

# Engineering Our Future NJ

*Engineering Education for Everyone*

Volume 1, Issue 2

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## EOFNJ Conference Highlights– May 11, 2007

“As trustees of New Jersey’s K-12 education system, you have the responsibility for preparing our students for success in a future that will be very different than the present. Workers and citizens of the future will not only need rigorous technological foundations in science and mathematics, but will need to create value by using their inventiveness and ingenuity, problem-solving abilities, and their ability to work in diverse teams across cultural and geographic boundaries, to meet important challenges that the global community faces in protecting the environment, in health care, national security, transportation, and numerous other domains.”

This is the message that speakers from government, industry, and higher education delivered to more than 250 of New Jersey’s principals and supervisors at a leadership summit, *Engineering Our Future NJ: Creating a Vision; Implementing Effective Models*, held at Stevens Institute of Technology, Hoboken, NJ. The event was sponsored by Stevens Institute of Technology’s Center for Innovation in Engineering and Science Education (CIESE), and co-sponsored by Verizon Communications, the New Jersey Department of Education, and the New Jersey Principals and Supervisors Association/FEA.

“We are pleased that more than 250 of New Jersey’s principals and supervisors appreciated the importance of the issues we are facing at a national and international level, and took the time to participate in today’s event,” said Beth McGrath, director of CIESE at Stevens. “Through greater awareness of global trends and critical needs, as well as collaboration on the local level between schools, universities, industry, and government, we will prepare our schools and students for success in a 21<sup>st</sup> century, global economy. Today’s summit is the beginning of a long-term planning effort that will strengthen our schools and our nation.” See more conference highlights in the following pages.



## **NEW Grant Opportunity: Science & Engineering in Elementary Grades!**

### **Partnership to Improve Student Achievement (PISA)**

Stevens Institute of Technology, in partnership with Montclair State University and Liberty Science Center, received a \$2.1 million Mathematics and Science Partnership (MSP) grant from the NJ Department of Education (NJDOE) to be administered over the next three years. PISA will include a two week summer institute each summer and monthly coaching visits during the school year. The 2007 summer session will focus on life and environmental sciences, addressing NJCCCS 5.5 and 5.10. Years two and three will cover physical and earth sciences. There are still a few spaces available. Below are the details.

**Who is eligible:** Grades 3-5 science, mathematics, technology, special education, and self-contained classroom teachers

**When:** 2007 Summer Institute July 9-July 20 or July 30-August 10, 8:00 a.m.-3:15 p.m. Also, there will be a required two-day follow-up session in the Fall 2007 (date to be announced).

**Where:** Stevens Institute of Technology, Hoboken, New Jersey

**What you will receive:** Intensive professional development with research-based curricula and materials directly related to NJCCCS and NJ ASK, \$1,000 stipend each year, \$300 materials voucher each year, PD credit, and opportunity for graduate credit.

If you are interested, please contact Dawna Schultz at [dawna.schultz@stevens.edu](mailto:dawna.schultz@stevens.edu) or 201-216-5655.

## NEW EOFNJ Engineering Lessons

New EOFNJ engineering lessons were designed as companions to CIESE award-winning science collaborative-based and real time data projects. Professional development training will be offered for a nominal fee at Stevens in the Fall 2007– Dates to be announced. If you are interested in professional development training in your district please contact Dawna Schultz at [dawna.schultz@stevens.edu](mailto:dawna.schultz@stevens.edu) or 201-216-5655. The current engineering lessons can be found at:

[www.stevens.edu/ciese.org/engineeringproj.html](http://www.stevens.edu/ciese.org/engineeringproj.html)

	<p><b>Design Liquefaction Withstanding Building Modifications</b> Students design and test building design modifications capable of withstanding liquefaction (the conversion of a solid into a liquid). (Grades 6-12)</p> <p><b>Design an Earthquake Resistance Structure</b> Students observe how a seismic event can lead to structural failure and discover what building characteristics most affect stability. (Grades 6-12)</p>
	<p><b>Design a Distiller</b> Students design and build a device to collect steam from boiling "polluted" water to create pure, clean water. (Grades 6-12)</p>
	<p><b>Design a Pump</b> Students design, build and test a simple hand pump to remove water from an area flooded by a Tsunami. (Grades 6-12)</p>
	<p><b>Design a Travel Bag</b> Students design, build and test a prototype travel bag for their stowaway adventure. (grades 5-8)</p>
	<p><b>Design a Windsock</b> Students design and construct a windsock to gather data about wind direction. (Grades 1-5)</p>
	<p><b>Design an Ant Day Care Center</b> Students create a suitable container/habitat for keeping and observing ants for one day. (Grades 1-5)</p> <p><b>Design a Mini-Square Marker</b> Students design and construct a "mini-square marker" device for a school yard investigation. (Grades 1-5)</p>

