

# science IMPACT

SPRING 2012: VOL. 1, NO. 1



**CARNEGIE  
SCIENCE  
CENTER**

One of the four Carnegie Museums of Pittsburgh



Middle schoolers observe a demonstration using super-absorbing polymer powder by representatives of Carnegie Mellon University at SciTech Days—a twice-yearly Science Center event that serves 6,000 students annually.

## Science Center Launches Chevron STEM Center

Carnegie Science Center's Chevron Center for STEM Education and Career Development, which opened in November, has already established a dramatic trajectory in new programming initiatives.

Recognizing the growing national and regional need for a workforce skilled in STEM—science, technology, engineering, and math—the Science Center conceived the STEM Center to sharpen the focus of existing programs and approach them in a more concerted way, and to generate new initiatives, all driven by four overarching goals: collaboration, inspired learning, great teaching, and a committed community.

“Science, technology, engineering, and math are critically important to our nation's economic growth,” says **John Radzilowicz**, director of Science and Education at the Science Center. “Through the Chevron

STEM Center, we bring the expertise of the Science Center to bear as we convene all the stakeholders—teachers, students, parents, universities, foundations, corporations, and legislators—to address STEM education collaboratively and effectively. The Chevron STEM Center seeks to inspire the next-generation workforce and expand the pipeline of students prepared to enter college and graduate with STEM degrees.”

“The Chevron Center for STEM Education and Career Development builds on the Science Center's major strength: making science accessible and fun and relevant to all age groups,” explains **Linda Ortenzo**,

Carnegie Science Center's director of STEM Programs. “The STEM Center concentrates those efforts to show young people what they can do with their lives, help them develop the skills they need, and introduce them to careers they never knew existed in emerging fields like bioinformatics, regenerative medicine, nanotechnology, and robotics, as well as more traditional fields like mathematics, electrical engineering, chemistry, and physics.”

The importance of this mission is reiterated almost daily on the news. STEM occupations have grown three times as fast as non-STEM occupations over the past 10 years, a pace that is expected to accelerate in the future. One million additional graduates with STEM degrees will be needed over the next decade to fill jobs that require these skills, according to a report released in February by President Barack Obama's Council of Advisors in Science and Technology. Filling those jobs requires the leading-edge human and knowledge capital of a workforce rich in scientists and innovators. *(Story continues on page 3)*



**Bruce Niemeyer**, Chevron's Vice President, Appalachian/Michigan Strategic Business Unit, welcomes guests at the Chevron STEM Center launch.

# directors' note



**W**elcome to the inaugural issue of *Science Impact*, a quarterly publication to keep you informed about Carnegie Science Center's ongoing achievements in informal science education as we strive to instill a passion for STEM—science, technology, engineering and math—in the next generation workforce.

Carnegie Science Center recently hosted more than 3,000 students for SciTech days, an event that connects kids with real-world scientists and engineers to broaden their perspectives about STEM careers. This dynamic combination of hands-on activities, workshops, and interaction with role models makes for highly inspirational experiences. One of our SciTech students summed it up best when he told his teacher: “I didn’t know my brain could work that way.”

We know that our role at the Science Center in providing informal science education is vital. Economic growth is dependent on science and technology innovation—and innovation is dependent on a workforce with proficiency in STEM. Yet on a recent international exam, U.S. students ranked 23rd in math and 31st in science compared to 65 other industrialized nations.

It will take collaboration to move the needle. In our region, Carnegie Science Center is truly the intersection where formal education and “the real world” connect. We’ve expanded that role in the past year with the formation of our new Chevron Center for STEM Education and Career Development. The Center’s goal

is to provide a focused forum among key STEM education stakeholders: preK–12 school districts, PA intermediate units, colleges and universities, business and industry, economic development organizations, parents and caregivers. We’ve been gratified by the community response to this important initiative, and are working diligently on a number of fronts to address the regional concerns about future workforce needs.

You’ll hear more from us in the months ahead as we move forward with this exciting new initiative. We’ll count on your help.

We know that the combination of formal and informal education can make a big difference. Consider this comment we received recently from a visitor: “My son is a sophomore at a private high school in our area, and he said he learned more in the 20-minute presentation here than he has from the last three weeks of science class at school. Thank you! Our teachers need to learn that hands-on is so much better than hand-outs.”

