

# THE NAVAL EDGE



Today's STEM: Accelerate Your Future

DIGITAL TUTORS:  
TAILORING EDUCATION  
TO FIT INDIVIDUAL  
NEEDS

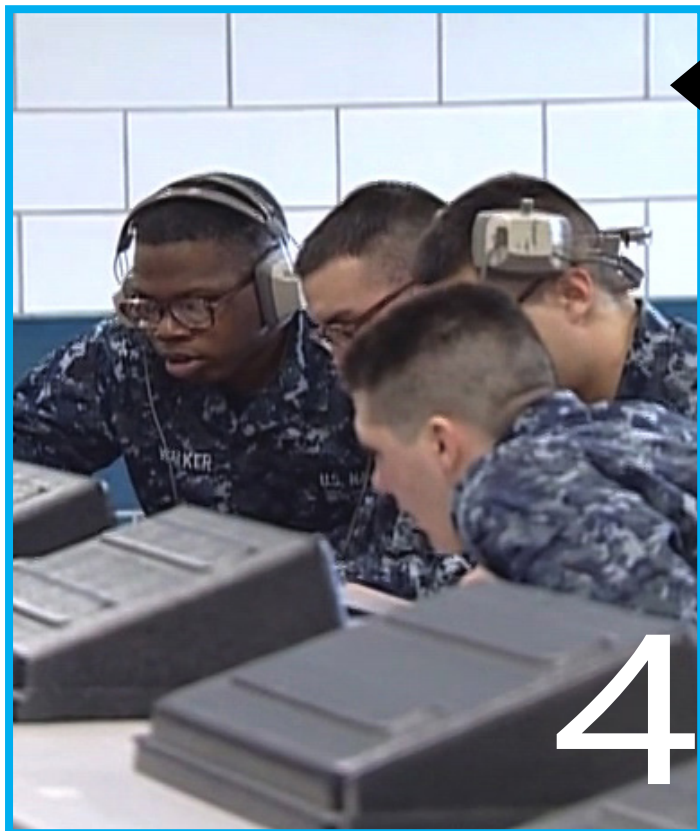
THE MANY  
REWARDS OF  
MENTORSHIP

STUDENT  
SPOTLIGHT:  
FROM INTERN TO  
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ONR GRANT IN  
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WHAT IN THE  
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## FROM THE DIRECTOR...

It's early in January 2018 as I write this—a new year joyous with wonderful possibilities. It is in the midst of this fresh year that I'm happy to share some news about Education &

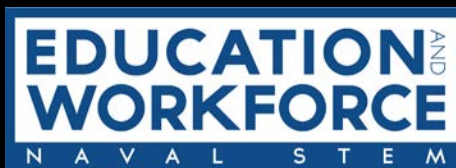
workforce will maintain the U.S. Navy and Marine Corps' technological, educational, inspirational and maritime superiority. We will showcase efforts that illustrate our portfolio of initiatives and investments that inspire, educate, employ, accelerate, retain and constantly develop the current and future workforce.

This is a community effort. We in the Naval STEM Coordination Office find opportunities for investment and improvement to close gaps and inefficiencies in current capabilities. And those at the command or organization level create a vibrant, and productive local research and development community through the management and execution of various STEM education, workforce and outreach activities.

Workforce/Naval STEM.

You are reading the first of our new quarterly newsletters. You'll notice the newsletter has a new title, "The Naval Edge—Naval STEM: Accelerate Your Future." The title evokes ideas such as being the leading edge in innovative research and the cutting edge, as in superior warfighting ability. The subtitle reminds us that individual and organizational futures can be accelerated via Naval STEM initiatives.

In this and future issues of our newsletter, we will present stories about people and organizations working to realize our vision of a diverse, innovative, world-class STEM workforce. This



Each Naval STEM community excels in its mission to promote science, technology, engineering and math competencies for students of all ages. The purpose of this newsletter is to celebrate the success of these programs, and to share events and opportunities in your community. I invite you to explore Education & Workforce/Naval STEM and understand how we are working to constantly develop the current and next workforce.

