

# Greater Southern Tier STEM Education

Preparing students for the 21<sup>st</sup> Century

SCIENCE | TECHNOLOGY | ENGINEERING | MATH



December 2011

## Commissioner's visit focuses on STEM

New York State Commissioner of Education Dr. John B. King, Jr. visited the GST BOCES region in November to see first-hand the work of the regional STEM initiative. Dr. King saw STEM and FOSS lessons in action during his visits to the Bradford Central School District and Winfield Elementary School in the Corning-Painted Post Area School District. He also visited Corning Inc., where the launch of the Greater Southern Tier Hub of the Empire State STEM learning Network was announced.

During his stop at Bradford, Dr. King visited a third-grade classroom where students were estimating the mass of objects and then using a balance to find the actual mass. He also saw sixth-graders constructing a FOSS Plane System using straws, rubber bands and propellers. The students were challenged to investigate variables that affect the outcome of the plane traveling along a flight line made out of fishing line. They were asked: What is the minimum number of winds of the propeller needed for the plane to fly the full four meters of the flight line? In the robotics classroom, students showed Dr. King the robots they constructed and discussed with him how they have programmed the robots to carry out specific tasks.

At Winfield Elementary School, Dr. King observed third-graders using a soda can and liquid to investigate the question: Does the 355mL labeled on the can refer to the capacity of the can or the volume of liquid in the can? He also visited a first-grade class where students were building mobiles to learn about balance.

"The STEM work that's being done in this region is preparing students for jobs in the 21st Century," said Dr. King. "I'm excited about what I've seen today. Students here are not just learning from textbooks, but are involved in hands-on learning. The foundation that students are gaining here in science, technology, engineering and math will provide them with the interrelated skills they'll need to be competitive in college and the workforce."

At Corning Inc., Dr. King joined Margaret Ashida, Empire STEM director; Dr. Mark D. Vaughn, manager of Technical Talent Pipelining for Corning's technology community; and Christine Sharkey, director of Corning's Community Affairs for the STEM Hub an-



NYS Commissioner of Education Dr. John B. King, Jr. observes third-graders at Winfield Elementary School.



Third-graders at Bradford Central School work together as Dr. King looks on.

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## Q & A with Canisteo-Greenwood teachers



*Lisa Brott's third-grade class investigates the effect of soap on the surface tension of milk.*

### *What changes have you seen in the classroom after implementing FOSS?*

When the kids see the big brown box they want to know what we will be doing because there are always experiments inside! My classroom counter has become a central command center for our experiments and the children respect the area enough not to touch until its time! *Kathleen Ludu, third-grade teacher*

The students, of their own free will, are choosing to read more non-fiction books during silent reading time or free reading time. They are really into learning about science and excited about what these books can teach them. *Dale Rouse, second-grade teacher*

Students are becoming more comfortable with student-driven assignments. They also are successfully working more independently within groups with goal-oriented tasks. Students are becoming deeper thinkers. They like to see what other answers are possible or other ways to get to answers. Students are learning to think "outside the box." *Lisa Brott, third-grade teacher*

Students are more excited about science and make connections to other areas of content. *Janice Smith, fourth-grade teacher*

### *What benefits have you seen with the FOSS program?*

The kids are really working together as a team to get a problem solved. They are really into being sure that things are fair for everyone. Good support of our character education program is a bonus! *Kathleen Ludu, third-grade teacher*

The students are becoming problem solvers on their own. They are always looking for patterns and connections that relate to the science unit we are covering. They love to use the vocabulary that we put on our class chart for each unit! *Dale Rouse, second-grade teacher*

The children are more motivated to learn about science because of all of the hands on materials and experiments that we do. My class wears white shirts that we call our "lab coats" when we do science. They really like "dressing up" for science. *Cynthia Norton, second-grade teacher*

Students love the hands-on experiments and investigations.

Science has become the favorite subject in our school day, sometimes favored over recess! Math has connected nicely with science, giving a transitional link to real-world application. Students are becoming bilingual with measurement, applying it to their everyday learning logs. *Lisa Brott, third-grade teacher*



*Cynthia Norton's second-grade scientists.*

## Q & A, continued

**What has the student response to FOSS been like in your classroom?**

Students really look forward to science time in my classroom. The conversations between children are more on task and they are really starting to hold one another accountable for doing their "jobs."

*Kathleen Ludu, third-grade teacher*

Every science time is anticipated by the students. They ask, "When are we going to do science? Is it time yet?" We all enjoy the science time every day.

*Dale Rouse, second-grade teacher*

Students love the FOSS science. It has truly brought enthusiasm back to our science curriculum.

