

United States Naval Academy STEM Center for Education and Outreach

Fall 2017

USNA STEM Center

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UNITED STATES NAVAL ACADEMY

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STEM Outreach: Midshipmen Perspective



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STEM OUTREACH IN THE COMMUNITY

"Girls Day taught me how to think in different perspectives to help others understand these new concepts." - MIDN 1/C Ashley Schenck



"STEM Around the World" was the theme of the Oct 14 **Girls Only STEM Day** held at USNA for 230 middle school girls. Interactive modules, led by 15 faculty with support from 48 mids, exposed students to real-world applications of STEM and career opportunities.



"I enjoyed seeing the unique ideas that the girls thought of that never crossed my mind. I was impressed with how smart some of the girls were." - MIDN 3/C August Will

Modules offered at **Girls Only STEM Day** included a wide range of applied science and engineering topics from around the world such as North Pole Magnetism, the Arctic Ice Cube Thermo Challenge, Australian Biomimicry, and South American Rain Forest Chemistry.

"In the classroom I too learn these topics, but through re-teaching of the topics through the STEM event, I gather a better understanding of fundamental concepts. I am better able to visualize and connect real-world aspects." - MIDN 1/C Yasmine Weddle



More than 175 people attended USNA **Family STEM Day** on Oct 21. The event was open to USNA faculty/staff and their families so that they could experience interactive STEM activities developed by the STEM Center and led by midshipmen.



"Seeing the excitement that young kids have for STEM is the most rewarding experience. No two rocket designs were the same. It was exciting to see the creative solutions these young kids came up with." - MIDN 2/C Yogaish Khastgir

Thirty STEM mids led activities at **Family STEM Day**, including the chemistry of art prints and slimy polymers, underwater and line-following robotics, launching rockets, and building hydraulic systems.

STEM OUTREACH IN THE COMMUNITY

"As a midshipman, it is important to share the importance of STEM with the next generation." - MIDN 3/C John Lee



The Summer STEM Program has been offered since 2008, in collaboration with the Office of Admissions, and 292 participants have since been inducted as USNA midshipmen. On Oct 25, many of these alumni midshipmen came together for a **Summer STEM Reunion**, along with midshipmen involved in STEM outreach who shared their experiences.

On Nov 16 and 29, USNA STEM partnered with Maryland MESA (Mathematics, Engineering, and Science Achievement) to present STEM activities to almost 500 youth at Johns Hopkins University Applied Physics Lab in Laurel, MD. On each **MESA Day**, about 35 midshipmen led hands-on activities.



"Kids make learning more fun. They are actually interested in learning which makes me interested in learning." - MIDN 3/C Kathryn Fung

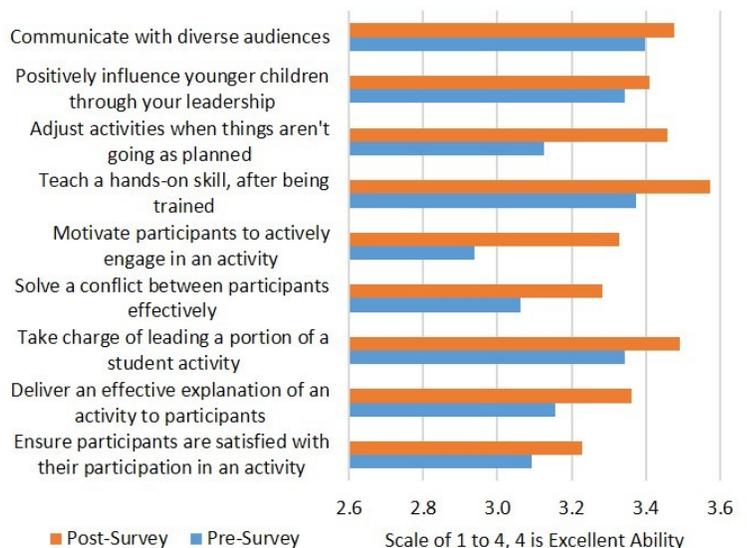
"The children's excitement and desire to learn about science inspires me to challenge myself in order to ensure that I am providing them with as much knowledge as I possibly can." - MIDN 2/C Shannon McAllister

Midshipmen volunteers at **MESA Day**, many of whom were new to STEM outreach, found the experience valuable. Surveys show personal gains in leadership and communication skills following the event.



At **MESA Day**, midshipmen presented engaging activities in Navy-relevant topic areas such as robotics and coding, buoyancy and hull design, water chemistry, hydraulics, bioterrorism, cyber and cryptography, engineering design, and more.

MESA Day: Mid Self-Evaluation of STEM Leadership Abilities



STEM OUTREACH AROUND THE NATION

The USNA STEM Center, in collaboration with the Office of Admissions, visited the **St. Louis** area on Oct 13-14, presenting activities to students at Webber Township High School in Bluford, IL and at the St. Louis Community College Upward Bound Program. Topics included circuits, gears, hydraulics, corrosion, and robotics.