**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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# Science Center Launches Chevron STEM Center

(...continued from page 1)

It's a concern shared by local industry and the community, as evidenced by the strong financial support of Chevron and the STEM Center's six founding partners — **California University of Pennsylvania, Duquesne Light, Eaton Corporation, LANXESS Corporation, NOVA Chemicals, and PPG Industries Foundation.** And their support isn't only financial—representatives of these organizations participate actively on the Science Center's STEM Advisory Board, which not only guides existing efforts but also brainstorms new ideas for

“...collaboration, inspired learning, great teaching, and a committed community.”

how to make an impact. It's truly a working Advisory Board, which grapples with the whys, hows, and wherefores related to STEM education in our region.

“Participating on the STEM Advisory Board has been a very satisfying experience because of the remarkable talent and dedication of the leaders from area

companies, universities, and institutions promoting science, engineering, and math to area students,” said Charles F. Kahle II, chief technology officer, PPG Industries. “The proof is in the countless smiles and boundless excitement of the thousands of students who attend the many sponsored events and exhibits each year.”

So while the Science Center continues to strengthen existing STEM programs like **SciTech Days, Science on the Road** outreach programs, the **Pittsburgh Regional Science and Engineering Fair,** and the **Girls, Math & Science Partnership,** new STEM initiatives are already emerging.

A **Teacher Education Center** is in development, with Science Center staff working with their longtime colleagues at **ASSET, the Math Science Collaborative,** and **California University of Pennsylvania,** particularly drawing on its master's program in STEM Education. Partnerships with **Pine Richland** and **Upper St. Clair** school districts as well as **PA Cyber** are under way, with these schools looking to the STEM Center to help find ways to peruse math and science curricula and with a vibrancy that will inspire students to embrace STEM studies for the long haul.

The Chevron STEM Center is also exploring STEM asset mapping. “With the current groundswell of interest in STEM, there are numerous local initiatives to address the

issues,” says Radzilowicz. “We want to document what everybody in this region is doing so we can collaborate and augment—not duplicate—each other's efforts.”

As the Chevron STEM Center pursues its goal of a committed community, it is preparing to launch a public awareness campaign to carry the message of the importance of STEM education to parents, students, and the general public. Watch for more details this spring.

Our modern society is built on science and technology. In order to be educated and engaged citizens of the world in the 21st century, everyone needs to know and understand STEM. The Chevron STEM Center will help guarantee that our children are ready and able to face the challenges, and seize the opportunities, of the century ahead. ■

**Want to know more about the rationale and vision for the Chevron Center for STEM Education and Career Development?**

Watch the video at:  
[CarnegieScienceCenter.org/STEMvideo](http://CarnegieScienceCenter.org/STEMvideo)



Students explore nanotechnology with scientists of RJ Lee Group, Inc. at SciTech Days.

## STEM Stats

- The U.S. ranks 27th among developed nations in proportion of students receiving undergraduate degrees in science or engineering.
- The World Economic Forum ranks the United States 48th in the quality of mathematics and science education.
- In an international exam given in 2006, U.S. high school students ranked 21st out of 30 industrialized nations in science, and 25th in math.
- China has replaced the U.S. as the world's number one high-technology exporter.
- In 2010, people with jobs in STEM fields earned 26% more than those employed in non-STEM fields.
- 65 % of graduates with a bachelor's degree in a STEM field earn more than those with master's degrees in non-STEM fields.
- Graduates with an associate's degree in a STEM field earn more than those with a bachelor's degree in a non-STEM field

# Kindling Early Learners' Love for Science

Children are born with a passion for learning and a fascination with science, even before they learn the word “science.”

They “get into everything” because they are on a natural quest for discovery from the moment they emerge from the womb. To help propel them on this quest, Carnegie Science Center brings programs to preschools that not only percolate with excitement but also give teachers tools to keep the excitement going.

Through a grant from **PNC's Grow Up Great with Science** program, the Science Center has developed a proven model that has worked so well in 133 Pittsburgh Public Schools and Westmoreland County Head Start classrooms that additional grants are allowing it to be replicated elsewhere. Science Center staff visit preschool classrooms with dynamic, interactive programs which delight teachers and pupils while nurturing scientific curiosity. After the visit, the teachers receive classroom kits containing items that make hands-on science learning possible, and with which most preschool classrooms aren't equipped. To extend the learning beyond the classroom, Family Fun Nights get parents and other family members involved, with science demonstrations and interactive hands-on activities. Parents also receive a family pass for a visit to Carnegie Science Center. The Science Center has brought this programming to Head Start classrooms in Pittsburgh and Westmoreland County for three years and more recently added a technology component to the program.

And for preschoolers there's no technology more exciting than robots! Carnegie Science Center developed **Hello Robo!**, to introduce the concepts



Wendy Brenneman, shown here in an early learners' classroom, joined the Science Center in 2005 and became early childhood coordinator in 2009. Since then she has developed the early learners programming for the Science Center and has presented at the Early Childhood Summit in State College and other conferences. “Young children don't have any misconceptions about science being hard or boring. They're just excited to get involved in any exploratory activity.”

