



STEM Stars students from Pittsburgh Sterrett participate in Carnegie Science Center's Future City Competition.

## Local Teachers Value Science Center's STEM-Effective Programs

When **Sarah Batovsky** began teaching her middle schoolers a lesson about friction, several girls already had hands-on, first-hand experience with the topic.

The students participate in STEM Stars, a program offered jointly by Carnegie Science Center and the YWCA, encouraging economically disadvantaged girls to learn about and pursue science fields.

"When I began teaching about friction in class, they were already learning about it at STEM Stars," said Batovsky, a science teacher at Pittsburgh Schiller Middle School. "It corresponded really well, and it helped them get a better understanding."

STEM Stars is just one of an array of the Science Center's programs promoting

STEM-effective education. Teachers from across the region regard these opportunities as valuable resources. They plan to continue pairing the content-rich informal education components with their classrooms' lesson plans.

STEM Stars students relish the afterschool program's chance for personal, small group attention, compared to their 30-student classroom experience, Batovsky said.

"The questions I get from them in class are far more advanced," she said. "Our population here is underserved and underprivileged, so it's great to see that the STEM Stars staff would come in and be willing to teach them more about science and to do it in a way that excites them. It's obviously

something that's important to the girls."

Students are also excited to present their out-of-classroom work to their teacher. After building solar cells at STEM Stars, the girls proudly told Batovsky: "We made these last night! And we really want to donate them to your classroom."

The program provides a safe space for students after the school day, and it shows students opportunities for jobs after graduation.

"I know at least one of them is considering a career in science," Batovsky said.

### Competitions Engineer Excitement

Some teachers have integrated Science Center programming into their classrooms for decades.

**Tom Harden**, for example, has encouraged Hempfield Area High School students for the past 10 years to participate in the Science Center's Chain Reaction Contraption Contest, which challenges students to engineer a contraption that completes a specific task in 20 steps or more.

"I can tie this competition into standards that I'm looking to accomplish," said Harden, coordinator of Hempfield Enrichment Program and a chemistry teacher at the large, suburban public school district.

Students tackle the project from start to finish—first brainstorming ideas and choosing a theme, then analyzing the science behind the mechanical steps, incorporating micro-processors, and noting aesthetics.

Over the years, he's noticed that students are more likely to take scientific risks when they're not being graded. He's also watched students' confidence soar during the challenge.

Fellow Hempfield teacher **Matt Clark** joined the team recently. To him, the program is most valuable for its elements of teamwork, group problem solving, and trial-and-error aspects.

*(Story continues on page 3)*

# directors' note



**S**uvir and Rishi Mirchandani are pretty exceptional kids. Suvir, the younger of the brothers, attracted national attention earlier this year for research he did three years ago when he was a 6th grader at Dorseyville Middle School. In preparation for his project for the Science Center's annual science fair, Suvir was looking at common sustainability practices employed by his own school and businesses everywhere, practices like printing documents double-sided instead of one-sided. But Suvir didn't stop there. He thought about the printer ink itself and investigated ways it could be used more frugally.

The key is the typeface, Suvir found. You need to pick a typeface that uses less ink. So – he concluded, after testing font after font – switching to the Garamond typeface could save his own school \$21,000 per year. The U.S. Government, he calculated, could save about \$230 million per year, just by changing to Garamond. The research was published in *Science*, and Suvir has been interviewed on CNN and the Huffington Post. Did we mention that Suvir was a 6th grader when he did this project?

Older brother Rishi is no slouch either. Rishi has done extraordinary science fair projects, largely related to the field of mathematics, a field he loves. His science fair projects have been so exceptional that he has advanced from our Pittsburgh regional fair to the Intel International Science & Engineering Fair two years in a row. His 2014 project using high level math to study traffic flow problems earned him the third place grand award among 65 nations in the world in the mathematical sciences.

