

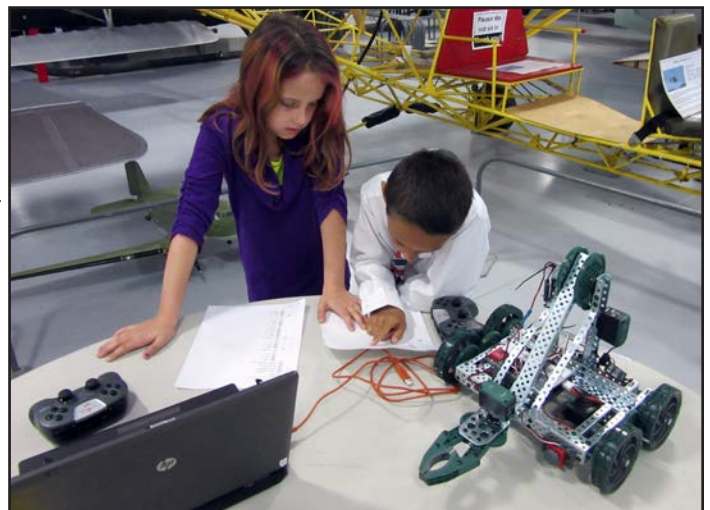
Spring robotics competitions showcase youth efforts and interests

GST BOCES sponsored two robotics competitions in the region recently. Many area school districts participated and student response was excellent. On May 27, the VEX Robotics Competition was held at the Wings of Eagles Discovery Center in Big Flats. Twenty-four teams from Addison, Arkport, Campbell-Savona, Corning-Painted Post, Elmira, Hammondsport, Jasper-Troupsburg and Watkins Glen and were involved in the day-long event. More than 85 students who participated in a Perkins Grant-funded after school program or who took robotics as part of their school day classes gathered to apply their developing skills to a variety of challenges. Students constructed and programmed their robots using Easy C or Robot C. Their efforts enabled the robots to complete both automated and operator control challenges. For most, this was a new experience and the students embraced the opportunity to expand their skills.

Format for the competition included a science fair in which students discussed their work with judges, individual autonomous challenges performed by their robots to function in a variety of mazes, the "Out Until Dark" light sensor challenge, and robot dance. Lastly, students worked in collaborative teams to complete the "robo-relay" challenge. Awards were given for each event and for the overall performance.



Robots dancing in singles, duets and trios, performed under autonomous control.



Writing code was a new and exciting experience for all the contestants.



Designing of robots for manufacturing.

Jon Lowin's high school class from Hammondsport shared their capstone project as an exposition item at the competition. They were first challenged with designing a robot which would travel on a wooden monorail. Once all students developed a successful robot, they were tasked with developing an integrated system which used seven robots to manage and inventory "wooden blocks" on an extensive monorail system. The system worked as advertised, and was demonstrated multiple times during the afternoon. These types of applications of mechanics and software allow students to experience many of the challenges and benefits of using robotics with STEM education.

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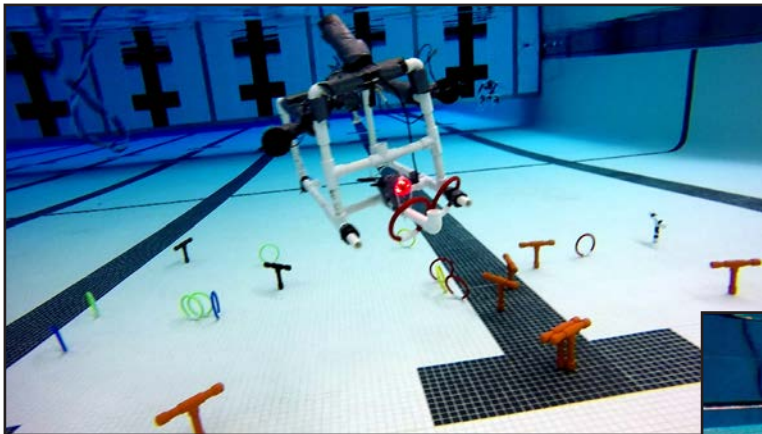
Spring robotics competitions, continued