“Young children don't have any misconceptions about science being hard or boring...”

of robotics and programming to the same Head Start classrooms in Westmoreland County and Pittsburgh Public Schools, funded by **Spark**, a program of the **Sprout Fund**. “What a fun way to introduce robots at our students level,” said one early childhood educator, “The materials and content help us by enriching our curriculum and giving a more hands-on approach to learning. We used our kit right after the presentation. The kids loved it! They took turns, problem solved, giggled, and used the words ‘clear’ and ‘program.’”

Next step: Indiana County. **Ready Set Science** is being developed and implemented in partnership with local Head Start programs to serve more than 300 children from low- to moderate-income families there. With federal funding through the **Institute of Museum and Library Services (IMLS)**, the Science

Center is providing each preschool classroom in the county with four classroom toolkits over two years.

Still another early learners initiative, funded by the **Claude Worthington Benedum Foundation**, is being developed with the West Virginia Department of Education. This program is designed to train all West Virginia preschool teachers in a strong math and science curriculum and to get caregivers involved with their children's learning. To engage families, the Science Center will provide 1200 classrooms with a send-home science kit containing activities for family members to try together, and related books to read.

**Wendy Brenneman**, Carnegie Science Center's early childhood coordinator, has seen how rewarding family engagement can be. “The most meaningful part of our Family Nights has been that students and families are able to have a shared hands-on experience, and both come away having learned something. With our send-home kits, we're hoping to extend that shared science learning, which is so beneficial for students.” □



# BOARD SPOTLIGHT



**Jane M. Kirkland**

Chair, Carnegie Science Center Board

**Jane Kirkland** is a seasoned business strategist from Sewickley with an MBA from Dartmouth. She's also an avid rower and mother to three teens, so it's amazing that she somehow also finds time to serve as the chair of Carnegie Science Center's board.

"I'm passionate about the Science Center's mission," she says, "and I am constantly energized by the commitment of the other community volunteers who serve with me on the board. We're very serious about the important educational role the Science Center plays in our region, but—c'mon, it's the Science Center—we also have lots of fun."

A board member since 1996, Jane has played a key role in the development of the Science Center's strategic plan, called Vision:2020. She also serves as a life trustee of Carnegie Museums of Pittsburgh.

## GRANTS & AWARDS

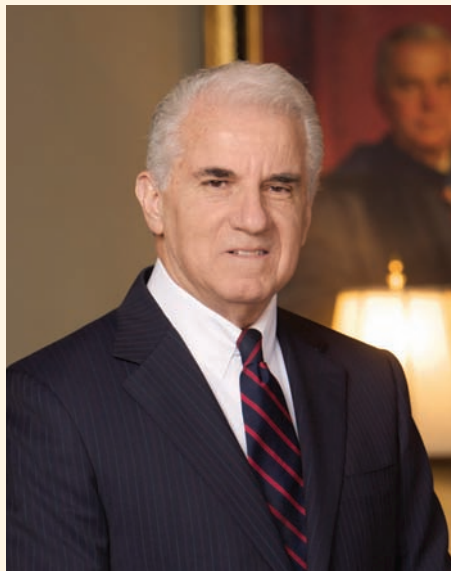
- The **PPG Industries Foundation** recently awarded the Science Center a \$143,800 grant to develop a new Science on the Road educational outreach show in partnership with the Pittsburgh Zoo & PPG Aquarium. The program will introduce students in grades K-8 to the emerging field of *biomimetics*—technology imitating nature – by having them participate in a “cyber safari.” The new program is expected to be launched in 2013.
- Funding has been approved through the **Allegheny County Redevelopment Authority's Community Infrastructure and Tourism Fund** to conduct a comprehensive structural marine survey of the *USS Requin* submarine. The assessment, to be completed in spring 2012, will provide an item-by-item condition report and repair recommendations for the vessel, which has been a major attraction at Carnegie Science Center since its opening in 1991. Restoration costs for the submarine may eventually cost as much as \$2 million.
- Thanks to generous funding by the **Claude Worthington Benedum Foundation**, Carnegie Science Center is working with the West Virginia Department of Education on an early learners program to build strong parent engagement and connect West Virginia's pre-K science and math classroom curriculum to home and family activities.
- A grant of \$122,867 from the **Institute of Museum and Library Services (IMLS)** will allow the Science Center to extend early learning resources to Head Start classrooms in Indiana County. *Ready Set Science* is being developed and implemented in partnership with local Head Start programs to serve more than 300 children from low- to moderate-income families there. The project's goals are to increase teachers' knowledge related to preschool science; improve the quality of preschool science teaching in Indiana County; provide better science equipment and materials; and strengthen parental awareness and involvement in children's learning. This project is an extension of Carnegie Science Center's extensive work with 133 Head Start classrooms in Pittsburgh and Westmoreland County, which has been funded by **PNC's Grow Up Great with Science** initiative.
- Carnegie Science Center has been awarded a three-year, \$764,000 grant by the **National Aeronautics and Space Administration (NASA)** to develop an educational programming and public outreach in heliophysics—a science that combines meteorology and astrophysics. The funded program, *SolarQuest: Exploration of the Sun-Earth System*, will examine the interactions between the Sun and Earth and examine how these interactions impact life on our planet. *SolarQuest* is designed to provide high quality, high-technology experiences to regional schools that would otherwise not be able to present astronomy and space science in a dynamic way.

