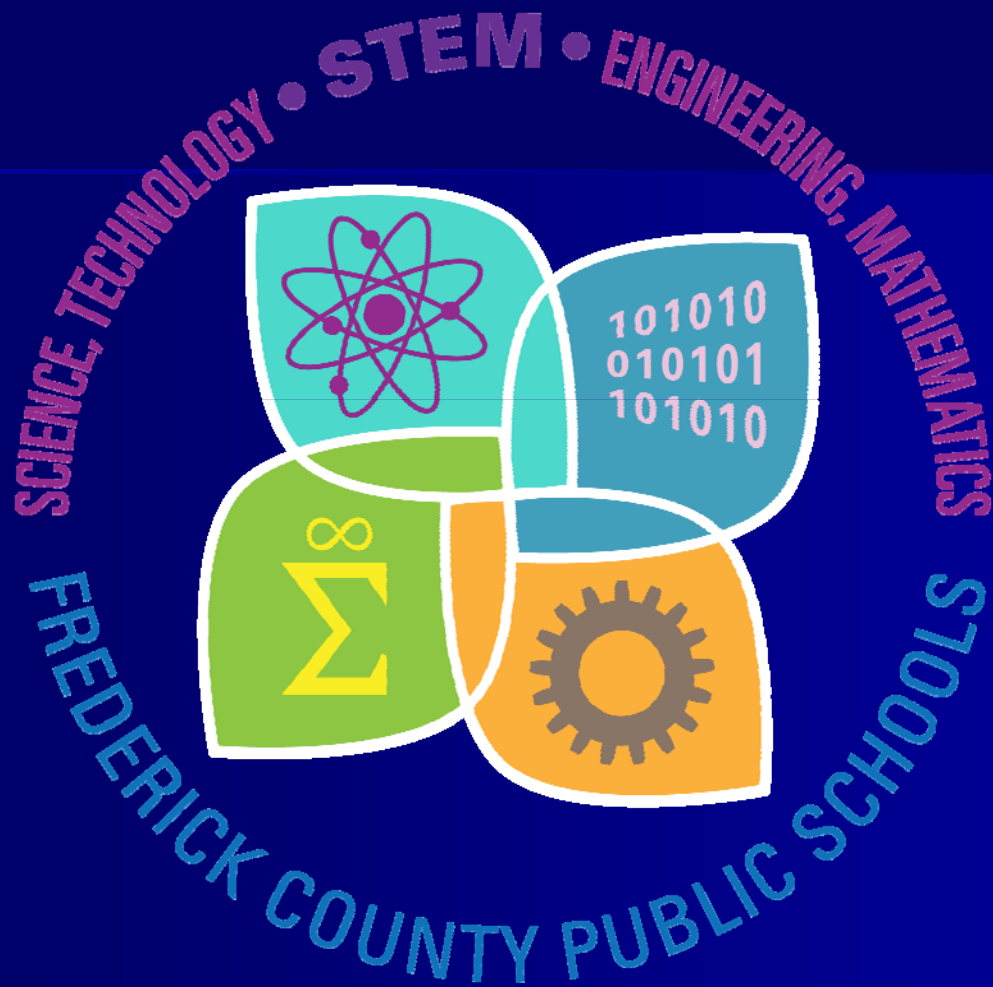


FCPS STEM Charting the Course Forward

March 2011



Vision, Mission, Goals, Framework

- **Vision:**

- The Frederick County Public Schools' vision is that FCPS graduates will be empowered with knowledge and skills to contribute successfully in a 21st century global economy based on Science, Technology, Engineering, and Mathematics (STEM).

- **Mission:**

- The mission of the FCPS STEM program is to **partner** with our local business, scientific and higher education communities to provide Science, Technology, Engineering, and Mathematics (STEM) experiences for all students that **prepare** them for 21st century careers in science, technology, engineering, and mathematics. STEM experiences will include a focus on **awareness** and **exploration** in elementary and middle schools with advanced **preparation** in high school especially for highly able learners, **underrepresented populations**, and first time college attendees.