"I was moved by the students' enthusiasm and drive to better themselves and learn." - MIDN 3/C Noah Rodman



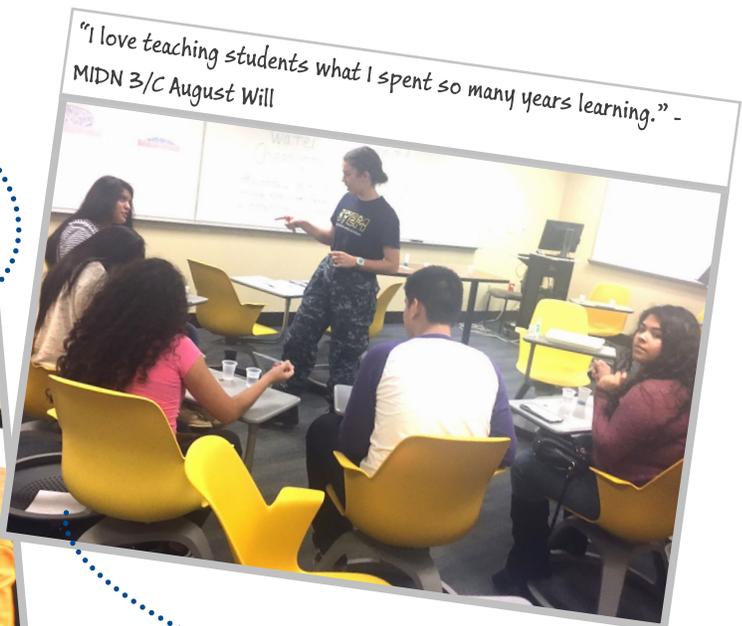
"This event gave me valuable experience teaching and interacting with kids. I learned a lot about students who face adversity in achieving their academic goals." - MIDN 3/C Sharat Nemani

On Oct 26 and 28, the USNA STEM Center and the Office of Admissions provided STEM outreach at the **General Motors Tech Center** to Detroit-area students in the Wayne State Upward Bound Program. Faculty and mids led sessions on hydraulics and fluids, chemistry, rockets and flight, and infrared sensors and temperature.

A **Mini-STEM** event was held at USNA on Nov 3 for high schoolers from Philadelphia's Women in Natural Sciences (WINS) outreach program, hosted by the USNA STEM Center and the Office of Admissions. Activities led by faculty and mids included a planetarium program and experiments in corrosion, electricity, and fluid dynamics.



"As a midshipman, it's easy to forget the joys of learning in such a busy environment. Showing these girls and teaching them about STEM was a refreshing breath of contagious excitement." - MIDN 3/C Leah Gordon



"I love teaching students what I spent so many years learning." - MIDN 3/C August Will

In partnership with the Office of Admissions and League of United Latin American Citizens, USNA STEM faculty and mids hosted a STEM outreach event at Mountain View Community College in **Dallas, TX** on Nov 18. High schoolers explored topics including Bernoulli's principle, chemical properties, cryptography, and bridge building.

MIDSHIPMEN SPOTLIGHT



MIDN 1/C Michelle Tran currently serves as President for the Midshipmen STEM Extracurricular Activity (M-STEM ECA). She knew as a plebe that she wanted to share STEM education with others and has been active in USNA STEM Outreach ever since. Michelle's major is Ocean Engineering. Michelle has been selected for Surface Warfare Officer/Oceanography Option upon graduation from USNA. "I believe that good officers should also be good educators," shared Michelle, "Each STEM event helped me hone the teaching skills I need in the future. Effective teaching requires out-of-the-box thinking. Ultimately, I learned that one needs confidence, positivity, and humility to improve the community around them."

"Officers, at the very least, I think, are teachers because if you can't interact or communicate basic ideas whether they be technical or non-technical, then you're going to have a hard time leading your sailors. I think that STEM has at the least been excellent practice for communication and just from a leadership perspective, planning logistics, of course, those are happening, but as a junior officer, most immediately, you're just learning to interact with people. I think STEM has done a great job exposing midshipmen to a wide variety from elementary schools to teachers, the spectrum is so wide." - MIDN 1/C Michelle Tran



MIDN 1/C Svetla Walsh currently serves as Communications lead for the M-STEM ECA. She has been active in STEM outreach since her plebe year, including support for the Summer Heroes Youth Program (SHYP) as a rising 2/C midshipman. Svetla's major is Information Technology. Upon graduation, Svetla will serve as a Marine Corps Ground Officer. "Being part of STEM has planted the seeds of community service that I will continue after graduation from the Academy," shared Svetla, "I want to continue sharing with others what I know for the betterment of others; because what is the point to learn something if you are just going to keep it to yourself?"

