

# Greater Southern Tier STEM Education

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

SCIENCE | TECHNOLOGY | ENGINEERING | MATH



December 2015

## A message from the GST BOCES STEM Staff Development Supervisor

### *How do you make explicit connections across disciplines?*

Within the Greater Southern Tier region, there is a strong commitment to STEM professional development. As the GST BOCES STEM team facilitates daily professional development sessions with in-service educators, we promote instructional best practice by providing tools to help teachers understand how to make explicit connections across disciplines. For example, during the 2015-16 school year the GST BOCES STEM team has added writing scales based on specific Common Core Writing Standards to the Regional STEM Notebooks at each grade level. This will enable students and teachers to monitor progress and growth in writing and argumentation within the context of their science classes. We are also providing Common Core Reading and Math Standards checklists in subsequent training sessions so that teachers can reflect and identify the connections between disciplines and be able to articulate this connection explicitly to students.

**Mission:** To re-energize, revitalize, and refocus attention, interest and understanding of the embedded importance of science, technology, engineering, and math (STEM) to life-long learning and success. To create a regional STEM "pipeline" that results in college and career ready students that are rich in STEM and 21st Century skills.

This work has multiple positive outcomes. Teachers will be working with the NYS Learning Standards and having dialogue about multiple disciplines standards, what they mean and how the standards translate into classroom practice. Teachers also will be better poised to monitor student progress through a more balanced assessment system, and make instructional decisions that are rooted in specific learning goals and targets for students.

The Greater Southern Tier STEM Program intends to impact student writing across disciplines and improve student learning and engagement in writing. Using a process to examine data on student writing in science related to specific learning goals and scales will help us show that the STEM program is more than just science curriculum. It is a way of engaging learners to transfer thinking and skills to multiple content areas.

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## Monthly STEM challenges

Remember to look out for monthly STEM  
Challenges posted on the STEM website at  
[www.gstboces.org/stem](http://www.gstboces.org/stem).



## Q & A with Hornell City School District staff

**Mickele Thompson, Sixth Grade Teacher, Hornell Intermediate School**

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

Students are thinking and questioning at a higher level. They are developing student-driven plans to conduct science investigations.



Students from Hornell work in groups to investigate measurement using a standard unit.

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

Students are more engaged and active learners when participating in the STEM investigations. Students' use of technical vocabulary and detailed writing is a common practice.

### **What has the student response to STEM been like in the classroom?**

Students enjoy working in groups and solving the science module and monthly STEM challenges!

### **How do you feel the STEM program supports the Common Core for ELA and Math?**

The STEM program encourages students to support their claims with evidence which transfers directly to the ELA common core. Our 6th grade math common core

has a direct correlation with graphing in the coordinate plane with independent and dependent variables.

### **How do you feel the professional development and mentor support have impacted your success with implementation?**

The training allows you to experience the investigations first hand! One of the best resources is the Edmodo website offered by BOCES STEM. The website allow you to retrieve up-to-date training materials and get immediate feedback from a wide community of teachers when sharing teaching strategies.

### **I feel good about the way...**

STEM is providing students with an opportunity to investigate scientific material in an inquiry based approach!

### **Douglas H. Wyant, Jr., Superintendent of Schools**

#### **How do you feel the STEM program supports the Common Core for ELA and Math?**

I feel there is a direct link between the STEM program and the Common Core Learning Standards. The higher cognitive skills are incorporated in the three math standards, making sense of problems and persevering in solving them, reasoning abstractly and quantitatively, and constructing viable arguments to critique the reasoning of others are key aspects of the STEM program.

#### **How do you feel the professional development and mentor support have impacted your success with implementation?**

The professional development and mentor support are on target to provide our instructors the needed skills and strategies to effectively implement the STEM program.

### **Lisa Oyer, Third Grade Elementary School Teacher**

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

The students are excited about STEM and look forward being "scientists" every day. They often ask, "When are we doing STEM again?"

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

We have established a student centered learning environment with a lot of hands-on learning. Student collaboration and teamwork is a daily practice. There is more opportunity for the students to perform at a higher level of thinking with an increased interest in learning.