The second event in an action-packed week of robotics in the area was the Underwater ROV Robotics Competition on May 29 at Haverling High School. This also was supported by funds from a Perkins Grant and students involved in after school and school day classes participated. There were 34 students from four area districts who used their newly-developed skills to perform a number of challenges using an ROV (remotely operated vehicle) in an underwater environment. Students from Alfred-Almond, Arkport, Bath and Canisteo-Greenwood discussed their insights with judges during the science fair and then went to the pool for challenges testing their craft's buoyancy and their skills of operation. Student response to these challenges was tremendous and often times their ability to "re-engineer" the ROV made the favorable difference. ROV designs were all original and many teams customized their robots for individual challenges using interchangeable components. A team from Bath was the overall winner of the competition.

GST BOCES will continue to support the expanding efforts of area districts to develop teacher expertise and curricula with educational robotics. Currently, GST BOCES is applying for a continuation of funds through the Perkins Grant for the after school program, and the STEM team is supporting districts with professional development, support and curriculum materials.



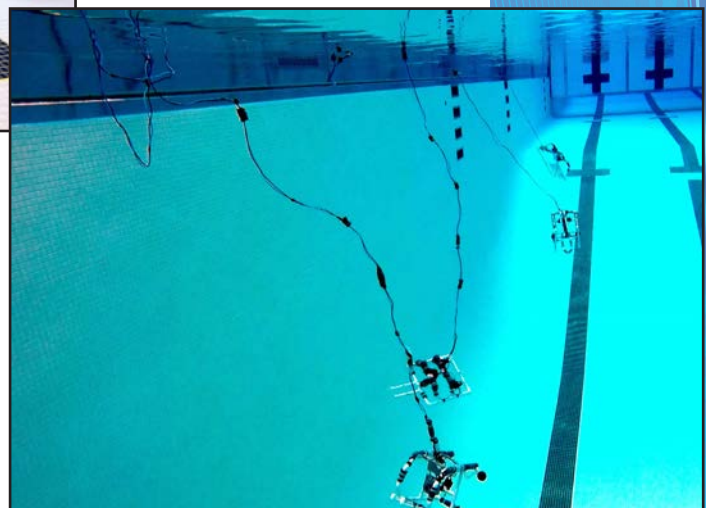
Above: The monorail system uses eight robots in all. Robots use a variety of sensors (light, touch and tracking) and timed motor commands while operating the system.



Above: Using only the video input from the on-board camera, students operate with ROV "below" the line of sight in the pool to retrieve artifacts and perform measurements.



Right: Sydney Davis from Jasper-Troupsberg CSD was the overall winner, with teams from Elmira HS and Corning-Painted Post MS finishing second and third.



Right: The rise to the top is a challenge which requires the ROV be neutrally buoyant and rise from a depth of 14 feet below the surface without any operator input – thoughtful design is a must!

Q & A with Dundee Central School District staff

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

"I have seen a renewed interest and enthusiasm about teaching and learning science! During the past 10 years, we have seen a decline in the amount of time that teachers spend on science because of many other initiatives they have been trying to implement. It has been so disconcerting, but I am so glad to see that the tide is turning."

– Laurie Hopkins-Halbert, Elementary Principal

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

"The students are talking about science for the first time in a long time! They are excited about the activities and they are sharing this information with their parents, who in turn have shared with us that they are so glad that we have started this initiative in the district. Any time that we can begin a program that makes our students excited about coming to school is truly a worthwhile endeavor."

– Laurie Hopkins-Halbert, Elementary Principal

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

"STEM promotes a student-centered learning environment. Students are able to answer complex questions and develop solutions for challenges and read world problems. They are learning how to investigate questions about the world that they come across in daily life. STEM provides students with the tools to investigate and analyze. It encourages students to solve problems using their own research. They are allowed to design, model and test solutions. The kids are learning how to cooperate with each other to solve the problems they are given. They must manage working together to collectively solve a problem, and include everyone in the process. This is an important lifelong skill for them to acquire. STEM is helping them to realize that everyone's input has value and that many people working to solve a problem is better than one."