"SHYP was the first time, we were told 'you're going to make something happen, do it' and I was like wow. I really was inspired and impressed from what the kids took from us and how we made an impact because I feel like it's not easy to see that what you do can affect others. When we spent these two weeks with these kids, I can tell you, people were crying and hugging us, and saying we are really going to miss you, and wow." - MIDN 1/C Svetla Walsh



STEM EDUCATOR TRAINING

The **Fall SET Sail** STEM Educator Training was held at the Naval Academy on Sept 9 for 150 K-12 educators from the region. The training focused on incorporating the engineering design process into all grade levels. Teachers attended sessions on hydraulics, mechanics, and electricity and motors, in preparation for the afternoon engineering design challenge.

"The best way to prepare for these events is to pay attention in class...in physics and in calc because that's the background of knowledge I rely on to complete these challenges and a background I hope to convince students, who come to our events, is important."
- MIDN 3/C Gabrielle Evans



"This was an amazing hands-on demonstration that no one is too old to gain knowledge and affirmed to me that education is an extremely powerful tool." - MIDN 3/C Emma Knapp



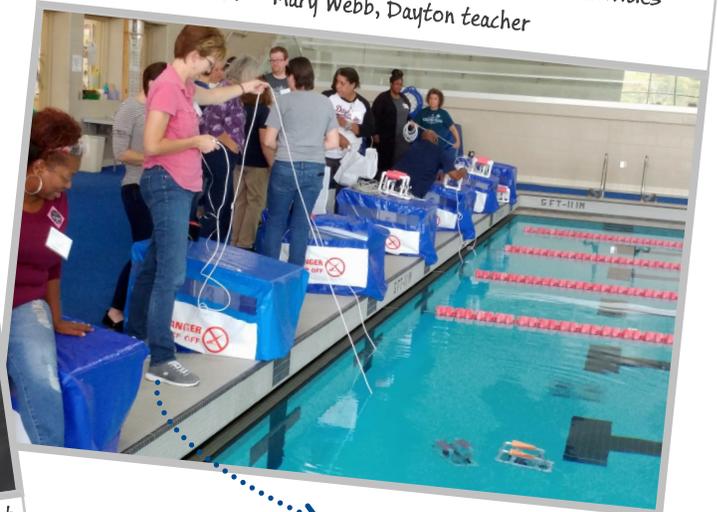
Led by trained midshipmen, teams of teachers at the **Fall SET Sail** STEM Educator Training took on the engineering design challenge. Using only simple and inexpensive materials provided, teams were tasked with designing and building a 'Navy Missile Reload Machine', moving a ping-pong ball 'missile' using simple machines, along with electronic and hydraulic systems.

The STEM Center presented an educator workshop at the **Albuquerque BioPark** on Sept 23 for teachers from five school districts in the local New Mexico region. Topics included electricity and circuits, cyber and coding, robotics, motors and electromagnetism, and engineering design.

"I will be using these activities both in my math class and my after-school math and science club. I also plan to share these activities with other teachers." - Mary Webb, Dayton teacher



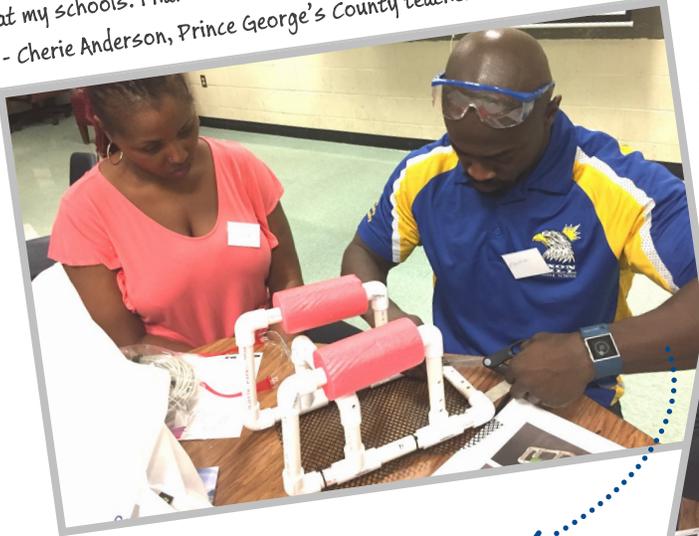
"Applying and trying activities and strategies puts you in the mindset of the students and what struggles or challenges they may face."
- Kristi Convisor, Albuquerque teacher



Dayton area teachers attended a USNA STEM Educator Workshop on Oct 20-21 in West Dayton, hosted by Trotwood Madison Schools in collaboration with DoD STEM. Teachers built and launched underwater robots and explored activities related to Navy engineering.