*"I will utilize this workshop as a motivational device for my students in the field of science."*

*— High School Teacher*

*"The workshop enabled me to realize that I can use common household materials to bring engineering concepts to my kids."*

*— High School Teacher*



## NEW Engineering The Future Summer Institute

### Engineering the Future Summer Institute (Grades 9-12)

June 25-29, 2007 or July 23-27, 2007

*Engineering The Future (ETF): Designing the World of the 21st Century*, developed by the Museum of Science, Boston is a full-year engineering and technology education course suitable for Grade 9-12 students. The course provides a strong foundation in physics and prepares students to explore the social, historical, and environmental contexts of emerging technologies. Through four projects, students learn about engineering design; manufacturing; communication and energy systems (fluid, thermal, and electrical). The course is not intended exclusively for students pursuing engineering or technical disciplines. Attend this ETF Summer Institute and learn how to implement the curriculum in your classroom. The four engineering challenges are: Design a cell phone holder; Construct a model of a multi-functional, energy-efficient structure; Re-design a toy boat that runs using a fluid/thermal engine; and Design an electrical communication system. **Cost:** \$150.00 per teacher.

#### Participants will receive: \$100 worth of curriculum materials

- 1 Teacher's Guide;
- 1 Student Engineer's Notebook;
- 1 Textbook;
- 30 Professional Development Hours; and
- Continental Breakfast



Jason Sayres demonstrates the engineering principles in the ETF "putt-putt" boat module.

#### Download an application at:

[www.stevens.edu/ciese.org/Spring\\_Registration\\_Form.pdf](http://www.stevens.edu/ciese.org/Spring_Registration_Form.pdf)

*"My students loved trying something new. The (high school) project showed applications of math and science in the real world. The girls in the class really excelled in the boat project!"*

— High School Physics Teacher

*"Once my students learned the engineering model, they began to apply it in different subjects and projects. The parents loved the project as well."*

— Elementary Teacher

## BUILD IT! Participants



The BUILD IT! program challenges students to design, build and program an underwater remotely and autonomously operated vehicle from LEGO components and other parts. The 2-year program begins this summer and will introduce teachers and students to programming and IT-based science and engineering by using a programming language based on LabVIEW, microcontrollers, and sensory data. The districts participating in this National Science Foundation-sponsored program are: Alpine, Bayonne, Bridgewater-Raritan, Cape May County, Cranford, Great Meadows Reg., Harrison, Hoboken, Jersey City, Lincoln Park, Monmouth County Voc., Newark, New Brunswick, Passaic, Passaic County, Red Bank, Tenafly, Vernon, Washington Township, Watchung, Westfield, and two New Jersey private schools and one school from New York.

For more information, please visit: [www.stevens.edu/ciese/buildit](http://www.stevens.edu/ciese/buildit).

## PTC Announces Free Software for New Jersey's Teachers & Students to Enhance Learning Design

PTC, a global software company partners with Stevens Institute of Technology to help improve science, technology, engineering and math learning in New Jersey



New Jersey teachers and students will receive free access to powerful mechanical engineering and design software thanks to a software donation valued in the millions of dollars, Ralph Coppola, PTC director of worldwide education announced recently.

Dr. Coppola made the announcement in Hoboken at Stevens Institute of Technology, as part of the *Engineering Our Future NJ* conference, a statewide conference of 250 K-12 and higher education leaders to promote the need for and benefits of exposing students to engineering in elementary through high school. As part of a separate Memorandum of Understanding, Stevens will provide teacher training at no or nominal cost to teachers on design and use of the PTC software. PTC will also donate curriculum materials.

Under the partnership announced at the EOFNJ conference, PTC, a Massachusetts-based global software company, will provide Pro/ENGINEER Schools Edition software, an engineering computer-aided design (CAD) tool capable of creating complex 3D models, assemblies, and 2D measured drawings, free of charge to any trained New Jersey middle school or high school teacher in both public and private schools.

The commercial value of the software is \$2,500 per license. In New Jersey, there are more than 5,000 science teachers and 1,350 technology teachers, meaning hundreds of millions of dollars in software value could eventually be donated to New Jersey's schools.

