Analytical thinking, problem-solving, collaboration, independent research and inquiry-based learning—these are just a few of the key skills that students are acquiring as a result of the robust STEM (science, technology, engineering and mathematics) program offered in the Shoreham-Wading River School District. Spanning grades K-12, students are engaged in myriad courses and activities in these subjects on an almost daily basis as they become innovative thinkers.

“Today’s student is one that is preparing for a globally changing, advancing world that is more connected than ever before,” said Mr. Gerard Poole, the District’s Superintendent. “The lessons they are learning are not only ones that are preparing them for the classroom, but for the workforce and future that awaits them upon graduation. STEM-related professions are one of the most rapidly growing fields in our nation and world— and our teachers are working to make sure that our students are well prepared to be tomorrow’s leaders.”

As part of the District offerings, students take part in cooperative learning experiences, such as small-group exercises that hone their out-of-the-box thinking as well as elective courses focused on specific subject areas. Additionally, they are afforded the chance to learn from and utilize the most advanced technological resources, including 3-D printers and handheld virtual learning devices. STEM activities are also prevalent beyond the classrooms in Shoreham-Wading River, including such offerings as a secondary robotics club, library makerspaces and partnerships with outside professional organizations and laboratories.

“The philosophy behind STEM focuses on providing our students with meaningful experiences that allow them to construct their knowledge of their world and use their skills to think critically and solve problems,” Dr. Amy Meyer, the District’s Director of STEM, explained. “The skills that they are learning aim to provide them with opportunities to view the interconnected nature of our world and engage in challenges that sharpen those skills. The experiences that students are having in our schools are sure to springboard their success in any career imaginable and even jobs in fields that have not yet been developed.”

To support the introduction of STEM-related activities, teachers at the K-5 grade levels often collaborate to develop engaging science, technology, engineering and mathematics activities. These professional development STEM planning workshops put teachers in the students’ seats as they work firsthand to complete a challenge that they will later introduce to their own students. The idea is to build an understanding of how to tackle challenges methodically, modify ideas that may not work and help reinforce teamwork to make connections among engineering, science and math.

The workshops are also an opportunity to discuss and strategize the elementary math and science curriculum, analyze benchmark data, revise grade-level benchmarks, discuss adaptive interventions, plan grade-level STEM challenges and collaborate on best practices for students.
SETTING A NEW STANDARD

In tandem with the District’s proactive approach to offering students authentic and real-world science experiences, teachers are working to incorporate curriculum updates and resources aligned with the newly-adopted Next Generation New York State Science Learning Standards. According to the Framework for the Standards, the multi-year process is designed to engage students in scientific and engineering practices in which they apply crosscutting concepts to deepen their understanding of the core ideas in these fields.

Shoreham-Wading River educators have been energetically transitioning into this change in teaching daily lessons. Middle School physical science teacher, Mr. Anthony Rohm, is just one of those educators at the forefront of motivating students to develop the skills to think like scientists: seeing a problem, planning for a solution, conducting trials, troubleshooting and coming up with answers independently to grasp the content they are learning.

A New York State Master Teacher, Mr. Rohm is among a select group of expert STEM teachers across the state who are helping to strengthen STEM education. He works in partnership with Stony Brook University and is dedicated to developing expertise in the areas of STEM content and helping students achieve an understanding of key science concepts. Since the beginning of the school year, Mr. Rohm has seen students step out of their comfort zones and embrace the concept of inquiry-based learning. His student-centered, hands-on learning lessons encourage exploration and promote deeper thinking—a critical feature in successful STEM education.

Along with District-created resources aligned to the new science standards, teachers have embraced Mystery Science, an innovative approach to learning in the elementary grades. The popular K-5 science curriculum leads students in the hands-on workings of science and engineering and toward developing a natural curiosity about scientific perspectives of the world.

Piloted last year, all lessons begin with a narrated mystery story coupled with images and videos. The students work in small groups and are encouraged to discuss, explore and experiment with activities using simple and readily available supplies. In both elementary schools, students are engaged in mysteries involving the science and engineering practices while studying natural phenomena. Some examples of these mysteries are: Force Olympics, Plant and Animal Superpowers, Work of Water, Power of Flowers, Energizing Everything and Watery Planet. Overall, students are gaining the ability to look at a problem or question, investigate it and collect evidence to formulate their conclusion.