## WHOWESUPPORT:NAVALSTEMSTAKEHOLDERS



# DIGITAL TUTORS: TAILORING EDUCATION TO FIT INDIVIDUAL NEEDS



Above (left to right): Cryptologic Technician Collection Seaman Recruit Ben Lowden, of Brownsberg, Indiana, Cryptologic Technician Networks Seaman Apprentice Alicia Sutliff, of Jacksonville, Florida, and Cryptologic Technician Technical Third Class Steven Tometzczak, of Reno, Nevada, preview the Integrated System for Language Education and Training program (ISLET). Conceived as an alternative to traditional computer-based training and classroom instruction, ISLET employs online social networking, interactive role-play, competitive gaming and speech recognition to create an immersive environment for collaborative learning. (U.S. Navy photo by Gary Nichols)

Video games—kids love them and parents wish their kids would play less of them—but naval researchers say this type of digital media could be a useful learning tool in helping to educate our youth and train the current Navy and Marine Corps workforce.

From the Navy's perspective, video games and simulation used as digital tutors could attract students toward STEM disciplines while providing them, and our current workforce, with critically needed technical skills that are important to the Navy.

## What are Digital Tutors?

Digital tutors, sometimes referred to as intelligent tutoring systems (ITS), use artificial intelligence to replicate one-to-one personalized tutoring by providing immediate and customized instruction and feedback to learners—without requiring the intervention of a teacher.

Dr. Ray Perez, a program officer in ONR's Cognitive Science of Learning program, has worked on developing ITS since the early 1990s. His research has been tested

within the Navy and academia and has seen significant benefits including—standardized training, an increase in the quality of one-to-one training, and a reduction in the time and cost of traditional training.

According to Perez and others who have studied these types of programs, the results appear to be promising which is why he and colleagues from the military and academia came together for a recent workshop titled, "Building America's Skilled Technical Workforce: The Role of Digital Tutors."

## Digital Tutors Workshop

The workshop, hosted by the National Academies of Science, Engineering and Medicine and the Institute for Defense Analysis, followed the release of a 2017 report by the National Academies titled "Building America's Skilled Technical Workforce." This report examined the coverage, effectiveness, flexibility, and coordination of various policies and programs designed to prepare Americans for skilled technical jobs in all sectors of the economy.

Continued on page 5



Continued from page 4

The report detailed findings and action-oriented recommendations that set an agenda for improving the nation's system of technical education, training and certification. Highlighted in the report were the emerging roles of new information technologies—such as digital tutors—in supplementing traditional education and training to reduce training times and costs, while enhancing the acquisition of knowledge and skills essential for national productivity.

This research on computer-based digital tutoring has long been supported by the Department of the Navy and other government agencies and research organizations. In fact, Lt. Gen. Gina M. Grosso, deputy chief of staff for Manpower, Personnel and Services for the Air Force, and a panel member at the workshop, indicated that her organization is assessing the use of digital tutoring in training, much like the Navy and the other services.

The reason for this classroom-oriented technical training is expensive and requires years of additional on-the-job education to develop expertise. Conversely, digital tutoring can produce expertise in the same time needed for classroom training.



Above: Alan Koenig is a Senior Researcher at National Center for Research on Evaluation, Standards and Student Testing at the University of California, Los Angeles. (ONR photo)

Recent assessments by DARPA (Defense Advanced Research Projects Agency) have found digital tutoring to be particularly successful in education and training for technical knowledge and skills. There is evidence that digital tutoring has given Navy recruits knowledge and skills beyond those of experienced fleet Sailors and is an effective tool to ready veterans for civilian positions.

