

science IMPACT

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**CARNEGIE
SCIENCE
CENTER**

One of the four Carnegie Museums of Pittsburgh



Students of diverse backgrounds enhanced each other's learning.

a stipend and Act 48 credits, while eligible students received academic credit toward their high school course work.”

Students were divided into teams and worked in three labs: biotechnology; chemistry/materials science; and robotics/engineering. Each team had to design and build a robot to retrieve unexploded material, test the metals and other samples, analyze the evidence, and debrief each other for information.

Using this experience as a professional development opportunity, teachers participated in many of the same activities and learned inquiry-based, hands-on teaching methods to bring back to the classroom.

Additionally, teachers were approached with ways to replicate this program model as well as modify it for modest school budgets.

On the last day, students and teachers gathered for a final press briefing to report results and solve the case.

(Story continues on page 3)

Panic At The Point! **Pilot Program Engages Teachers & Students**

Mock press conference officials share news of a bioterrorist attack that occurred at Point State Park during a fireworks display. Contaminated with shrapnel and biological agents, fireworks exploded over the crowd, causing mass hysteria.

Students and teachers are called upon to solve this case. Their mission: Retrieve and test any unexploded material, identify the contaminants, access the risk of exposure to the crowd, and identify the perpetrator.

This scenario was at the center of “Panic at the Point,” a weeklong program innovatively joining nearly 50 students and 15 teachers in scientific problem-solving.

This summer, Carnegie Science Center,

in partnership with Upper St. Clair High School, offered the first major Teacher Professional Development and Student Program initiative under a \$50,000 pilot program grant from the Heinz Endowments. The program also received instructional support from California University of Pennsylvania.

“Panic at the Point” is an offering of the Science Center’s Teacher Excellence Academy, which falls under the auspices of the Chevron Center for STEM Education and Career Development.

“About one-third of our participants came from underserved school districts and were offered full scholarships,” said **Linda Ortenzo**, director of STEM Programs at the Science Center. “Teachers received



Teachers and students explore together.

directors' note



We love our summers here at Carnegie Science Center, with the tens of thousands of visitors who come to explore, imagine, learn, and laugh. It's especially gratifying to see how many visitors each summer come from outside of the Pittsburgh region, and to hear their comments about what for them is a "first-time" experience.

But we also always look forward to fall and the start of the school year, because that's when we start a new season of STEM-related programming: ChemFest in October, SciTech Days in both November and March, the Chain Reaction Contraption high school engineering competition in December, the Future City middle school engineering competition in January, National Engineers Week in February, and our Pittsburgh Regional Science and Engineering Fair in April.

We're launching a new program this school year as well. It's called i5, and it's a digital video competition for middle and high school students on the impact of STEM in their lives—innovations; issues; individuals; inspiring careers; and incredible income potential. We'll be naming winners next spring.

Fall is a special time of year for another reason as well. This is when we kick into high gear on planning our annual Carnegie Science Awards, which are presented each May. Since we began the Awards program in 1997, we've honored more than 300 individuals

and organizations throughout the region for their innovation in science-related industries and science education across a broad array of categories – from advanced manufacturing and advanced materials to IT and environmental technologies.

Each year this time we put out a wide-spread call for nominations from the community at large (See page 5). We rely on a cadre of experts and past Awards winners to evaluate these nominations and select each year's crop of new honorees. That's not an easy task—there is so much talent and excellence throughout our region!

So we're not looking back longingly for summer—we're full-tilt into a new and exciting season of activities. That type of excitement, that type of energy, typifies the culture here at Carnegie Science Center.

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



One of the four Carnegie Museums of Pittsburgh

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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
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CarnegieScienceCenter.org/Publications.

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Robotics was among the featured labs, along with biotechnology and chemistry.

Panic At The Point! (...continued from page 1)

Throughout the week, STEM professionals were on site to add excitement, real world context, and exposure to STEM career fields such as epidemiology, robotics, chemical engineering, and crime scene investigation. Instructors for each lab included an Upper St. Clair teacher, a Science Center staff member, and STEM Master's Program students from California University of Pennsylvania.

“Based on initial feedback from both teachers and students, this pilot program was a powerful and effective program,” said **John Radzilowicz**, director of Science and Education at the Science Center. “We have gathered evaluation data and plan to provide a full analysis and report to the Heinz Endowments in support of continued funding for this unique approach to STEM education.”

Based on the success of “Panic at the Point,” the Science Center currently is exploring possible locations to offer the program in 2013, Radzilowicz said.