### IN MEMORIAM:

## JOSHUA WHETZEL, JR.

The Carnegie Science Center family mourns the passing on Jan. 24 of one of the organization's great visionaries and community leaders. **Joshua Whetzel, Jr.**, was director of the Buhl Science Center from 1982-89 and, as chief planner for Carnegie Science Center, played a key role in transitioning the 40+ year old Buhl Planetarium and Institute of Popular Science into a large, contemporary science center. "I don't know that he ever took a salary. The Science Center was just a passion for him. He just gave back a lot and was just tireless once he was committed," said Ron Baillie, who worked with Whetzel at the Buhl and is currently co-director of the Science Center.

# PARTNER SPOTLIGHT



## Dr. Angelo Armenti, Jr.

President of California University of Pennsylvania

Since Dr. Angelo Armenti, Jr. was appointed president of California University of Pennsylvania in 1992, enrollment has grown dramatically, to nearly 9,500 students, and the campus has been transformed with high-tech “smart” classrooms and nationally recognized student housing. Under his guidance, new programs have been initiated, including a Master of Social Work, Master of Arts Teaching (including a STEM Education track), and Master of Science in Nursing: Nursing Administration and Leadership, plus undergraduate degree programs in Computer Engineering Technology, Commercial Music Technology and Robotics Engineering Technology, among many others. Cal U Global Online, founded in 2005 to provide 100 percent online programs, now is ranked No. 1 in the country by *Guide to Online Schools*. President Armenti holds a bachelor’s degree in physics from Villanova University, and master’s and doctoral degrees from Temple University in special and general relativity, respectively.

### On the Importance of STEM Preparedness:

“In the Digital Age, information literacy is no longer optional, and understanding STEM principles is essential to success in any field. No matter their area of interest, students with a strong background in science, technology, engineering, and math will have a competitive advantage when they enter our rapidly evolving workforce. With this in mind, we must provide cutting-edge instruction for students who wish to build careers in science and technology, cultivate teachers who can instill a knowledge and love of STEM subjects, and equip every learner with a solid foundation in STEM.”

### Importance of Cal U’s Partnership:

“The vision for Cal U includes a special mission in science and technology, along with a longstanding commitment to preparing high-quality teachers to work in our public schools. Cal U’s partnership with the Chevron Center for STEM Education and Career Development will create opportunities for synergy, both with Carnegie Science Center and with our industry partners, that can benefit our Cal U students and, ultimately, the region’s employers and K–12 schools throughout the region.”

### Personal Connection:

“I always enjoy taking my grandchildren to Carnegie Science Center. Their excitement about science takes me back to the days before I came to Cal U, when I studied and taught physics at Villanova University. Watching my grandchildren, I am reminded that not only learning, but the love of learning, begins at an early age.”

microbits



May 13–18

David L. Lawrence Convention Center

### International Science and Engineering Fair Comes to Pittsburgh

Approximately 1,600 science fair winners from around the world will journey to Pittsburgh to attend the International Science and Engineering Fair (ISEF) May 13–18 at the David L. Lawrence Convention Center. Carnegie Science Center staff are co-chairing the Education Outreach Committee, which provides a day-long experience for regional middle and high school students on May 17—including CSI-themed activities designed to excite them about STEM topics and allowing them to interact with the ISEF contestants. Pittsburgh was selected to host ISEF in 2012, 2015, and 2018 based on the strength of the Science Center’s Pittsburgh Regional Science and Engineering Fair and the enthusiasm and support of our regional science and technology community. **Linda Ortenzo**, director of STEM programs at Carnegie Science Center, and **Lisa Kosick**, director of the Science Center’s regional fair, have been centrally involved in all planning efforts.

