

## **CMS STEM (Science, Technology, Engineering and Math) Initiatives for students**

### **Elementary School STEM**

#### **PreK Standard Curriculum**

Kathy Richardson's Formative Assessments in Math  
Daily centers for hands-on math and science

#### **K-5 Standard Curriculum**

Investigations in Number, Data and Space  
McMillan/McGraw Hill science textbook with kits  
Discovery Education-multimedia resources

#### **Available at some sites**

Kathy Richardson formative assessments for preK-3  
Engineering is Elementary-career based problem solving units  
Camp Invention-inquiry based experiential learning  
Science Olympiad-It's elementary-problem based competition  
UNCC Regional Science Fair  
Lego Robotics Mindstorm kits and competitions  
KNEX for math, construction and engineering  
WeatherBug

### **Elementary Program descriptions:**

Kathy Richardson's Formative Assessments in Math

These assessments require 1:1 administration and ask students to perform tasks, while explaining the student's thinking.

Investigations in Number, Data, and Space

This reform math curriculum provides students with the opportunity to explore before a teacher explains. Students spend time using manipulatives to construct real math understanding.

Engineering is Elementary

This program features 20 stories about various types of engineering, set in 20 different countries. Students read about an elementary student encountering an engineering problem, then engage in 3-5 experiments based on the story.

Discovery Education

These multimedia resources are web-based and provide students with virtual labs, readings, videos, and opportunities to conduct research. Each student has an account that may be accessed anywhere through the internet.

Camp Invention

This immersion in inquiry provides students with a chance to solve new problems every 90 minutes. It was developed by the National Inventors Hall of Fame to teach students how STEM concepts lead to innovation.

KNEX hands-on kits

There are kits appropriate for K-2 and 3-5 math, K-8 construction and K-8 engineering with 20 lesson plans. Teachers who attend a PD receive kits to use in math and science classes, afterschool, or clubs. Teachers also have the opportunity to become trainers with KNEX kits.

Lego Robotics Mindstorm-These kits provide students with the opportunity to create and program robots, as well as compete in local, regional and state contests.

## **Middle School STEM**

### **Standard Curriculum**

Pearson's Community Math Project 2  
McDougal Littell science textbook with inquiry supported  
Discovery Education-multimedia resources  
Career and Technical education classes

### **Available at some sites**

Camp invention-Inquiry based experiential learning  
Texas Instruments Math Forward-technology with relevant realworld problems  
KNEX for math, construction and engineering  
NOVA Digital Dataloggers  
Weatherbug  
Middle Years International Baccalaureate program  
Environmental Club  
Robotics Club  
Science Olympiad  
Future Cities-architectural challenge competition  
UNCC Regional Science Fair

## **Middle School Program descriptions:**

### **Middle Grades Math Project**

This initiative provides students with project based learning experiences using their math skills.

### **Texas Instruments Math Forward**

This initiative provides students with technology to keep them engaged, relevant problem scenarios to show them how math is used in the real world, and immediate feedback as they master math content.

### **Middle Years International Baccalaureate program**

This international program provides students with the opportunity to engage in rigorous study of core academic subjects with a global perspective.

### **Camp Invention**

This immersion in inquiry provides students with a chance to solve new problems every 90 minutes. It was developed by the National Inventors Hall of Fame to teach students how STEM concepts lead to innovation.

### **Science Olympiad**

This competition involves 18-20 events that require students to master STEM content and apply it to changing situations. Students compete at the regional, state and national level.

### **Future Cities**

This competition provides students with the opportunity to use "SimCity" to create a city that meets specific criteria. The students must communicate about their creation as well as explain their thinking.

### **KNEX kits**

There are kits appropriate for K-2 and 3-5 math, K-8 construction and K-8 engineering with 20 lesson plans. Teachers who attend a PD receive kits to use in math and science classes, afterschool, or clubs. Teachers also have the opportunity to become trainers with KNEX kits.