The Heinz Endowments also are

supporting the development and implementation of the Carnegie Science Center STEM Education Endorsement.

The Science Center's STEM Endorsement would “certify” a school or district as having pursued STEM education in a structured, comprehensive manner including curriculum, career development, parent involvement, and teacher professional development.

“The endorsement would serve as a national model to define STEM Education in a consistent way while providing, and modeling, effective instructional strategies including inquiry-based, hands-on, project-based learning, real world applications of technology, and team-based instruction and learning,” Radzilowicz said.

In developing the endorsement, Ortenzo said the Science Center is convening partners including the Math & Science Collaborative; ASSET; University of Pittsburgh, School of Education, Department of Instruction and Learning; California University of Pennsylvania; and a range of industry partners. ■

Kennametal Joins STEM Center as Founding Partner

Kennametal has joined Carnegie Science Center's Chevron Center for STEM Education and Career Development as a founding partner. The mission of the Chevron STEM Center focuses on four central goals: collaboration — to serve as a “town square” to bring together all stakeholders to collectively address STEM education in our region; great teaching — to strengthen STEM teaching at all grade levels pre-K through 12; inspired learners—to inspire student excitement for STEM programs and careers; and a committed community—to achieve, through public awareness and the nurturing of partnerships, a sustained commitment to improving STEM education.

Along with title sponsor Chevron, the other founding partners are California University of Pennsylvania, Duquesne Light, Eaton Corporation, LANXESS Corporation, NOVA Chemicals, and PPG Industries Foundation.

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Summer Camps Set Record

Carnegie Science Center's 2012 summer camps achieved the highest enrollment since the program's inception.

The majority of camps operated at full capacity, with more than 200 students attending each week. Nearly 2,400 students participated in more than 100 camps.

Additionally, nearly 400 students attended more than one camp, and 16% of all campers were members.

Topics on robots and video game design were this year's most popular camps. A new camp called *Electrifying Science*, in partnership with Carnegie Mellon University's CREATE Lab, garnered high praise from campers, who explored electricity, ran experiments, and made simple electrical circuits. Other camp themes included astronomy, robotics, and chemistry.

New i5 Digital Video Competition Spotlights STEM

Carnegie Science Center is partnering with Pittsburgh Filmmakers to launch the i5 Digital Video Competition, a new STEM program geared for middle and high school students.

Students are invited to create a 5-minute video that shares the impact of STEM in their lives—namely: innovations, issues, individuals, inspiring careers, and incredible income potential.

Students will be judged in a range of prize categories. An online voting component will allow the public to vote for their favorite film.

An awards ceremony will be held at the Rangos Omnimax Theater on April 25. All participants will be invited to attend the event, and finalists' films will be shown on Pittsburgh's biggest screen.



Photo courtesy of NASA.

NASA-Funded *SolarQuest* Under Development

Carnegie Science Center is developing *SolarQuest: Exploration of the Sun-Earth System*, funded by a \$765,000 grant from NASA's Education and Public Outreach for Earth and Space Science (EPOESS) Program. *SolarQuest* will explore heliophysics, an environmental science that combines meteorology and astrophysics, in an exciting and innovative program for education and public outreach.

"Like NASA, Carnegie Science Center has long used the wonder and beauty of the cosmos as a gateway to excite students about STEM, and to motivate them toward careers in astronomy and space science," said **John Radzilowicz**, director of Science and Education at the Science Center.

"The *SolarQuest* project builds on these synergies to present the frontiers of heliophysics for students, teachers, and the general public."

SolarQuest will examine the interactions between the Sun and Earth, as well as how these interactions impact life on our planet.

A 10-minute, full-dome planetarium show — a "fly-through" of the Sun/Earth environment — is the first element of *SolarQuest* to be developed. It will debut at

the Buhl Planetarium on Nov. 16 to coincide with the opening of SpacePlace.

Beginning in January 2014, this show will go on the road through the use of a portable digital planetarium system, as part of a new offering of the Science Center's outreach program Science on the Road, which currently serves 212,000 students and teachers annually. Designed as a theater-style assembly show for students in grades 4–8, the *SolarQuest* school experience will employ large scale props, live physics and chemistry demonstrations, stunning visual imagery on a digital video globe, as well as audience participation to immerse students in a futuristic journey through the Solar System.

The planetarium show also will be distributed, free of charge, to 50 planetariums worldwide.