We love to point to Suvir and Rishi as shining examples of how the programs we offer at Carnegie Science Center inspire young people to spread their wings. But there are other kids whose achievements are just as important to us, achievements that don't win prizes or media attention. We think of John, a middle school kid from McKeesport, who found a love for science and robotics at our SciTech Days a few years ago and subsequently realized he could think like a scientist and wants to become one. Or Melvina, from Pittsburgh Public Schools, who was part of our STEM Stars after school program for middle school girls. Melvina wrote to Nina Barbuto, the Science Center staff member who runs this program: "Dear Miss Nina, Being in [STEM Stars] gave me an idea that being a girl doesn't mean a thing. Being with you I know that I can change the world and I thank you."

These are just a few of the names and stories from young people attending the wide array of STEM programming we provide. There are hundreds more stories – actually thousands more – about the kids we see through our programs and competitions. And Melvina is right: They can change the world!

**Ron Baillie and Ann Metzger**  
*Henry Buhl, Jr., Co-Directors*



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[CarnegieScienceCenter.org](http://CarnegieScienceCenter.org)

Carnegie Science Center delights, educates and inspires through interactive experiences in science and technology. By making science both relevant and fun, the Science Center's goal is to increase science literacy in the region and motivate young people to seek careers in STEM (science, technology, engineering and math).

The Science Center also serves as a town square for community dialogue on science and its social implications and seeks to showcase regional science and technology advances.

One of the four Carnegie Museums of Pittsburgh, the Science Center is Pittsburgh's premier science exploration destination, reaching more than 700,000 people annually through its hands-on exhibits, camps, classes and off-site education programs.

**Ron Baillie and Ann Metzger**  
*Henry Buhl, Jr., Co-Directors*

*Science Impact* is available online at  
[CarnegieScienceCenter.org/Publications](http://CarnegieScienceCenter.org/Publications).

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Students carefully test and tweak their Chain Reaction Contraction apparatus at Carnegie Science Center.

## STEM-Effective Programs (...continued from Page 1)

“Not everything they do is going to work, but they’re going to keep going and figure it out until it works,” Clark said. “Those kinds of experiences are invaluable.”

For more than 15 years, science teacher **Betsy Killmeyer**’s students at St. Bede School in Point Breeze have competed in the Science Center’s Future City Competition. The contest challenges students to design a city of the future and to build a scale model of it.

“I do Future City to help the more advanced students that need more of a challenge,” Killmeyer said. “This competition itself has the kids doing math, science, engineering, problem solving, research – it basically covers everything.”

She’s noticed that Future City inspires students to become “real problem solvers.”

“They’re definitely more involved in finding the answers than before I started doing Future City. They’re not expecting to be given the answers; they have to go find them,” she said.

In addition, the competition’s essay component helps to hone concise writing skills, and its presentation phase encourages confident public speaking skills.

“They love it,” she said. “Quite a few of the girls especially have gone into engineering. I’ve had several students who have become engineers. It opens their

eyes to the possibility of being a scientist – ‘Hey, I can do this!’”

The Science Center’s programming is so ingrained into the curriculum at St. Bede School, kindergarteners have already pledged that they’ll someday participate in Future City. Killmeyer says, “You see, it inspires the younger kids, too.”

### Making Videos to Enhance STEM Learning

Other teachers have recently signed on to the Science Center’s STEM-effective

educational offerings, such as Bishop Canevin High School, which for the first time this year included the i5 Video Competition as a part of eighth-graders’ coursework. i5 stands for innovations, issues, individuals, inspiring careers, and incredible income potential.

Biology teacher **Vanessa Bentley** teamed with the school’s algebra teacher to draft a rubric their students would need to satisfy.

“It opens their eyes to the possibility of being a scientist – ‘Hey, I can do this!’”

“They were very independent,” Bentley said. “They really thought up the ideas and went running from there. i5 was something students could relate to. It really outlined what they should be getting out of STEM. It was a very good connection.”