– Jenn Maloney and Angie Cox, Second Grade Teachers

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

"Children are eager for information. They want "real life information". There is a love for learning and exploring happening. Students are applying the skills, concepts and vocabulary that

they have learned in STEM toward other areas of learning. The students are thrilled. When the children are squealing from excitement you know you're doing a great thing."

– Karen Adams, First Grade Teacher

"More teamwork and perseverance are evident than before."

– Valerie Brechko, Second Grade Teacher



Kindergarten students at Dundee Central School investigate to find out how fabric reacts to drops of water.

Q & A, continued

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

"Students are applying the problem solving skills they are practicing in science to math as well. They seem to have more patience when trying to figure out how to tackle word problems in math. Students are curious about learning more about the STEM topics they have engaged in. They want to dive deeper into a concept and learn more about it. They often utilize the library to check out additional books to gain more information on what they have been learning."

– Jenn Maloney and Angie Cox, Second Grade Teachers

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

"I enjoy being able to motivate and excite my students with high level science concepts. My students are disappointed when we have to stop our STEM lesson. They would do STEM all afternoon if they could. I hear my students saying things like 'I love STEM! I am making new discoveries, and STEM is making me smarter.'"

– Valerie Brechko, Second Grade Teacher

"I am pleased that my students often ask in anticipation when we will be doing science. They are excited and seem to enjoy thinking outside the box to solve STEM questions."

– Stacey Wills, Second Grade Teacher

"I am please about the inquiry that the children get to participate in and the conversations they have. The teacher is there to help initiate and foster the students but not tell them how or why. They do that. The teacher gains so much knowledge from listening in on what the children are talking about. STEM is a safe way of learning to be a risk taker."

– Julie Dunkelberger, Second Grade Teacher

"The students are willing to try to solve the problems. They don't feel frustrated when taking risks. STEM encourages students to be more inquisitive."

– Brenda Keegan and Renee Crofoot, First Grade Teachers

(Right) Dundee students learn about earth materials by studying the properties of rocks.



(Left) Kindergarten students at Dundee Central School feel different fabrics to determine their texture.

Confessions of a Malcontent Science Teacher

By Joe Liberto, *STEM Mentor*

In my new role as a STEM mentor, I have to confess that I'm not always comfortable with the reflection activity that is played out at the start of teacher STEM trainings. I love participating, but I don't always like the feelings that well up in me when we share-out the successes and, especially, the difficulties in teaching science.

A familiar uneasy feeling has been resurfacing from my experience with teaching science, once again rekindled by the conversations of teachers in our reflection circles. It's a restless kind of thinking which triggered a significant change in myself, eventually leading to a break with how I taught science.

I can't always publicly express what I'm thinking in the reflection activities, especially when those thoughts are difficult to deal with or understand. So I began to borrow a practice I learned from my studies in the Dynamics of Group Psychology called a "reaction paper". It's simply a habit of writing down thoughts that come up in a group discussion soon after the experience with a group. It's very effective for making sense of a world of emotions and thoughts, which can evolve in a group setting.

Let me share with you a series of confessions I pulled from my reaction papers that reveal my personal struggle with teaching science and ultimately played a significant difference in how I approached teaching science.

"The Wall" Confession

"All in all you're just another brick in the wall. Hey, teachers, leave them kids alone!" is a chorus of lyrics I often heard on my way to work and in my classroom. I don't own that classic rock opera album, *The Wall* by Pink Floyd. The song would not go away... the unsettling began to take root.

Holy Grail Confession

I followed the Holy Grail of state Regents science curricula defining what a brick should look like. I did a great job in shaping the minds of science students to be "just another brick in the wall". Bricks loaded with procedural knowledge and rote memorization and coached to get the "right" answers. My bricks achieved high scores on their Regents exams. Administrators, parents and students were all very complimentary of my efforts. It couldn't get any better.

Walls of Brick Confession

My students could regurgitate the state creed of conventional science facts with great success, yet, I was not happy. I was not satisfied with my teaching. Without warning, I got hit with this one thought: I had taught not wisely, but too well. It was time to look beyond those walls of bricks I helped to build.

Make a Difference Confession

Like most science teachers, I joined the ranks of science education to share the sense of wonder and excitement I often experienced in studying science. As in any teaching profession, I was in it to make a difference. Well, my students didn't seem excited, nor did they look like I was making a difference.