### **What has the student response to STEM been like in the classroom?**

The students enjoy working in groups. They enjoy the hands-on approach to solving problems and discovering new things about the world they live in. Most of all, learning is fun for them!



*Students collaborate to determine the accuracy of their measured value of the desk.*

### **How do you feel the STEM program supports the Common Core for ELA and Math?**

The students are applying the skills and concepts they are learning in STEM, such as supporting claims with evidence, toward their Common Core activities. Because of this, students continue to study different subjects that are actually related to each other in a positive way.

### **How do you feel the professional development and mentor support have impacted your success with implementation?**

The training allows you to experience the investigations through the eyes of a child. You walk in their shoes for the day of training and go through each investigation, step-by-step. This allows you to fully understand how to teach the different investigations in the classroom. It is great to know that you also have mentor support to help you with anything you might need once you return to the classroom.

### **I feel good about the way...**

STEM has created an excitement about teaching and learning, both for teachers and students.

### ***Molly Liberto, Parent of a Sixth Grade STEM Student***

#### **What changes have you seen in your child with regard to learning in a STEM classroom?**

When you ask my daughter at the dinner table what she did at school, the first and sometimes the only thing she talks about is what they are learning in STEM. She will, in great detail, explain every step of an investigation that she and her group have been working on for the week. My daughter will light up like a light bulb when you ask her to explain what she is working on in STEM.



#### **How have your child's interests in school or ideas about what they like to do in school been affected by STEM?**

My daughter is a very bright student with a high motivation for learning. She would come home complaining that school was

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*Hornell students apply various ways of standard measurement to determine the size of an object.*

## Special Ed. classes seeing success with STEM



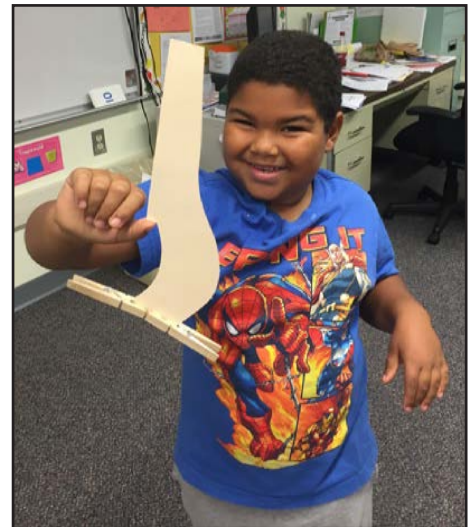
*Students work in teams to create a balanced mobile using paper and a straw.*

Several special education classrooms across the GST BOCES region are discovering success in STEM. Currently, STEM curriculum is taught in 33 BOCES special education classrooms and a significant number of special education classrooms within the 20 component participating districts.

STEM in the special education classroom is thought-provoking, exciting and extremely rewarding. Students thrive on this model of inquiry instruction. They enjoy project-based learning and the real-world experience STEM provides. STEM offers stimulating investigations for students to engage in that are easily related to the students' everyday lives. During STEM time, students can have fun learning through exploration and manipulation

of materials used for science investigations and engineering challenges. It provides built-in, hands-on time for the students to discover different strategies to achieve their goals. Learners become more adept at thinking through ideas and understanding cause and effect. Often the students realize that they can do things if they try and this in turn helps them to build their confidence. Even the most challenged learners become fascinated with STEM learning.

STEM in the special education classroom is not without its unique challenges. Across the region, special education teachers frequently modify the curriculum to support students with reading or writing difficulties. Teachers expand their lessons to provide even more hands-on opportunities to connect to students' prior knowledge, reinforce scientific vocabulary, support working collaboratively with others and help students make real-world connections. We recognize that many teachers are often alone in creating variations and modifications of STEM materials at their specific grade levels. It is our hope that special education teachers across the region can become connected and use each other as a resource. We would like to encourage teachers to participate in a Special Education STEM Networking Session offered through the Teacher Center (see information below). This sharing and networking session will allow special education teachers to share ideas, time saving tips and classroom materials, and to gather strategies to help their students be even more successful in STEM.



