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
- Engineering is Elementary-career based problem solving units
- Discovery Education-multimedia resources

Available at some sites
- Kathy Richardson formative assessments for preK-3
- 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
- These kits are 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
- Holt math textbooks will be replaced with Pearson’s CMP 2 for fall 2011
- Middle Grades Math Project-problem based learning
- 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 11th and 12th 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

**8th grade**
- Math and Science of Recycling with Gerdau Ameristeel

**7th grade**
- Forces and Motion with Hendricks Motorsports and Bank of American

**6th grade**
- Sustainability with electric cars, recycling of water, and composting

In the Virtual Field Trip development process:

**HS Biology**
- Biodiversity in NC

**HS Geometry**
- The geometry at the SPEED Channel and Time Warner Cable

**5th grade**
- The Physics of Flight with the Carolina Raptor Center and the Carolinas Aviation Center

**4th grade**
- The math of sports television with the SPEED Channel

**2nd 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) 5th Grade Science Conference
This 3 day workshop in August provides 5th grade teachers with access to high quality resources aligned to the NCSCOS. It also provides them the opportunity to network with other CMS 5th 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 6th-8th 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 1st, 2nd and 3rd 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.

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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.

e) **STEM All-Star Awards**
This event is sponsored by our department and recognizes PreK-12 teachers who have gone above and beyond for their students. The teachers are honored at a reception at Discovery Place, receive an embroidered shirt, bag, picture and plaque. Discovery Education has sponsored the event.

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