

THE PITSCO NETWORK

August-October 2018

GAIN AN EDGE
IN ROBOTICS
PAGES 6-11

EDUCATING
GENERATION Z
PAGES 26-27

CHANGING LIVES
WITH SOFT SKILLS
PAGES 28-29

BUSINESS/INDUSTRY AND EDUCATION JOINING FORCES



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CONTENTS

Features

- 3** **SySTEM Alert! for students**
STEM jobs are growing fast!
- 6** **Urban Search & Rescue**
Novices overcome obstacles, take gold
- 12** **Connecting school, work, life**
Yakima, WA, district expands robotics program
- 14** **Joining forces**
Business and education come together in NC
- 18** **Locally grown engineers**
Middle school exposure is the sweet spot
- 22** **Beefing up health care job exposure**
Meaningful experience begins in elementary school
- 26** **Educating Generation Z**
Sweeny (TX) ISD sets foundation with STREAM Missions
- 28** **Microburst Learning**
'This is stuff that can change our lives'
- 30** **Missions help boost science scores**
STAAR pass rate jumps 23 percent
- 32** **The student perspective**
Middle schooler says STEM is for everyone



18
Locally grown
engineers



6 Urban Search
& Rescue



28 Microburst
Learning

Departments/Columns

- 2** From the Executive Editor
- 4** Digital Space
- 24** Leadership Perspective
- 31** Funding Opportunities

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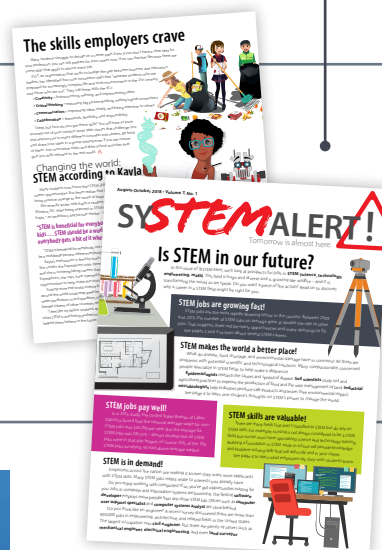


online

SySTEM Alert!

Download the free electronic student newsletter – and quiz.

Pitsco.com/Experience-Pitsco/Resources/Publications



26
Educating
Generation Z

*Pitsco's vision: Leading education
that positively affects learners*

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PITSCO
EDUCATION



From the Executive Editor

CHOOSE TO BE PART OF THE SOLUTION

I recently asked an employee why he has stayed with Pitsco for so many years – nearly 25. His answer? “I want to be part of the solution.”

Pitsco is blessed to have many durable relationships – with our employees, with our customers, with our partners. This answer could have come from any of them. What is the solution we all want to be part of? Is it a product? A line of curriculum? These are solutions, but they aren’t quite the solution.

We are. Or rather, our relationships are.

We connect with the common purpose of bringing the world to students through hands-on engagement. We share ideas and information, learn one another’s needs and capacities, and stand together to open doors for learners.

IN THIS ISSUE OF *THE PITSCO NETWORK*, READ ABOUT:

- North Carolina’s STEM East initiative, where school districts and industry have come together to increase educational opportunities and build a strong regional economy.
- FRC East and Hyster-Yale, two companies that have brought precision problem-solving with the aim of cultivating engineers.
- A panel discussion among nurses and medical professionals to consider student exposure to health care careers.
- The 2018-2019 *FIRST*® Tech Challenge season, gearing up now.
- A strong CTE program in Yakima, WA, that became even stronger with expanded robotics offerings.
- The unique synergy between the Microburst Learning EmployABILITY Soft Skills Program and the Pitsco Expeditions that is literally changing lives in Havelock, NC.
- A big boost on the State of Texas Assessments of Academic Readiness (STAAR) science test that followed the implementation of STREAM Missions and STEM Units.

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Matt Frankenbery

Matt Frankenbery

Vice President, Education & Executive Editor

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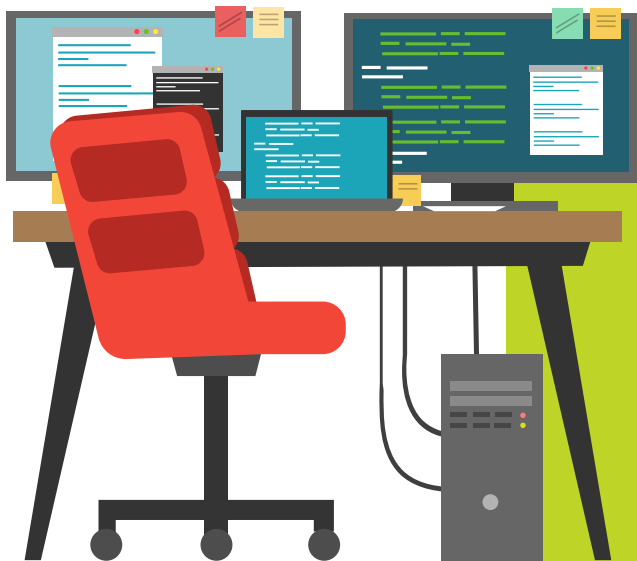


CONVENIENT QR CODES

To enrich your *Network* experience, we are including QR codes where appropriate to give you direct links to additional information online. You may use your phone’s camera app or a QR reader app available free on the app store.

TOMORROW IS ALMOST HERE, and SySTEM Alert! IS A MAP FOR YOUR STUDENTS.

The SySTEM Alert! newsletter inspires students to see how their lives intertwine with the world of STEM. Each four-page issue is stuffed with STEM-relevant content – from news about cutting-edge science, to explorations of familiar technology, to conversations with engineers, to real-world applications of math.



FIND FULL ISSUES ONLINE!

Visit our website to download the most recent issue or to browse the archive. In recent issues:

Discover the robots responsible for putting food on your table. (April-May, 2018)


Read about a real wind tunnel in North Carolina used by NASCAR technicians to test their vehicle designs. (February-March, 2018)

Learn about the networks of pneumatic tubes that were forerunners to the Internet and the Hyperloop a century ago. (August-September, 2017)

IN THE CURRENT ISSUE

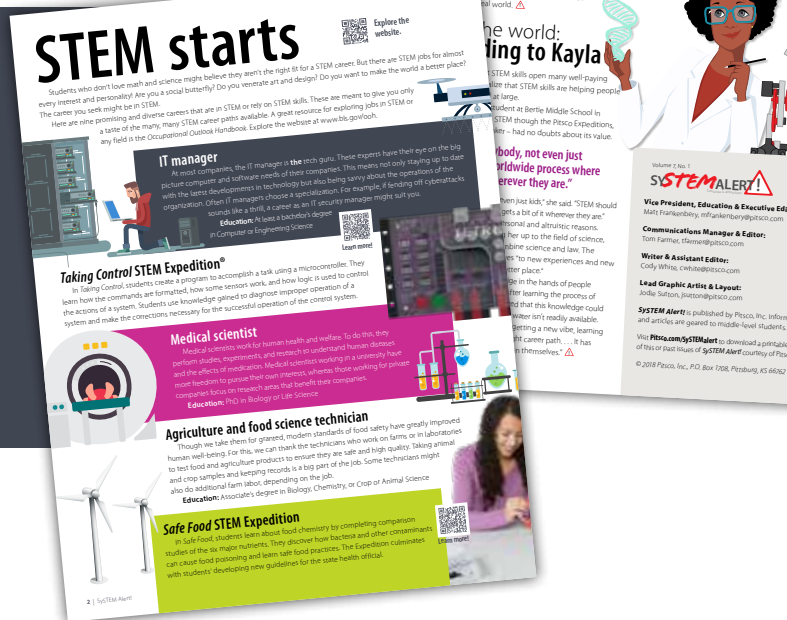
This issue of SySTEM Alert! is a bit unique. We are taking the direct approach, examining the nuts and bolts of the STEM job market. It is never too early for students to begin thinking about their career paths, and this issue gives plenty of food for thought.

Not only will students learn why the STEM field is attractive, they will discover numerous in-demand jobs perfect for different interests and personalities. If your students believe STEM isn't for them, they might find out otherwise. And just as importantly, they'll learn about the (sometimes surprising) skills they will use in those jobs.

As a resource for teachers, a quiz for each issue is also available on the website. After students explore the content, 10 questions test their knowledge and a bonus question prods their creative thinking. 



Visit now!





By Jessica Born
Digital Marketing Manager
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READY TO WORK #ThisIsSTEM

“What do you want to be when you grow up?”

It seems like that is the million-dollar question from about age four through our teens and 20s. But how do early learners and maturing students begin to answer this question and find their calling, especially when they’re still learning to tie their shoes or to solve for x in algebra class while navigating the social landscape of elementary, middle, and high school? What can we do to inspire them to explore various fields? And how can we help them develop the skills they need for success in any profession or path they choose?

You might have seen this statistic before, but it’s worth repeating. Sixty-five percent of today’s students will be employed in jobs that don’t exist yet (World Economic Forum). That is mind-boggling and potentially a little anxiety inducing for educators, parents, and students

alike. At Pitsco, we’ve asked this question several times recently: How do we prepare students for the world they’ll grow into?

So, let’s start with what we do know. We know that, regardless of field or focus, recruiters, HR professionals, administrators, and entrepreneurs tell us they want and need people who can “people.” That is, they need employees who can get along with others, communicate well, and troubleshoot problems together. Top employers such as Google, which has been known to push for hard STEM skills, actually report that these soft skills are the most important in career success and achievement (*The Washington Post*).

We’d like to redefine STEM a bit though; soft skills **are** STEM skills. We fully believe that STEM is inherently a perfect juncture where students can develop these 21st-century skills. Want to

learn more about our stance? Check out Pitsco.com/This-Is-STEM.

As such – and as you likely know – Pitsco recently released Career Expeditions curriculum designed specifically to spark inquiry, exploration, and skill development. Students of various personalities and backgrounds can thrive within this learner-centered curriculum. It blends tech and traditional hands-on learning for a more immersive experience.

We've also gathered a few general inspirational and informational videos and websites that we think can be great additions to your career prep/soft skills toolbox.

- **First up:** Though non-tech, this list provides nine fun ideas to get students moving, thinking, and connecting. Plus, sometimes, we can all use a break from a digital device. Weareteachers.com/9-awesome-classroom-activities-that-teach-job-readiness-skills
- **Next up:** A few digital sources to watch and explore.

VIDEOS:

- **Multipotentialites, Ted Talk:**
Ted.com/talks/emilie_wapnick_why_some_of_us_don_t_have_one_true_calling

Visit now!



- **What 60 Schools Can Teach Us About Teaching 21st Century Skills, Ted Talk:**

Youtube.com/watch?v=UZEZTyxSI3g

- **Prepare Our Kids for Life, Not Standardized Tests, Ted Talk:**

Youtube.com/watch?v=Rvhb9aoyeZs

- **Soft Skills that Pay the Bills, US Department of Labor:**

Dol.gov/odep/topics/youth/softskills/SoftSkills-videos.htm

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WEBSITES:

- **Resources for P21®:**
P21.org/our-work/resources/for-educators
- **Career Education, McGraw-Hill Education:**
Mheducation.com/prek-12/category.30717.html
- **Creating Critical Thinkers and Problem Solvers, Pitsco Education:**
Pitsco.com/Our-Programs/Grades-6-9/Curriculum-Overview

College and career prep doesn't have to be scary or one size fits all. The right mind-set and self-management skills needed for college and the tool set to immediately contribute in the workforce make all the difference in a student's trajectory. Success starts here. **#ThisIsSTEM.**

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The Pitsco Blog delivered straight to you.