"*SolarQuest* will center on the Sun-Earth environment and the effects of space weather that the Sun produces," said **Frank Mancuso**, planetarium producer at the Science Center. "We'll explore how NASA's Solar Dynamics Observatory is being used to observe and study the Sun to help us learn more about how it works, its effects, and how to predict space weather." ■

Buhl Planetarium Gets Star Treatment

The Buhl Planetarium at Carnegie Science Center reopened on Sept. 22 after undergoing major improvements.

"This is the largest renovation the planetarium has received to date," said **Robert Marshall**, program development coordinator at the Science Center. "The last upgrade occurred in 2006, when the planetarium installed the Digital Sky System, made possible by a generous gift from the Buhl Foundation."

Improvements to the planetarium include cleaning and re-painting the dome; re-upholstering the seats; installing new carpeting and LED lighting; and upgrading the sound and interactive systems.

Grants from The Grable Foundation, Allegheny Technologies, PPG Industries Foundation, and private donors helped the Science Center raise \$1.4 million for SpacePlace and upgrades to the Buhl Planetarium.

BOARD SPOTLIGHT



Al J. Neupaver

Carnegie Science Center Board

The father of three adult children, Al J. Neupaver makes frequent trips to Carnegie Science Center with his six grandchildren.

Neupaver always finds time to explore the second floor. He knows that he can count on Andy, a socially interactive robot, to greet him at the entrance of his favorite exhibit—*roboworld™*.

“*Roboworld™* is a great example of how the Science Center adapts its exhibits to stay current with technology and community interests,” said Neupaver. “I also like the array of exhibits that appeal to all ages.”

Neupaver, president and chief executive officer of Wabtec Corporation, joined the Science Center Board in 2006. He has a personal interest as well as a strong background in STEM.

He received a bachelor’s degree in mechanical engineering from the U.S. Naval Academy before serving as an officer on nuclear submarines for five years.

The Belle Vernon native also earned a master’s degree in materials science and metallurgical engineering from the University of Pittsburgh.

GRANTS & AWARDS

■ **GEMS (Girls Engaging in Math and Science)** is a partnership with Pittsburgh Public Schools to provide hands-on informed learning to enhance the classroom experience.

Originally funded by the ALCOA Foundation, the program is held at Pittsburgh King Pre-K–8 on the North Side. This 10-week after-school enrichment program provides middle school girls with hands-on, inquiry-based experiences focusing on math and science careers.

Nearly 40 girls in grades 6–8 participated in the program during the first two semesters. The GEMS program has been fully funded for another year with a \$75,000 grant from **Gerber Family Foundation**. This new grant will allow the program at Pittsburgh King to continue through the summer of 2013.

Additionally, the Gerber Family Foundation is helping fund Carnegie Museum of Natural History’s teen docent program, as part of a “Service to Teens” initiative.

■ Grants and scholarships allow numerous schools to have Carnegie Science Center field trips that they could not otherwise afford. For example, the **Pierce SkyWatch Scholarships** provides substantial funding to qualifying schools for field trip experiences that include a planetarium show. From October 2010 through August 2012, funding from **The Pierce Family Foundation** served more than 90 groups for a total of 8,390 visitors.

■ **SHOP ‘n SAVE** established the **Students Extra Educational Development (S.E.E.D) school assembly program** more than ten years ago to bring fun and exciting educational experiences to schools throughout western Pennsylvania, Ohio, and West Virginia. Carnegie Science Center receives nearly \$44,000 in SEED funding annually for its Science on the Road program. This year, Science on the Road added two new shows developed in partnership with Carnegie Museum of Natural History—*Amazing Bugs* and *Dinosaur Detectives*. An additional \$15,000 will be provided by the SEED program to support these new shows.

Call For Awards Nominations

Every year, science and technology achievements across the western Pennsylvania region are recognized at the Carnegie Science Awards, presented in partnership with premier sponsor Eaton Corporation. Since 1997, the Science Center’s award ceremony has celebrated the accomplishments of nearly 400 individuals and organizations.

The Science Center is now accepting nominations for the **17th annual Carnegie Science Awards**, which will be conferred on May 3, 2013, at Carnegie Music Hall in Oakland.

The Carnegie Science Awards celebration is presented in partnership with Eaton Corporation, with Richard D. Holder serving as event chairman. Kennametal Inc. and Thermo Fisher Scientific are the Associate Sponsors. Presenting sponsors include Ansaldo STS USA; Bayer; Bombardier; California University of Pennsylvania; CONSOL Energy Inc.; New Perspective; NOVA Chemicals; *Pittsburgh Business Times*; Pittsburgh Technology Council; Reed Smith LLP; and WTAE-TV Channel 4.