STEM EDUCATOR TRAINING

"Great workshop that provided me with priceless resources to use at my schools. I have activities that I can use immediately."
- Cherie Anderson, Prince George's County teacher



On Sept 27-28, teachers from **Prince George's County** Public Schools in Maryland attended "Engineering to Explore the Ocean", a USNA and NOAA workshop, held at Charles Flowers High School and Prince George's Community College in collaboration with DoD STEM. Teachers gained activities and resources for learning about underwater exploration, and built a SeaPerch ROV.

Teachers at the NOAA/SeaPerch workshop in **Prince George's County** developed skillsets for building a SeaPerch underwater remotely operated vehicle (ROV), including soldering a circuit board, cutting and drilling PVC pipe, building and mounting motor sets, and troubleshooting. Additional activities included projects with sensors, circuits, batteries, sound, optics, and engineering design.



Teachers at the USNA STEM Educator workshop in **Baltimore** built their own SeaPerch underwater ROV, and launched them in the pool at Morgan State University. Participants discussed engineering modifications for missions and how to host a local competition. USNA partnered with DoD STEM for this event.



Teachers from **Baltimore** and surrounding areas attended a USNA STEM Educator workshop on Dec 2, held at Morgan State University. The training provided hands-on activities focused on ocean exploration. Teachers built a SeaPerch ROV by creating a PVC pipe frame, mounting motors, and soldering a control box. Additional activities included investigating physical and chemical properties of water, buoyancy and hull design, and fundamentals of robotics and engineering.



"I feel competent enough to teach students skills I previously felt underqualified to teach. Love this training because it was 100% hands-on throughout." - Alesa Shepherd, Baltimore teacher

SUPPORTING DoD STEM OUTREACH

"[I learned] better ways to present STEM topics to high school students." - Museum Educator



On Oct 27, a "Best Practices in STEM Outreach" workshop was held at USNA for **museum educators**, sponsored by the Office of Naval Research. Hands-on curriculum ideas highlighting Naval-relevant topics were presented to informal educators, including representatives from the USS Hornet and USS Turner Joy historic ship museums, the Submarine Force Museum, the Independence Seaport Museum, and the SS John Brown Liberty Ship.



USNA STEM presented a "Best Practices in STEM Outreach" workshop at **Naval Medical Center San Diego** on Nov 6-7, sponsored by the Office of Naval Research with support from BUMED. Military and civilian members from medical commands on the west coast and Guam attended, along with Navy Child and Youth Programs staff and local teachers. Attendees explored hands-on activities in chemistry, biomechanics, hearing and vision, sensors, health and disease, and the neuromuscular system.

Museum educators explored STEM topic areas blending current technology with historical developments, including corrosion, electricity and magnetism, cyber, and robotics. Attendees teamed up in the "Escape the Museum" challenge, finding clues around the USNA Museum, solving puzzles and completing tasks, bringing to life methodology and strategies for engaging STEM outreach.



Participants in the **Navy Medicine workshop** had an opportunity to practice outreach skills by presenting many of the activities at a STEM fair for military youth at the Admiral Hartman Youth & Teen Center in San Diego. Attendees also developed activities of their own in topic areas such as physiology. The workshop provided a forum for building the STEM community.



"[I learned] how to properly put together a STEM event, how to develop modules, and how to structure lessons to all ages. Best training I have had in the Navy!"
- Navy Medicine Workshop participant

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UPCOMING EVENTS

SPRING 2018

Jan	<ul style="list-style-type: none"> • NESAS STEM Merit Badge Jamboree, USNA, Jan 20 • FIRST Tech Challenge Robotics Tournament, USNA, Jan 26-27
Feb	<ul style="list-style-type: none"> • Baltimore Building STEPS Mini-STEM, USNA, Feb 1 • NOAA/SeaPerch Educator Workshop, Tulsa, OK, Feb 12-13 • Mini-STEM Event, USNA, Feb 23 • “SET Sail” STEM Educator Workshop, USNA, Feb 24
Mar	<ul style="list-style-type: none"> • Girls Only STEM Day, USNA, Mar 3 • Anne Arundel County Science Fair, Glen Burnie, MD, Mar 3 • Best Practices in STEM Workshop, USNA, Mar 12-13 • Baltimore Science Fair, Towson, MD, Mar 24-25
Apr	<ul style="list-style-type: none"> • USA Science and Engineering Festival, Washington, D.C., Apr 6-8 • Maryland Regional SeaPerch Challenge, USNA, Apr 7 • SeaPerch Showcase, USNA, Apr 13
May	<ul style="list-style-type: none"> • Junior Science & Humanities Symposia (JSHS), Hunt Valley, MD, May 2-5 • DoDEA STEM Educator Workshop, Italy, May 7-11 • Intel International Science and Engineering Fair (ISEF), Pittsburgh, PA, May 13-18

Schedule subject to change