Vision, Mission, Goals, Framework

- **PARENT AND COMMUNITY PARTNERSHIPS INITIATIVE:** Establish **parent and community partnerships** to increase awareness about STEM education and career opportunities.
- **PARTNERSHIP INITIATIVE:** Establish **partnerships** with local business, scientific, and higher education communities to provide relevant workplace experiences and mentors for students and teachers.
- **CURRICULUM INITIATIVE:** Review, develop, and align **curriculum** to ensure STEM experiences for all students that will provide awareness, exploration, and preparation as appropriate throughout the K-12 continuum.
- **STUDENT OPPORTUNITIES INITIATIVE:** Review, develop, and align **experiences for students outside the classroom** to ensure awareness and exploration of STEM experiences.

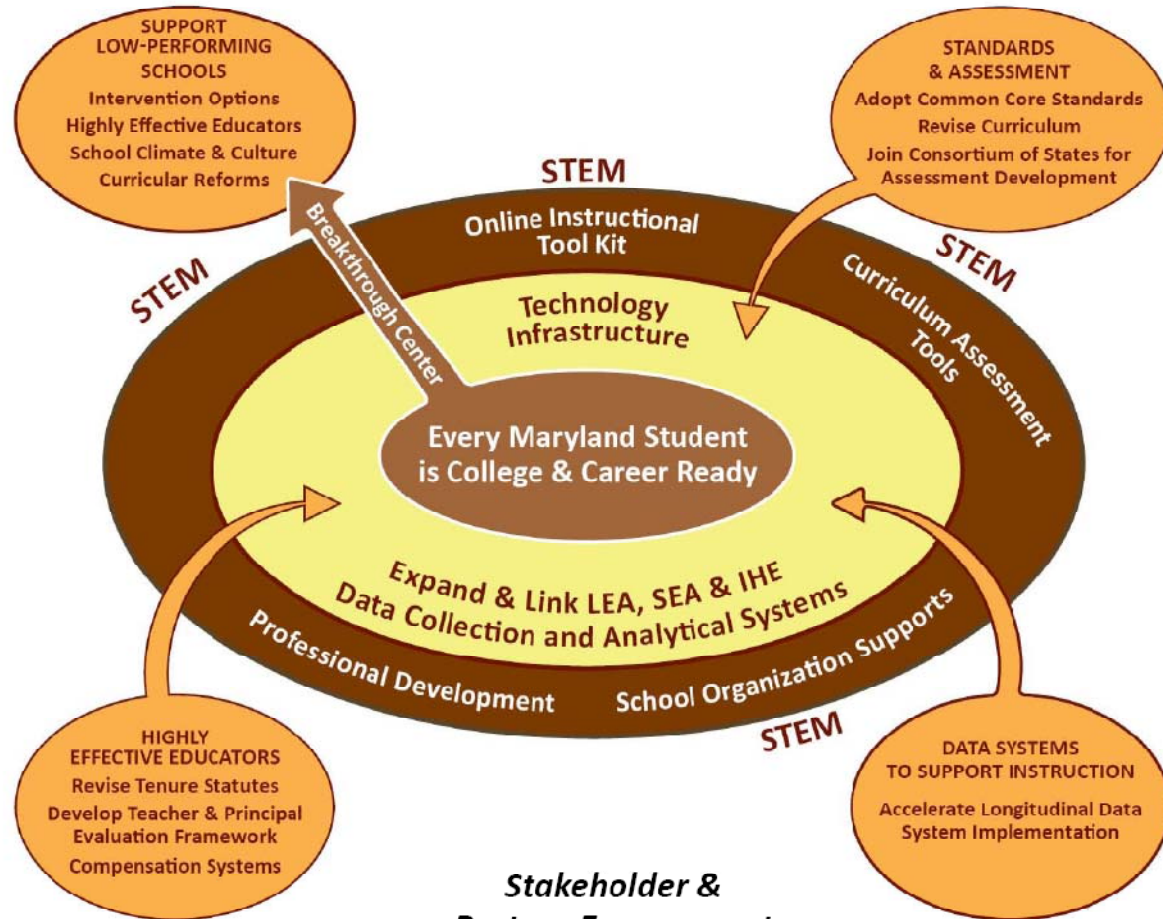


Frederick County Public Schools Framework for S.T.E.M. Education



COMPONENT	DESCRIPTION	TARGET POPULATION	EXPERIENCE INTENSITY	TIME FRAME	RESOURCES REQUIRED
1. Elementary Curriculum	<ul style="list-style-type: none"> a. Embedded units/activities b. Science / Interactions Fairs c. Saturday STEM activities d. STEM clubs 	<ul style="list-style-type: none"> • ALL • ALL • Interested • Interested 	<ul style="list-style-type: none"> • Awareness • Exposure • Awareness • Awareness 	<ul style="list-style-type: none"> • 1-2 yrs • 2-3 yrs • 2-3 yrs • 1-3 yrs 	<ul style="list-style-type: none"> • Curriculum Specialist and Teacher Specialists time required • School staff to mentor clubs • Club mentor stipends required
2. Middle Level Curriculum	<ul style="list-style-type: none"> a. Embedded units/activities b. Co-Curricular Activities (school day) c. Science / Technology Fairs d. STEM career tours e. STEM interschool exhibitions 	<ul style="list-style-type: none"> • ALL • Interest • Interested • Interested • Interested 	<ul style="list-style-type: none"> • Exposure • Exposure • Exposure • Awareness • Exposure 	<ul style="list-style-type: none"> • 1-2 yrs • 1-2 yrs • 2-3 yrs • 2-3 yrs 	<ul style="list-style-type: none"> • Curriculum Specialist and Teacher Specialist time required • Business partnerships required • Club mentor stipends required
3. High School Level Curriculum	<ul style="list-style-type: none"> a. Align existing curricula to create STEM pathways b. Locate / Create new courses to enhance existing curricula c. STEM interschool competitions 	<ul style="list-style-type: none"> • Interested • Interested • Competitive 	<ul style="list-style-type: none"> • Preparation • Preparation • Preparation 	<ul style="list-style-type: none"> • 1-3 yrs • 2-4 yrs • 2-4 yrs 	<ul style="list-style-type: none"> • Curriculum Specialists and Teacher Specialists time required • Club mentor stipends required