*Lisa Brott, third-grade teacher*

My class loves doing FOSS! *Janice Smith, fourth-grade teacher*



*Kathleen Ludu's third grade class drops water on a penny to test surface tension.*



*Dale Rouse's second grade students show off their science projects.*

**How do you feel the STEM initiative supports the new Common Core for ELA and Math?**

I see a strong link between STEM and the math Common Core. The measurement unit in particular impacts students' choice in tools for measurement and they are developing a truer sense when estimating measurements because their understanding is much deeper. The specific vocabulary being used has helped with the ELA and their use of the words in writing responses. This is a continuing skill that will continue to be strengthened through exposure and unit investigations.

*Kathleen Ludu, third-grade teacher*

I love discovery learning by the students. This type of learning creates life-long thinkers and problem solvers. My understanding of the new Common Core is that we need to produce more graduates who can think for themselves and problem solve in their chosen careers. The STEM initiative is a great way to interest students in hands-on learning and thinking for themselves.

*Dale Rouse, second-grade teacher*

It goes along nicely with the Common Core Curriculum so far. It also is another way teachers can teach and review ELA and math skills while teaching science. We have so little time these days that we need to integrate our subjects as much as we can.

*Cynthia Norton, second-grade teacher*



*A second-grader sings The Cloud Song to accompany the Air and Weather unit.*

## Students excited about FOSS at C-G

Canisteo-Greenwood Elementary has adopted Full Option Science Systems (FOSS) in second, third and fourth grades this year. Although we are not even half-way into the school year, the children have truly enjoyed the experiences they are having in science. To call the course “science” is an understatement. This inquiry-based science program embeds math, science and technology into hands-on learning experiments.

Students are “learning by doing,” exploring and questioning each other during science instruction. They are thinking critically, journaling, developing hypotheses, experimenting, recording and analyzing data, communicating findings and working as a team. These are all qualities needed for success at the next level of their education/careers.

The support Canisteo-Greenwood has received from GST BOCES in implementing FOSS has been wonderful. Grade level teachers are trained in delivering the instruction with other teachers across the GST region and are given an opportunity to network and share best practices. Back in the classroom, a FOSS curriculum mentor is available for additional support. The program provides documentation that connects the investigations to current NYS standards/performance indicators, the New Common Core, interdisciplinary extensions, science stories and technology/home connections.

As a principal, it is quite a sight to see our elementary students with their lab coats and goggles, having serious conversations about science and developing skills they will be using the rest of their lives. Students are excited about their learning, and they love to experiment and challenge each other.

Yours in Education,

**Colleen M. Brownell**

Elementary Principal

Canisteo-Greenwood Elementary



*Third-graders prepare to become scientists.*

## SU conducts STEM study

Dr. Scott Shablak and his team from Syracuse University's Office of Professional Research and Development (OPRD) are conducting the program study for the GST STEM Project. They began their work in February 2011 and will continue during a period of at least three years to study the GST STEM Project and its impact in relation to the STEM Project Team's expected outcomes. From the systematic study of the project, they will make recommendations and facilitate important decision-making within the STEM Project Team to bring the project to scale in the region.

The study will provide valuable data regarding the effectiveness of the strategies developed by the STEM Project Team. It also will provide information and a framework to share across the state and nationwide regarding STEM education. The First Quarter Report has been completed and will be used to communicate the STEM Project Team's strategic plan and to prioritize decision making in the region for year two of implementation.

# Corning Inc. shares STEM program with President Obama

Corning Incorporated's ideas for building creative scientific curiosity in school-aged children may help influence the Obama administration's policies on creating a more highly-skilled American workforce. Don McCabe, senior vice president of Manufacturing and Performance Excellence, heard some of President Obama's plans last summer and described to administration leaders Corning's partnership with local schools on science education.

The president invited McCabe and 100 other manufacturing executives to Northern Virginia Community College to learn about the administration's plans to expand Skills for America's Future. The broad program seeks to equip Americans with competitive skills in a high-tech economy by linking the interests of industry, schools and labor.

At the meeting, the president announced new partnerships with industry and multi-media groups that will raise awareness of ways unemployed or underemployed Americans can access new training and job opportunities. The efforts will underscore the initiative's overall dual objective: reducing unemployment and helping employers find the highly-skilled workers they need to stay competitive in the global economy.

To McCabe – invited to the meeting because of Corning's efforts to improve education programs around math and science – the subject was a familiar one.

"What the president discussed is really something that Corning has been working on for 18 months or more," he said.

After the event, McCabe met with the president and used his time to talk about STEM – an approach to teaching science, technology, engineering and math in elementary and middle schools.

The president discussed the concept with interest with McCabe and fellow attendees Emily De Rocco, president, Manufacturing Institute, and Jay Timmons, president and CEO, National Association of Manufacturers.

Skills for America's Future uses community colleges as the conduit between future workers and the high-tech, industry-accepted science and math skills American manufacturers need.

Corning's STEM program goes a step deeper, reaching students well before they go to college or enter the work force.