Hardboiled Confession

The tragedy of teaching is not that exciting youthful teachers leave education, but that they grow old, spoiled and don't believe anymore. Teaching becomes as exciting as a bored mortician at a cheap funeral. I was showing signs of that kind of teacher most of us quietly fears of becoming: I was becoming hardboiled. It was time for change in myself.

Continued on next page

Confessions, continued...

An Uneasy Confession

Change is not easy for me; it's difficult when what you are doing is working out well. My classes were primarily fact driven and content heavy, followed by recipe-like run labs. Inquiry-based research skills were found hiding out in that lone science project, available for extra credit.

No More Bricks Confession

Industry, businesses and colleges were screaming, "No more bricks!" They wanted microchips, nanotechnologists and information technologists. With that transformation from brick to microchip, demands for markedly different science students were being called for, and they were far from the kind I had been teaching. Equally so, a different science teacher from the one I had been was now required.

New Focus Revelation

I needed to focus more on the doing of science, on the here and now of science rather than the there and then of compliance-minded science. I also found I needed to focus on the things I could control rather than those could not, which revealed that I had a shot at teaching science differently. I didn't have control over science content and science standards, nor could I control my teaching schedule, student placement and those dreaded extra teaching duties. But I did have control in how I taught science in my classroom.

I hope by sharing my confessions with you I have let you know you that the STEM team empathizes with your struggle and effort in applying the inquiry approach to your classroom. You are not alone in your plight to find a better way to engage and energize students in how they connect with the world around them. Teachers, whether they like or not, play a major role in how their students see and experience life outside the classroom. A student's vision for the future is often sharpened or dulled through the eyes of their teacher. Once I had accepted that I had to first change my vision for myself, and then for my students, the work of change became a manageable challenge

Summer of Innovation 2015 set to begin

Exciting opportunities for learning and exploration will be offered to elementary and secondary students this summer at the GST BOCES Bush, Coopers and Wildwood Education Centers, Wings of Eagles Discovery Center and other sites. Academies will be offered on a wide range of topics, including fishing, cooking, criminal justice, digital media arts, cosmetology, animal science, robotics and aviation.

Log onto www.gstboces.org for a complete course catalog and registration information, as well as information on opportunities at other sites including Tanglewood Nature Center, the Science and Discovery Center, Alfred State College, Alfred University, Elmira College, Notre Dame High School and the National Soaring Museum. Space is limited and participants will be registered on a first-come, first-served basis.



Message from the STEM Supervisor, continued...

Examining and addressing these factors will help to support lasting improvements in STEM related to increasing: 1) Engagement – students must have an orientation to STEM disciplines that include awareness, interest and motivation and teachers must have positive attitudes toward and beliefs about STEM; 2) Capacity – students must possess the acquired knowledge and skills needed to advance to increasingly rigorous STEM disciplines and teachers must possess STEM content knowledge and appropriate pedagogy; and 3) Continuity – students must have sustained access to programmatic opportunities, material resources and guidance that support advancement to increasingly rigorous STEM disciplines and teachers must have continuous access to the supports (training, administrative support, curriculum, and materials) necessary to provide high-quality, inquiry-based STEM instruction (Jolly, Campbell and Perlman, 2004).

The theme of sustainability will be guiding the STEM work in the region during our STEM Summer Academy slated for July 28 at Corning Incorporated.

Thank you for your continued support!

Jeremy Wheeler GST BOCES STEM Staff Development Supervisor

Participating districts

- Addison Central School District
- Arkport Central School District
- Avoca Central School District
- Bath Central School District
- Bradford Central School District
- Campbell-Savona Central School District
- Canaseraga Central School District
- Canisteo-Greenwood Central School District
- Corning-Painted Post Area School District
- Dundee Central School District
- Elmira City School District
- Elmira Heights Central School District
- Fillmore Central School District
- GST BOCES
- Hammondsport Central School District
- Hornell City School District
- Horseheads Central School District
- Notre Dame High School
- Odessa-Montour Central School District
- Spencer-Van Etten Central School District
- Watkins Glen Central School District
- Waverly Central School District