“They learned about careers and how STEM is important in finding careers and in everyday life,” Bentley said.

Students enjoyed working together and watching each other’s videos.

“It’s a really neat experience because it puts some excitement into the coursework. Sometimes in school we worry about tests and content knowledge. The Science Center reminds us that science can be really fun. It’s important to see science in action,” Bentley said. “It’s a good reminder to schools that we need to do science, not just learn it.” ■



Winners of the Science Center’s i5 Digital Video contest pose with their awards after watching their films on the biggest screen in Pittsburgh at the Rangos Omnimax Theater.

# Science Fair Celebrates 75<sup>th</sup> Anniversary



*During Carnegie Science Center's Pittsburgh Regional Science & Engineering Fair, a student presents her science fair research to a judge.*

The oldest kids who participated in the first year of Carnegie Science Center's science fair would be turning 92 this year, as the Pittsburgh Regional Science & Engineering Fair (PRSEF) marks its 75th anniversary.

Over the years, more than 60,000 students have competed in one of the nation's largest science fairs. This year's event in March welcomed 1,100 students representing 120 school districts. It awarded local students with \$1 million in cash and scholarships.

Throughout its eight-decade history, the fair has granted prizes to winners, though they've changed over the years. In 1955, awards included a Smith-Corona typewriter, a power drill, a Brownie Camera, a college briefcase, and \$75 cash.

Their ambitious projects chronicle the history of science and offer a glimpse into the future.

Photography's impact, for example, evolved from 1940s projects exploring pinhole cameras and micro-projectors to projects decades later examining celestial photography and lasers' role in creating images.

The students' work often provides a peek into the issues that most affected their generation.

For example, a 1943 project studied "Emergency Air Raid Shelter Rooms." In 1957, students considered "Principles of Television" and the "Multiple Selective Computer."

During the 1960s, projects took an environmental turn, examining topics such as stream pollution and water filtration.

In the 1970s, students showed a fascination with space, tackling projects about the moon, space travel, U.F.O.s, and colonizing space.

Sometimes students' work transcends the era's technology, glimpsing into technology of the future.

For example, in the early '50s, students pursued ideas of the "Tubeless Intercom," "Garage Door Operator," "Life Through the Ages in 3-D," and "Simple Computer." In 1964, a student won the grand prize for the project "Automatic Morse Code Sender."

In 1972, a student presented research about hydroponics. The next year, a student presented "A Method for Flat-Screen Video." That same decade, an entrant examined fiber optics.

In the 1980s, projects analyzed computerized robotics, solar heating, windmill energy, and cancer's impact. By the 1990s, students were concerned with issues of gene cloning, DNA fingerprinting, pollution in Pittsburgh's rivers, El Niño, and applied artificial intelligence.

More recent projects analyzed the impact of zero-gravity on plant growth, chemotherapy, efficient rockets, concussions' effects, and 3D printing.

Common themes have emerged year after year, among them animals' biology, engines' construction, and critters' anatomy. Another emerging theme is the continual involvement of bright students from across the region who wrestle with scientific questions determined to discover answers.

To honor the milestone anniversary, science fair alumni were invited to attend this year's awards ceremony and a special reception. Some Science Fair alumni give back to the event by volunteering each year. ■

## microbits

### Local students compete at International Science Fair

Four local students competed in the Intel International Science & Engineering Fair (ISEF) in Los Angeles in May.

Representing the region were: **Songela Chen**, North Allegheny Senior High School (Wexford); **Akash Levy**, Taylor Allderdice High School (Squirrel Hill); **Rishi Mirchandani**, Fox Chapel Area Senior High School; and **Suvir Mirchandani**, Fox Chapel Area Senior High School.