4. Co-Curricular Experiences	<ul style="list-style-type: none"> a. STEM clubs b. Local competitions c. Inter county competitions d. State / national competitions 	<ul style="list-style-type: none"> • Interested • Interested • Competitive • Competitive 	<ul style="list-style-type: none"> • Exposure / Preparation • Exposure / Preparation • Preparation • Preparation 	<ul style="list-style-type: none"> • 2-4 yrs • 2-4 yrs • 2-4 yrs • 2-4 yrs 	<ul style="list-style-type: none"> • Must develop interest & support • Must create local competitions • Must identify existing competitions
5. Extra-Curricular Experiences	<ul style="list-style-type: none"> a. School level STEM clubs b. County level STEM clubs c. Summer/weekend STEM academies 	<ul style="list-style-type: none"> • Interested • Interested • Interested 	<ul style="list-style-type: none"> • Awareness / Exposure • Exposure / Preparation • Exposure / Preparation 	<ul style="list-style-type: none"> • 1-3 yrs • 1-3 yrs • 2-3 yrs 	<ul style="list-style-type: none"> • Must create vision for local clubs • Club mentor stipends required to sustain
6. Internship Experiences	<ul style="list-style-type: none"> a. High intensity, long duration b. Medium intensity, duration varies c. Low intensity, minimal duration 	<ul style="list-style-type: none"> • Competitive • Interested • Interested 	<ul style="list-style-type: none"> • Preparation • Exposure / Preparation • Awareness / Exposure 	<ul style="list-style-type: none"> • Immediate • 1-3 yrs • 1-3 yrs 	<ul style="list-style-type: none"> • More locations needed • New partnerships required • New partnerships required
7. Partnerships – Business	<ul style="list-style-type: none"> a. Business b. Educational (2 + 2 + 2) c. Research 	<ul style="list-style-type: none"> • All • Interested • Competitive 	<ul style="list-style-type: none"> • Partnerships, Tours, Resources • Partnerships, Staff Development • Internships, Student Experiences 	<ul style="list-style-type: none"> • On-going • 1-3 yrs • 1-3 yrs 	<ul style="list-style-type: none"> • New partnerships required • New partnerships required • New partnerships required
8. Staff Development	<ul style="list-style-type: none"> a. FCPS staff provides b. Business Partners provides 	<ul style="list-style-type: none"> • Staff as appropriate 	<ul style="list-style-type: none"> • Staff Development • Staff Development 	<ul style="list-style-type: none"> • 1-3 yrs • 1-3 yrs 	<ul style="list-style-type: none"> • Must be developed • Some exist, more required
9. Parent / Community Education	<ul style="list-style-type: none"> a. Education b. Public Relations 	<ul style="list-style-type: none"> • Parents • Community 	<ul style="list-style-type: none"> • Community awareness and education 	<ul style="list-style-type: none"> • 2-4 yrs 	<ul style="list-style-type: none"> • This needs to be a major marketing effort