“The students enjoyed the inquiry-based program,” said fourth-grade teacher Kelly Ryan-Jimenez, after her students observed the role that hills play in making roller coasters move. “It encourages collaboration and helps develop problem-solving skills.”

A WISE Choice

With a national push to include more females in STEM research, the District has made a strong commitment to foster experiences that allow them to explore it—one of which includes the Women in Science and Engineering Program at Stony Brook University.

Students apply for the three-year program to work with mentors at the university on areas related to the mentors’ research, and share aspirations and pathways for college and beyond. One program focuses on neurology and neuroanatomy in humans and other animals. Working alongside graduate students, Shoreham-Wading River students learned about their research using zebra fish to target specific areas or diseases. They also received lessons in the use of MRI and PET scan brain imaging tools and human neuroanatomy, exploring preserved human brains and comparing them to preserved animal brains. Another program is in collaboration with the Center for Functional Nanomaterials at Brookhaven National Laboratory. Students are studying nanoparticles, a specialized area of research with potential applications in biomedical, optical and electronic fields.

The Stony Brook University mentors help to provide students with insight into what it is like to be a graduate student and what to expect in college and careers. The WISE program encourages the Shoreham-Wading River participants to become a part of a community of women scientists and gain the skills needed to pursue careers in science, mathematics and engineering.

“WISE has allowed me to experience scientific research through lab work and hands-on approaches,” said Julia Petreczky, a Shoreham-Wading River High School junior. "The variation in the courses offered have showed me how much I actually enjoyed certain fields I would never have even considered taking, much less pursuing a career in."
OUT-OF-THE-BOX LEARNING

REVVED UP FOR ROBOTICS

Key STEM concepts are put to the test as the High School Robotics Team explores the fundamentals of robotics and the engineering design process, as well as practicing teamwork, leadership and communication skills.

The new academic adventure was launched in the fall when students, under the leadership of their coach, technology teacher Mr. Nick Vertucci, began to design and build a "test" robot with Vex robotics gear. Then, to compete in a game-based engineering challenge, they are constructing a practice arena and competition robot.

The students are learning about the main factors of the entire robotic subsystem (power, control, sensors, pneumatics, drivetrain, lift) for their competition robot, which has led to various design iterations and other engineering challenges. According to Dr. Meyer, team members have not only contributed to the engineering challenges, but to the organization of the team. This organization includes the creation and organization of the team divisions - development, design and construction, managing the development of code using GitHub, and the formation of a team website. "Our team members are not only gearing up for success in competition, but in STEM college and career pathways."

System integration, engineering, prototyping and design are high-level focal points that students are learning. These foci are also integrated and discussed in other Technology Education classes including Design and Drawing for Production, Computer Science and Architecture.

"While most see the Robotics Team as a competition club, I see it as an entryway for robotics entirely, with a deep understanding of the design process," said Mr. Vertucci, who has plans for various problem-solving exercises outside of competition for the team to address as well as extending the entire robotics and Vex curricula into the classroom. "With new learning concepts, parts, tools, and software, every day is a journey with something new to learn and solve," he said.

"Our robotics team members are mastering the relevant skills of tomorrow and gaining the practical knowledge that can be applied to many other careers," said Principal Frank Pugliese. "By constructing a tangible product, they are visually experiencing the results of their work while building a foundation of interest in STEM fields and other career opportunities."

3-D PRINTER INTEGRATION

One of the newest tools for the Robotics Team is a Lulzbot Taz 6 3-D printer, which allows the team to build prototypes to test its ideas. Prototyping helps the team make incremental changes that perfect its designs while utilizing minimal materials or assets. The team is learning to design first and build second; creating sketches of ideas, learning computer-aided design to model, printing a scaled prototype and finally fabricating the actual part or design element.

