

Greater Southern Tier STEM Education

Preparing students for the 21st Century

SCIENCE | TECHNOLOGY | ENGINEERING | MATH



March 2016

P-TECH to open, new GST BOCES STEM Supervisor appointed

GST BOCES will open a Pathways in Technology Early College High School (P-TECH) this fall. The new Greater Southern Tier STEM Academy Early College High School will serve up to 50 new students in its first year. Current eighth grade students from 13 local school districts in the GST BOCES region are eligible to apply. This new STEM Academy is another opportunity for students in the region to pursue career and college goals in STEM-focused pathways.

The overarching goal of the GST BOCES P-TECH partnership is to provide students with a personalized pathway to mastery of the academic, personal, technical and workplace skills needed to successfully transition from education to real-world careers. Key themes that will drive the program include: integration of academics and career and technical education with college level rigor; intensive inquiry-based STEM instruction with real-life applications to authentic regional industry problems; standards-based assessments that accurately measure students' progress toward proficiency of learning standards; development of social competencies and life skills; and workplace learning activities that are infused into the daily curriculum. By embracing these shifts in education, the P-TECH partnership will prepare the next generation of students in the Southern Tier for emerging high-skills careers in one of three pathways: Advanced Technical Education, Health Care and Clean Energy. Students in the P-TECH program will begin in ninth grade with a career exploration experience within the pathways and graduate with one of 11 possible A.A.S. degrees or industry-recognized certifications from Corning Community College at no cost to the students or families.

Primary instruction within the core curricula will be delivered in a 1:1 instructional technology setting utilizing integrated project-based learning (PBL) and other best practices in STEM. This culture of college and career readiness for all will encompass college coursework, career learning, workplace experiences and internships, tutoring and advising. Additionally, students will receive academic and personal behavior instruction in time management, collaboration/teamwork, problem-solving and decision-making, leadership, study skills, communication and tenacity.

The new STEM Academy will offer students another opportunity that works in concert with the current GST Regional STEM program already being integrated in Pre-k through twelfth grade programming. After six years of supervising and leading the current GST Regional STEM Program, Jeremy Wheeler was appointed as principal of the new GST STEM Academy. Kelley Batrowny has been selected as the new GST BOCES Regional STEM Supervisor.

Batrowny has worked for GST BOCES since 2008. She served as an instructional technology specialist, curriculum mentor and director of technology before accepting her most recent position as Career and Technical Education Program assistant principal in 2014. Prior to joining GST BOCES, Batrowny was a teacher at Horseheads Middle School for six years.

Batrowny received a bachelor's degree in Spanish and Mathematics from SUNY Geneseo, a master's degree in Spanish from Middlebury College in Vermont and permanent certification in Spanish and Mathematics (7-12). She earned a certificate of advanced study in educational

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Q & A with Spencer-Van Etten Central School District staff

We are thrilled to have Spencer-Van Etten Central School District as part of our GST BOCES STEM program. After piloting two grade levels last year, Spencer-Van Etten CSD has expanded to include all grade levels. Students are really engaged in their STEM curriculum and their curiosity is soaring as they experience this inquiry-based instruction.

What changes have you seen in the classroom since implementing STEM?

"My students are more focused and ask more questions."

– *Connie Szczepanski, PreK Teacher*

"Since implementing STEM, I have seen a heightened excitement for learning and a curiosity about our STEM topics and related topics. I have heard my students have thoughtful conversations about what they are observing and what they are predicting. I have seen my students work together and collaborate more than ever before."

– *Hilary Strong, Second Grade Teacher*

"Now that I am implementing STEM in my classroom my students are much more willing to take risks with their learning."

– *Robin Gillette, Fourth Grade Teacher*



PreK students explored the circulatory system.

"The changes I have observed are better collaboration, respect for each other and what they have to say, and increase in confidence."

– *Robert Myers, Fifth Grade Teacher*

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

"When are we going to do science? Are we doing science today?" They love STEM projects and are so excited."

– *Connie Szczepanski, PreK Teacher*

"My students love STEM and are disappointed when we have to skip a lesson."

– *Hilary Strong, Second Grade Teacher*

"Students love STEM! I'm most impressed with my students who find other subjects a chore. They are engaged and interacting unlike they do in other subject areas. My students thoroughly enjoy working together in the relaxed learning environment that is STEM."

– *Robin Gillette, Fourth Grade Teacher*

"The response has been "bugged-out eyes" excitement. The students are always asking, 'What are we doing today?'"