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By Patty Cooke
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Novices overcome obstacles, take gold at SkillsUSA® Robotics URBAN SEARCH & RESCUE

LOUISVILLE, KY – Recently, 6,300 students participated in the 2018 SkillsUSA® National Leadership and Skills Conference in Louisville, KY, competing for top awards in more than 102 different fields.

One SkillsUSA area that has seen continuous growth is the Robotics: Urban Search & Rescue (USAR) competition. This year, participants from 22 states and Puerto Rico combined to create eight middle school teams, 22 high school teams, and five postsecondary teams.

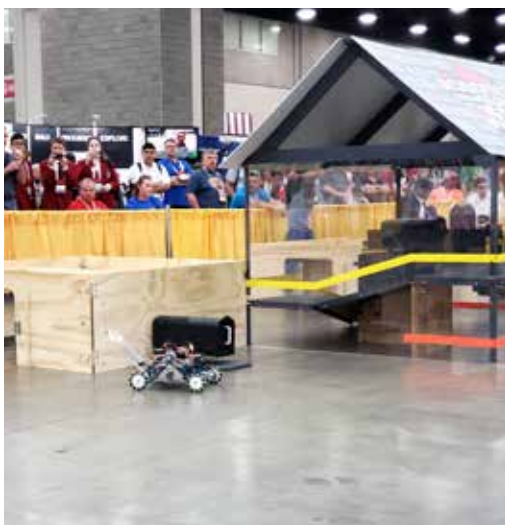
Two-member teams were judged and scored on their engineering notebook, oral presentation, and a written exam as well as on the design of

their robot and its performance on the course. During the timed course section, teams remotely navigated their robot through the course, locating and disposing of simulated ordnances.

NEWCOMERS: UP TO THE CHALLENGE

This year's winners included some relative newcomers – both to USAR and to robotics in general.

The winning high school team consisted of Nicholas Reed and Chris Calvao, both from Blackstone Valley Regional Vocational Technical High School in Upton, MA. This was Calvao's first year competing in USAR and only Reed's second. It was the first year at Nationals for both.



Likewise, the postsecondary winners, Aaron Haymore and Willard Sheets of Wilkes Community College in Wilkesboro, NC, were new initiates to the USAR challenge. Sheets, who has some high school robotics experience, won his very first USAR competition at the North Carolina SkillsUSA conference in April. After that, Haymore joined the team with almost zero knowledge of robotics and electronics.

Hard work, perseverance, and a can-do attitude helped carry both teams to victory.

NO OBSTACLE TOO LARGE

Sometimes, inexperience can be an asset, which was definitely the case for these two teams, who never gave up, even in the face of mounting odds.

For Reed and Calvao, the toughest obstacle was getting a good camera system set up. "We decided to change to a backup camera system because it would provide us with lines to help guide our robot through the course and had a wide viewing angle," said Reed. "But when the system finally came in, we realized that it ran off a 12-volt system. [Rules specify a 9-volt system.] So last minute, I went out and bought a cheap



drone camera with a built-in transmitter and a receiver. We then played with it until we got it to work properly right before state."

Haymore and Sheets agree that 3-D printing was their Achilles heel. "I think I now know 101 ways to crash a 3-D printer," said Sheets. "We managed to crash three different 3-D printers on multiple occasions."

"We had to take baby steps," said Haymore, "printing, at times, just one or two simple components at a time."

TETRIX® STRONG

One thing the teams didn't have to worry about was whether their robotics system was up to the task. Both teams had robots composed of at least 95 percent TETRIX® parts, which helped tremendously in competitions.

"I can honestly say that Pitsco robotics supplies are leagues better than the building system we used in high school in reliability, durability, and functionality," said Sheets.

Calvao and Reed also had high praise for the TETRIX system. "TETRIX parts were a big help to our robot," said Calvao. "The parts fit together nicely all the time and the gears would never slip. The same goes for the rack and pinion system, which never once broke or had problems for us. Overall, TETRIX parts had a big influence on the reliability of our robot."

To see a list of all the USAR medalists, visit [Skillsusa-register.org/rpts/EventMedalists.aspx](https://skillsusa-register.org/rpts/EventMedalists.aspx).

Learn more about the SkillsUSA: Robotics: Urban Search & Rescue event here. [P](#)

Eight middle school teams, 22 high school teams, and five postsecondary teams competed in the SkillsUSA® national 2018 Robotic: Urban Search & Rescue competition. USAR teams had to collect ordnances and place them in the designated drop box. Above, winning USAR teams take their turn atop the medal stand.



USAR Medalist

[Skillsusa-register.org/rpts/EventMedalists.aspx](https://skillsusa-register.org/rpts/EventMedalists.aspx)



Urban Search & Rescue Challenge

“Believe in yourself and never give up,” said Reed. “I was told by multiple people that I would not be able to complete a robot and engineering notebook before we were to compete at state. . . . If I had listened to them, I would not have made it this far.”

THIRSTY FOR SUCCESS

When it comes to robotics competitions, the lure varies for each participant.

Sheets didn't hesitate when his electronics instructor, Robert Doyle, asked him to compete in SkillsUSA® Robotics: Urban Search & Rescue (USAR). “I've always had a soft spot for electronics and mechatronics,” he said. “I was the child that, to my parent's dismay, had to take apart all his toys to see how they worked.”

Calvao can relate. “As a young kid, I always liked taking things apart and putting them back together. I favored discovering something new and applying my learning. . . . The USAR challenge was another opportunity to demonstrate my love for robotics and create something like nothing before.”

Haymore's route was less conventional. After returning from the SkillsUSA CNC Milling Specialist competition with an unsatisfactory finish, he was approached by Doyle to join the USAR team. “He offered anyone in the class a bottle of water and I said that I wanted one,” explained Haymore. He said, ‘I will give you this on one condition.’ That condition was that I replace [Sheets'] partner and go to nationals on the [USAR] team. . . . This has been a running joke since that day that I got into this because I was thirsty.”

In a sense, though, all four of these competitors were thirsty – for adventure, for new experiences, and mostly, it seems, for

challenges. The evidence of this is clear in their advice to other competitors.

“Believe in yourself and never give up,” said Reed. “I was told by multiple people that I would not be able to complete a robot and engineering notebook before we were to compete at state. . . . If I had listened to them, I would not have made it this far.”

“You have to find what you are good at,” added Calvao, “and if you enjoy it, that's how you find a passion for something. Keep doing what you love, and it will lead you to success.”

Haymore agreed. Despite his less-than-stellar performance in the CNC Milling Specialist competition and his lack of robotics knowledge, he wasn't afraid to join the USAR team. “Regardless of the bottle of water, I would have accepted without hesitation because I am never afraid of new experiences,” he said. “Never be afraid to get out of your comfort zone. You never know what doors can open and take you further on.” 



By Corinne Pachl
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GET COMPETITIVE WITH TETRIX®

From *FIRST*® to SkillsUSA® to WRO™, strength and durability of system shine through

Robotics competitions can be tough – tough on the mind, body, and robot. While you might not be able to physically relax until after competition season is over (and is it ever really over?), we can certainly help put your mind at ease if you're still looking for the perfect parts for your competition bot. The following TETRIX® sets were designed specifically for their corresponding events. And if you participate in a program not listed here, chances are we can still help you out!

Visit Pitsco.com/Competitions,-Clubs,-and-Programs for more information at any time or Pitsco.com/TETRIX for more inspiration of any kind.



TETRIX FIRST® TECH CHALLENGE COMPETITION SET

This FIRST Tech Challenge Competition Set was the first approved kit of parts for FIRST Tech Challenge and was cocreated by the event's designers, partners, and – most importantly – the competitors! This set contains a large array of building elements – 824 pieces, to be exact – that includes structural, motion, and hardware elements; TorqueNADO® Motors; a rechargeable battery pack and charger; and much more. See pages 10 and 11 to learn more about why FIRST teams come back to the TETRIX system year after year.



Buy now!

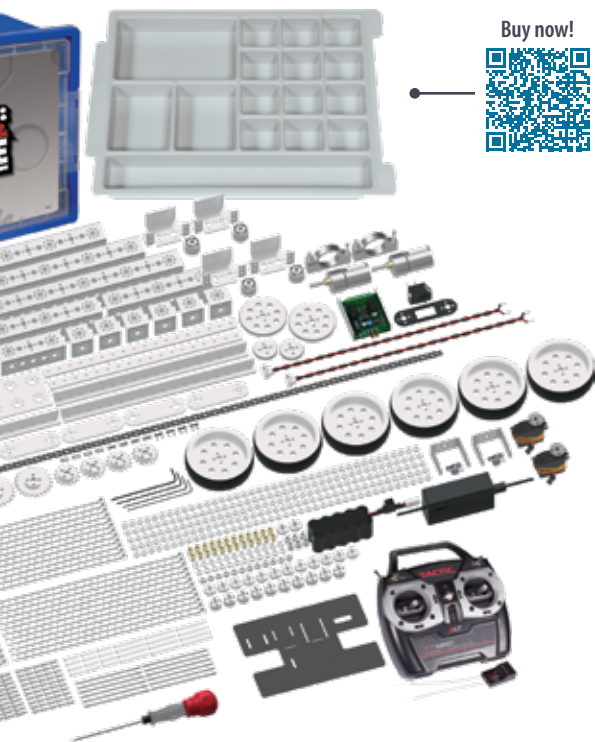


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ROBOTICS: URBAN SEARCH & RESCUE CHALLENGE SET

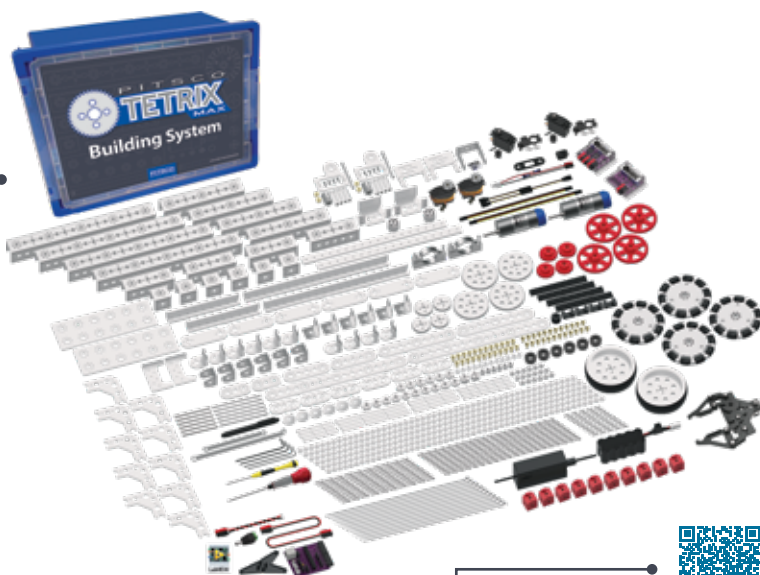
Did you know that this event started thanks to Pitsco Education? That's right! The creators of TETRIX proposed the Robotics: Urban Search & Rescue (USAR) challenge to SkillsUSA® back in 2012, and since then it has become a national competition. Thus, the official USAR TETRIX set was born! It features heavy-duty, aircraft-grade aluminum elements for construction, powerful drive motors, and expandable capabilities. This set enables competitors to get the specialized items and range of components needed to develop a unique robot that can not only successfully complete the challenge but also beat out the competition.