- **Akash Levy** won an Honorable Mention from the American Association of Physics Teachers.
  - **Rishi Mirchandani** won a third place grand award in mathematical sciences (\$1,000) and an Honorable Mention Karl Menger Memorial Award from the American Mathematical Society.
- Rishi was also selected as the senior division recipient of the Carnegie Science Award, which he received at a ceremony in May in Pittsburgh.
- **Suvir Mirchandani** won a Web Innovator Award (\$1,500) from GoDaddy.

The students were selected for the international competition based on their projects submitted at Carnegie Science Center's Pittsburgh Regional Science & Engineering Fair in March.

### Big Blue Summer at the Science Center

*BLUE!*, the Science Center's newest gallery, features an immersive, hands-on experience with molded foam blocks of all shapes and sizes – from small enough to use on a tabletop to huge enough to climb. Carnegie Science Center's Big Blue Summer includes a weekly summertime blue-themed performance series in the gallery with blues and bluegrass music. Exhibit sponsors are **Pennsylvania Virtual Charter School** and **Med Express**. **Dollar Bank** is sponsoring the performance series, with radio station **BOB-FM** as media partner.

# BOARD SPOTLIGHT



## Bob Bozzone

To **Bob Bozzone**—who worked his way from junior metallurgist to chairman of the board at Allegheny Technologies Incorporated—technological skills are crucial for a successful nation.

“Our ability to lead the world technologically is an absolute key,” he said.

That’s why he joined Carnegie Science Center’s board more than a decade ago and continues to serve in an emeritus capacity. He’s cognizant of international competition and wants to bolster the next-generation workforce.

Now retired from Allegheny Technologies—formerly called Allegheny Ludlum—the New York native studied at Rensselaer Polytechnic Institute, then moved to Leechburg for work in the steel industry. He retired from Allegheny Technologies with 52 years of service.

He enjoys attending Science Center board meetings and listening to reports about activities and outreach programs. Bozzone also serves as an emeritus trustee of Carnegie Museums of Pittsburgh.

“The Science Center is a wonderful success story,” he said. “We’ve succeeded, and we’re running out of space because of our success. That’s why I think the Science Center’s expansion plan is so very crucial, and I think it’s crucial for Carnegie Museums of Pittsburgh.”

Outside of the boardroom, Bozzone spends time golfing, snorkeling, and traveling. He credits his wife Irene for her support. The two have three children and 10 grandchildren.

The couple enjoys visiting roboworld™ and Rangos Omnimax Theater.

“I think there’s something there for people of all ages, which is also important because you want good mentors for these children,” he said. “Carnegie Science Center is the future.”

# GRANTS & AWARDS

- Carnegie Science Center will transform its popular Kitchen Theater into a new, live demonstration theater called BodyStage, presented by **Allegheny Health Network**. This theater, opening July 3, will feature programming about anatomy, health, nutrition, and medical technologies, in addition to cooking science demonstrations. BodyStage is made possible through a \$500,000 sponsorship from Allegheny Health Network and Highmark Blue Cross Blue Shield. The sponsorship will also fund engaging and educational programming with a new Science on the Road program, also focused on the human body and health.
- With a \$50,000 grant, **FedEx** is pledging support as Presenting Sponsor of SciTech Days in 2014–2015, along with the Pittsburgh Regional Science and Engineering Fair in 2015. FedEx will also help to support the Carnegie Science Awards as a Presenting Sponsor in 2015 with a \$10,000 grant.
- **The Pennsylvania Historical Museums Commission** provided \$32,500 for general operating expenses.
- **Pirates Charities** recently awarded the Science Center a \$100,000 grant for a baseball-themed Science on the Road show. The show includes support from **Chevron**, **Pirates Charities**, and the **Pittsburgh Pirates**. It’s set to launch in spring 2015.
- Thanks to a \$212,000 grant from **Chevron**, Campos is conducting research this summer about attitudes regarding STEM education among parents, children, and educators in our region. Carnegie Science Center and Chevron are working with Campos to craft the questions and determine the scope of the survey. The results—expected in late August—are expected to illuminate the extent to which STEM education is valued and why it is valued, as well as the barriers that are keeping young people from choosing STEM coursework and careers. **Nova Chemicals** is contributing an additional \$5,000 to the survey.
- **Bayer** has become the newest founding partner of the Chevron Center for STEM Education and Career Development. A \$150,000 grant from Bayer USA Foundation will support a full range of STEM-related programs, events, and competitions.