Part of the reason for the success of these programs is that these digital tutors, unlike human ones, can tailor instruction in real time to the background needs and learning abilities of each individual. But the question remains: Are digital tutors ready to be used routinely to advance the education and training of students and the workforce?

The consensus of the workshop participants is that the technology is more than ready. Established results of digital tutoring suggest it can substantially increase efficient use of time and resources for training skilled technical workers in the military and other sectors.

*Sierra Jones is a contractor in ONR's Corporate Strategic Communications Office. Also contributing to this article is Dr. Ray S. Perez, program officer in ONR's Warfighter Performance Department.*

## UPCOMING EVENTS

### USA Science & Engineering Festival

Details: The United States Science and Engineering Festival is the largest celebration of STEM disciplines in the United States, with more than 2,000 hands-on exhibits.

Date: April 7-8, 2018

Location: Walter E. Washington Convention Center (801 Mt. Vernon Place NW, Washington, D.C. 20001)

More information: <http://www.usasciencefestival.org/2018-festival.html>

### Junior Science and Humanities Symposium

Details: JSHS is a STEM competition sponsored by the U.S. Army, Navy and Air Force and promotes original research and experimentation at the high school level.

Date: May 2-5, 2018

Location: Delta Hotels Baltimore Hunt Valley (245 Shawan Road, Hunt Valley, Maryland 21031)

More information: <https://www.jshs.org/about-jshs/>



## THE REWARDS OF BEING A MENTOR

It's a well-known fact that one of the best ways to learn something is to teach it. In fact, Roman philosopher Seneca was a champion of this very idea when he said: "While we teach, we learn." And in my opinion, there's a similar benefit when you become a mentor—the advancement of your professional and personal development through the sharing of career and life lessons.

To be successful as a mentor, I also believe it helps if that individual has been a protégé themselves; it provides for a common experience to share. Think about how you were as an intern; what made the biggest impact either professionally or personally; and what, or even how, you learned. If you are able to put yourself in their shoes, you can take the best from your past experiences and use that knowledge to understand how your protégé may be feeling, while providing them the tools to empower their learning and how you communicate with them.

It is important to realize that there's no one size fits all mentorship. After all, if there are 16 basic personality types—measured by Myers-Briggs tests—then there are 256 different basic personality combinations in any relationship between two people. What works, what doesn't and how you connect may be very different among individuals. The bottom line is that you need to be flexible and respectful of your students' individuality, interests and areas for growth.

For individuals to get the most out of the experience, it needs to be organic and experiential, not stiff and formal. It's important for mentors to be cognizant of the power dynamic in play, and of the impact your words and actions could have.

Take, for example, the two Science and Engineering Apprenticeship Program interns I hosted last summer. They were given an extremely challenging summer project. We met twice a day to discuss what needed

to be done, which parts they wanted to undertake and how to tackle each challenge. Then I got out of their way. By leaving them alone—except for a periodic email with ideas and links to help solve some of the more challenging technical problems—I was subtly showing them I respected their intelligence and ability to do the work, but also letting them know I was available if needed and cared about their success.

So it's critical to be present and authentic. Share your own school and career experiences. Share thoughts, opinions, mistakes and stories. Be candid, even to the extent of honestly sharing how your ego may have gotten in your way at times, and when it helped you in persevering and being resilient when faced with challenges. I call that sharing mentoring moments.

So what are the rewards of mentoring? I'd say that when successfully done, mentoring can be one of the most real and rewarding experiences you can have. You'll have the satisfaction of knowing you've used a powerful vehicle to help shape an individual's professional and personal development. It's one of the most important things anyone can do.

*Dr. Edward B. Rockower is a research professor at the Naval Postgraduate School.*



**Dalai Lama**  
@DalaiLama

Follow

Change in the world always begins with an individual who shares what he or she has learned and passes it on to others.