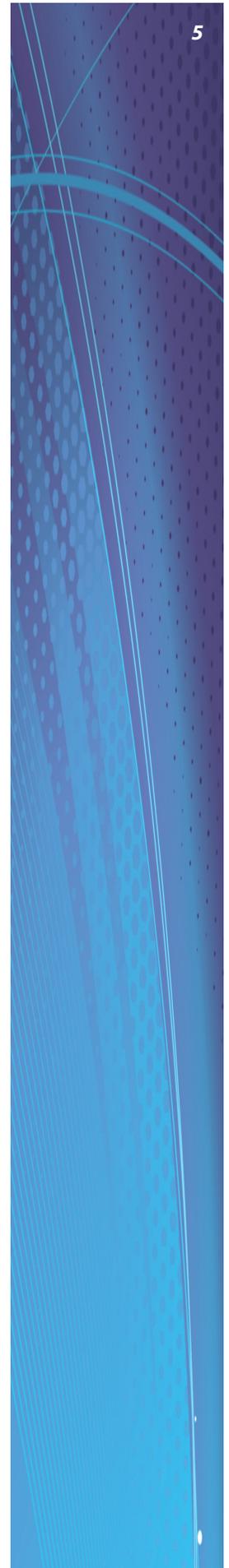
The program arose out of Corning's ongoing struggle to fill jobs for machinists, technicians and other skilled manufacturing roles. In 2009, the company partnered with local school districts, government offices, students and teachers to closely examine math and science education programs in the region.

Corning guided a team through a year-long Performance Excellence project that led to STEM and the adoption of FOSS education theory – Full Option Science System.

Corning now provides funding for teacher training to maintain and expand the STEM program in schools throughout the GST BOCES region. Currently, seven school districts teach the new STEM-focused curriculum to about 6,200 students.

As Corning and other American manufacturers watch to see if STEM yields the high-skilled workers they need, the Obama administration also will watch for ways to incorporate lessons from STEM into programs such as Skills For America's Future.

"We are leading the change with the work that we are doing here in Corning," McCabe said. "Our system could be a model and one of the better examples of a company focused on changing the quality of math and science education."



## Meet the new members of the STEM team

**Michael Bostwick** joins GST BOCES as a STEM Curriculum Mentor. He attended SUNY Cortland, where he obtained a BS. Ed. in Elementary Education with a minor in Biology as well as a M.S. Ed. in Childhood Education with a concentration in Math and Science.



*Michael Bostwick*

Mike taught sixth-grade science and ELA in the Horseheads Central School District for eight years. During that time, he served on numerous committees, led curriculum work and offered several in-services/workshops. Mike also served as grade level chairperson for several years.

After obtaining his administrative certificates at the building and district levels, he was coordinator of the Summer Learning Academy for two years. Mike is excited to join the regional STEM team in hopes of facilitating the growth of future scientists and engineers.

**Becky Bowers** received a Bachelors of Science in Elementary Education from SUNY Cortland in 1995 and a Masters of Science in Education from SUNY Cortland in 1997. Becky has more than 15 years experience teaching all levels from Pre-K to the collegiate level.

For the past 10 years, Becky has worked for GST BOCES as part of the Adventure Based Learning Program. The focus of her teaching has been inquiry-based learning, helping students learn to problem solve, cooperate, collaborate and communicate successfully with each other. She also implemented numerous staff development programs for teachers and community organizations. Becky is excited about the STEM initiative and helping students develop skills for the 21st Century workforce.



*Becky Bowers*

## Virtual Worlds update



*Karen Hunter*

- Karen Hunter is the new Virtual Worlds Coordinator at GST BOCES. She has worked for GST BOCES for 14 years in various departments, most recently supporting special education software in the Computer Services Center. Karen earned a degree in The Arts with a concentration in Computer Graphic Design, so Virtual Worlds is a great fit for her. She hopes to contribute to the program's continued success and bring some fresh ideas for growth.
- This fall the Virtual Worlds Program had approximately 85 students from six local middle schools participate in our SciFair program. Students from Addison, Bath, Campbell-Savona, Corning-Painted Post, Elmira and Horseheads chose a topic to research and with the help of their teachers and college mentors, built a 3D virtual world based on their topic. Themes this fall included communication, hurricanes, the planets and how Hawaii was formed.

Also this fall, the CyberCiv program included sixth grade students from Ernie Davis Middle School; Broadway Middle School and Addison students will begin their research soon. Students have been logging onto the EDUni-NY site and interacting with each other while learning about ancient civilizations such as Mesopotamia, Greece and Rome.