Awards categories include Advanced Manufacturing and Materials, Corporate Innovation, Educators, Entrepreneur, Environmental, Emerging Female Scientist, and Leadership in STEM Education.

Visit CarnegieScienceCenter.org/ScienceAwards for a complete list of award categories and nomination forms. **Nominations must be submitted by Wednesday, Oct. 31.**

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Summer Attendance Soars

The National GUITAR Museum's traveling exhibit, *GUITAR: The Instrument That Rocked The World*, and Christopher Nolan's final installment of the Batman Trilogy: *The Dark Knight Rises* at the Rangos Omnimax Theater, boosted attendance this summer.

July attendance with 73,300 visitors resulted in a 32% increase over July 2011; August's 58,900 visitors represented a 15% increase over August 2011.

Member visits were 32.1% of the total admissions in July and 33.7% in August, as compared to 39.7% for January through May (the period before *GUITAR* opened), suggesting that a higher than usual percentage of visitors was new to the Science Center. Admission from the region surrounding Pittsburgh—eastern Ohio, northwest and central Pennsylvania, western New York, and West Virginia—was up 38.4% in July 2012 over July 2011.

Apryl Peroney, program development coordinator at the Science Center, said nearly 600 people attended Saturday acoustic performances throughout the summer, and about 200 people took advantage of free guitar lessons offered each Sunday in August by Empire Music.

Additionally, Peroney said the Martin Guitar presentation, "The Evolution of the American Guitar," drew a total of 300 people to its two performances on the Bayer Science Stage.

The fastest-growing economic clusters need a STEM workforce:

- **Biotechnology (Biomedicine)**
- **Information Technology**
- **Environmental Technology**
- **Advanced Manufacturing**

PARTNER SPOTLIGHT



Richard J. Harshman

Chairman, President and Chief Executive Officer of Pittsburgh-based **Allegheny Technologies Incorporated (ATI)**, one of the largest and most diversified specialty metals producers in the world.

Why did ATI choose to partner with the Science Center?

Many of the ages of humanity are named after materials—the Stone Age, Iron Age, and Bronze Age—because advancements in materials enable social progress. Today our era of advanced materials is enabling some of humankind's greatest accomplishments. Materials such as titanium, high-strength nickel alloys, and specialty steel alloys enable flight and space exploration. Carnegie Science Center stimulates interest in science and inspires minds to explore new ideas that will enable social progress. We want to support and encourage this experience.

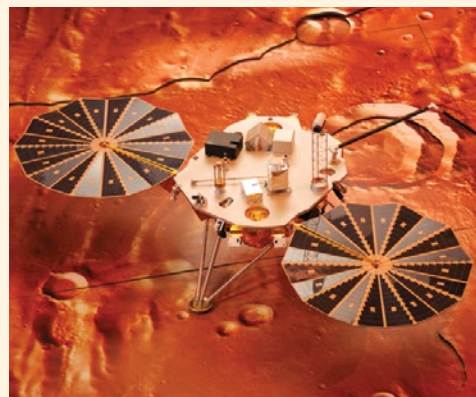
ATI also believes in Pittsburgh. We have invested in our operations throughout the western Pennsylvania area, including the Hot Rolling and Processing Facility in Brackenridge. We also support the region's universities.

What is the history of ATI's work with the Science Center?

ATI has been supporting the Science Center since 1990. Recently, we donated a one-third scale model of NASA's Phoenix Mars Lander, which is on display in the Science Center's *roboworld™* exhibit. During its mission, the Mars Lander identified water in a soil sample. The lander's robotic arm delivered the soil sample to the Thermal Evolved-Gas Analyzer (TEGA), which identifies vapors. Our proprietary titanium material, ATI 425® Alloy, was used for major structural elements in the Phoenix's TEGA equipment, selected for its strength, light weight, corrosion resistance, and cold formability. NASA continues to explore Mars and will use the 2008 Phoenix mission as a model for future visits.

What is ATI's connection to aerospace and space exploration?

ATI is a world leader in the development and manufacture of advanced metallics for airplanes, helicopters, spacecraft, satellite systems, and the engines that power them. We have delivered specialty metals solutions to support generations of progress in the aerospace industry, including high-strength alloys for the early jet engines. Our niobium was used for the rocket engine on the historic Apollo 11 spacecraft's mission to the moon, and our titanium was used for the Gemini 4 spacecraft's structure, whose flight included the first American spacewalk. Today, our products continue to be used for critical applications that enable flight and space exploration, such as titanium for airplane structures, superalloys for rotating engine parts, innovative powder and niobium alloys for engine nozzles, and aluminum rings for the International Space Station's docking system. □



Phoenix Mars Lander as it appears in roboworld™.



