For three weeks each June, students in grades eight through 11 from all over the country vie for the chance to participate in the United States Naval Academy’s (USNA) Summer Science, Technology, Engineering and Mathematics (STEM) Program.

Approximately 250 students attend each weeklong session, taking part in innovative, hands-on modules in engineering, science and technology led by 40 USNA faculty and staff—along with about 80 midshipmen trained in their assigned modules.

An average day for campers includes brain-stimulating games, four modules in a wide range of categories, a free-choice section during lunch break—and a chance to meet and interact with academic leaders in a variety of STEM disciplines. Camp concludes with a technology fair, where students are given the opportunity to present one of the camp modules to family, friends and USNA faculty and staff.

Week three, which is tailored to the older students, simulates a professional conference, preparing them for future STEM careers. Students discuss engineering and scientific concepts during longer sessions, which allows them to dig deeper into each subject. They also participate in hands-on modules and design competitions.

Especially unique to the USNA Summer STEM Program is the emphasis on leadership by the midshipmen, who teach side by side with USNA faculty and staff throughout the session. This gives the USNA students an excellent opportunity to teach the concepts they have learned in their own STEM education.

Modules for the 2013 curriculum include: cybersecurity and freedom fighting, helicopters, crypotgraphy, optics and light, storm chasing, biometrics authentication, weather, flight simulation, rocketry, corrosion and electrochemistry, bioterrorism, electronics, fluid dynamics, engineering design, robotics, controls and automation, hull design, aquaculture engineering, heart dissection and heart health, materials engineering, nuclear energy and more.
STUDENT FIELD TRIPS BECOME HANDS-ON AT NSWC CRANE

Naval Surface Warfare Center (NSWC) Crane Division has long been a destination for school field trips, with local schools sending busloads of children to the base where Crane personnel would show off naval science and engineering. But Crane’s STEM professionals wanted to better engage the students and make the field trips more interesting, so they transformed traditional field trips for fourth-, fifth- and sixth-graders into hands-on science learning experiences. The STEM coordinator at NSWC Crane hired a state-certified teacher to help plan and execute outreach activities. Working with naval scientists and engineers (S&Es), they developed three science learning modules for each grade that are aligned with the Indiana state science curriculum and specifically relate to the science and engineering expertise and resources at Crane. They also outfitted a special classroom for STEM outreach activities.

Now, instead of ordinary field trips, students visiting Crane are exposed to learning experiences that enrich their lessons in the classroom. More than 800 students experienced these hands-on, project-based STEM field trips during the spring of 2013.

FOURTH GRADE: Alternative energy. Students build solar ovens from inexpensive, easily obtainable materials. They use the ovens to bake S’mores and, after eating the sweet treats, go on base where S&Es show them advanced solar batteries being developed by the Navy.

FIFTH GRADE: Power and propulsion. Students build water rockets out of 2-liter soda bottles and then enter the base to visit S&Es working on missiles and related components.

SIXTH GRADE: Optics. Students build kaleidoscopes, and then visit laboratories where Navy S&Es develop night vision and electro-optics technologies.

MESSAGE FROM THE NAVAL STEM EXECUTIVE

At first glance, it may seem difficult to find a connection between long summer days of sunshine and STEM activities. Vacations, relaxation and summer fun; however, are really the perfect time to see science at work in the world around us. Whether it’s making visual observations on the state of nature in our own backyards or having more opportunities to study lakes, beaches and oceans (those of us in the U.S. Navy and Marine Corps are particularly fond of those moments), summer fun and STEM go together.

STEM, in other words, should be a year-round state of mind—and should be synonymous with passion and continual learning. This is critically important for our educators and STEM advocates as they work to inspire the students who will carry the scientific torch for America in the years to come. As astronomer Carl Sagan put it, “Science is a way of thinking much more than it is a body of knowledge.”

As the chief of naval research, it is always a delight to see students interacting happily, and energetically, on science projects or working together to conceptualize technologies that may one day be a breakthrough for society and our brave men and women in uniform.

But while considering ways to make the pursuit of knowledge a passion, make no mistake: Nurturing an appreciation for STEM among our young people is a mission of great importance to the United States. More than 50 percent of the Department of the Navy’s science and engineering workforce will be retirement eligible by 2020. It is a priority not just for the Navy and Marine Corps, but for our nation itself, to improve our efforts to reach out and inspire, and recruit, young scientists and engineers.