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## STUDENT SPOTLIGHT: TRANSITIONING TO THE WORKFORCE

## STUDENT PROFILE: VERNON PRYOR

INTERNSHIP(S): Science and Engineering Apprenticeship Program (SEAP); Naval Research Enterprise Internship Program (NREIP); and Science, Mathematics & Research for Transformation (SMART) Scholarship for Service Program

SCHOOL: University of South Carolina

WORKFORCE LOCATION: SPAWAR Systems Center Atlantic

Vernon Pryor became associated with SPAWAR Systems Center Atlantic through the Cyber Security Summer Camp. He began working for them as a high school intern via SEAP, an internship program sponsored by the Office of Naval Research. The following year, he was selected to be part of NREIP. Pryor applied for the SMART scholarship, a Department of Defense scholarship for service program. Under the program, he was selected by SPAWAR Systems Center Atlantic (SSC Atlantic) to intern every summer leading up to graduation.

Pryor is now a member of the University of South Carolina's 2018 graduating class. Upon graduation, he will transition to a full-time SSC Atlantic employee—the first undergraduate SMART scholar to do so.



## STUDENT PROFILE: ADAM CRYAN

INTERNSHIP(S): Naval Research Enterprise Internship Program (NREIP); and Science, Mathematics & Research for Transformation (SMART) Scholarship for Service Program

SCHOOL: Worcester Polytechnic Institute

WORKFORCE LOCATION: Naval Air Warfare Center Aircraft Division (NAWCAD) - Lakehurst, New Jersey



Five years ago, Adam Cryan was a senior at Steinert High School in Trenton, New Jersey, where he was a member of the school's "Zero Gravity" FIRST Robotics team. One of the team's mentors, Matt DeFelice, was an engineer at NAWCAD Lakehurst, and he invited the squad to visit the command's labs and test facilities. On the tour through Lakehurst's Aircraft Launch and Recovery Research, Development, Test and Evaluation facilities, Cryan became excited about the idea of becoming an engineer.

Fast forward five years.

Adam is in his final year at the Worcester Polytechnic Institute (WPI) in Worcester, Massachusetts, and will be graduating with an undergraduate degree in mechanical engineering. During his time at WPI, Adam was selected by the Office of Naval Research to take part in their NREIP program and again as a SMART Scholar, where he spent three summers working at NAWCAD. When he finally starts his official career in the spring of 2018, Adam will be working alongside DeFelice, his high school FIRST Robotics mentor, in the engineering branch supporting the Navy's newest aircraft arrestment system, the Advanced Arresting Gear or AAG. Adam will literally hit the ground running, in support of naval aviation.

# ONR GRANT IN THE SPOTLIGHT: MECHATRONICS

**Mechatronics:** The combination of mechanical engineering, computing and electronic, as used in the design and development of new manufacturing techniques.

Office of Naval Research (ONR) Director of Education and Workforce Dr. Michael Simpson recently met with local Navy STEM coordinators and Ventura County educators at the Career Education Center to discuss STEM outreach programs, Navy career pathways and potential educational funding opportunities for the county.

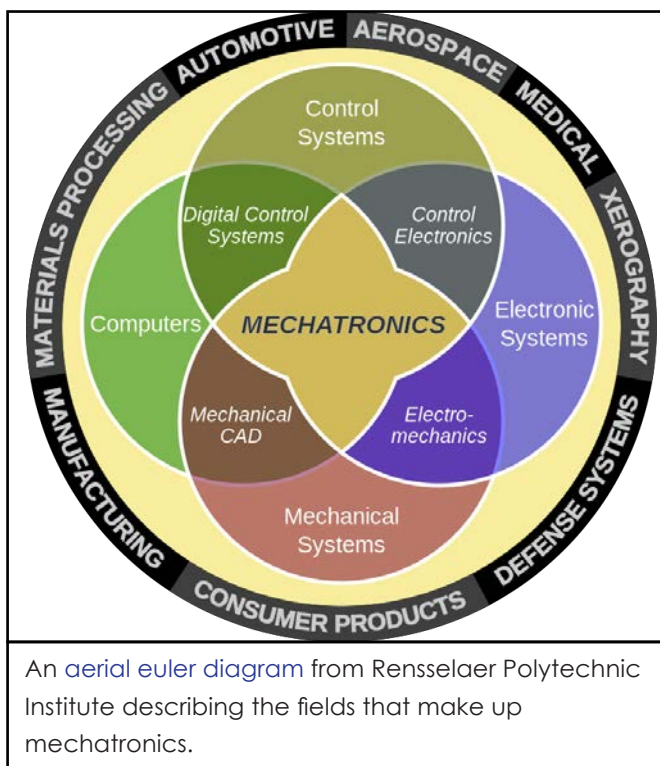
The Navy has an ongoing commitment with the Ventura County Office of Education (VCOE) to boost STEM learning opportunities for students in the area. Most recently, the county received an ONR grant to begin a mechatronics program in K-12 schools. Simpson is the ONR STEM sponsor for the program.