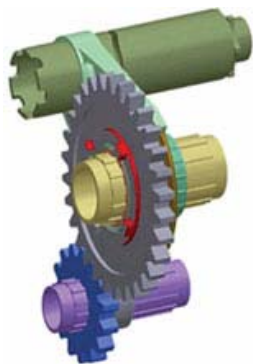
Each certified teacher will receive a perpetual license enabling them to install the software on 300 computers. Students will also be permitted to take the software home to be installed on a computer used there. Teacher training, which typically costs up to \$1,500 for a class of 15 teachers, is being provided by Stevens at no or nominal cost through a separate grant from Verizon Communications. Once a teacher is trained, he or she can teach students to use the software.

"PTC has a vested interest in New Jersey because the state is home to a number of high technology industries, including telecommunications, pharmaceuticals, and homeland security technology development," Dr. Ralph Coppola, PTC Director of Worldwide Education said. "We want prepared students with skills that give them a competitive advantage when entering the workforce. We are looking forward to working with Stevens Institute of Technology to prepare the next generation of STEM professionals."

Students who enter universities with Pro/ENGINEER experience also have a competitive advantage, as 46 of the top 52 mechanical engineering universities in the U.S. teach Pro/ENGINEER in the classroom. Pro/ENGINEER is recognized as the most widely used product development software solution in the world.

Studies show less than 10 percent of high school graduates pursue undergraduate degrees in engineering. Of the 10 percent who do enter engineering, only about 50 percent earn a degree in the field.

### *NEW* Pro/ENGINEER Training and Free Software



Pro/ENGINEER Schools Edition software, an engineering computer-aided design (CAD) tool, will be available free of charge to any New Jersey middle school and high school teachers (both public and private) trained through Stevens Institute of Technology.

Two-day training sessions will be held at Stevens starting in September 2007 and throughout the school year—dates to be announced. Each teacher attending the training will receive a perpetual license enabling them to install the software on 300 computers.

## EOFNJ Conference Speaker Highlights

Stevens Provost and University Vice President George P. Korfiatis told conference attendees that formal education--K12 schools and colleges and universities--must do more to nurture creativity and invention in our students. "To support such a culture, a nation's teaching infrastructure must be geared to produce innovators and inventors. It must educate people who can develop high-level solutions to problems, who will create new technologies that will advance the frontiers of the economy and opportunity." He cited a statistic from a recent report, *Rising Above the Gathering Storm*, that 85% of economic growth per capita derives from technological innovation and that the future workforce will reward those who create new knowledge and products, regardless of their nationality or location.

Dr. Ioannis Miaoulis, President and Director of the Museum of Science, Boston, told the audience that, "The key to educating students to thrive in today's competitive global economy is introducing them to the engineering design skills and concepts that engage them in applying their math and science knowledge to solve real problems, often fueling innovation of new technologies. Up until now, our country's school curricula — which are more than a hundred years old — have focused more on the natural world, not the technological one. But it is the technological, or the human-made, world that facilitates more than 95% of our daily experience."

*"The key to educating students to thrive in today's competitive global economy is introducing them to the engineering design skills and concepts..."*

*-Ioannis Miaoulis*

David Small, president of Verizon Partner Solutions, an engineering graduate himself, discussed how an engineering degree prepares students for success across a broad array of careers. He shared that high technology companies, such as Verizon, depend upon technological talent to remain competitive and create new solutions for the marketplace. Verizon has invested heavily in preparing the future technological workforce in New Jersey through a \$500,000 grant to the *Engineering Our Future NJ* initiative, which is supporting the training of 2,000 teachers statewide.

In a talk entitled, *Preparing Our Children for Success and Citizenship in a Global Economy*, New Jersey Assistant Commissioner of Education Jay Doolan stressed the need for educators and parents to have high expectations regarding student performance in science and mathematics and the need to adopt world-class standards and assessments to ensure that our students meet international benchmarks. Doolan discussed initiatives the Department of Education is undertaking, including a nine-state partnership to increase the numbers of students passing Algebra II, to ensure New Jersey's students succeed in the 21<sup>st</sup> century.

Dr. Ralph Coppola, director of worldwide education for Parametric Technology Corporation, a global software company, discussed both the national security and economic competitiveness risks the U.S. will face if it fails to prepare a sufficient technological talent pool to assume jobs being vacated by a generation of engineers in the defense industry and other critical fields.

## EOFNJ Conference Breakout Session Highlights!

A series of 21 breakout sessions helped New Jersey's education leadership better understand not only the "why" of K-12 engineering, but also the "how." Workshops presented by teachers, university faculty, education researchers, and government representatives shared proven models, exemplary curricula, and lessons learned about K-12 engineering from a variety of perspectives and experiences. To view the list of presenters and download some of the PowerPoint presentations visit: <http://stevens.edu/ciese/eofnj/conferencehighlights.htm>



Questions or comments?  
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