Maryland Education Reform Plan: Race to the Top



Stakeholder & Partner Engagement



American Recovery and Reinvestment Act (ARRA)

This presentation is a product of the Maryland State Department of Education 1/26/09



Celebration of Funding

■ MSDE STEM Grants		
– FY09	-	\$100,000
– FY10	-	\$100,000
– FY11	-	\$100,000
■ BNBI funding (2009 – present)		
– Planning funds	-	\$20,000
– CCA Project funds	-	\$100,000
– Teacher Externships (2009,2010)	-	\$37,500
■ Bechtel funding		
– STEM support funds	-	\$25,000
– ESSL support funds	-	\$5,000
■ MSPP Grant participation		
– ePortfolio project (elem)	-	\$86,800
■ Career Development Grant (STEM)		
– Community Foundation	-	\$11,200
■ Clinical Research Management (Feb 11)	-	\$5,000
■ TOTAL TO DATE	-	\$590,600*
■ (*Does not include over \$50,000 in funding provided for JHU EI summer courses)		

Celebrations of FCPS STEM

- MSDE grants
 - 3 grants @ \$100,000 each = \$300,000
- 3rd Annual Future Link Conf for High School Sophomores
 - Over 350 student participants last year
 - 35 STEM career sessions x 3
 - FCBRE / FCC / Ft Detrick*
- 2 Annual Classes of BNBI Teacher Externs
 - 5 teacher externs to date
 - Suspended for 2011
- 2nd Annual JHU Engineering Innovation course
 - 28 students in 2010
 - Goal for 2011: 40 – 48 students (student cost \$650)

Celebrations of FCPS STEM

- 3rd year of MS STEM Teacher Leaders
 - 13 middle schools + HRS + Outdoor School
- 2009 STEM Mars Rover Camp Academy (Crestwood MS)
 - >80 student participants
 - Student built and programmed Mars rovers to navigate “Martian” terrain
 - Cafeteria was filled to capacity with parents, grandparents, siblings to watch the final day demonstrations
 - Inspired for 09-10 school year
 - Lego Robotics CCA: UMS, OMS, MoMS, GTJMS, HRMS, NMMS
 - Engineering CCA: WMS
 - We built capacity in 7 middle schools with one academy
 - For 2010 – BNBI CCA Lab Schools (3)
- Even an elementary school got involved
 - Whittier ES Lego Robotics

Celebrations of FCPS STEM

Monocacy Middle School

- **STEM week, March 22-26**
- Goal - to inspire kids to consider STEM careers by showing them two things
 - what's available to them in terms of career choices
 - how courses they take in middle and high school prepare them for these careers.
- ALL of our students (750) were impacted at least once
 - Most saw several guest speakers during the week
- Don Thomas (former NASA Astronaut) kicked off the week
 - F16 fighter pilot, Major Ben Schill, presented to all science classes
 - University of MD's Physics is Phun program presented to all students
 - 20 guest speakers from the community (and beyond) in classrooms ranging from flight surgeons to EPA to accountants.
- STEM lessons (from Design Squad) taught all week during CCAs (by the 15 teachers who volunteered...not the whole staff).