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Buy now!



Read article now!

Flexible yet durable

WRO™ COMPETITION SET

If you compete in the World Robot Olympiad, you actually have two choices when it comes to TETRIX prepackaged sets. The base set comes with more than 1,000 TETRIX building elements and anything else you could need for the Advanced Robotics Challenge (ARC) – except a control system. That's where your other option comes in. The Competition Set with myRIO includes everything from the base set in addition to the National Instruments myRIO controller, its mounting hardware, and LabVIEW™ software. You can read all about how the 2017 winning ARC robot was made with TETRIX in the "Flexible yet durable" article – this team attributes the win in part to the stability and adaptability of the system. [P](#)

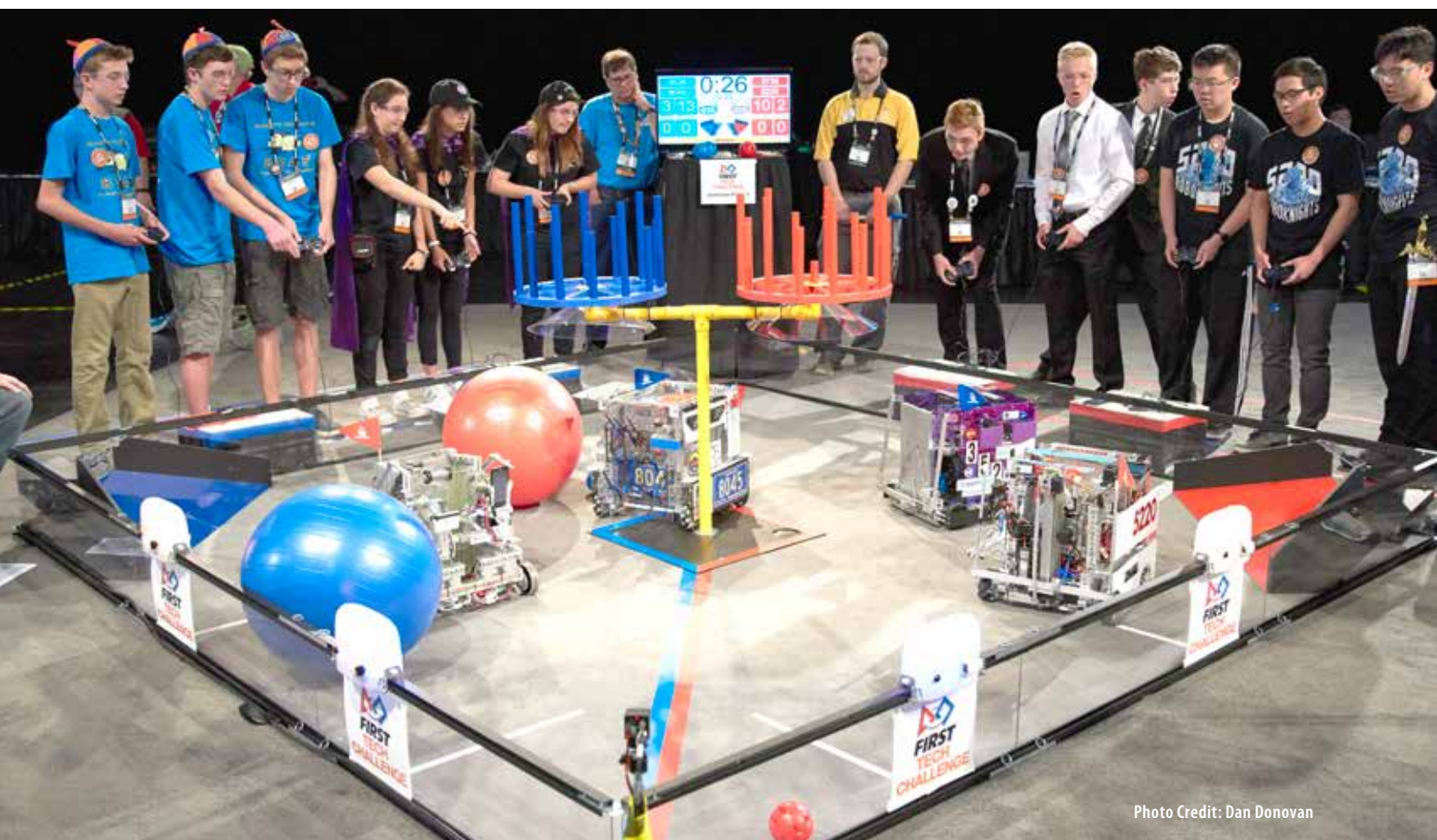


Photo Credit: Dan Donovan

2018-19 FIRST® TECH CHALLENGE SEASON COMING SOON!

By Patty Cooke
Communications Assistant
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The 2018-19 *FIRST*® Tech Challenge season starts soon. Are you ready?

The *FIRST* (For Inspiration and Recognition of Science and Technology) Tech Challenge involves teams of 10 students in Grades 7-12 competing in a robotics challenge that includes head-to-head competitions as well as alliances and chances to earn bonus points.

Registration for the upcoming season began in May, but the big season kickoff, which will unveil details about the new game, ROVER RUCKUSSM, is coming in September. When the season begins, the next few months leading up to the World Championship will be filled with lots of practice builds, trial-and-error runs, and regional and state championships. Teams who hope to do well will have to hit the ground running in September.

GET REGISTERED!

The first step for any *FIRST* Tech Challenge team is registration. The *FIRST* website has registration information for both veteran and rookie teams. The interactive PDFs also contain

loads of helpful information, including FAQs and step-by-step registration instructions.

When you're registered, you can begin building your robot. And for a durable, adaptable build, you'll want to go with a set that was designed specifically for the *FIRST* Tech Challenge. As noted in "Get competitive with TETRIX," the TETRIX *FIRST* Tech Challenge Competition Set was cocreated by the event designers, partners, and competitors. That means every element of the set – including the eight cables that enable teams to connect TETRIX MAX TorqueNADO® motors and encoders to the REV HUB – was included purposefully. Additionally, Pitsco also carries several spare part packs that can be useful, such as the TETRIX MAX Structure Pack, the TETRIX MAX Hardware Pack, and the TETRIX MAX Advanced Gear Pack.

TAKE THEIR WORD FOR IT

Looking for some inspiration? Look no further than these winning robotics teams who used TETRIX as a main component in their robots.

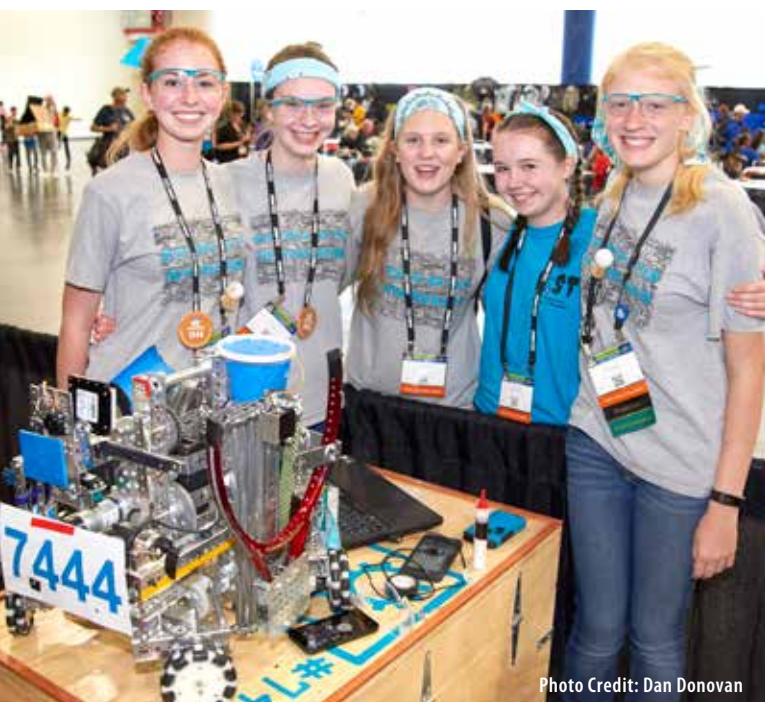



Photo Credit: Dan Donovan



Photo Credit: Adriana Groisman

- “Back in middle and high school, the school STEM programs used another building system of mostly plastic components, and I remember even then, before knowing about TETRIX, remarking how flimsy the stuff was. I can honestly say that Pitsco’s TETRIX robotics supplies are leagues better in reliability, durability, and functionality. I also get the gist that TETRIX gear is designed to very easily combine with third-party components as well, which was almost unheard of when we used the other system.” – Willard Sheets, Team 504, first place, 2018 SkillsUSA® Robotics: Urban Search & Rescue (USAR), postsecondary competition
- “The parts fit together nicely all the time and the gears would never slip. The same goes for the rack and pinion system, which never once broke or had problems for us. Overall, TETRIX parts had a big influence on the reliability of our robot.” – Chris Calvao, Team 106, Salvare Saviors, first place, 2018 SkillsUSA Robotics: USAR, high school competition
- “We appreciated the strength of TETRIX and the material’s enduring quality. Whether we were modifying the robot or practicing repeatedly, the structure and pieces were unchanged. Moreover, the number of pieces allowed us to design

and construct a robot that could perform according to the given challenge.” – Terdsak Intachot, coach, Valaya Alongkorn team, Thailand, first place, 2017 World Robot Olympiad: Advanced Robotics Challenge (ARC)

- “The autonomous portion of the teleoperated contest was won with PRIZM®, using Grove sensors as well, which were unbelievably reliable.” – Mario Blouin, coach, Team Ontario, first place, 2017 Skills Canada: National Mobile Robotics competition 