Mechatronics is a combination of mechanical and electrical engineering with a focus on control systems. Students also utilize computer science skills, such as coding.

The group showcased pilot programs and also discussed STEM workforce development to support the hiring of career-minded students who graduate from the programs, notably in providing pathways to employment with the Navy.

Discussion of education proposals focused on “the future need for naval engineers; the increasing growth at the warfare centers housed on base; best practices for connecting to education partners; and the value and diversity of home-grown employees,” according to Dr. Tiffany Morse, VCOE executive director.

The overall STEM experience is based on an education continuum that begins with exposure at a young age through integrated math and science



lessons, guest speakers and hands-on projects. This is followed by recruiting through specialized and advanced programs, competitions and mentoring; advanced content and pre-engineering programs; and training and specialization through internships, apprenticeships and jobs.

“This program is very formative to our future force,” said Simpson. “It helps ensure the Navy has people with the skill sets we need to fulfill our mission and maintain superiority.”

Simpson imparted to the group his three-word ‘mantra: “align, allocate and accelerate.”

“Are you ‘aligning’ to the mission; are you ‘allocating’ by looking at your efforts strategically and tactically; and are you ‘accelerating’ positive outcomes?” he said.

In regards to the STEM continuum, “it is important to instill a sense of curiosity and inquisitiveness,” said

Simpson.

Encouraging students to “try and possibly fail is part of it, as long as they are willing to try and recognize that’s what engineers and scientists do, taking a failure and building upon it and then sharing knowledge and lessons learned.”

This philosophy embraces “High Velocity Learning,” one of the Chief of Naval Operations Adm. John Richardson’s foundational lines of effort.

Naval Base Ventura County is home to three systems commands: Naval Facilities Engineering Command, Naval Air Systems Command, and Naval Sea Systems Command (NAVSEA). Each command has a STEM coordinator.

Naval Surface Warfare Center, Port Hueneme Division (NSWC PHD) is a field activity of NAVSEA. Dr. Ramon Flores is the command’s STEM outreach coordinator, overseeing programs such as SeaPerch and the Pre-engineering Program.

The programs demonstrate how engineers use math and science to develop conceptual ideas and solve problems. NSWC PHD is considered a DoN federal laboratory, which provides a unique learning and research environment. Flores provides students the opportunity to learn and work with the command’s engineers, logisticians, research scientists and professional staff.

*This article, originally titled “ONR sponsor meets with Navy STEM coordinators, county educators,” was written by J.W. Marcum from the Naval Surface Warfare Center, Port Hueneme Division in California.*



# HOMETOWN STEM: NAVY NOMINEES FOR THE DOD STEM ADVOCATE OF THE FOURTH QUARTER 2017

The STEM Education and Outreach Advocate of the Quarter Award recognizes individuals or teams from both the DoD civilian and active duty military/Guard/Reserve that demonstrate exemplary support of STEM education and outreach. These individuals go above and beyond their expected roles and responsibilities to bring STEM into the community through active engagement. For more information, please email: [naval\\_stem@navy.mil](mailto:naval_stem@navy.mil).