## Jason Brown Director of Science and Education



**Jason Brown** has joined Carnegie Science Center’s Senior Leadership Team as director of Science and Education. A native of upstate New York, Brown holds degrees from Hobart College and State University of New

York at Buffalo. His extensive experience as an educator includes teaching physics, astronomy, geology, and science technology and the environment in private, public, and alternative classrooms. His most recent teaching experiences are as a science and engineering teacher at Propel Braddock Hills High School and assistant professor of Construction Management at the State University of New York. He also has substantial experience with innovative educational technologies.

Brown joins **Linda Ortenzo**, director of STEM Programs, and **Alana Kulesa**, director of Strategic Education Initiatives, in leadership of the Chevron Center for STEM Education and Career Development. He will play a leading role as the Science Center develops a Teacher Excellence Academy and numerous other STEM endeavors, and he will supervise the new Planetarium director, who arrives in late June.

# PARTNER SPOTLIGHT

Charles F. Kahle II, PPG Industries

Chief Technology Officer and Vice President, Coatings Research and Development



Charles Kahle joined PPG in 1987 as a research chemist. He worked in several research and development leadership roles before becoming Vice President of Coatings Research and Development, along with Chief Technology Officer. He holds responsibility for science and technology globally.

Kahle earned a bachelor's degree in chemistry from Bowling Green State University and a PhD in organic chemistry from University of Illinois at Champaign – Urbana. He is named in 16 U.S. patents.

## What is PPG's mission?

To be the world's leading coatings and specialty materials company.

## How much technology is used at PPG?

Our business is based on products supported by a variety of technologies for many end-use markets. The company was founded in 1883 as Pittsburgh Plate Glass by Captain John B. Ford and John Pitcairn. Today, PPG is a global supplier of paints, coatings, optical products, specialty materials, glass, and fiberglass. We have global locations and are still headquartered in Pittsburgh.

Through leadership in innovation, sustainability, and color, PPG helps customers in industrial, transportation, consumer products, and construction markets and aftermarket to enhance more surfaces in more ways than any other company.

## Why is a STEM-prepared workforce important to your company?

PPG employs more than 3,000 scientists and technical experts globally, with about 600 in southwestern Pennsylvania. We have research and development labs in Monroeville, Harmar Township, Springdale, and Allison Park.

Our company's success is predicated on the knowledge and the innovative products created by this team. We will be less competitive as a research and development organization, and as a company, without strong new scientists joining the workforce.

## In what ways has PPG supported the Science Center?

PPG supports numerous initiatives with dollars and volunteers, including SciTech Days, SpacePlace, and the Chevron Center for STEM Education and Career Development. Also, I serve on the Science Center's board. I'm proud to say there is an instant and overwhelming response when a call goes out to our scientists for volunteers at the Science Center.

Perhaps PPG's most visible contribution is the Science on the Road outreach program. PPG has supported five traveling assembly shows used at schools and other venues to demonstrate the practical applications of science to students.

## Why does PPG value its support of Carnegie Science Center?

PPG believes strongly in our community, and we want to make a positive difference. Secondly, Carnegie Science Center is a great venue for engaging our technical workforce in enhancing the community. Our research associates love to share their knowledge and play a role in inspiring students and anyone else interested in science. And last, it's a fact that the Science Center influences and molds the creative minds necessary for the future of innovation in our region and at PPG. These curious and creative minds are crucial to ensuring the next generation of scientists.