Dr. Alan G. Brown, founder of the Pennsylvania NanoMaterials Commercialization Center, engages Café Sci attendees after his presentation on “Nanotechnology and Grand Challenges of the 21st Century.”

Adults Talk Science At Café Sci

Years ago, Sanford Bendix and John “Dave” Stanec often teamed up to conduct experiments in their science class at Pittsburgh Friendship School.

Equipped with raincoats, Bendix and Stanec once demonstrated centrifugal force by filling buckets with water before repeatedly swinging them over their heads.

“When we tried to slow the bucket down to a stop, the law of inertia took over, and some of the water spilled onto the floor. At that point, the teacher felt it best to continue the class that day without any further demonstrations.”

Bendix, now 63, serves as a Carnegie Science Center volunteer. He and Stanec reunite once a month to eat, drink, and “talk science” at Café Scientifique.

Café Scientifique launched at Penn Brewery on Pittsburgh’s North Side in 2004, offering pub fare, beer, and a scientific discussion led by a guest speaker. In 2009, this free event for adults moved to Carnegie Science Center as part of its mission to serve as a town square.

Recent Café Sci topics have included nutrition, with Leslie Bonci of the UPMC Center for Sports Medicine; epidemics, with Donald Burke, dean of the University of Pittsburgh Graduate School of Public Health; and sustainable energy, with Patricia DeMarco of Chatham University’s Rachel Carson Institute.

Record attendance was reached in May 2012 with nearly 300 people engaging in “Views Of The Big Bang: The History And Future Of Our Universe,” a presentation by Andrew Zentner, a professor in the Department of Physics and Astronomy at the University of Pittsburgh.

The June program proved equally compelling when John Radzilowicz, director of Science & Education at the Science Center, presented a thought-provoking program called “Is There a War on Science in the U.S.?” Radzilowicz went on to do interviews on KQV and WESA (Essential Public Radio) related to his presentation.

After a summer hiatus, Dr. Alan G. Brown gave an interactive presentation on “Nanotechnology and Grand Challenges of the 21st Century.” Brown, founder of the Pennsylvania NanoMaterials Commercialization Center—a Pittsburgh-based non-profit focused on commercializing the new field of nanotechnology—talked about the basic principles of nanotechnology; everyday products currently using nanotechnology; and futuristic advances created by nanotechnology. ■

21+ Nights Launched

This summer Carnegie Science Center launched its first 21+ Night, designed to give adults a chance to experience Science Center exhibits in an adults-only atmosphere. More than 325 adults of all ages took advantage of the opportunity to compete against robots, play in the water tables, linger in the Miniature Railroad and Village®, and build with Legos, all without having to wait for kids to have their turn. With *The Dark Knight Rises* playing in the Rangos Omnimax Theater and *GUIAR: The Instrument That Rocked The World* in the Atrium and Mezzanine, the atmosphere was perfect for an adult evening – especially with a live band and a cash bar. A modest \$10 admission price made the opportunity all the more attractive. Those attending were enthusiastic about the evening and many requested that 21+ Nights be held more often.

The next 21+ Night, scheduled for Nov. 9, will be in collaboration with the Pittsburgh Glass Center. Participants will learn about the art and science of glass through demonstrations by a Glass Center artist and will have a chance to make their own fused glass tile.

Additional 21+ evenings are being planned for 2013.



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USS *Requin* Undergoes Conservation Survey

Carnegie Science Center's Cold War-era submarine, USS *Requin* (SS-481), recently underwent a four-week conservation survey.

The conservation survey, made possible through a grant from the Allegheny County Community Infrastructure and Tourism Fund, is routine among historic vessels and is part of Carnegie Science Center's stewardship of this national treasure, to ensure its preservation for generations to come.

Charles C. Deroko, Inc., a certified marine surveyor and consultant and oversaw the survey.

The access hatches located on the *Requin's* outer hull, which were welded shut when the submarine was decommissioned

in 1968, were reopened to give access to the ballast and fuel tanks that filled with water and air when the submarine would dive and resurface.

New hatch covers, similar to the originals, were fabricated and bolted to the submarine for easy access to the tanks in the future. The Science Center will receive a full report of the findings this fall. The report will be the basis for determining efforts to maintain and preserve the *Requin* in the coming years. Funding for this initiative will be sought for future *Requin* repairs. ■