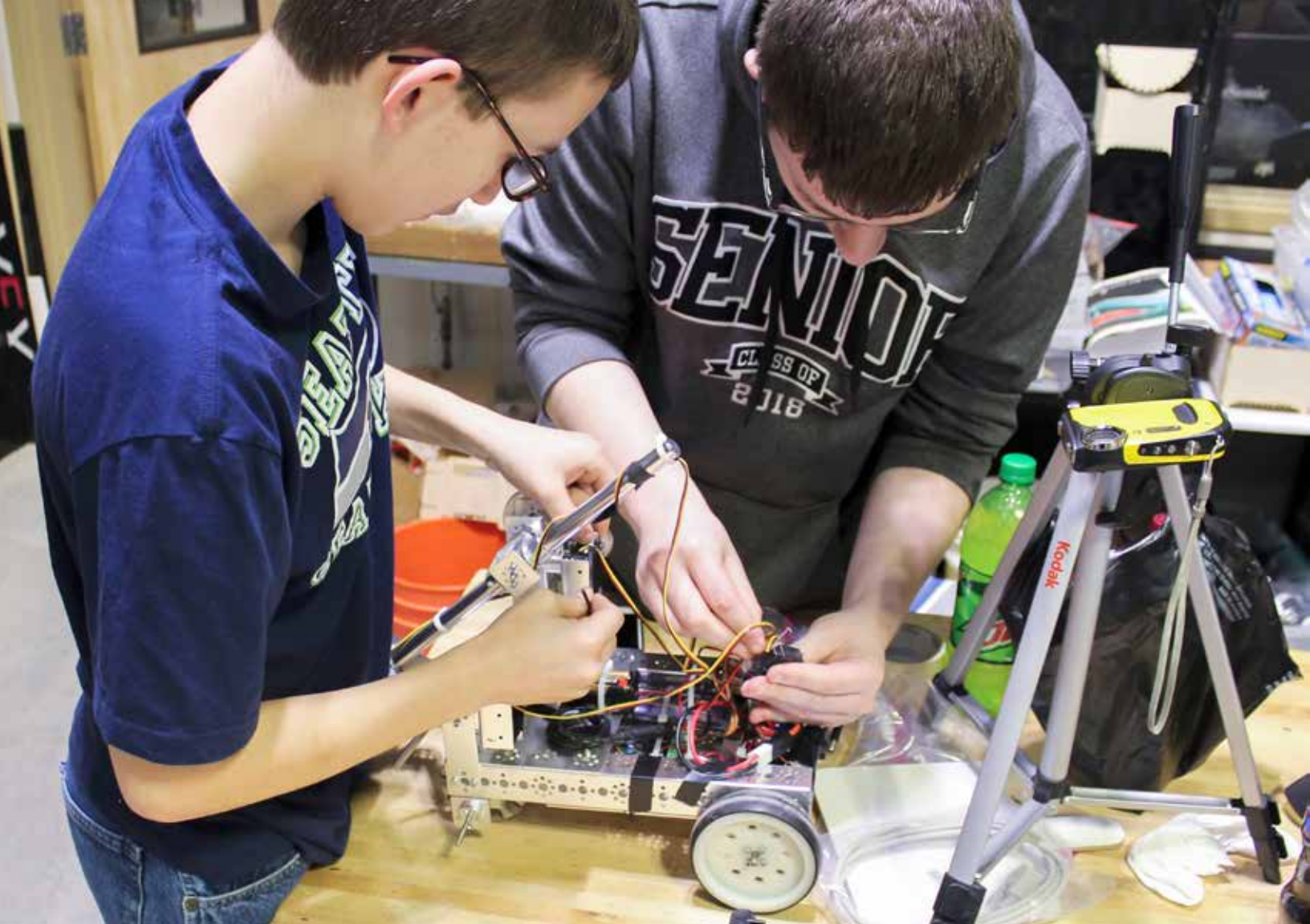
At left, *FIRST*® Tech Challenge teams form and compete in alliances to win challenges. In the middle, girls can robot too! All-girl teams are increasingly common in *FIRST*. At right, *FIRST* Tech teams rely on TETRIX® to build flexible, heavy-duty robots.

Learn more!



FUNDING YOUR TEAM

When it comes to financing a robotics team, there are several options. Many teams have bake sales, car washes, and other fund-raisers. Grants are another possibility. Not only is there a *FIRST*® Tech Challenge team grant, but there are many state- and sponsor-funded grants for robotics teams as well. And for even more funding opportunities, check out the Pitsco Grants and Funding page.



By Patty Cooke
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ROBOTICS: CONNECTING SCHOOL, WORK, LIFE

Yakima (WA) School District expands robotics programs, student options, with TETRIX®

Administrators and teachers in the Yakima (WA) School District are determined to give their students every opportunity to succeed – in school and in life.

Already home to an extensive CTE program, the district has decided to give students even more opportunities by expanding their robotics programs. To that end, they have added nine TETRIX® MAX R/C Getting Started Packages, two Robotics: Urban Search & Rescue Challenge Sets, and 20 TETRIX MAX Dual-Control Robotics Sets to their program.

"We were expanding our robotics programs and were looking for products and curriculum that would help with that," explained CTE Technical Support Eric Franz. "We had some kits and needed to expand due to increased enrollment in our program. We also had students that wanted to compete in the Urban Search & Rescue competition through SkillsUSA®."

The SkillsUSA Robotics: Urban Search & Rescue (USAR) Challenge enables students to create a mobile robot, such as those employed by emergency service personnel, designed to secure an area by locating, neutralizing, moving, and disposing of explosive materials. The challenge has become increasingly popular with both students and outside organizations

Read article now!

**Massachusetts Army
National Guard takes lead
with USAR**



(see “Massachusetts Army National Guard takes lead with USAR”), including Yakima students.

“We first started with only two teams,” said Franz. “Several other students saw what they were doing and wanted to do the same thing. So, we had to expand, and now we have five USAR teams across the district.”

WHY ROBOTICS?

With an already strong CTE program, what made Yakima want to extend their robotics reach? The answer, quite simply, is that robotics has a plethora of benefits, making it fit nicely into so many different areas.

Working with robots fosters creativity. When students get the hang of connecting the parts, there’s no telling what they might create. Anything from a simple two-wheeled remote-control robot to a boat with a four-stage compound gear train and beyond is possible. And with sets such as PRIME for quick, easy builds and MAX for more complex builds, students can construct whatever their imaginations can dream up.

“Robotics allows students to be creative and dream up a robot that serves a single function or many,” said Director of Career and Technical Education Will Sarett. “How cool is it that kids get to go to school and learn to build and program robots? Who wouldn’t want to do that?”


Additionally, teachers can easily connect robotics lessons to real-world and workplace skills. “We get students who say, ‘I can’t do math’ or ‘I can’t write very well,’” said Sarett. “When they program their robot, we tell them they just used math. When they do their write-up for the competitions, we tell them, ‘You just wrote a

paper.’ We connect our students to real-world applications through robotics.”

And the district is going outside the classroom walls to make sure those real-world connections stick. “We are adding some amazing programs that will help students be ready for the workforce,” said Franz. “We just partnered with Byron Automation in Naches [WA], and we are going to add industrial robots to Davis and Eisenhower [high schools] next year with their help. These robots are the ones



you see in packing plants, car manufacturing, and our local fruit industry.”

In the meantime, Franz and Sarett are excited for the future of Yakima’s CTE program. Sarett explained, “I want kids to be able to take an increasingly rigorous program of study that ends in a capstone experience that includes industry certification and a job shadow/ internship component. We are on our way to put all of those plans in place.” 



At left, Yakima students learn engineering and collaboration skills while working with TETRIX. At top right, Yakima school district now has five Urban Search & Rescue teams. At bottom right, TETRIX offers both remote-control and autonomous robot kits.


CONNECTING A COMMUNITY

While students are connecting robots, robotics has a way of connecting communities. From families brought together to cheer on robotics teams to industries becoming more involved in helping students succeed, robotics is more and more becoming a common thread.

Yakima has seized upon this link, creating connections between families, schools, districts, and industries. “Once a year we host an Experience STEM project at the Central Washington State Fair for 10 days,” said Sarett. “We bring all our robots down and have the community get their hands

on robots and more. We get lots of elementary students using robots on a daily basis at the fair.”

Franz hopes that interest will help them expand their robotics programs into the lower grades. “In the future I know we would like to have some robotics programs at the elementary level.”

Additionally, they are sharing their Robotics: Urban Search & Rescue knowledge with other districts. “Word got out [about our USAR teams],” said Franz, “and we have several other schools in other districts that are very interested in participating in USAR challenges.” 



JOINING FORCES

By Tom Farmer

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Early results promising for businesses and education collaborating in NC

GREENVILLE, NC – Education and business leaders advocate the need to break down the silos in which they have traditionally operated. After all, their common aim is a well-prepared workforce, so a unified effort clearly makes sense. But what does it really look like when talk turns into action and the silos disappear?

For a clear picture, look no further than the eastern region of North Carolina, where for the past eight years business and education leaders have emerged from their boardrooms and district offices, come together at the table, and tackled long-standing issues that had resulted in a repeated disconnect between what education was producing and what businesses needed in their employees.

The catalyst for this change has been STEM East, an offshoot of NCEast Alliance, an economic development group focused on shaping a transitioning work landscape. STEM East officials formed the Eastern North Carolina Employers and Superintendents Council with superintendents from the 11 school districts

in the region and 11 key business and industry leaders whose companies rely on local school systems for their most important commodity – that well-prepared workforce.

“We want a workforce of inquisitive minds. We don’t want somebody to take the notebook that says, ‘Here’s how we’ve always done it.’ We want a workforce that can take us to the next level,” said Duke Energy Government and Community Relations Manager Millie Chalk. “And that to me is what STEM is providing us, and that is what our commitment to STEM education in North Carolina is really about – How do we build a better workforce? How do we grow our economy to be more productive and to do more and be more? That really comes from a grassroots effort in education.”

Businesses are eager to step up and support education when it clearly listens to and meets their needs. In eastern North Carolina, that is happening through ever-growing K-12 STEM programs that engage students, add relevance to their education,

expose them to careers in the region, and cultivate soft skills needed in today's workforce.


"This pedagogical approach to inquiry uses the idea of, 'We are going to be developing you as a student who can work in a group and ask questions of each other and communicate with each other and make your own presentation about what it is that you're learning,'" said STEM East Executive Director Bruce Middleton. "These are discrete skills that you can work on, and they are important for the workplace."

STEM, STEAM, STREAM, and similar approaches are more about developing these essential skills that will be key to employability in the future if the recent past is an accurate barometer. According to a 2017 US Bureau of Labor Statistics report, "Employment in STEM occupations grew by 10.5 percent . . . between May 2009 and May 2015, compared with 5.2 percent net growth in non-STEM occupations."

National jobs data is telling, but even more important to employers in the region are projections that their future employees will have the knowledge and skills necessary for open positions, work well together, and desire to stay in the area. Toward that end, major employers such as Duke Energy, Fleet Readiness Center East, Hyster-Yale, and regional health care providers have representatives on the STEM East advisory council. They share best practices, help fund STEM programs, put on summer camps, offer a mobile Fab Lab, mentor and train teachers, and offer internships and field trips to give educators and students a glimpse at the job opportunities in their own backyard.

Mark Meno, research and engineering group head at FRC East, where about 850 engineers are employed, said clearer communication has been helpful in breaking down the silos. "Education is only reacting to what they think they're hearing from industry, and industry is not a clear communicator because we can't speak educationese," he said. "So, a lot of times we end up with this weird alignment issue that misses the mark slightly, and 10 years later we look at the output and we're like, 'Uh oh, that went wrong.' . . . STEM East is addressing the issue. The conversation is happening at the table."

Further proof of progress, says Craven County CTE Director Chris Bailey, is that the eastern region is a certified work-ready community based on jobs being profiled by ACT® WorkKeys® and students being rated on National Career Readiness Certificate® testing.

"What that does is it shows that there is solid alignment between secondary and postsecondary programs and industries to show that we're trying to build a superhighway with multiple on- and off-ramps where students can get the careers they want," Bailey said. 



Business and education leaders in the STEM East region of North Carolina recently visited Bridgeton Elementary School in New Bern, where a \$25,000 Duke Energy grant helped fund a Pitsco STREAM Missions lab for students in Grades 3-5.



Bruce Middleton
STEM East Executive Director



Millie Chalk
Government and Community
Relations Manager, Duke Energy



Mark Meno
Research and Engineering
Group Head, FRC East



Chris Bailey
Craven County CTE Director



By Tom Farmer
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Health care providers connect directly with educators

Teachers educate students about careers, but who educates the teachers – and administrators and school counselors – about the good-paying jobs that are readily available in their communities?

In the eastern region of North Carolina, businesses are taking it upon themselves to educate the educators directly.