## High School STEM

### Standard Curriculum

Holt math textbooks  
Science textbooks with inquiry supported  
NOVA Digital dataloggers  
AP Science and Math courses for college credit  
Career and Technical education classes  
Discovery Education-multimedia resources

### Available at some sites

Texas Instruments Math Forward for Algebra 1 classes  
International Baccalaureate courses for 11<sup>th</sup> and 12<sup>th</sup> graders  
NOVA Digital dataloggers for student use  
Science Olympiad  
Chemistry Olympiad  
Math Olympiad  
UNCC Regional Science Fair  
NC Student Academy of Science competition

## K-12 Virtual Field trips

These multimedia units provide a local STEM industry context for a 2-3 week unit of student in math or science. Current topics include:

HS Physics	Physics of Safe Driving with Richard Petty Racing
HS Chemistry	Chemistry of Coca Cola
HS Earth/Environmental	Geology of North Carolina
8 <sup>th</sup> grade	Math and Science of Recycling with Gerdau Ameristeel
7 <sup>th</sup> grade	Forces and Motion with Hendricks Motorsports and Bank of American
6 <sup>th</sup> grade	Sustainability with electric cars, recycling of water, and Composting
4 <sup>th</sup> grade	Food Chemistry with Johnson and Wales
3 <sup>rd</sup> grade	Muscles and Bones with Ortho Carolina

In the Virtual Field Trip development process:

HS Biology	Biodiversity in NC
5 <sup>th</sup> grade	The Math of Sports Broadcasting with the SPEED Channel
2 <sup>nd</sup> grade	The Sounds of Music with the Charlotte Symphony Orchestra

## CASTLE Coalition-Charlotte Area STEM Teaching and Learning Environment;

This group of STEM industry representatives, institutions of higher learning, informal education institutions, nonprofits and interested individuals meet monthly to leverage their resources and political influence for STEM education initiatives in the Charlotte area.

## STEM Initiatives for Teachers

### 1. Elementary Teachers

#### a) Monthly Math Facilitator meetings

These meetings provide updates on best practices in elementary math teaching and learning, as well as inquiry experiences for the Math Facilitators. These meetings provide coaching and leadership training for the facilitators and take place during the day.

- b) Monthly Investigations Alliance meetings**  
These meetings are open to any interested teacher and provide opportunities to discuss the teaching practices, assessments and interventions for the topics upcoming in the CMS pacing calendar for the appropriate grade level. The leaders of these meetings are teachers who are part of the CMS Leadership Corps and who had had instruction in leadership and presentation skills.
- c) MSP for Elementary Math**  
This is a grant funded initiative that has been in place for 3 years in collaboration with UNCC Charlotte and the Kannapolis City Schools. Participants in this initiative attend 10 days of PD in the summer, then monthly meetings as a Professional Learning Community. Participants are expected to become math leaders for the district and provide instruction in the Investigations Alliance meetings.
- d) Monthly Science Facilitator meetings**  
These meetings are open to elementary instructors who are tasked with science in their buildings. The meetings include content and pedagogy that are research-based best practices.
- e) KNex training for K-5 Math, K-8 Engineering and K-8 Construction**  
These meetings provide specific instructional practices to use with KNex kits to teach math and science concepts. Participants leave with a kit and the expectation that they will share with their colleagues at their site.
- f) Engineering is Elementary for K-5 teachers**  
This PD is for a pair of teachers at a site to learn how to implement Engineering is Elementary. Once a teaching pair has attended a PD, and performed one of the units, they are eligible to receive more EIE units for their schools.
- g) Math in the Garden**  
This weeklong summer immersion at Daniel Stowe Botanical Gardens provides elementary teachers with experience using gardens to illustrate patterns for their students. They also become comfortable working with the plants in the garden and are expected to start a garden in the school and present their experience to a Math or Science Alliance meeting.
- h) SITE K-2 and 3-5 Training**  
This weeklong summer immersion at UNC-Charlotte provides elementary teachers with time to experience the inquiry focused on the most difficult concepts taught at their grade level. After the weeklong summer institute the teachers are expected to attend a Friday/Saturday training each quarter and present at the Science Alliance meetings.
- i) 5<sup>th</sup> Grade Science Conference**  
This 3 day workshop in August provides 5<sup>th</sup> grade teachers with access to high quality resources aligned to the NCSCOS. It also provides them the opportunity to network with other CMS 5<sup>th</sup> grade teachers to share ideas and successes.
- j) NASA STEM Conference**  
This 3 day conference occurs each March in conjunction with NASA to provide K-8 teachers with opportunities to interact with free NASA and other multimedia resources. This conference is free to CMS teachers and our department provides substitute funding.
- k) UNCC K-8 Science Conference**  
This 1 day conference occurs every January and focuses on topics determined by examining our state test data. CMS teachers present and participate to spend the day exploring topics relevant to their classrooms. Our department provides tuition for 100 CMS teachers each year to attend this conference.

## 2. Middle school teachers

### a) Middle School Science Alliance meetings

These quarterly meetings on Saturdays at UNC-Charlotte provide teachers with hands-on inquiry experiences relative to the topics they will be teaching in the next several weeks.