– *Robert Myers, Fifth Grade Teacher*

How do you know that STEM is helping to foster problem solving skills in students?

"My students are using the skills they learn in STEM in other parts of our day. They are thinking more and analyzing ELA material and working better in groups because of their group work in STEM."

– *Connie Szczepanski, PreK Teacher*

"My third graders are noticing more in their environment. Recently, one asked why there was water



First grade students designed a roller coaster as part of an engineering challenge.

dripping off a trailer near our classroom window. To find the answer, students devised an investigation with water and temperature, then implemented their plan during the next two days. They talked about their findings and hypotheses with observations over the course of three days. This year they are really enjoying conversations relating to STEM and real-life observations in other parts of their day.”

– *Betty (Yaples) Morgan, Third Grade Teacher*

“At the beginning of the year, my students kept looking to me for the answers to their questions. Now they know to just keep observing and thinking to come up with a conclusion.”

– *Hilary Strong, Second Grade Teacher*

“To solve any problem, one must be able to apply prior knowledge to new situations as well as take the risk of being wrong. STEM offers opportunities for students to be engaged and actively involved learners who make thought-filled discoveries while collaborating with peers.

At the beginning of the school year, students were reluctant to share learning for fear of being wrong. Now most students can hardly contain themselves when it’s time to share discoveries. My once quiet and reserved classroom is now a noisy, busy place of STEM learning.”

– *Robin Gillette, Fourth Grade Teacher*

“I see it in how students can explain their thought process to others and be able to support it during group discussions. If something does not work out on the first try they don’t quit, they keep trying. I love the effort my classes give.”

– *Robert Myers, Fifth Grade Teacher*

How has using STEM translated to other content areas or improved academic skills?

“Some of my students have started asking full sentence questions and predicting what is going to happen in stories. They determine how to solve the problems we read about.”

– *Connie Szczepanski, PreK Teacher*

“Presently, we are raising mealworms for our insect study. Having the mealworms out has been an incentive for my students to complete their work in a timely manner so they can use the extra time to take out the mealworms and look for changes. My students also love to throw in their new vocabulary words during other lessons.”

– *Hilary Strong, Second Grade Teacher*

“During STEM students are so engaged that they don’t know they are building problem solving skills. This builds confidence that transfers to other subject areas, especially mathematics. Students often find creating a quality written math or ELA response difficult. The verbal and written practice of claim and evidence statements during STEM has helped to increase the quality of answers in all subject areas.”

– *Robin Gillette, Fourth Grade Teacher*

“Students are applying their ELA skills, especially when it comes time to answering claims and evidence section. I have introduced math terms and have students define them using their context clues in their notebooks. They are recognizing that all subjects are related.”

– *Robert Myers, Fifth Grade Teacher*



Second grade students learned about insects through studying mealworms.



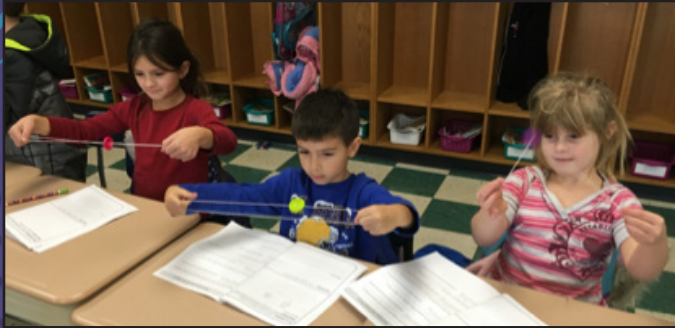
Fourth grade students investigated the properties of light.

Q & A, continued

What are you most pleased with regarding the implementation of your STEM course?

"I am thrilled to see how excited my students are for science. They never want to miss it. They start asking half way through the day if we are going to do science. We do it four times a week, but they have to make sure."

– *Connie Szczepanski, PreK Teacher*



First grade students used zoomers and twirlers to study balance and motion.

"I love that we have a time in our day when my students can be actively engaged in the discovery of information rather than passive listeners to content. I love the conversations they have with each other during our lessons. I love that I never know for sure where the lesson will lead each day."

– *Hilary Strong, Second Grade Teacher*

"I am relieved to finally have a cohesive, rigorous science curriculum that doesn't require me to create it myself. I love being able to go to training to experience entire

investigations before teaching the lessons to my students. Because of the monthly trainings, I have found that planning daily STEM lessons takes much less time and I'm more confident about my teaching than I ever have been before."