“What we want to do is let the school systems know and the teachers know and the counselors know that there are good-paying jobs right here in Lenoir County,” said UNC Lenoir Health Care Human Resources Director Jimmy Person. “We want to teach the students that you don’t have to go other places. You can go to Lenoir Community College and get a degree in radiology and get a \$50,000-a-year job two miles away.”

At UNC Lenoir Health Care, there’s a shortage of nurses and nursing assistants (See related article on page 22.) in particular. The same goes for the region’s largest health care provider, Vidant Health in Greenville. Vidant is continually seeking qualified nurses and other health care professionals.

The two health care providers have something else in common – a seat on the 11-county Eastern North

Carolina Employers and Superintendents Council. Person brings 35 years of hospital HR experience to the council’s quarterly meetings. Vidant’s Chief Human Resources Officer John Marques has been part of the council for about three years.

“Vidant was a member and early supporter, having recognized STEM as key to economic and workforce development,” Marques said. “By being part of such a vibrant and forward-thinking group, we can play a key role in support and advocacy of STEM education and programs for eastern North Carolina. Given the socioeconomic demographics of the area, we believe STEM can ignite an engine for growth.”

The two men appreciate an opportunity to effect change at a grassroots level. “By being around the table, developing relationships with the superintendents and the other representatives on the STEM East council, we can bring back ideas to our county,” Person said. “About a year ago we had all the counselors here and showed them the hospital, gave tours, presented the kinds of jobs that we have here. . . . It’s just surprising that students don’t really know what’s available to them.” 



Duke Energy seeks inquisitive new employees

NEW BERN, NC – Duke Energy is one of the largest electric power holding companies in the United States, and to maintain that position it needs to attract top-performing students, particularly those who have developed STEM skills through hands-on experiential learning and exposure to the engineering design process.

“As we look at the upcoming workforce, we want inquisitive minds,” said Government and Community Relations Manager Millie Chalk. “We want a workforce that can take us to the next level. And that to me is what STEM is providing us, and that is what our commitment to STEM education in North Carolina is really about. How do we build a better workforce? How do we grow our economy to be more productive and to do more and be more? That comes from a grassroots effort in education.”

Among Duke Energy’s investments in STEM education are grants that have helped establish Pitsco Education labs in elementary and middle schools in the eastern region of North Carolina where for years the STEM East network has been making inroads and connecting business and education representatives.

Chalk recently spent time at Bridgeton Elementary School in New Bern, where a \$25,000 Duke Energy grant helped fund a Pitsco STREAM Missions lab for students in Grades 3-5. Principal Melisa Thompson said she and her staff were excited when the lab was announced, primarily because of the known potential benefits of STEM education delivered in a collaborative way such as the four-person Crews who complete Missions work.

“Anytime you can give kids inquiry-based learning, it’s exciting,” Thompson said. “They learn how to think and how to problem solve and how to explore. In preschool and kindergarten they learn through play. Well, with the older kids it’s not play, but it is exploration.”

Not to mention the built-in engineering design loop where students learn that it’s OK – even good – to fail, as long as they try again while making changes in an attempt to improve.

“We learn from our failures, and hopefully we come to a better solution,” said Chalk, who briefly taught physics and chemistry at the secondary level before returning to college to earn an engineering degree that led to a position with Duke Energy, where she has worked for the past 28 years. “Obviously, you don’t want to have a failure and it be catastrophic, but you do want people to know that it’s OK to have an idea that might not be the right idea, but it might lead to a better idea. So, I think that format of learning is very important.” **P**



Bringing down the silos

Hyster-Yale official credits STEM East for getting business and education on the same page

GREENVILLE, NC – A couple decades ago, the concept behind the STEM East network was inconceivable. Business and education were not only siloed, but there were few lines of communication between the two.

Wayne Washington is happy those days are mostly long past – at least in the eastern region of North Carolina. Washington is the human resources manager for the engineering group at Hyster-Yale in Greenville, a leading international manufacturer of lifts. He also serves on the Eastern North Carolina Employers and Superintendents Council, which is comprised of school superintendents and business and industry representatives from an 11-county region.

“STEM East has been excellent. They represent what is needed in the workforce,” Washington said of the third-party entity that has been tearing down the silos and blending business and education into the natural mix it should have been all along. “They’ve been an excellent collaborator and consultant, bringing business, industry, and education together so that we could form these programs and help these kids out.”

Working closely with educators on the council, business representatives can share ideas for how best to prepare the region’s future workforce. Hyster-Yale’s production plant and offices in Greenville need a steady supply of engineers and skilled manufacturers, who benefit from hands-on STEM programs and related courses throughout their education.

In addition to promoting the implementation of STEM-related programs and activities at all age levels, Hyster-Yale wants students as young as middle school to visit their facility so they can see firsthand the well-paying jobs that might be available when they graduate from high school, community college, or university.

“We’re more in need of soft skills and knowledge in terms of science, technology, engineering, and math; the ability to work in teams and collaborate,” Washington said. “When they can see us physically working and can see what we do on a daily basis, they’re more educated and ready when they come out to actually work here or someplace else. It benefits the economy because we have a more educated workforce.” **P**



**By Cody White
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LOCALLY GROWN ENGINEERS

Middle school exposure is sweet spot for entry, according to officials with FRC East, Hyster-Yale

CHERRY POINT, NC – “I had to live in Marshallberg. It was just that simple,” exclaimed Ramsey Davis, an engineer for Fleet Readiness Center East in nearby Cherry Point, NC. “I’m the 14th generation in Marshallberg. My youngsters are the 15th generation.”

Davis traces his lineage through generations of boat builders in the small coastal North Carolina town. He grew up in a boathouse, learning the ins and outs of structures.

Employees like Davis who have both advanced skills and deep local roots are immensely valuable to a region’s economy. This is particularly true in locales far from metropolitan centers, which tend to be filled

with attractions and incentives that draw millennial talent.

Increasingly, educators and industry leaders are learning to work together to build schools-to-careers pipelines that develop and retain regionally tailored workforces. This is exactly the kind of crossover that North Carolina’s STEM East network was designed to foster.

But getting the fine details of the pipeline right isn’t just a networking matter; it’s also an engineering problem. No doubt this is why two regional employers with rich pools of engineering knowledge – FRC East and Hyster-Yale – have been so impactful.

STEM INVESTMENT NOW PAYS DIVIDENDS LATER

FRC East employs about 850 engineers in its mission to maintain and modify Navy and Marine Corps vertical lift aircraft. Research and Engineering Group Head Mark Meno has given much thought to ways the organization can offset attrition by hiring locally.

He has determined there is a need of about 50 engineers a year. But not just any 50. "I need 50 that want to stay here. . . . And the most likely population of 50 that want to stay here are the 50 that are already here."

The key, FRC East suspected, was to appeal to regional students. So far, research has born this out. A survey of new hires asking what drew them to the company revealed that after internships, the second most influential factor was exposure through middle school engineering camps supported by the company years before.

"The yield we get from our investment in recruiting fairs and related efforts – even at our target engineering schools with whom we are strong employer partners – pales in comparison to what we get from our local interactions," said Meno.

Along with engineering camps at the middle school level, FRC East prompted an arrangement in which North Carolina State University would offer a satellite engineering degree program on the campus of nearby Craven Community College. Davis is one of the program's early graduates.

According to Meno, his company expects a significant upsurge of local applicants with engineering degrees in the next few years. This is because students originally exposed to STEM in the middle schools are at last beginning to graduate.

Additionally, the investment in tuition for local talent, resulting in an increase in retention and reduced costs to train them when they come on board, actually results in a savings of approximately \$10,000 per local engineering hire when compared to a traditional candidate.

Pitsco's STEM curriculum is part of this picture. Present in numerous middle schools throughout the STEM East region, curricula such as the STEM Expeditions® emphasize hard science knowledge through hands-on learning and real-world application. According to Meno, who has visited Pitsco labs, this approach fosters interest well.

A constant need for engineers and artisans at FRC East, left, and Hyster-Yale, below, in North Carolina, has led officials to begin their recruiting efforts at the middle school level.




MOBILE FAB LAB FURTHERS STUDENTS' HANDS-ON ENGINEERING EXPERIENCES

FRC East has taken a multitiered approach to spreading STEM knowledge and enthusiasm among students in the region. One tool for this mission is the Fab Lab, or mobile fabrication lab. The lab, housed in a trailer that is driven from school to school, is equipped with scanners, 3-D printers, laser cutters, laptops with design software, and more. The goal was to give students the opportunity to take their school engineering projects to the next level, inspiring them to think about building prototypes.

Regional teachers were invited to tour the lab. Afterward, they created lesson plans that utilized the lab's resources. The lab visits schools for as long as a week, and students

make extensive use of it. In cases where a teacher might not have a clear vision for a project, Randall Lewis, an electrical engineer with FRC East and the manager of the Fab Lab, has created projects for students.

Teachers have been quite innovative, however. Several have used the Fab Lab in conjunction with Pitsco curricula.

One such project involved enhancing water bottle rockets. "The kids came into the lab and were able to 3-D print or laser cut fins for the rockets," said Lewis. Pitsco CO₂ dragsters also had a turn in the lab. "We used the Fab Lab to cut out the shapes on the bandsaw. . . . And then we use the drill press to drill the axle hole so we could get it perfectly straight." 



Wayne Washington
HR Manager, Hyster-Yale

"The point of the activities in the Pitsco way of learning seems to hit the kids and say, 'I can do this, and this is cool.' So now we've got them excited."

THE SOFT-SKILLS ADVANTAGE

In Greenville, a bit further inland, engineering heads at forklift manufacturer Hyster-Yale were developing a similar line of thought: millennials are essential to the company's future. The company began bringing student tours to their facility to educate them about day-to-day work processes. Company reps visited classrooms as well, both in person and through online video conferencing.

According to Wayne Washington, HR manager for the company's engineering group, this kind of exposure has many pluses. "It benefits the child for one, because they are more educated and ready when they come out to actually work here or any organization they decide to work at. It benefits the economy

because we have a more educated workforce, and that's just a trickle-down effect for the whole. It's an ecosystem."

According to Washington, overcoming the silos that naturally develop in an organization is key to improving performance. The team-based approach promoted by Pitsco Expeditions emphasizes collaboration and knowledge sharing among students. These 21st-century skills are intentionally written into the design of the curricula in response to the needs described by employers. There is a growing awareness that our collective economic future depends on the cultivation of these skills.

"You have to be collaborative," said Washington. "You have to be in a team-based setting. It's not just me, me, me; it's we, we, we. It's very project driven. These soft skills have to be developed for us to survive 2020 and beyond." **P**



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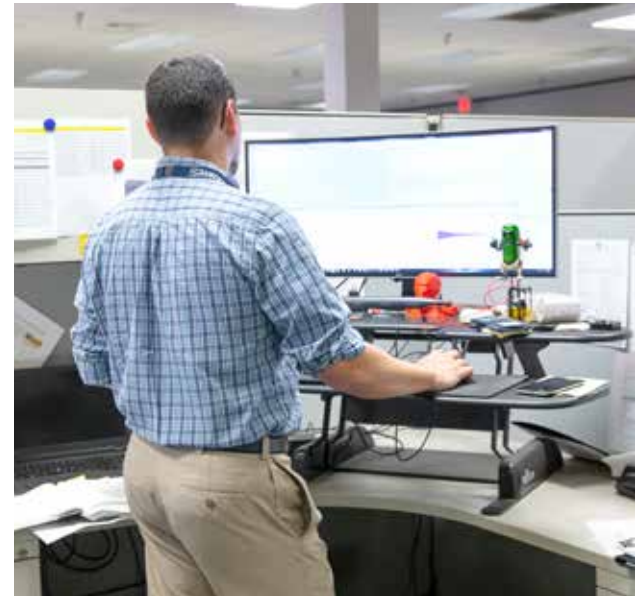
ENGINEERS AGREE: THERE'S NO SUBSTITUTE FOR HANDS-ON EDUCATION

We want to give the current generation of young people the best opportunity to succeed in vital, well-paying careers such as engineering. So, it makes sense to heed the insights of those who have already made it. Engineers and other professionals from two

companies in the eastern region of North Carolina shared their thoughts on the value of STEM and hands-on education.