When summer ends and students and teachers return to the classroom, let us return renewed and recharged in our mission. Our Sailors, Marines and country are depending on us to succeed. Your leadership in this critical field is hugely appreciated, and, remember, STEM is cool!

Sincerely,

Matthew L. Klunder
Rear Admiral, U.S. Navy
Chief of Naval Research
Naval STEM Executive
STUDENT CRIME SOLVERS TAKE OVER SMU

By Lindsey Groark

The Caruth Institute for Engineering Education at Southern Methodist University (SMU) hosted the 3rd annual Crime Scene Investigation (CSI) Summer Camps in July, funded by the Office of Naval Research (ONR). More than 150 students from the Dallas and Houston regions entering the 6th and 7th grades learned about the science, technology and mathematics behind crime scene investigation.

Throughout the programs, campers engaged in hands-on activities to analyze crime scene evidence. Participants heard directly from a variety of law enforcement and forensic science experts who shared their career experiences and taught them the basics of CSI. Visitors to the SMU CSI Summer Camp website followed along as the campers solved crimes.

In addition to the campers, 16 teachers from local Dallas schools and national Knowledge is Power (KIPP) Public Charter Schools participated in the camp. Each teacher returns to his or her school with the full SMU CSI curriculum, as well as a CSI kit that includes a computer, printer, fingerprint scanner and other materials necessary to replicate many of the activities in their classrooms.

The SMU CSI Summer Camps are one piece of the STEM portfolio within the Caruth Institute. This portfolio includes:

- CSI Camps-for-a-Day
- CSI Teacher Training and Professional Certification Workshops
- CSI Summer Camps

The programs are aimed at increasing the number and diversity of students interested in pursuing STEM education and careers.

For more information about the SMU CSI Summer Camps or to follow the campers’ CSI work, go to: www.STEM-Worksblog.com.

A camper at the SMU CSI Summer Camp watches closely for results during the paper chromatography Lab.

NDEP SPONSORS FIRST ROBOTICS TEAMS

By Wanda Parise

More than 10,000 students from around the world were at the Edward Jones Dome, home of the St. Louis Rams football team, April 24–27 to compete in the For Inspiration and Recognition of Science and Technology (FIRST) championship.

Sixteen of the nearly 650 teams participating were sponsored by the National Defense Education Program (NDEP). Nine of these teams were mentored by Department of the Navy scientists and engineers. During the 2013 season, 116 naval personnel volunteered as coaches and mentors for NDEP-sponsored teams around the country.

On their path to St. Louis, NDEP teams won 48 awards in regional FIRST competition qualifying tournaments across the nation.

At the championship, three students from the NDEP-sponsored teams were finalists for the prestigious Dean’s List Award Championship. The students were mentored by personnel from the Naval Air Warfare Center Training Systems Division, Naval Research Laboratory Stennis Space Center and Wright-Patterson Air Force Base.

NDEP support of FIRST robotics builds a foundation for the Department of Defense’s (DoD) future workforce needs by supporting STEM programs for kindergarten through 12th grade, undergraduate, graduate and post-graduate students. By connecting students with naval science and engineering mentors, DoD is inspiring students to pursue careers in STEM.
Gooru Makes Back-to-School A Breeze for STEM Teachers

A free educational search engine, funded in part by the Office of Naval Research, brings together STEM educational materials on the Web and provides thousands of assorted multimedia resources to teachers and students. Gooru is an efficient learning tool that will save teachers time by making it easy to discover, organize and share free and engaging materials from the Web.

The Gooru search engine, developed by the 501(c)(3) nonprofit Gooru organization, provides a one-stop shop for fifth- to 12th-graders and their teachers to discover and share high-quality videos, games, digital textbooks, quizzes and other interactive products related to STEM—and eventually other subjects.

Though Gooru can be used to learn about any topic—from planet earth to parts of speech—it provides a particularly powerful platform for exploring STEM fields. Instead of relying only on textbooks and lectures, Gooru harnesses the Web's more-dynamic, engaging and educational STEM content.

Teachers can access and organize these free multimedia resources into collections, build their own quizzes and assign them to students, who can study at their own pace. It's estimated that more than 300,000 teachers will be using Gooru to prepare for this new school year, and, so far, at least 30,000 collections aligned to common-core standards for math and English language arts have been created by teachers.

Instead of rushing through a lecture or a lab, Canning gives his students time to explore the concepts at their own pace through learning stations. Students decide how long they spend with each station and accompanying collection. By the end of the lesson, students have had an opportunity to master and apply the concepts they have learned.

Learn more about Gooru at www.goorulearning.org.