– *Robin Gillette, Fourth Grade Teacher*

"Knowing that my students come to class excited to learn and will give 100 percent effort."

– *Robert Myers, Fifth Grade Teacher*

How can we offer more STEM to our students?

One great way to squeeze more STEM time into our week is to offer extra STEM activities such as STEM Club. A group of fifth-grade students at Dana L. Lyon Middle School in Bath have been spending some of their study hall time working on STEM investigations. Students attend STEM Club once a week. During this time, numerous exciting science and engineering activities take place.

STEM Club offers students a chance to work together in groups or with partners to complete STEM centered investigations as they work through a variety of thought-provoking challenges. Many of these activities encourage the students to work through the engineering design process. As students test and retest their theories, they are learning to consider everyone's ideas and to persevere.



STEM Club members created ice cube arches.

Activities completed by the fifth grade STEM Club include working as a team to engineer a cup mover and turning recycled materials into a toy. The group even experimented with polymers to create bouncy balls out of liquid glue. The students are having a wonderful time investigating while they learn about science, technology, engineering and math. "STEM Club is fun," said student Jacob Houck. "We get to experiment and try new things we don't normally do in the classroom."



Students engineered a cup mover that they used to pick up, move and stack cups.

GST BOCES STEM competitions wrap-up

ROBOTICS

The GST BOCES VEX Regional competition was held at the Wings of Eagles Discovery Center on January 13. Although inclement weather had a slight impact on attendance, the competition was the largest to date with approximately 120 students from nine school districts attending. Teams from Alfred-Almond, Hammondsport, Elmira Heights, Elmira High School and Ernie Davis Academy, Arkport, Canaseraga, Watkins Glen, Horseheads Intermediate and Middle schools and Waverly were involved in the day-long activity. They demonstrated their knowledge of basic programming skills using several educational robotic platforms (VEX IQ, VEX Cortex and Lego EV3).



Elmira students work together to program their robot at the VEX competition.

The competition format provided student teams with an opportunity to discuss their solutions to the challenge events during the science fair. They also were able to demonstrate their programming and operator skills in individual and team challenges. The competition format gives students more than an opportunity to acquire points in each event, and focuses how they did it, and sharing that with peers and the judges.

The day was capped off with an awards ceremony recognizing the overall efforts of

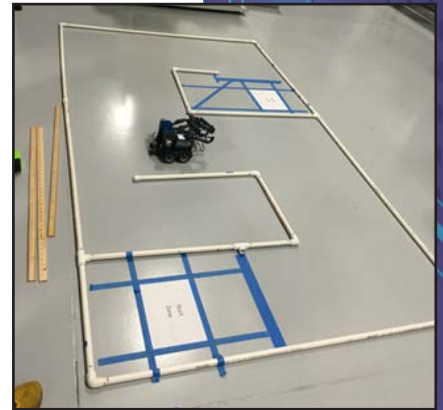
teams from three different districts that won awards: first place – Elmira Heights Cohen MS, second place – Watkins Glen MS and third place – Elmira City HS.

UNDERWATER ROV

The underwater ROV (Remotely Operated Vehicle) competition on January 19 at Bath-Haverling High School was attended by a record number; 117 students organized into 33 teams representing seven schools within the GST BOCES region. Students from Addison, Bath, Corning-Painted Post HS, Ernie Davis Academy, Horseheads Middle and Intermediate schools and Waverly HS participated in the regional competition. This was the culminating event for fall 2015 after school program and was also used as part of the day program classes for several districts.

Students participated in spirited discussions with judges and other students as part of the science fair segment of the competition format. Students then operated their ROVs in the pool for three events: rise to the top, artifact retrieval and a race against the clock. The race was a new aspect of the competition which required the students to “drive” along the underwater course using only the on-board camera and land-based video monitor for guidance.

We are very grateful for the efforts of all the students and their teachers. An awards ceremony closed the day recognizing the winning teams: first and third places – Corning-Painted Post HS and second place – Bath-Haverling HS.



Students had to program their robots on-the-spot to maneuver through “Unseen Maze.” Teams were awarded points based on the number of trials to complete the maze.

P-TECH to open, new GST BOCES STEM Supervisor appointed, continued

administration from SUNY Brockport.

“Kelley’s background in teaching, technology and administration will help her lead our regional STEM efforts as we continue to move forward and expand,” said GST BOCES Director of Instructional Support Services Linda Perry.