"The design process that students are engaged in provides them with the opportunity to understand the many levels involved in the engineering of a robot," Dr. Meyer said. "By providing this 3-D technology, we’ve allowed them to leverage technology to develop and test their solutions. Team members are able to create prototypes of their designs, and this modeling is an integral part of the assessment and revision during the engineering process."

MAKERSPACE: PIQUING CURiosity AND CREATIVE LEARNING

Adhering to the notion that learning should be engaging, challenging and fun, Shoreham-Wading River High School and Prodell Middle School students put their creativity to the test as they take part in technology and science activities outside of the classrooms.

During visits to the makerspace areas in the respective schools’ library, students have the chance to explore their own interests and creativity as they become designers, inventors and engineers for an unlimited number of projects.

"We learn by playing here," said Prodell librarian Ann-Marie Kalin, who introduces students to David McCauley architecture and design books and encourages actual construction using Keva building blocks to comprehend balance and structure. High School librarian Kris Hansen encourages independent and collaborative activities to help students explore and develop their own learning opportunities with many donated and recycled items in the makerspace. Recent projects include creating posters and 3-D printed items for the display cases, making 3-D holiday cards for members of the military, figuring out how to make a lever from bottlecaps and upcycling DVD cases to create mosaic hearts for Valentine’s Day.

"Our makerspaces provide students with a place to tinker, create, and dream," said Dr. Meyer. "Our librarians have designed a playground for creation and invention. We will continue to work on providing students with technologies and materials that inspire new STEM ideas."

OUT-OF-THE-BOX LEARNING
Classrooms and spaces at Shoreham-Wading River High School have transformed from traditional learning areas to real-world science laboratories, as students enrolled in the Introduction to Science Research Class have committed to several environmental stewardship projects this year. As avenues to develop their skills as researchers, students are partnering with many community organizations. Some of our partnerships include the Open Space Stewardship Program and A Day in the Life of the Peconic Estuary with Brookhaven National Laboratory. Additionally, two student-generated proposals for the Barcode Long Island Program were recently accepted and students are working with the Long Island Native Plant Initiative as part of the assessment of the health of the High School campus pond ecosystem.

As part of their effort to rejuvenate the High School pond, students submitted scientific proposals to Barcode Long Island on genetics technology. The DNA samples they extracted from the pond will contribute to research projects for documentation of Long Island's biodiversity. According to teacher Mrs. Dana Schaefer, their proposals reflect more of an ecology theme with a genetics procedure, as each team in the BLI program performs the same work and techniques for different underlying purposes.

The project is a continuation of the full-year initiative, in which students are identifying and analyzing the variety of species in the pond to determine its overall health. A unique, real-world laboratory, the pond is useful in helping them to understand Long Island's aquatic ecosystems by measuring water sample qualities, researching healthy pond parameters, collecting samples of aquatic macroinvertebrates, identifying and logging them, and extracting the DNA. The ultimate goal is to gain an intuitive understanding of the crucial interdependence between humans and the environment.

“Mrs. Schaefer’s students have built quite a résumé of experiences to draw upon as they prepare to apply for STEM programs at the college level and ultimately STEM careers,” Dr. Meyer said. “Our SWR students are learning to examine our world through a critical lens, to ask questions and to develop ways to answer the questions they want to find answers to.”

The Shoreham-Wading River School District pond project is a work in progress, and future plans include the creation of a Wildlife Research Center, which students of all grade levels will have an opportunity to use as an outdoor classroom.

This February the District adopted a new K-5 math program called Eureka for implementation in the 2018-19 school year. A committee of teachers and administrators worked over the past 10 months to review and recommend a program for adoption. Instructional staff will be preparing this spring through professional development and grade level meetings to implement the program next year. Parent workshops are being developed as well.

**EUREKA! A NEW K-5 MATH PROGRAM**

Eureka! A New K-5 Math Program
The world of computer coding – a profession that has grown tremendously in recent years – is explored by students throughout the District through a series of events, activities and courses.

More than 200 High School students learned to write and test code through their participation in the fourth annual Hour of Code, a global event that encourages learning the basics of computer science and nurtures problem-solving skills, logic and creativity. According to Technology Education teacher Ms. Linda Blasko, who directs the program, when students participate, they develop a foundation for success in many 21st-century career choices.