Chris Barone is employed as an engineer at forklift manufacturer Hyster-Yale. In this role he virtually models production to identify

Hyster-Yale Engineer Chris Barone, below, says his hands-on experiences in the classroom were invaluable in paving a path to his chosen profession.



potential problems. Before coming to work for Hyster-Yale, he worked for a company that designs reactors for submarines and carriers. But his first exposure to engineering came while he was in high school. He chose engineering and architecture as areas of study and found himself modeling houses, drafting by hand and in CAD, and cutting on the lathe.

"Engineering principles I learned in high school helped me in college," Barone explained. "Some of the stuff in college I just opted out of because I already did it in high school." And what about in his career – did his hands-on work in class help him in the long run? "I don't even know how to quantify it. I don't even know if I'd be here without some of that stuff."

Ramsey Davis, an engineer at FRC East, didn't get much hands-on experience in school, but he got plenty at home, working for his family's boat construction business, and that exposure gave him an edge in his career. Still, he has a window into current trends in education through his wife, a school counselor and former middle school math and science teacher. He is hopeful about the push to give students hands-on STEM experiences. "I think it's a better approach," Davis said, especially since there are fewer opportunities for kids to get these experiences outside of class. "I think in today's world it's much more challenging to find those hands-on opportunities."

Pitsco Education has a heavy presence in schools in the NC East region. STEM Expeditions® give students hands-on, collaborative educational experiences, which offer benefits that hands-off, solitary educational experiences can't. Students are stimulated to solve problems, appreciate the differences between real world and theory, and work with others to achieve shared goals and overcome differences. These are skills that give employees an edge in STEM fields.

No wonder that employers in the region are excited to dedicate resources toward cultivating the STEM education culture that Pitsco and STEM East have been developing. Randall Lewis works as an engineer at FRC East, but he spends much of his time visiting schools, delivering hands-on experiences to students through the company's traveling Fab Lab program. In some cases, the Fab Lab acts as an extension to Pitsco classroom activities.

"One of our big pushes is try to build this culture of STEM here locally to us," says Lewis. "If we can foster that culture of STEM and technical careers, [regional students] don't have to be engineers, but like artisans, machinists, or sheet metal workers and things like that."

In other words, according to those who have made their way in the industry, STEM education benefits all. 



Ramsey Davis
Engineer, FRC East



Chris Barone
Engineer, Hyster-Yale



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BEEFING UP HEALTH CARE JOB EXPOSURE THROUGH EARLY EDUCATION

Meaningful experiences at elementary and middle levels are a starting point

KINSTON, NC – If the average sixth grader isn't interested in being a nurse or a doctor, chances are they won't give a second thought to a career in health care because they probably aren't aware of the other options. That's unfortunate. As one of the fastest-growing career fields, health care includes hundreds of occupations, many of them far removed from the nurse and doctor roles.

"You can work in health care and not have to work with blood or needles or stuff like that. There's a whole range of jobs," says UNC Lenoir Health Care Human Resources Manager Jimmy Person, who noted that nurse and doctor are just two of more than 300 different job descriptions

on file at the rural North Carolina hospital with just under 1,000 employees. There are positions in respiratory therapy, radiology, laboratory, IT, rehabilitation, nutrition services, medical records, and environmental services, to name a few.

The greatest employee shortage is in nurses and nurse assistants, which make up nearly one-third of the entire workforce at UNC Lenoir Health Care. The hospital is tackling this issue head-on by working with local school districts and Lenoir Community College to ensure local students know about the path to nursing and the many other available careers in health care.

A group of four nurses recently joined Person for a panel discussion focused on ways education could better enlighten and prepare students for careers in health care. One of the nurse panelists, Emily Baker, RN and BSN, works directly with patients. The other three draw from their experiences as floor nurses when attempting



to attract more qualified candidates to the open positions. Misty Emory is an employment coordinator, Stephanie Fox is a human relations generalist, and Laura Guinn is an education specialist and workforce development coordinator.

All panelists agreed that exposure to a variety of health care careers at the middle school level – or even earlier – is necessary to turn the tide. (See related story, “Joining Forces.”) Hands-on experiential programs such as Pitsco Education’s STREAM Missions for elementary (for example, *Being Healthy*, *Amazing Body*, and *Body at Work*) and Expeditions for middle level (for example, *Body Blueprint*, *Bio Research*, and *Vital Signs*) have been implemented in many schools across eastern North Carolina through the efforts of STEM East, an offshoot of the NCEast Alliance.


“I didn’t have anything like that in middle school. In high school I was in HOSA (Health Occupations Students of America) and I did competition one year,” Baker said. “But that’s the only exposure I got to the health care field before I went off to college.”

Allowing students to explore health sciences and careers via collaborative, real-world experiences in Missions and Expeditions can ignite a spark of curiosity that carries into high school where opportunities for deeper dives into specific careers can occur in CTE courses and pathways.

Guinn invites high school students to visit the hospital and learn more firsthand. “We’ve been involved in the Teachers at Work and Students at Work programs for two years now, and I coordinate job shadowing. They come in for a couple of hours and are able to observe the staff, ask lots of questions, and just learn about that job to see if they’re interested or if they’re not interested.”

Emory is particularly interested in better career exploration opportunities for students because her son is in his freshman year of high school and aspires to a career in pharmacy. “I’ve talked to him about different careers for years, about the different things that he could do in hospital settings and in other professions as well,” she said. “I don’t think that students at the middle school and even at the high school level know all of the different options and careers that are out there. . . . They really don’t have any idea that you could be a CT tech or you could be a medical laboratory technologist. They just don’t have that exposure in schools.”

If early exposure to careers is as essential as the panelists say, then an important second step is to get middle school and high school students to spend time in hospitals and clinics. “I think hands on in the classroom is great for learning about critical thinking and working through problems,” Guinn said. “STEM focuses more on these student-led activities, which is great for leadership. But I just think taking them into the workplace is such an important piece of preparing them.”

Emory added that students must be taught about job options in their region, which would require flexibility to customize curriculum and course offerings to meet the needs of local business and industry. “I think that school systems need to have more local control over development of curriculum,” she said. “So much of it now is coming from the legislative end. Teachers have to get this covered and get this covered and get this covered. But is that meeting the needs of the local market and really exposing students to opportunities?” 

Hospital officials agree that earlier and deeper exposure to various health careers might lead more students to choose that path.



Jimmy Person
Human Resources Manager,
UNC Lenoir Health Care



Laura Guinn,
Education Specialist and Workforce
Development Coordinator,
UNC Lenoir Health Care



The STEM lifeline in rural North Carolina

Golden LEAF Foundation supports capturing student interest in Grades 4-9

Golden LEAF Foundation at a glance

Creation: In 1999, the North Carolina legislature created the nonprofit Golden LEAF Foundation to administer one-half of North Carolina's share of the Master Settlement Agreement resulting from litigation with cigarette manufacturers.

Focus: The Foundation's mission is to assist rural, tobacco-dependent, and economically affected communities with economic transition. Its grant making focuses on critical issues facing rural communities: advancing agriculture practices, creating opportunity for job creation, helping retain crucial businesses at risk for leaving an area, and readying the workforce. The Foundation also works with schools to prepare students for college and the workforce and other priorities that help move communities toward economic vitality.

Results: The Foundation has awarded more than \$650 million in grants, resulting in:

- 63,053 jobs created.
- \$624 million in new payroll.
- 68,000+ workers trained or retrained for good-paying jobs.

Q What exactly is the Golden LEAF Foundation's role in increasing economic opportunity in North Carolina?

A The Foundation was established to be an endowment for the future of rural North Carolina. Because the state was the largest tobacco producer in the nation, the then-attorney general, who went on to become governor, advocated that the court settlement for North Carolina should include using a portion of the proceeds from the class action lawsuit to help the rural counties that were negatively impacted by the decline in tobacco production transition to new economic opportunities. So, Golden LEAF was created to assist with rural economic transformation by investing in the physical infrastructure and human talent needed by rural communities to replace the revenue lost and attract new economic opportunities so that people could choose to remain in rural communities that represented prosperous places to live, work, and play.

Q Can you give one shining example of what Golden LEAF Foundation is doing in conjunction with the STEM East network to impact rural education?

A One example is the investments Golden LEAF made in eastern North Carolina to help Fleet Readiness Center East (FRC East) and other companies acquire the talent they needed to grow their businesses. During the Iraq War, FRC East, whose mission is to repair damaged aircraft and helicopters and send them back into military service, found it needed to manufacture small numbers of parts to replenish depleted inventories so they would have the parts needed to repair then return aircraft to active duty. They needed engineers who knew how to reverse engineer and manufacture parts because many of the items needed to restore aircraft were not available and limited blueprints existed. FRC East was hiring individuals from national colleges of engineering and bringing them to eastern North Carolina to work. When those new hires got off the plane and drove into eastern North Carolina, they would say, "Where's a Starbucks? Where's the mall?" And immediately they would start looking for employment elsewhere. When STEM East came along, it gave them an organic strategy to develop talent, engineering and other, in their region. An FRC East head engineer now frequently comments publicly, "Now that we have partnerships with education through STEM East, the organization is able to save \$50,000 for every engineer hired because they're coming from surrounding rural communities and want to stay here. They're deeply rooted in these rural communities and would prefer staying there if good paying jobs are available."

Q Regarding ACT® WorkKeys® and the National Career Readiness Certificate®, how important is it that Pitsco's curriculum is aligned with these standardized tests?

A I think talent development strategies like this are very important because we are battling both a skills and interest gap. Employers indicate they can teach new hires the technical skills, but they find it difficult to also teach them employability or life skills. They constantly seek candidates who are coachable and can work in teams to collaboratively solve problems. Do they know what to do when they don't know what to do? Can they identify and filter through gobs of data to get to relevant information that's necessary to solve

a problem? Those traits are hard to develop and take a longer-term perspective, so having a workforce curriculum that aligns to and promotes both technical and employability skills is important.

Q Why is it important to intentionally build career exposure and experience into the school day at all grade levels?

A It's unfortunate that a lot of STEM curricula get bucketed into CTE, which traditionally is isolated from core academic courses that students take. I think having curricula aligned to career readiness helps connect career and technical education to core curricula in math, science, English, language arts, and social studies. Taking a more integrated approach that shows students, for example, how technical report writing or math gets applied in a career or a business sector is critically important. Math and science teachers, like all teachers, have so much on their plate, making it hard for them to gain a deep understanding of how the core content they teach is applied in the real-world such as in aviation, manufacturing, welding, or nursing. Having the Pitsco curriculum align to core subjects through pacing guides has proven effective in assisting students to learn how math is a critical skill that is relevant in an occupational career – we've seen that happen with Pitsco.

