

## Districts going heavy on science education

By Chris English

Staff Writer

There's no stemming the STEM tide.

Classes and programs emphasizing science, technology, engineering and mathematics have become all the rage at school districts in Lower Bucks County and across the country.

And with good reason, said Bensalem School District K-12 STEM Supervisor Jason Bowman.

"In 2010, the National Science Foundation suggested that 80 percent of jobs created in the next decade will be in STEM-related fields," he said. "There is also a tremendous need to increase participation in STEM fields with both female and minority students."

"Most importantly, a quality STEM program teaches students 21st Century skills that can be utilized in any profession and in any classroom," Bowman continued. "We believe that by teaching students the 4 Cs of communication, collaboration, creativity and critical thinking, that we are better preparing them for a successful career in our global economy."

Bowman said Bensalem offers a variety of technology and engineering courses at both the middle and high school level that are heavily infused with robotics and coding.

"We believe that it is an extremely effective way to teach an integrative STEM model in these elective courses and we utilize these type of courses to support our core subject areas," he said.

Bensalem is in year two of a three-year STEM plan for grades kindergarten through eight. The plan is to implement a new science program rich in STEM activities and well aligned with Next Generation Science Standards, said Bowman.

"Some of our most exciting initiatives are our professional development partnerships with the Franklin Institute and the Center for STEM Excellence at the College of New Jersey," he added. "Over the next two years, all of our teachers will be trained by the Franklin Institute on brain based research and by the College of New Jersey on implementing an integrative STEM and cross curricular approach to teaching in the classroom."

The STEM picture is similar in other Lower Bucks school districts, including Pennsbury, which just hired a STEM supervisor, Elizabeth Price, to further enhance an already healthy STEM emphasis in the school district.

"It shows how seriously we take the importance of STEM and how committed we are to it," said Donna Dunar, Pennsbury assistant superintendent.

"It is so important for our students and community to be good in math, science, engineering and technology, as well as in the arts," she continued. "It's important that our students be competent in all things technical and mathematical, and in the arts, so they have good prospects in regard to career and college."

Pennsbury has implemented a program called Engineering is Elementary for gifted students in the district's elementary schools. In addition to offerings throughout the grade levels, Pennsbury also has two active STEM co-curricular clubs, the Pennsbury Sea Falcons Submersible Robotics Team and the Technology Students Association.

The robotics team recently won several awards at a prestigious competition at Drexel University, Dunar said.

Price said she is looking forward to helping the district's STEM programs go to the next level.

"We want our students to be skill based, functioning and critical thinking members of the 21st century," she said. "We want to be sure Pennsbury students are equipped with those skills when they leave us."

Instilling a certain mindset and attitude in students is critical to effective STEM education, said Price.

"For example, when a student does well on a test, people will say 'oh you're so smart' and that's not productive to say," she said. "It implies that intelligence is fixed, like either you're born with it or you're not, and that's not productive and it's not true. What we should say when a student does well on a test is 'you did really well, you worked hard to achieve those results.' We want to reward hard work, perseverance and persistence."

The Bristol Township School District has been trying to implement as much STEM as possible at all three levels - elementary, middle and high school - said school district Acting Superintendent Melanie Gehrens.

In July, five elementary school teachers attended Bucknell University to be trained as STEM lead teachers, she said. The elementary schools will use the engineering portion of the program in grades K-6. Students will learn about engineering and then complete a project with their peers, based on the curriculum for their particular grade level, said Gehrens.

In the middle schools, BTSD is adding - pending school board approval - a course called Introduction to Computer Science. It will cover the principles of computer science using creativity and an interactive design process, which students will apply to creating their own basic applications.

A course called Computer Science and Software Engineering will be available to students at the district's Harry S. Truman High School this year, Gehrens said. The course aims to develop computational thinking, generate excitement about careers that utilize computing, and introduce professional tools that foster creativity and collaboration, she added.

"An exciting complement to Truman High School's Project Lead the Way program is the recently approved Capstone Course Engineering Design and Development," said Gehrens. "It provides students with an opportunity to apply the knowledge and professional skills they have acquired through Project Lead the Way engineering to identify an issue and then research, design and test a solution, ultimately presenting their solution to a panel of engineers."

Neshaminy spokesman Chris Stanley said that the school district is actively boosting its STEM programming at all grade levels in both curricular and co-curricular activities.

"The plan to do this, which is outlined on the district website ([www.neshaminy.org](http://www.neshaminy.org)), offers our students a hands-on, integrated approach to science and technology with lots of real-world applications," he said.

Among the many Neshaminy STEM initiatives, said Stanley, is that science fairs have been re-introduced at each elementary school.

"Students are provided the time and resources to generate a scientific theory during the school day, test it, and present it to their classmates and parents at the fairs," Stanley said.

Neshaminy is expanding its Project Lead the Way engineering curriculum in both the middle schools and the high school, he added.

"This is an integrative, hands-on approach that allows students to explore real world applications of technology," said Stanley. "Students at all three middle schools are studying digital design and modeling using state of the art tools such as AutoDesk Inventor software and 3-D printers. Each middle school has introduced computer clubs that explore such topics as robotics, coding and augmented reality."

The STEM-based curriculum at Neshaminy High School is growing, with new classes in engineering design, computer science and civil engineering, he added.

Also, the school district hosted its first STEM Expo at the high school in May.

"The event was a big hit, with hundreds of elementary and middle school students and their families enjoying hands-on demonstrations from high school students, teachers and outside presenters in robotics, physics, biology, computer science, screen printing, digital animation and more," said Stanley.

Council Rock also holds an annual science fair as one of many events and programs designed to encourage interest in science, technology, engineering and mathematics, school district officials said. It includes exhibits and projects put together by students at all grade levels.

Other STEM initiatives in the district include teacher and STEM specialist Tim Duke teaching classes and hosting programs at various Council Rock elementary schools.

"My goal is to inspire young students to be inquiring learners," he said after teaching a STEM-related class at Holland Elementary School last school year.

"By providing them with fascinating and challenging STEM activities, we want to light a spark that encourages them to take higher level science and math courses at the middle and high school levels," Duke added.

The Centennial School District has a long list of STEM programs going on at all grade levels, said the school district's Director of Teaching and Learning Cathy Perkins.

Students at Willow Dale and McDonald Elementary Schools will have a chance soon to program robots through a program called LocoRobots that is being provided to the district for free by a Drexel University professor, said Perkins.

Courses called STEM I and STEM II were added at the middle schools last year to allow interested students the opportunity to explore various real world applications and careers in STEM fields, she added. Some of the topics covered were simple machines, robotics, bioengineering and graphic design, said Perkins.

Students from both Centennial middle schools participated in a STEM competition hosted by the Bucks County Intermediate Unit last school year and also attended a STEM conference in May held at Delaware Valley University in Doylestown Township.

A course in principles of engineering has been added at William Tennent High School and is designed for students interested in pursuing an engineering career, said Perkins.

"Through engaging and challenging problems, students will explore a broad range of engineering topics, including mechanisms, the strength of structures and materials and automation," she added.

Through a partnership with Eli Lilly, two teams of William Tennent students participated in the Incubator Challenge Camp over the summer, said Perkins. During the challenge, the students learned how to apply the multi-step processes involved in research and development of new concepts and products, she said.