Students Grow Through Navy Cultivation

The Space and Naval Warfare Systems Center (SSC) Pacific in San Diego is working to transform its local community through STEM. Nowhere is this goal better realized than at the Preuss School at the University of California, San Diego.

The Preuss School is a sixth-through-12th grade charter school, founded in 1999 by the chancellor of the University of California for low-income, highly motivated students who strive to become the first in their families to graduate from college. According to Newsweek's 2011 Best High Schools, Preuss ranked third in California and 34th in the nation, a remarkable achievement by any account, but even more so considering that their students are chosen by lottery from some of the most underserved areas in their community.

SSC Pacific's relationship with Preuss began in 2008 through teacher workshops funded through the National Defense Education Program (NDEP). That led to access to classrooms followed by participation in senior exhibitions and annual science nights. With the principal's encouragement this evolved into SSC Pacific hosting science nights in Spanish for their middle school students and non-English-speaking parents.

As relationships with the teachers at the school were cultivated, Preuss students began appearing on SSC Pacific's campus at one-week summer camps and then, for the last two years, as Science and Engineering Apprenticeship Program (SEAP) summer interns. Four Preuss students are interns this summer. With the help of Preuss teacher Shannon Baird, a pilot program began last year where middle school girls are mentored by STEM professional women from SSC Pacific.

This year, for the third year in a row, Preuss was selected by Newsweek as the top transformative school in the country, and 100 percent of the 97-member class of 2013 was accepted to a four-year college or university.
On June 10, 2013, in Washington, D.C., the Business-Higher Education Forum (BHEF) hosted the “Summit on Meeting the President’s STEM Call to Action – A Joint Implementation Response to the President's Council of Advisors on Science and Technology’s (PCAST)’s Engage to Excel Report.”

Top experts convened to discuss a national agenda designed to meet President Barack Obama’s goal of 1 million STEM graduates within the next decade. The meeting brought together senior leaders from across government, industry and academia. Attendees included internationally renowned scientists, business leaders, university presidents and representatives from BHEF, the Office of Naval Research (ONR), National Science Foundation, Department of Defense and the White House.

INDUSTRY SPEAKS

BHEF Chairman— and Northrop Grumman Chairman, CEO and President—Wes Bush gave the opening remarks. “This effort does not belong to a single group; rather, it is the responsibility of leaders across industry, government and higher education,” Bush said. “The collaboration between ONR and BHEF has produced a new system dynamics model that can shape strategies for building pathways to successful STEM higher education-workforce solutions. The solutions we deploy as partners will determine the success of our future generations and the health of America’s economy. The stakes are high, but I am confident tools such as the U.S. STEM Education Model and sound partnerships—such as the ones we spotlight today—equip us well to meet the president’s challenge.”

CALL TO ACTION

Secretary of the Navy Ray Mabus spoke about why the Department of the Navy was invested in STEM and motivated to help meet the president’s goal. “Why the Navy and Marine Corps? Why should we care? Why should we be interested?” Mabus said, posing questions he said he and others in the Department of the Navy (DoN) often receive. “Well, first, every single day, our Sailors and Marines are deployed worldwide and are the cornerstone of American defense, doing incredibly difficult and very technical tasks. They operate and maintain the world’s most advanced ballistic and guided missile systems, they operate and repair avionics on the most advanced aircraft, and they take submarines to the depths of the oceans. They run nuclear reactors on our subs and our carriers, and they have a safety record in doing that that’s absolutely second to none. You cannot ask for more technically demanding jobs anywhere. And in order to do them, and do them well, they’ve got to understand what these systems do, why they work, and it requires a strong foundation in STEM.”

In 2011, ONR asked BHEF to apply the U.S. STEM Education Model to show how its investments in cutting-edge STEM student retention strategies can have the strongest impact on future naval workforce needs. Insights from that model will inform DoN on the best strategies to grow a robust civilian workforce that is highly educated in STEM knowledge and skills and ready to contribute to the next generation of naval innovation. This work positions DoN to strengthen its civilian STEM workforce and serve in a strong national leadership role in advancing the president’s goals.

View and run the U.S. STEM Undergraduate Model here: https://forio.com/simulate/bhef/u-s-stem-undergraduate-model.
Jennifer Golda, who will enter her senior year as a mechanical engineering major at Carnegie Mellon University in Pittsburgh, returned to work this summer at Naval Surface Warfare Center Carderock Division–Ship Systems Engineering Station (NSWCCD-SSeS) in Philadelphia as part of the Department of Defense’s Science, Mathematics and Research for Transformation (SMART) Scholarship for Service program.