“I am very excited about this opportunity to continue the work and expand the influence of STEM in our region,” Batrowny said.

STEM mentors focus on notebook writing

Last summer, a team of STEM mentors looked at student writing in notebooks. The evident trend from this collection showed a need for more expectations aligned to standards for the writing done in STEM notebooks by students. The STEM team created learning goals and scales and a student tracker around the New York State Learning Standards for writing in each grade level from Kindergarten to grade 12. These learning goals and scales have driven the work done in regional trainings this year. We are determined to see the impact of this work as well. We have a team of STEM mentors collecting student notebooks from various grade levels at various districts. We will look at the students' scales, tracker and reflection throughout the year, and compare it to their results on the NYS Assessment as well. We hope to see impact on the constructed response portion of the exam by adding the writing expectations component in the content areas. This data collection will continue to expand as we seek to improve our STEM programming every year.

Fifth Grade STEM Notebook Student Tracker

NYLS.ELA-LITERACY.W.5.1

"Write opinion (argument) pieces on topics or texts, supporting a point of view with reasons and information." (Clear reasons with relevant evidence)

Rating	Description
4	I can write arguments supported with clear, logical reasons and relevant evidence that creates cohesion and clarifies relationships among claims, reasons, and evidence.
3	I can write arguments to support claims with clear reasons and relevant evidence.
2	I can write arguments that partially support claims with reasons and evidence.
1	I can introduce a claim(s) but am unable to support them with reasons and evidence.
0	I am unable to write arguments and support claims with evidence.

Standard: W.1 Student Name _____

4									
3									
2									
1									
0									
Date									

Date: _____ Task: _____

Goals for improvement: _____

Teacher Feedback: _____

Staying current with the NYSSLS updates

A third iteration of the New York State P-12 Science Learning Standards (NYSSLS) draft was released November 2015, with an accompanying public feedback survey that was released in December 2015 and closed in February 2016. The feedback received will inform revisions to the draft of NYSSLS updates prior to presenting them to the Board of Regents for discussion and eventual adoption.

Background

Using the Next Generation Science Standards (NGSS) as a starting point, the New York State Department of Education utilized the expertise of many science education stakeholders including those on the Preliminary Draft Writing Team, Science Standards Writing Team and Science Education Steering Committee to draft a set of science learning standards. This draft incorporates feedback the department received during the past few years and maintains the general tenets of the National Research Council's A Framework for K-12 Science Education: Practices, Crosscutting Concepts and Core Ideas.

Overview

The draft of the NYSSLS maintains the architecture and coding system included in the NGSS. Standards are identified by individual grade level (P-5), and combined MS (grades 6-8), combined HS (grades 9-12) with Engineering Design bands for K-2, 3-5, 6-8 and 9-12. The draft of NYSSLS includes standards, not curriculum.

In a critical shift from previously written science standards, the new draft NYSSLS are written first as performance expectations (PE), goals for what students need to know and be able to demonstrate to show they have met the standard. They are not instructional tasks or activities, but describe what a student should be able to do after instruction.

Each standard is grounded by three foundational dimensions: science and engineering practices (SEP) – the cognitive, social and physical practices scientists engage in; disciplinary core ideas (DCI) – the core ideas from science discipline (Physical Science (PS), Life Science (LS) or Earth and Space Science (ESS)); and cross-cutting concepts (CCC) – the concepts bridging all science disciplines. Within each standard, there is a clear coherence and articulated links to the Common Core Learning Standards for Math and ELA.

Summary

The new NYSSLS draft reflects the desired outcome to educate students to be scientifically literate – students who are ready to ask questions, define problems, investigate and analyze data, construct explanations and design solutions. The framework and design of the standards create a context for learning, provide students with strong science-based knowledge and skills, and promote critical thinking and inquiry-based problem solving. Integrating rigorous science content and application reflects how science and engineering is practiced in the real world.

From its inception, the GST BOCES STEM Education program was founded on the commitment of redesigning STEM education. Six years of focused, inquiry-based STEM program implementation, including consistent professional development for all teachers of science, places the regional STEM network ready to excel with the NYSSLS. Providing students with engaging, meaningful learning experiences rooted in a real world context, the current STEM program embeds science and engineering practices throughout investigations at all grade levels. Moving forward, the GST STEM initiative will support the transition to the new NYSSLS by maintaining and developing cutting edge instructional resources for the success of all students in life, career and college with 21st Century skills.