*A first-grade student demonstrates balance as he uses counterweights to steady the paper on his finger.*

***Are you looking for ways to help your Special Education students be more successful with STEM? Do you have great ideas you would like to share with others or are you looking for ideas and assistance? A Networking Session for Special Education will be offered on Wednesday, January 13, March 2 and May 11 from 4-6 p.m. at the Teacher Center in Bath. Participants will have the opportunity to work together to make modifications to STEM units and assessments. Please contact the Teacher Center at [tcenter@bathcsd.org](mailto:tcenter@bathcsd.org) or call 662-1113 for more information.***

## Family STEM Night offers fun and learning

Are you looking for a way to get more involvement and excitement for STEM in your community? A great way to begin to get families involved in STEM is a Family STEM Night.

Hendy Elementary in Elmira recently held a Family STEM Night to get families excited about STEM and their upcoming student Science Fair. Several teachers, along with members of the Student Council, set up nine stations in the gym. Each station had a different focus question for families to explore, such as "What happens when you put Skittles® in warm water?" Participants were able to investigate the focus question, make observations and explore the concept of density. Other stations included apple volcanoes, static electricity, Tanglewood Nature Center, earthquakes, wind power and GST

BOCES STEM. Each station had its own QR code that parents could scan for further information and exploration online at home. As they entered the event, every student was given a



*A Hendy student volunteer helps her classmate create an apple volcano.*



scavenger hunt checklist to take with them as they explored. After they had the opportunity to investigate at each station they received a sticker. Once their entire board was filled they were then entered into a drawing to win a one year membership to the Corning Museum of Glass or the Ithaca Science Center. Looking for ideas to implement your own Family STEM Night? Contact your GST BOCES STEM Curriculum Mentor for more information.

*Hendy parents and children investigated the results of placing Skittles® in warm water.*

## Q & A with Hornell City School District staff, continued

boring and she was learning the same things over and over. Since being involved with STEM, her excitement for learning has been reignited. She will come home and talk about how she wants to be a scientist because they learn about cool things and do fun activities. My daughter sees herself as a scientist and talks about getting a job as one. As a parent concerned for her kid's future, I can only express a huge sigh of relief when a sixth grader is looking at herself in that way at her age.

### **I feel good about the way...**

My daughter's excitement about learning is at an all-time high. The completed STEM projects and notebooks that she brings home are full of engaging activities with a great deal of writing reflective of good claims and evidence statements, plan and procedure sequencing, data collection and graphing and a wealth of vocabulary. She really feels that she could see herself as scientist and a career in science is within reach of her abilities.

## Regional robotics competitions set for January

Students within the Greater Southern Tier BOCES region are again gathering to participate in two robotics competitions this January. The VEX Robotics Competition will showcase students working on programming challenges. This event will be held at the Wings of Eagles Discovery Center on January 13 from 9 a.m. to 2 p.m. Participating students have been involved with the Extended Day Program, which is supported by a Perkins Grant that is administered through GST BOCES, or are involved

in robotics as part of their school day programs within their districts.

Students from Alfred-Almond, Arkport, Avoca, Canaseraga, Canisteo-Greenwood, Corning-Painted Post, Elmira City, Elmira Heights, Hammondspport, Horseheads and Watkins Glen will be in attendance. Please come and support their efforts and hear about what they have learned. As part of the competition, they will make informal presentations about their work, and then have their robots perform a variety of autonomous and operator controlled challenges.



There also will be an Underwater ROV (remotely operated vehicle) Competition held at Haverling High School in Bath on January 19 from 9 a.m. to 2 p.m. The students involved are also composed of districts offering the Extended Day Program or robotics education within school academic courses. Support from the Perkins Grant and at the district level also helps to provide this experience for students. We are very pleased that this year's ROV competition looks to be one of the largest ever, with students from Addison, Bath,

Canisteo-Greenwood, Corning-

Painted Post, Elmira City, Horseheads and Waverly districts. Students will discuss their projects as part of a science fair and then demonstrate their proficiency in the pool with the ROVs. The ROVs will perform an artifact retrieval and race course challenge under operator control using only an on-board camera and a land-based monitor.



*Photos from top right, clockwise: A student runs his robot through a challenge at the VEX Robotics Competition.*

*Poolside troubleshooting is often required during the Underwater ROV Competition.*

*Students work in teams to program their robot at the VEX Competition. A student tests the waters with his team's entry in the ROV Competition.*