There are a few new ideas being developed in the Virtual Worlds program, including a collaboration with the Wings of Eagles Discovery Center on an Antarctica e-mission, as well as the development of a world based on U.S. History, particularly the Civil War era. If you are

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## STEM team attends national conference

The GST BOCES STEM team recently embarked on a trip to Hartford, CT for the National Science Teachers Association (NSTA) Conference. NSTA is the largest organization in the world committed to promoting excellence and innovation in science teaching and learning for all. Their current membership of 60,000 includes science teachers, science supervisors, administrators, scientists and business and industry representatives.

The area conference boasted a wide variety of more than 300 presentations and workshops that ranged from a one-hour engineering overview to full-day workshops on integrating literacy into science curriculum. Several other sessions included the FOSS note-taking process, brain-based learning, turning ordinary science into engineering projects, integrating instructional technology into the science classroom with Vernier probeware, and much more.

While attending the conference, the STEM team participated in a workshop called *Picture Perfect Science* facilitated by the authors Karen Ansberry and Emily Morgan. *Picture Perfect Science* integrates the **BSCS 5E instructional model** to incorporate literacy – in the form of picture books – into inquiry-based science instruction and learning. The team is currently implementing various activities into their regional trainings to assist local teachers with the deliverables of the new ELA Common Core requirements.

Another workshop attended by the STEM team was facilitated by an organization called Engineering Go For It (eGFI). At that session, participants were given an overview of the organization as well as a tour through their website to highlight the engineering

challenges that could be easily employed into kindergarten through twelfth-grade classrooms.

Finally, a **marshmallow challenge** was pre-

sented to all participants in which designated materials were allotted to groups of three or four with the objective of building the tallest free-standing structure that would embrace a marshmallow at the top. Participants were provided 20 pieces of uncooked spaghetti, some string, tape, a marshmallow and 18 minutes to showcase their engineering aptitude. The local STEM team proved to be victorious.

The GST BOCES STEM team continues to keep up-to-date with their professional growth in order to further the STEM mission and vision across the region.



*STEM team members met Picture Perfect Science authors Karen Ansberry and Emily Morgan at the conference.*

## Commissioner, continued

nouncement. The designation establishes a model for connecting those in higher education, business, government and community, along with parents and students, to achieve STEM excellence.

“STEM is the future, not just for our students but for our state and our economy,” Dr. King said. “The program Corning Inc. and the GST BOCES have developed is the kind of partnership between the private sector and public education that New York needs. Somewhere out there are the students who can change our world. The STEM initiative provides them with the opportunity to create, to build, to design, to reasearch ways to make that change.”

## Virtual Worlds, continued

a teacher and would like to contribute your expertise in a particular area, please contact Karen Hunter. Virtual Worlds are an exciting way to make learning fun and can be incorporated into your curriculum. EDUni-NY addresses National Educational Technology Standards that include the complete ISTE NETS.

If you have any questions about Virtual Worlds or the EDUni-NY website, please contact Karen Hunter at [klhunter@gstboces.org](mailto:klhunter@gstboces.org) or 739-3581, ext.1024.

## Professional development offered

Trainings for kindergarten through seventh grade FOSS modules were held around the region throughout the fall. Teachers explored Air and Weather, Measurement, Matter and Energy, Magnetism and Electricity, Mixtures and Solutions and Variables. During the trainings, the STEM team also assisted teachers from the seven districts in making connections between the FOSS modules and the new Common Core Standards in ELA and Math. The Common Core shifts in thinking are directly linked to the inquiry based learning that is occurring within the STEM classrooms. Training will continue throughout the year in regional cohorts for grades second through sixth. Click on the link [here](#) to see the regional training schedule or [here](#) to see the Elmira City School District schedule.



*Teachers participate in a regional third-grade FOSS science workshop.*

## STEM team learns about engineering program

Two members of the STEM team travelled to Boston in October to participate in a Teacher Educator Workshop at the Boston Museum of Science. The intensive three-day workshop was designed to introduce educators to the Engineering is Elementary (EiE) program and its materials.

Participants learned about pedagogical strategies for running professional development programs for elementary teachers that feature EiE and experienced the engineering/design challenges first-hand as they developed a hand pollinator, a packaging system for shipping a plant across the country and a habitat for penguins. EiE units combine all academic disciplines into a problem-solving methodology as outlined by the Engineering Design Process.

The Engineering is Elementary project at the Boston Museum of Science was started

in 2003 through funding from Intel. The program developed from initial research that illustrated that there is a very strong need for increased technological literacy and knowledge of related engineering careers.

EiE also supports the idea that children need to be equipped with the problem-solving and critical thinking skills necessary to excel in a constantly changing world. EiE strives to clear up misconceptions related to engineering and encourages students to consider engineering careers, develop problem-solving skills and grow to be technologically literate members of society.

You can find the data from EiE's research on students' and teachers' conceptions of technology and engineering, as well as effects of the curriculum on science learning, on the EiE website at [www.mos.org/EiE](http://www.mos.org/EiE).