## Personal connection:

I am inspired by working with the staff at Carnegie Science Center. Their dedication to the mission and the excellence they bring to their work is a hallmark of a professional, successful organization.

Also, it really makes me happy to see the smiling faces of the visitors and to hear the stories of students who become excited and inspired to pursue STEM fields as a result of their interactions with the Science Center.

“...the Science Center **influences and molds** the creative minds necessary for the **future of innovation.**”

## microbits

### Science Center to Host STEM Summit

For the first time, the annual **Pittsburgh STEM Summit** will be held at Carnegie Science Center. The Aug. 28 event strives to bridge the gap between education, innovation, and industry-led solutions. It's designed to join educators, entrepreneurs, business leaders, and innovators to discuss strategies to enhance teacher professional development, encourage student engagement, and provide learning opportunities in traditional and non-traditional environments.

The summit, led by **Pittsburgh Technology Council**, will feature more than a dozen "innovation zones" throughout the Science Center.

### STEMisphere Curates STEM Resources

Late last year, Carnegie Science Center launched **STEMisphere.org** as a community service curating STEM opportunities across the region. The online hub is now home to more than 400 resources for children in grades PreK–12 in western Pennsylvania. More than half of those resources are independent of the Science Center. More than 1,200 unique visitors have used the site since its launch.

Support for STEMisphere was generously provided by Shell, Claude Worthington Benedum Foundation, Alcoa Foundation, and The Grable Foundation.

### Baldwin Student Wins i5 Grand Prize

Baldwin High School student **Jillian Weida** wowed the judges of Carnegie Science Center's i5 Digital Video Competition, presented in partnership with **Pittsburgh Filmmakers**. Weida won the grand prize award for chronicling the Baldwin Bioswale, a green infrastructure to quell floodwaters.

Eighty middle and high school filmmakers from 18 area schools participated in the competition exploring the impact of STEM in their lives through video. More than 5,380 people — from as far away as the Netherlands and Herzegovina — viewed their work online.



Eaton's President of the Circuit Protection Division Ruppert Russoniello; University of Pittsburgh Chancellor Mark A. Nordenberg; Carnegie Science Center Co-Director Ann Metzger; Carnegie Mellon University President Emeritus Dr. Jared L. Cohon; Carnegie Science Center Co-Director Ron Baillie.

## 2014 Carnegie Science Awards

The Carnegie Science Awards ceremony in May recognized the accomplishments more than two dozen scientists, students, educators, entrepreneurs, and corporations who are making significant contributions to science and technology in western Pennsylvania and beyond. The event celebrated the theme of cooperation, particularly in bestowing its highest honor to **Jared Cohon, PhD**, President Emeritus, Carnegie Mellon University and **Mark Nordenberg**, Chancellor, University of Pittsburgh. Chairman's Awardees Cohon and Nordenberg spoke during the ceremony. The two were honored for their legacy of collaboration and its impact on western Pennsylvania. ■



Trip Oliver, Manager, Policy, Government and Public Affairs at Chevron, presents the Elementary Educator Award to Danielle Kephart of Divine Redeemer School.



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*Students interact with employees of petrochemical company Braskem during Engineer the Future.*

## Students Engineer the Future at Carnegie Science Center

Each February, Engineer the Future offers students a chance to engage in hands-on activities introducing them to engineering fields. This year's two-day event featured activities about engineering balloon rockets, testing polymers, creating super bouncy balls, and overcoming natural and manmade challenges to build a pipeline. Participants interacted with engineering professionals and viewed presentations at more than 50 event tables.

Thanks to EQT Foundation's sponsorship, 1,200 students from schools in Greene, Washington, and Armstrong counties attended the event. In addition, EQT Foundation funded the participation of STEM Stars students. STEM Stars is an after-school program offered by Carnegie Science Center in partnership with the YWCA for middle school girls from underserved school districts. The STEM Stars girls showcased the model cities they built for the Future City competition earlier in the year.