Q Have you visited any of the Pitsco STEM/STREAM labs?

A I've been to a significant number of schools that uses the Pitsco program. I drive about 40,000 miles a year around the state, so a lot of the work that I do is going out to visit grantees and learn what's happening on the ground. Golden LEAF sees itself as a partner to its grantees, often pushing them to go beyond what they initially proposed and grow their work with intentionality. I don't have all the answers but do know another grantee that's gone through something similar and found a strategy that worked.

Q Do you recall what your initial takeaways were in those Pitsco labs?

A My initial takeaways came from seeing students engaged, on task, and self-directed. They had essentially taken ownership of the learning process where the teacher was serving in more of a facilitator role, coaching students to help them explore, discover, and think more deeply about the problems they were trying to solve. That was a very important observation. I saw a level of excitement from students who may not see school as their thing but through hands-on learning see the relevance of what they are learning in core subjects and how that knowledge can be applied to a work-related experience.

“Having the Pitsco curriculum align to core subjects through pacing guides has proven effective in assisting students to learn how math is a critical skill that is relevant in an occupational career – we've seen that happen with Pitsco.”

Q Why is Golden LEAF focused primarily on STEM education for Grades 4-9?

A In our infancy, Golden LEAF was primarily concerned with replacing the jobs and revenue lost from the decline in tobacco production. Our core work was focused on helping communities replace jobs and preparing adults for the workplace. After the first few years of making grants, we began to look back and think through how we needed to start developing the pipeline by working with youth to develop a pool of qualified workers. We heard about a skills gap from employers but also an interest gap from parents and students. It was not unusual to hear a parent say, “Thou shalt not pursue employment in manufacturing! I lost my job when the factory closed. You can be a doctor, a lawyer, or any other profession, but don't go into manufacturing!” And so, the interest gap was something that really caught our attention. We knew that if we were trying to influence students' decisions in high school, we needed to start early and expose students to career options in the local and regional labor markets. Through research conducted by graduate students at Duke University's Sanford School of Public Policy and some internal findings, we decided to start exposing students to STEM skills and career exploration beginning as early as the fourth grade so they could be successful in the gateway course, Math I, and to extend support on up into the ninth grade to make sure that they were successful. So that drew our initial target on skill building and career exploration for students in Grades 4-9. **P**



Mark Sorrells

Senior Vice President, Golden LEAF Foundation

Mark Sorrells, a senior vice president with the Golden LEAF Foundation (GLF), can personally relate to the organization's aims to seed new economic opportunities in struggling rural communities. “After graduating from high school, I was told that I needed to get out of the rural community where I grew up because there was nothing there for me. I went away to college but wound up back home operating the family business. I saw the brain drain that was happening in rural communities and knew that if there were not some real innovative ideas and dedicated resources to help stem the brain drain, many rural areas would cease to be viable places. The economic declines and dwindling populations would end up being the demise and downfall of rural life as I knew it.” Now with more than 18 years of work leading GLF's education and workforce preparedness grant initiatives, Sorrells is seeing the positive impact of investments made to rejuvenate the rural landscape of NC, particularly in the NCEast Alliance region where GLF has pumped significant resources into establishing quality STEM programs in rural schools.



Read more:
Read more of the interview with Mark Sorrells.



By Tom Farmer
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EDUCATING GENERATION Z

Texas superintendent cites three keys: student-centered learning, design-based thinking, and collaboration



Dr. Tory C. Hill
 Superintendent,
 Sweeny (TX) ISD

When he stepped in as superintendent of Sweeny (TX) ISD in May 2017, Dr. Tory C. Hill didn't immediately put his stamp on things. He listened . . . and he learned . . . and he coupled this new knowledge with the nuggets of wisdom he had amassed in 16 years as a teacher, assistant principal, principal, professional learning administrator, and assistant superintendent.

Hill's proactive, fact-gathering approach has led to a clear plan for education in this small Gulf Coast town, not far from the metropolis of Houston. That plan is to educate Generation Z students in new ways that best serve their natural instincts and interests.

"With Generation Z, which is the majority of students we serve today, they are more hands on. They are more technology driven," Hill said. "Even the generation right before them, the millennials, we consider them to be technology driven, but now our students today can

multitask with so many different things. And so the way we design learning experiences has to be very, very, very different."

Different as in creating a STREAM continuum at the elementary level that flows into STEM at the middle level and high school. Pitsco Education STREAM Missions, STEM Units, and STEM in the Gym™ were added at Sweeny Elementary School for the 2017-18 school year, and they lead into the previously added Pitsco STEM lab in middle school. From there, students can enter focused career pathways in high school, which cap K-12 vertical alignment that feeds neatly into programs at nearby Brazosport College and then on to careers with the area's leading employers in petrochemical and health care fields.

"One of the things that I've been focused on is a very clear vertical alignment," Hill said. "Sweeny ISD is located right here on the Gulf Coast, and the petrochemical industry is really



the leading employer in our area. We are very fortunate to have Phillips 66 and Chevron Phillips right here in our school district, and they are major employers. And our students, if they choose to work in that industry, can really make a decent living."

That's a noble goal, but reaching and teaching today's students must occur before skills can be learned and jobs eventually filled. Hill says Generation Z students have distinct learning needs. Among these are three key elements: student-centered learning, design-based thinking, and collaboration.

The mantra in education is that today's students will work in a world that is nothing like the one we live in. "But what does it take to really get them there? How do we prepare them for that?" Hill asks. "The first thing is just student-centered learning, where the teacher is really the coach and the facilitator, and the students are driving that experience and have a voice in their learning and the products that show they're learning."

"Another element I think is important is design thinking – giving our students an opportunity to solve complex problems and think through challenges, sort of giving them the skills to be solution focused. Their future is not going to be about regurgitating facts. It's going to be about really looking at problems and coming up with solutions to address those issues."

Enter the STREAM Missions lab and STEM Units. "It's not just the essential skills that students are walking away with. They're learning. They're gaining a soft skill, that design-thinking component."

Lastly is students learning how to collaborate at a very young age, discussing and working through challenges together. "We have learned to rely a lot on technology, and many will criticize our youth because they're so engaged in their phones or their technology that sometimes they might lack those interpersonal collaborative skills," Hill said. "So, it's important that we strategically design learning experiences and allow them to still gain those skills through working together on projects."

Hill's insights into the needs of Generation Z isn't guesswork. Staff, community members, and students themselves have told him. "I sat down with about 12 elementary students my first month here in Sweeny, and I asked them simple questions – What do you love about your school? If you could do anything to improve it, what would it be? And what suggestions would you give a new superintendent? I still have the list to this day. The elementary students gave me a list of 19 items that they wanted me to address, and they weren't items like the lunch food is not good. They were very specific items such as we want to be more engaged in the learning experience. We want more hands-on learning. And these are elementary kids."

Similarly, Hill tunes in to what the region's largest employers need. "I serve on a community advisory panel for both of these (petrochemical) organizations, and so we talk three or four times a year. We also have several of their key leaders, including the plant managers and other public relations staff, who serve on district committees to help advise the school district."

(continued on page 32)

Empowering students to use design-based thinking skills enables them to focus on solutions instead of just memorizing facts.

“... the way we design learning experiences has to be very, very, very different.”



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“You know, this stuff is way more important than just for this class. This is stuff that can change our lives. This can help us be more successful in our lives, have less problems to deal with – if we can learn how to deal with people and how to react and behave in situations.”

‘THIS IS STUFF THAT CAN CHANGE OUR LIVES’

Practicing newly learned soft skills helps troubled student improve his home life

Jimmy’s home life was tough, he had struggled with grades and behavior in elementary school, and controlling his anger and dealing with frustrations were not his forte. His energy and attention problems continued when he entered sixth grade. But things began to change when he experienced the Microburst Learning EmployABILITY Soft Skills Program his teacher was delivering in conjunction with the Pitsco Education STEM Expeditions®.

“He lives with his grandma, and he had a lot of discipline problems in elementary school,” said Michelle Smith, the STEM Expeditions teacher at Tucker Creek Middle School in Havelock, NC. “We had just completed a soft skills activity, and I was doing the debrief.

Jimmy raised his hand and said, ‘You know, this stuff is way more important than just for this class. This is stuff that can change our lives. This can help us be more successful in our lives, have less problems to deal with – if we can learn how to deal with people and how to react and behave in situations.’ It sounded like a 30-year-old man was talking from this young boy’s body. All I could do was stand there in awe and think, ‘That’s amazing!’”

Near the end of the semester, some visitors were in Smith’s classroom, and she asked Jimmy to share with them how he used these soft skills. “I was expecting him to share how he was controlling his behavior in all of his classes and controlling his anger. He explained how at home he would argue with his grandmother and not listen to what she had to say. He went on to say how the soft skills lessons helped him understand that listening and thinking about the situation and his response – before

speaking – would help him get along better with his grandma and stop fighting so much.” Unbeknownst to Smith, Jimmy had been using these transferable soft skills at home.

Smith was blown away by how effective the lessons were and ecstatic to see students apply them naturally while working collaboratively in the hands-on Pitsco Expeditions. Nowhere else in school do students learn about and employ soft skills such as conflict resolution, productivity, initiative, dependability, and communication.

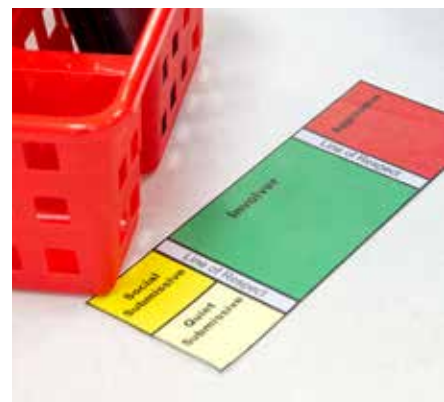
“When you’re talking about middle school kids nowadays, they are used to being assigned group work, but they are not used to or equipped for collaboration,” Smith said. “They are used to

individual work. They are used to testing. They are used to one-to-one devices. When they are put into groups, they are not given any training in how to work well together. Most group experiences result in mediocre work, at best, and frustration rather than collaboration.”

The combination of the Microburst Learning program and Pitsco’s Expeditions provides a unique opportunity to change the lives of students. The Expeditions require students to collaborate, communicate, and solve problems together. The soft skills program gives them the tools and training to do this successfully. Together, the programs foster a classroom culture that can lead to career-defining moments that teachers rarely experience.

The first day when Smith listened to Jimmy explain how these new lessons and experiences in the STEM lab could change his whole future, she felt as if she’d reached the summit. “As soon as school was out, I walked up to my principal, Ms. Casey, and said, ‘I quit.’ Looking completely shocked, she said, ‘What are you talking about?’ I said, ‘Today’s the day. I’m done. I cannot teach another day because I’ve been to the mountaintop. It can’t get any better than hearing a sixth grader explain how soft skills are changing his life.’” P

Tucker Creek Middle School students collaborate, at left and below, on a Microburst Learning EmployABILITY activity that helps them improve teamwork and communication skills.



PARTNERS IN SOFT SKILLS DEVELOPMENT

Microburst Learning and Pitsco Education join forces to teach employability skills, improve social and emotional learning

Pitsco Education and Microburst Learning have partnered around their shared goal of teaching students how to employ essential 21st-century soft skills such as conflict resolution, communication, and collaboration.