Name: Dr. Corey Bergsurd  
Warfare Center: Naval Surface Warfare Center  
Department: Spectrum Technology Advance Research Laboratory  
Location: Crane, Indiana  
Nominated for: Mentorship and technical collaborations with Indiana University



Name: Dr. John Dicecco  
Warfare Center: Naval Undersea Warfare Center  
Department: Undersea Warfare Weapons, Vehicles and Defensive Systems  
Location: Newport, Rhode Island  
Nominated for: Undersea Technology Apprentice Program



Name: Lt. Cmdr. Derrick Lebeau  
Warfare Center: Navy Medicine West  
Department: Naval Hospital Twentynine Palms  
Location: Twentynine Palms, California  
Nominated for: Job shadowing and tours at the naval hospital



Name: Chelsey Lever  
Warfare Center: Naval Surface Warfare Center  
Location: Dahlgren, Virginia  
Nominated for: Volunteering and facilitating a number of STEM activities within the Dahlgren community



Name: Department E  
Warfare Center: Naval Surface Warfare Center Explosive Ordnance Disposal Technology Division  
Department: Systems Engineering  
Location: Indian Head, Maryland  
Nominated for: FIRST Robotics



Name: Keyport & PSNS/IMF  
Warfare Center: Naval Undersea Warfare Center & Puget Sound Naval Shipyard and Intermediate Maintenance Activity  
Location: Bremerton, Washington  
Nominated for: Partnering and bringing a multitude of programs to Kitsap County in Washington State