By 2014, there are expected to be **2 million** jobs created in **STEM-related** fields.

—Bill & Melinda Gates Foundation

### Science Center Enjoys Outstanding Year in 2011

While large science centers nationwide have experienced a decline in attendance of about 15% in recent years, Carnegie Science Center is bucking the trend. 2011 was a very successful year at the Science Center, marked by significant progress and steady growth. Admissions attendance in 2011 was 490,500 people, representing a rise of 2.8% over 2010 attendance and 9.4% over 2009. Omnimax Theater attendance increased 17% over 2010.

Other onsite programs—camps, classes, and sleepovers—saw 12,000 participants, growth of nearly 20% since 2010. And the Science Center's educational outreach program saw more than 212,000 students and teachers offsite, an increase of 25% from the previous year.

Carnegie Science Center has numerous opportunities for individuals, families and groups to visit for free or reduced admission. Overall in 2011, the Science Center saw more than 8,000 individual visitors for free days, an additional 31,700 at deeply discounted admissions, and more than 21,000 free or reduced group admissions.

### Fisher Science Education Partnership for Nationwide Professional Development Workshops

**Robert Marshall** works in the Buhl Digital Planetarium and has a passion for laser shows. But he also travels across the country conducting STEM Professional Development Workshops in partnership with Fisher Science Education, teaching teachers how to use Fisher products to enhance classroom education. In the last quarter Robert has presented STEM Education workshops for more than 150 teachers.



*Tom Joseph of Epiphany Solar Water Systems, shown here (left) with Carnegie Science Center Board members Noland Cheung (center) and Sylvie Tran (right), won the Environmental Award for ground-breaking technology designed to solve the global water crisis, including a low-cost, high-output, solar-powered water purification unit designed for Third World nations.*

# Carnegie Science Awards Winners Announced

The 2012 winners of the prestigious Carnegie Science Awards, honoring the region's most outstanding scientists and science educators, were announced at Carnegie Science Center in February.

Winners were selected in 18 categories, along with nine honorable mentions. The awards recipients have made significant breakthroughs in a wide range of

categories—from corporate innovation to information technology, from life sciences to entrepreneurship, from the environment to advanced materials. Student winners will be selected at the Pittsburgh Regional Science and Engineering Fair in March. Now in its 15th year, the Carnegie Science Awards have honored the accomplishments of more than 275 individuals and organizations.

The awards will be conferred at the annual Carnegie Science Awards celebration on Friday, May 11, at Carnegie Music Hall in Oakland. Keynote speaker is Emmy- and Peabody-Award winning journalist **Robert Bazell**, NBC News chief science and health correspondent. The evening features a strolling dinner and silent auction along with the awards ceremony, and all proceeds benefit programming at Carnegie Science Center. Make plans to attend! Tickets are available at [CarnegieScienceCenter.org/CSA](http://CarnegieScienceCenter.org/CSA). ■

*◀ Richard Holder, Carnegie Science Center board member and president- Electrical Components Organization for Eaton Corporation's Electrical Sector, is the event chair for the Carnegie Science Awards. Eaton, title sponsor of Carnegie Science Awards, has supported the program since its inception in 1997 and has committed ongoing support through 2014.*







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## What do prehistoric plants have to do with the way we heat our homes and power our vehicles?

Students across the region will be learning the answer when this van brings the newest Science on the Road show, *Colossal Fossil Fuels*, to their schools.

Funded by a grant from the **EQT Foundation** and produced in collaboration with **Carnegie Museum of Natural History**, this show engages students in a dynamic, interactive assembly program about the geology behind natural gas. Appropriately, the van will soon be upgraded for biofuel use — and so powered by natural gas — thanks to a technology that has just become available.

A Carnegie Science Center educator plays a character

inspired by the Jurassic Park films, leading students on a journey through geologic time aboard the Prehistoric Pendulum to learn about the origins of natural gas. Returning to the present, the journey includes a stop at Rockbuster Rig, where a zap of electricity, a whooshing water bottle, and a comical air cannon all help explain how natural gas is brought to the surface. Then it's off to the emerging future of transportation technology, with a little help from a fuel-efficient, fiery methanol reaction. There's real science behind the narrative and the demonstrations, and the kids come face to face with colossal fossil life-size skull replicas. Real-life dinosaur diggers and deep well drillers join the adventure on screen.

Carnegie Science Center's Science on the Road outreach program is one of the nation's largest. Last year its programs served more than 212,000 students throughout the local region and as far away as Nevada. **□**