Additionally, the High School’s Advanced Placement Computer Science class teaches students the intricacies of coding using Java, a widely used object-orientated programming language. The focus of the course is on developing algorithmic and computational thinking with a systematic approach to program design through flowcharts and pseudocode.

“One of the most important parts of this course is problem-solving,” Ms. Blasko said, “an essential skill for students no matter what occupation they choose.” This course will be mirrored at the elementary level, which will allow for students to explore block-coding at their own pace to make coding less intimidating.

Miller Avenue Principal Ms. Christine Carlson and Dr. Meyer are working with teachers to provide students with early exposure to this discipline in technology.

Recognizing that every student in Shoreham-Wading River should have the opportunity to realize the real-world application of the curricula provided in its instructional program, the District has developed a School-to-Community Program.

The outreach program consists of students, faculty, parents, administrators and partners from various businesses and community organizations, including Aflac, ASRC Federal, Brookhaven Business Advisory Council, Brookhaven National Laboratory, the Long Island Science Center and the Tesla Science Center at Wardenclyffe, among others. They work together throughout the year to develop specialized programs, a school-wide Career Fair, as well as mentoring/shadowing and internship/job opportunities to encourage education as a lifelong learning experience.

The District and the School-to-Community program will host the Third Annual STEM Symposium on Tuesday, May 15th. In addition to exhibits that will include displays of student work, interactive activities and technology demonstrations, School-to-Community Program partners will share resources and authentic access to STEM opportunities and careers after high school. We encourage you to attend this celebration of the many successes of the STEM program.
Message from the Superintendent

Dear Shoreham-Wading River Community,

This newsletter highlights the incredible programs and innovative STEM opportunities that the Shoreham-Wading River School District is providing to our students. This field is one that has grown exponentially over the past several years and is becoming one of the most coveted career paths for today’s students. In fact, the United States Bureau of Labor Statistics projects that STEM-related careers are expected to grow to more than 9 million by the year 2022. Those careers will span a wide range of fields, from management to engineering to education.

Students within our District are not only learning about this booming area, but are also experiencing the concepts behind it in very hands-on ways. As this publication notes, our students in K-12 are learning about STEM through inquiry-based activities and programs such as mystery science, coding, robotics, 3-D printing and even cutting-edge DNA research. It is our firm belief that exposing students to these exciting fields through experiences will not only enhance their academic success and introduce them to a myriad of career paths, but also provide them with a diverse skill set transferable to almost any aspect of life.

In addition to our focus on STEM, our students continue to explore their interests across all content areas, and many have received recognition for their successes. Recently, in honor of their exceptional talents, 10 of our student-musicians qualified for and participated in Long Island String Festival Association concerts. Additionally, our newly formed debate team competed and won debate rounds in their first year and has qualified for state level competitions. Furthermore, 170 of our students were recognized as New York State Scholar-Athletes for maintaining averages of 90 or higher during their competition season, and 10 of our sports teams were recognized for postseason play this past fall. Our DECA students earned top recognitions in all areas of business at regional contests and have advanced to the state level. Katharine Lee, a senior, was recently recognized as a News 12 Scholar Athlete. Congratulations to all of our students and teams for their accomplishments, and many thanks to our community that continues to support their successes.

As spring approaches, the District is beginning to plan for the 2018-19 school year and is working to develop a proposed budget that will continue to support our growing and enriched program. The Board of Education and administration look forward to sharing the draft 2018-19 budget through presentations and workshops over the next few months. Additionally, as we begin to plan for our future needs, we have begun to discuss the state of the Briarcliff property. Many thanks to those residents who joined us during our meetings to share their thoughts and suggestions regarding this topic. As we have said from the beginning, the District recognizes that the future of this facility will require careful and considerable planning, and we truly value hearing the voices of all residents throughout this process.

As we continue to renovate the District through the community-approved bond projects, enhance our programming for students through STEM opportunities and celebrate the successes of our students, it is certainly an exciting time in our schools. Thank you for your continued support, and I look forward to seeing you at upcoming student events and budget workshops.

Sincerely,
Gerard W. Poole
Superintendent of Schools