**Photo Rewind:** A look at the engagements around our naval STEM communities.

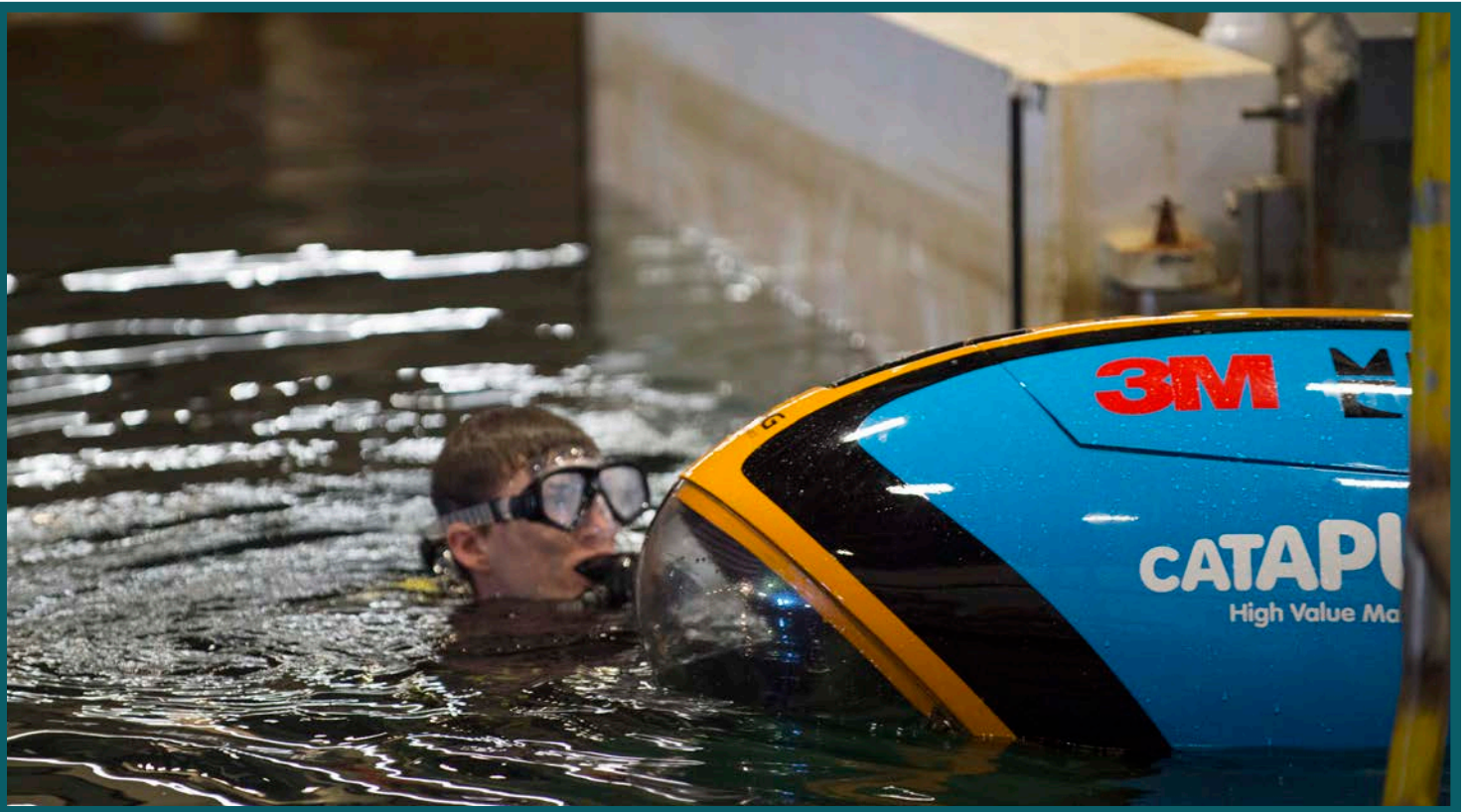


Top: Participants in the Science, Service, Mentor and Medicine program for high school students receive a pathology lecture. (Photo courtesy of Uniformed Services University)

Bottom left: Emma Houck, a USNA college intern from the University of Maryland, trains a teacher on quadcopter design and flight during a STEM education workshop. (Photo courtesy of USNA)

Bottom right: A firefighter from the Quantico Fire Department drops a “balloon brain” from a hook and ladder. Teams of teachers from Quantico Middle/High School, researched the topic of concussions and used construction materials to form a protective barrier to protect their balloon brain from damage. (Photo by Gregory Marsh of the College of William and Mary)





Top left: Members of the Naval Hospital Bremerton STEM team highlight the importance of water—including habitat, conservation and environmental stewardship—at the 22nd annual Kitsap Water Festival. (Photo courtesy Naval Hospital Bremerton)

Top right: Randall Reeves, SSC Pacific engineer, explains the model range concept to National Junior Science and Humanities Symposium participants. (Photo courtesy SSC Pacific)

Bottom: Students participate in the 14th International Submarine Race (ISR) held in the David Taylor Model Basin at Naval Surface Warfare Center, Carderock Division, located in Bethesda, Maryland. The mission of the ISR is to inspire students to explore broad areas of underwater technology advancement; foster advances in subsea vehicle hydrodynamic, propulsion and life support systems; and to increase the public awareness of the challenges people face in working in and exploring the ocean depths. (U.S. Navy photo by John F. Williams)



# EDUCATION AND WORKFORCE

N A V A L S T E M

The Department of the Navy always employs the latest scientific and technological advantages to maintain maritime superiority. But technological advancements alone will not maintain our edge. The Navy and Marine Corps also need a workforce of talented, diverse and dedicated naval scientists and engineers to stay ahead of shifting threat environments. The Education & Workforce/Naval STEM Coordination Office supports strategic educational and outreach opportunities that inspire, educate and develop the current and future workforce.

To learn more, please visit <http://ew.navalstem.navylive.dodlive.mil> or contact the Naval STEM Coordination Office at [naval\\_STEM@navy.mil](mailto:naval_STEM@navy.mil).