This is Golda’s fourth summer working at NSWCCD-SSeS and her second summer in the SMART program. She previously had been in the NSWCCD-SSeS Science and Engineering Apprenticeship Program and the Student Temporary Employment Program.

Golda was assigned to the Major Programs Branch, working on power flow analysis of equipment at one of the newest test sites for the Ohio Replacement Program, the Navy’s next-generation ballistic missile submarine.

As a recipient of a SMART scholarship, Golda will begin three years of full-time work at NSWCCD-SSeS after graduation.

“Those three years will allow me to learn more about the organization and figure out exactly what career path I want to take,” said Golda. “It’s a large organization with so many great mentors and opportunities.”

Golda said she enjoys the project management aspect of engineering. She said she also enjoys presenting projects in a public setting, sharing engineering ideas with large audiences.

“Since I’ve been working here I’ve learned that engineering is really the best way to make a difference in people’s lives,” Golda said.

Despite her father being an engineer, Golda never considered a career in the field until she took Advanced Placement Physics during her senior year of high school.

“I just wanted to get the physics class out of the way so I didn’t have to take it in college,” she said. “I enjoyed the class and I started talking about it more with my Dad.”

Courtesy of Joseph Battista, NSWCCD-SSeS Public Affairs

Jon Mitchell
Former SEAP student shines as Student of the Year

Jon Mitchell, a former Science and Engineering Apprenticeship Program (SEAP) intern at Naval Research Laboratory (NRL) Stennis Space Center in Mississippi, was named Louisiana’s student of the year in May 2013. He maintained a 4.66 weighted GPA at Pearl River High School and participated in numerous extracurricular activities, including theater and a student writers club, where he wrote award-winning poetry.

In 2012, Mitchell worked with Dr. Paul Elmore, a computer scientist in NRL’s Marine Geosciences Division. Under Elmore’s guidance, Mitchell created a graphical user interface to automate script and file generation for software used by physical scientists to analyze data for the Digital Bathymetry Database at the Naval Oceanographic Office.

Mitchell will enroll in Louisiana State University Honors College in Baton Rouge, La., in the fall, where he plans to explore both computer science and electrical engineering majors.

“SEAP was a remarkable experience that introduced me to a variety of different fields and disciplines,” said Mitchell. “The ability to meet and interact with scientists and engineers was invaluable. SEAP cemented my decision to pursue a STEM career and inspired me to aid in our country’s research efforts.”

Courtesy of Shannon Mensi
NAVY SCIENTISTS AND ENGINEERS KEEP TEACHERS POWERED UP IN FLORIDA

His summer, scientists and engineers (S&Es) at Naval Air Warfare Center Training Systems Division (NAWCTSD) Orlando will share their expertise with teachers and YMCA volunteers from all over Central Florida.

ENGINEERING IS ELEMENTARY

Public school teachers from the area will join NAWCTSD S&Es at the Orlando Science Center for training in Engineering is Elementary (EiE), a program designed by the Museum of Science in Boston to integrate and emphasize science topics generally taught in elementary school. NAWCTSD S&Es will provide the teachers with curriculum materials that integrate engineering and technology concepts and skills into elementary science lessons.

Many teacher-S&E partnerships begin in EiE summer training, bringing S&Es into classrooms to share their enthusiasm for STEM and help teachers deliver EiE lessons to fourth- and fifth-grade students.

SEAPERCH

Twelve YMCA facilities in Central Florida are training instructors on how to build SeaPerch, an underwater remotely operated vehicle. NAWCTSD S&Es will teach the volunteers how to solder and use multi-meters and will help with general construction of their vehicles. NAWCTSD will expand YMCA SeaPerch events to include building, testing and competing in challenge events and will broaden the scope of the program to support science experiments and advanced robotics applications.

In addition to SeaPerch, scientists and engineers at NAWCTSD also will mentor robotics clubs and classes in middle schools and high schools, supporting several For Inspiration and Recognition of Science and Technology (FIRST) programs, including Lego League, FIRST Tech Challenge and FIRST Robotics Competition. VEX robotics programs will be supported next year.

Teachers from Central Florida build a “Tower of Power” during an engineering exercise at the Florida Engineering Education Conference.

SUMMER CAMP FEATURES LEGO ROBOTICS

Twelve engineering mentors from Marine Corps Systems Command (MCSC) recently teamed with engineers from Naval Systems Warfare Center (NSWC) Dahlgren Division in Dahlgren, Va., professors from the College of William and Mary and 13 local teachers to provide a robotics camp for 45 students from Quantico Middle/High School in Virginia.