### b) MathForward for Title 1 math teachers

This initiative provides Title 1 math teachers with approximately \$15,000 in equipment and training. MathForward uses graphing calculators to engage students and provide teachers with continuous formative assessment. The MathForward coaches provide 1 week of training prior to beginning the process, then 4 days of coaching each month and 1 day of math instruction each month.

### c) SITE for 6<sup>th</sup>-8<sup>th</sup> grade Science teachers

This initiative provides middle school science teachers with a week in the summer to spend time experiencing inquiry aligned to the topics in their NCSCOS. Each summer the focus varies from earth science to life science to physical science. The teachers then have 3 followup meetings on a Friday and Saturday during 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> quarters to explore specific topics upcoming in their pacing calendars.

### d) KNex for middle school math teachers

This training provides teachers the opportunity to work with the KNex pieces, explore the lesson plans and collaborate on ways to use these hands-on materials to teach difficult and abstract math concepts. Teachers leave the training with a class set of KNex.

### e) KNex for middle school science

There are 2 topics (K-8 engineering and K-8 construction) which are relevant to middle school science. At the training the teachers work in pairs to construct objects using KNex and collaborate on science topics best suited for teaching with these materials. Teachers leave the training with a class set of KNex.

### f) NASA STEM Conference

This 3 day conference occurs each March in conjunction with NASA to provide K-8 teachers with opportunities to interact with free NASA and other multimedia resources. This conference is free to CMS teachers and our department provides substitute funding.

### g) UNCC K-8 Science Conference

This 1 day conference occurs every January and focuses on topics determined by examining our state test data. CMS teachers present and participate to spend the day exploring topics relevant to their classrooms. Our department provides tuition for 100 CMS teachers each year to attend this conference

### h) Middle School Math Leadership Alliance

This initiative provides applicants with an immersion in the Common Core State Standards and best practices for math. Teachers commit to training for 1 year and are expected to become deliverers of this PD to other teachers in their school and learning zone.

## 3. High School teachers

### a) High School Science Alliances

These monthly meetings are lead by CMS teacher leaders in their content area and provide teachers with opportunities to experience best practices targeted to upcoming topics in the pacing calendar. Teachers leave the 2 hour meetings with a piece of equipment, a book or a skill that can be applied within 1 week to their classrooms.

- b) NOVA Digital Datalogger Biotechnology Corps**

These monthly meetings provide opportunities for CMS biology teachers and the middle school teachers who received NOVAs to share their lesson plans and use of NOVAs in the classroom. Teachers are expected to develop lesson plans with assessments that will be vetted by peer teachers and ultimately published in a CMS Biology Lab Handbook.
- c) MathForward Alliance**

These monthly meetings provide MathForward teachers the opportunity to learn new strategies using their technology, as well as opportunities to share their success and struggles. This group is a PLC with resources from the Texas Instruments MathForward coaches and experts, as well as CMS math leaders.
- d) Gates Formative Assessment Alliance**

This initiative involved 40 CMS Algebra 1 and Geometry teachers who met to study the Common Core State Standards and [www.insidemathematics.org](http://www.insidemathematics.org) to discover the best practices for formative assessment. The teachers received a document camera and were expected to create units using their knowledge. Now, they are beginning to deliver their learning as PD to other teachers in their schools and Learning Zones.

#### **PreK-12 STEM opportunities for teachers**

- a) Discover Education Training**

Discovery Education has offered intensive training (4-7 days each year) for science and math leaders from each school. DE has also offered training at each school site and offers ongoing webinars on particular topics and strategies.
- b) Discovery Education Network**

CMS teachers who contribute lesson plans and assessments to Discovery Education are connected to the DEN and provided with other special learning opportunities. These include field trips to engaging local attractions as well as time to work with experts in the STEM field.
- c) Field Biology at local parks in the summer**

These weeklong immersion provides PreK-12 teachers with hands-on field experiences. Teachers leave with confidence in using equipment and techniques as well as with suggestions for classroom management and assessment of these types of learning opportunities.
- d) Field Ecology with Queens University**

This weeklong immersion provides PreK-12 teachers with hands-on field experience at Red Lair (a local protected environment). Teachers receive equipment that will allow them to repeat the experiences with their students and have access to the Queens University staff and sites during the school year.

#### **For more information contact:**

**Cindy Moss, Ph.D Director of PreK-12 STEM**

**[Cindy.moss@cms.k12.nc.us](mailto:Cindy.moss@cms.k12.nc.us)**

**980-343-5099**