The companies’ solutions will be paired primarily in secondary STEM labs, where they met with success on a trial basis last school year.

“Imagine a classroom where students collaborate as team members to accomplish assignments and projects while demonstrating respect for different views and resolving conflicts in a responsible manner,” said Microburst Learning CEO Jordy Johnson. “Students learn and demonstrate appropriate behaviors and skills needed in life and the world of work while being fully engaged in hands-on STEM education. This

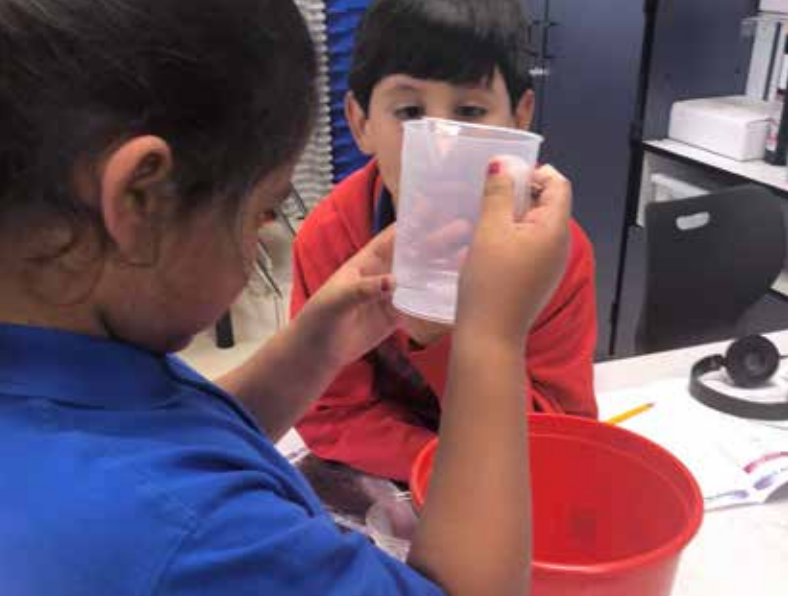
is the synergy conceived by the newly formed Pitsco-Microburst Learning partnership.”

Pitsco Vice President of Education Matt Frankenbery said that Pitsco’s framework for delivery of hands-on curriculum has inherently allowed for application of soft skills for decades, but the addition of Microburst Learning’s EmployABILITY Soft Skills Program intentionally embeds a deeper understanding of the transferable skills essential to success in the workplace of the future.

“Collaboration, problem-solving, and respect for others’ opinions are just a few of the key skills that students must practice in preparation for careers of the future. And what better context for that than during practical application of cross-curricular STEM concepts?” Frankenbery said. P

Read the full article now!





By Tom Farmer

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HANDS-ON **STREAM** MISSIONS HELP BOOST SCIENCE SCORES

STAAR pass rate for fifth graders in San Diego, TX, shoots up 23 percent

The rate of fifth graders passing the State of Texas Assessments of Academic Readiness (STAAR) science test shot up 23 percent over the previous year to 66 percent.

Who says homework isn't effective?

Amanda Morgan, the STEM coordinator for San Diego (TX) ISD, did her homework researching the Pitsco Education STREAM Missions, ensuring that the hands-on, standards-based content would apply the concepts fifth graders were learning in science.

"I took our year-at-a-glance document, which is our scope and sequence, and aligned the Missions with what the students were studying in the classroom," said Morgan. "This led to the lab being an extension of the classroom learning as opposed to a stand-alone curriculum."

A full year of STREAM Missions exploration and discovery in topics such as ecosystems, energy, and weather proved to be the perfect academic boost to core science instruction at Collins-Parr Elementary School during the 2017-18 school year. The rate of fifth graders passing the State of Texas Assessments of Academic Readiness (STAAR) science test shot up 23 percent over the previous year to 66 percent.


The significant improvement in science was particularly noticeable. "Scores in most other areas stayed about the same as the previous year," Morgan said. "Science is the only area which demonstrated significant growth."

Two Pitsco STEM labs – STREAM Missions for Grades 3-5 and STEM Units for Grades K-2 – were the cornerstone additions made

possible through a four-year, \$5 million Texas Title I Priority Schools (TTIPS) grant awarded in 2016. The district also added a family STEM night, STEM Saturdays, and STEM camps that utilize Pitsco materials. The experiential STEM curriculum helps students develop a foundation of lifelong, transferable 21st-century skills such as critical thinking, collaboration, career exploration, and problem-solving.

"We have seen the excitement from students and parents," Morgan said. "We will be increasing our STEM presence in our school as well as at the junior high school and high school."

The STEM success didn't stop when school let out in early June. The district hosted 21 STEM summer camps for elementary school students at all ability levels. "While our STEM camps have attracted our higher-performing students," Morgan said, "we have also seen many of our at-risk students enjoy camps."

Superintendent Dr. Samuel Bueno was already a believer in the Pitsco labs before the stellar test results arrived in June. "I have not walked into the STEM lab, not once, where the kids aren't just completely immersed and operating at a high level of engagement. . . . There's an authentic play going on and they're learning. There's a lot of dialogue." 



Pat Forbes

Education Liaison | patforbes@pitsco.com

FUNDING FOR YOUR WORK READINESS AIMS

In today's labor market, large corporations have a vested interest in work readiness and career education. This places emphasis on the purpose and significance of curricula. It is vital that the meaning of a course of study puts the student in touch with basic principles that guide toward a necessary sense of direction.

Pitsco has encompassed the vitality of this readiness need through the introduction of KUBO through the TETRIX® robotics programs for hands-on education. This STEM revolution has sewn together classrooms eager to encourage a growing student body of young people to embark on the technologies they will confront.

Education entities will face a costlier challenge to add all the needed elements. There are grant sources with specific ideas regarding their choice of a worthy educational objective. STEM education is one of those specific objectives in addition to realities of the robotics emphasis. Some of the grant sources available for approachability might include **ExxonMobil Foundation**, which places encouragement of diligent pursuit of math and science courses.

Corporate.exxonmobil.com/en/community/math-and-science

Or perhaps an application could be sent to the **Grow Rural Education**

Program from **America's Farmers**, which is an ardent supporter of STEM education and awards more than \$2 million annually in amounts from \$10,000 or \$25,000 per gift.

Americasfarmers.com/grow-rural-education

The **Walton Family Foundation** has long been a supporter the arduous task of improving K-12 education.

Waltonfamilyfoundation.org

GE Foundation has sought to bring innovative learning through STEM education.

Gesustainability.com/enabling-progress/ge-foundation/

In discussing educational gifts, the **Annenberg Foundation** gave millions for school reform. Their Annenberg Challenge in 1993 was one of the largest gifts in philanthropic history.

Annenberg.org/who-we-are

Charles Stewart Mott Foundation desires to expand learning opportunities and elicits support for children, particularly those from low and moderate-income communities.

Mott.org/work/grantseekers

The **Asbury-Warren Foundation** is most prominent in Appalachia.

Fdnweb.org/asburywarren

Grant Application DEADLINES

SEPTEMBER

27

Northrup Grumman Foundation

Funds initiatives that address education-related programs that promote the advancement of STEM learning.

Northropgrumman.com/CorporateResponsibility/CorporateCitizenship/Philanthropy/Pages/Matching.aspx

28

Lowe's Toolbox

Encourages stimulation for the creation a singular project.

Toolboxforeducation.com

October

1

Toshiba Small Grants (K-5)

Supports programs that stimulate interest in math and science.

Toshiba.com/taf/k5.jsp

The beat goes on with Brinker International Initiative, which supports STEM and seeks to ensure Hispanic/Latino participation in STEM curriculum.

Brinkereducationinitiative.org

The hands-on element is appealing to the **Geraldine R. Dodge Foundation** as they support innovative instruction for underserved students.

Grdodge.org

The future recipients of the learning process will need possible leadership skills, and the **Annie E. Casey Foundation** is an avid supporter of popular leadership development in addition to other educational goals.


Aecf.org/work/leadership-development

For today's teachers and students, the rhythm is a solid beat toward the **Pitsco** offerings for hands-on education that will steer the student toward the realities of future learning venues. **P**

Proximity to Houston, one of the leading health care regions in the world, means health care education also is a priority. "It connects back to the STREAM lab because there are Missions related to that line of work," Hill said. "We have a thriving health science program that is growing exponentially. . . . It's very refreshing to see that we have such a large number of students who are now interested in the health sciences pathway at the high school because there will be a growing need for that."

Well-thought-out changes are in the works in Sweeny, Texas. More and

deeper classroom experiences will lead to students making better choices about their future.

"At the end of the day, our sole purpose is to show that we're preparing students to create their future, that we're allowing them to engage in learning experiences that will help them reach their greatest potential," Hill said. "And how do we ensure that we are preparing this student, this Gen Z student, to create their future? The types of learning design models that we use have to be tailored to these students that we serve." 

By Cody White

Communications Assistant | cwhite@pitsco.com

THE STUDENT PERSPECTIVE

Speaking with students is another essential method for gauging our curricula's impact. We recently spoke with Kayla, a Bertie Middle School student. After being exposed to STEM through the Expeditions, Kayla – who is an ambitious, big-picture thinker – had no doubts about its value.


"STEM is beneficial for everybody, not even just kids," she said. "STEM should be a worldwide process where everybody gets a bit of it wherever they are."

Kayla's enthusiasm is fired by both personal and altruistic reasons. She

credits the Expeditions with opening her up to the field of science, and she is contemplating careers that combine science and law. The Expeditions, she says, have opened her eyes "to new experiences and new opportunities to help make the world a better place."

Putting more real-world science knowledge in the hands of people around the world could reap great benefits. After learning the process of water purification in an Expedition, she reflected that this knowledge could benefit citizens of other countries where clean water isn't readily available.

Perhaps Kayla is onto something. But she also directly observed benefit in the effect of the Expeditions on classmates.

"I feel like my fellow students appreciated getting a new vibe, learning what STEM is and being pushed toward the right career path. . . . It has helped them believe in the future and believe in themselves. And it also taught some of them discipline – basic stuff like cleaning up after your Expedition, making sure you turn in your work on time, being responsible for your own self." 



UPCOMING EVENTS

Pitsco's family of companies will be represented at education shows and conferences across the world in the coming months. If you attend any of these events, stop by the Pitsco booth. Our representatives look forward to meeting you!

October

- 7-9** International STEM Education Association, Branson, MO
- 23-24** North Carolina Association for Biomedical Research, Raleigh, NC

November

- 1-3** Conference for the Advancement of Science Teaching, Fort Worth, TX
- 7-9** Worlddidac, Bern, Switzerland
- 16-18** World Robot Olympiad, Thailand
- 28-Dec. 1** Association for Career & Technical Education, San Antonio, TX

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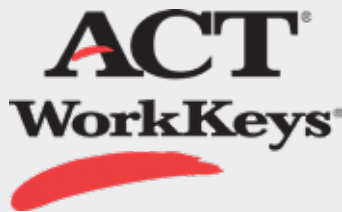


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"In the workplace, we are really struggling to find people who have the necessary skill level in workplace graphics – reading charts, maps, and graphs. These Expeditions are really, really teaching that skill. There's a direct link in what students are going to find in those Expeditions and what they're going to find on the job."

– Mary Paramore, ACT certified profiler



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