This was the third year MCSC and NSWC Dahlgren Division have held a summer robotics camp at the Quantico school, which is located on Quantico Marine Corps Base. The theme of this camp, which ran from June 17–21, was Lego Robotics. The camp consisted of guest speakers, engineering presentations, Lego challenges, demonstrations and other engineering and science activities. Twelve teams built and tested their Lego robots along with a card tower, balsa wood bridge and sea foil. Demos included the Marine Corps Light Armored Vehicle, Electromagnetic Railgun and Tactical Robotic Controller. There were also two activities put on by the FBI.

A highlight for the campers were science demonstrations from Jake Joseph, a professor at the College of William and Mary. Whether flying a quadrotor helicopter to the top of the gym, creating lightning in a pickle or doing test-to-destruction demonstrations, Joseph amazed and inspired the students.

MCSC Commander Brig. Gen. Frank Kelley also participated by giving inspirational talks, checking on students and encouraging them to pursue STEM careers.

For the first time, a companion event, Science Week, took place at the Marine Corps Tactical Systems Support Agency at Camp Pendleton, Calif.
Dear STEM Colleagues:

The time has come. I have received orders to move on to my next assignment working for the Assistant Secretary of Defense (Research & Engineering), effective Aug. 15, 2013. Change is an inherent piece of military life—and of our STEM experiences as well.

In the short time that I have had the honor of being deputy director of research (STEM), we have seen some amazing growth in the Department of the Navy’s (DoN) STEM program. Under Secretary of the Navy Ray Mabus’ direction, we have increased our outreach to underrepresented populations from rural and urban centers and expanded the numbers and types of internships we offer at our Navy and Marine Corps facilities. We have strengthened the collaboration between and across DoN’s core STEM programs, ensuring that students enjoy a stronger and more comprehensive STEM experience. Our Navy and Marine Corps’ success rests on its scientific and technological edge. Our ability to maintain this edge requires a culture of creativity and innovation. Our STEM workforce drives this culture, which is why it is so important that we maintain a robust STEM pipeline into our future workforce.

Dr. Chris Fall will serve as the new deputy director of research (STEM). I look forward to reading about STEM’s success under his leadership in future issues of this newsletter. Fair winds and following seas!

—Cmdr. Joseph Cohn, Ph.D.

About Stem2Stern

Stem2Stern is the Department of the Navy’s Science, Technology, Engineering and Mathematics (STEM) Initiative. Under the leadership of the chief of naval research, who serves as the Naval STEM Executive, STEM2Stern works with the naval system commands, laboratories, warfare centers and other research and education institutions to leverage resources and maximize the impact of the department’s STEM investments. These investments support a wide variety of STEM educational programs, ranging from activities designed to spark younger students’ interest in STEM careers, to more in-depth, hands-on learning opportunities for middle and high school students, internships and research fellowships for older high school and post-secondary students and professional development opportunities for naval STEM professionals and faculty.

STEM2Stern.org provides information about STEM projects sponsored by the U.S. Navy. This includes recent news about the programs, as well as specific program descriptions and success stories. Visit STEM2Stern.org to learn more!

Stem Team Bios

Deputy Director of Research (STEM): Cmdr. Joseph Cohn, Ph.D., is an aerospace experimental psychologist in the U.S. Navy’s Medical Service Corps.

STEM Advisor to the Naval STEM Coordination Office: Carolyn Van Damme is a STEM professional with more than 20 years of experience working within the high-tech industry, research universities and education not-for-profits.

To contact the office directly, send emails to info@stem2stern.org

Important Stem Dates

Online applications open Oct. 1, 2013, for two Navy internships:

Science and Engineering Apprenticeship Program (SEAP): seap.asee.org/apply

Naval Research Enterprise Internship Program (NREIP): nreip.asee.org/apply

Stay tuned for the Fiscal Year 2014 Broad Agency Announcement on STEM to be released this fall.

Naval Stem Websites and Sponsored Activities

Below is a list of websites that may be of interest to this community. It includes Web addresses for various naval programs, as well as some of our signature program partners.

www.stem2stern.org
www.usna.edu/STEM
www.seaperch.org
www.iridescentlearning.org
www.goorulearning.org
www.ndep.us
seap.asee.org
nreip.asee.org
smart.asee.org
www.nmsi.org
www.dodstarbase.org
www.usfirst.org