Celebrations of FCPS STEM

Middletown High School

- *Science Technology Engineering and Mathematics Career Day - April 13, 2010*
- 3rd Annual STEM Career Day
- students hear several speakers ranging from
 - Culinary Arts
 - Equine Veterinarians
 - Cancer Research
 - GIS

Celebrations of FCPS STEM

Brunswick Middle School

- April 6-9: week long presentation from Bechtel Engineering, a local firm in Frederick County
- Bechtel Engineering in every mathematics classroom during the week
 - presenting hands on activities
 - slide shows showing what engineering is and how much fun it can be
- Seeing the success rate from other schools, their presentations motivate students who usually do not care about math to actually listen and have fun

Celebrations of FCPS STEM

Battelle National Biodefense Institute Co-Curricular Activities (CCA) Development Project

- BNBI providing funding for the development of 8 STEM CCA
- 21st century, student-driven, STEM problem-based learning modules
- FCPS teacher developed in collaboration w/BNBI researchers and other industry experts
- 1st two being implemented in classrooms this spring
- Based on a STEM "recess" concept

BNBI CCA Development Project

- Design Squad: <http://pbskids.org/designsquad>
- eCybermission: <http://www.ecybermission.com>
- Monster Storms: <http://www.jason.org>
- Sea Perch: <http://www.seaperch.org>
- Solar Cars:
- Forensics:
- Lego Robotics (Mindstorms):
- Creation Station:
- Astronomy: <http://nasa.gov>

Celebrations of FCPS STEM

1st ever Frederick County Maryland Science Olympiad Tournament

- Feb 20, 2010 @ Crestwood Middle School
- Organized by Jason Johnson and staffed by STEM teacher leaders from FCPS
- Over 300 students from across Maryland and northern Va
- Teams from 8 FCPS middle schools competed (7 of 8 had never fielded an Olympiad team before)
- Events included robotics, airplane design, catapult accuracy, powered car to a specified distance, science facts, ornithology, junk yard challenge, and several other events

Celebrations of FCPS STEM

- Kids on Campus (FCC)
 - Summer STEM activities for middle school/ elem schools
 - CTC last summer
 - This summer
 - CTC
 - BMS
 - TMS
 - UMS

Celebrations of FCPS STEM

- A.C.E. Mentoring Program
 - Architecture, Construction, Engineering
 - Partnership FCPS w/ Bechtel
 - 10 additional sponsors
 - 36 students 2005 / 84 students 2009
 - Bechtel engineers mentor groups of students in a year long project
 - Targets the “average” student
 - **NSBE** heavily involved
 - Proposing solutions for real world problems
- Ft Detrick YES program partnership
 - Targeting **underserved populations**
 - TJMS, WFMS, MoMS, CMS

Bechtel

- \$5,000 Specified for ESSL support
- \$25,000 for STEM support (proposed)
 - \$10,000 for JHU EI summer 2011 course
 - \$5,000 for elementary STEM support
 - \$1,000 for LHS First Robotics Club support
 - \$2,000 for W.I.S.E. club
 - Remaining \$7,000 ???

Celebrations of FCPS STEM

- Robust partnership with Frederick County Business Roundtable for Education (FCBRE)
 - Future Link
 - Teacher externships
 - Student internships
 - Business partnerships

JHU Engineering Innovation

- Unique partnership for FCPS
- Introductory JHU engineering course
- 3 transferable JHU elective credits for B or better on final exam
- 4 weeks/ M-F / 6 hr days
- Culminating bridge design project
- 24 max students per site
- JHU level instructor w/FCPS teaching assistant

Initiatives Moving Forward

- NSBE Jr. at CMS, WFMS, GTJMS, MoMS
- Jason Project (National Geographic project) incorporated into MS science curriculum
- SeaPerch (M.I.T. robotics project) project incorporated into MS technology education curriculum
- MS STEM mathematics tasks incorporated into MS math curriculum
- STEM Summer Academies (Lab School, MSO)
- STEM as part of MSDE Education Reform Plan
- Expand STEM opportunities into elementary schools
- Lincoln Elementary as a model STEM elementary school

Lincoln ES

- Unique opportunity
- STEM elementary school
- New building
- New learning opportunities
- New business partnerships
- New excitement & energy
- Building the Frederick HS feeder
 - WFMS in 2008-10
 - FHS in 2013 ????