THE PITSCO

NETWORK

WHAT TYPE OF EDUCATOR ARE YOU?

From Prudent Planner to Technology Trailblazer, you can make a positive impact through STEM

WHAT'S YOUR TEACHING TYPE?

Are you the Prudent Planner with your whole year planned out and every item in your room organized and color coded? Or maybe you're more of a Coordinator of Chaos, creating amazing learning opportunities for your students all aboard the hot mess express?

FIND YOUR TYPE

MERRY MAKER

YES!

Have you started a makerspace?

INSPIRING INNOVATOR

Do you love brainstorming new ideas?

YES!

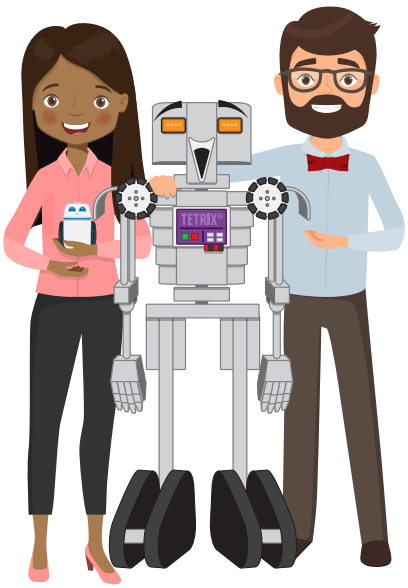
Do you control your kitchen appliances with your phone?

YES!

Is your classroom a thing of neat and orderly beauty?

YES!

TECHNOLOGY TRAILBLAZER



YES!

Are you OK with a mess as long as learning is involved?

PRUDENT PLANNER

COORDINATOR OF CHAOS

CONTENTS

Features

On the cover *– Art by Jason Redd and design by Jodie Sutton*

Departments/Columns

online

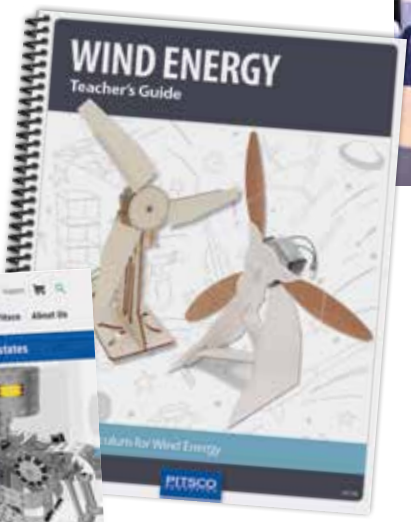
From inspiration to transformation

Explore Pitsco's engaging hands-on programs and curriculum that can change your students' future!

Pitsco.com/Our-Programs

10
Small district, big experiences

16
Opportunity in Northwest Arkansas



4
Free enhanced teacher guides

8
Pitsco.com/TETRIX

26
Permian Basin museum aims to inspire

THE PITSCO NETWORK

Volume 20, No. 2 | November-December 2018

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

CEO:
Harvey Dean, hdean@pitsco.com

President:
Lisa Paterni, lpaterni@pitsco.com

Executive VP & Chief Strategy Officer:
Stephan Turnipseed, sturnipseed@pitsco.com

Vice President, Education & Executive Editor:
Matt Frankenbery, mfrankenbery@pitsco.com

Director of Sales:
Eric Simmons, esimmons@pitsco.com

Communications Manager & Editor:
Tom Farmer, tfarmer@pitsco.com

Graphic Designer:
Jodie Sutton, jsutton@pitsco.com

The Pitsco Network is published by Pitsco, Inc., four times each year (Aug.-Oct., Nov.-Dec., Jan.-Feb, March-May). Information and articles are geared to Pitsco Education facilitators and administrators.

Article submissions and story ideas:
Story ideas, suggestions, and full-text submissions are welcome. Please send them to Editor Tom Farmer at tfarmer@pitsco.com or P.O. Box 1708, Pittsburg, KS 66762.

Change of address:
To report a change of address or name of recipient, contact Editor Tom Farmer at tfarmer@pitsco.com or P.O. Box 1708, Pittsburg, KS 66762.

2018 APEX® AWARDS FOR PUBLICATION EXCELLENCE

PITSCO EDUCATION

From the Executive Editor

If innovation were one size fits all, it wouldn't be innovation.

It takes all types of educators to make our learning landscape vibrant, and Pitsco is lucky to connect with a network of outside-the-box teachers, administrators, and coordinators. In this issue of *The Pitsco Network*, you'll meet several individuals who, each in their own way, are pushing the boundaries to bring transformative learning experiences to young people.

Teaching Type Quiz

Want to know what Teaching Type you are? Take the quick quiz at Pitsco.com/FindYourType to find out. My result was Coordinator of Chaos, by the way, and the description fit my classroom teaching style to a T, though Prudent Planner would have been a close second.

- Maybe those two types also go together in veteran teacher Byron Clemsen of John Handley High School in Winchester, Virginia. His **Prudent Planner** nature helps him maximize the value of the multifaceted, hands-on projects such as the CO_2 dragsters that he uses to teach his students about careers.
- **Technology Trailblazer** Rick Neal, superintendent of schools at Pea Ridge, Arkansas, is using robotics to bring valuable programming and computer science skills to even the youngest students in his district.
- **Inspiring Innovator** Sally Coughlin runs the Fiddle Brickers STEM activity center in Brooklyn, Michigan. There, she pushes the wisdom that perseverance through failure is essential to success.
- In Fredonia, Kansas, this same philosophy is held by another **Inspiring Innovator**, K-12 Lead Teacher Brian Houghton. He uses his penchant for big-picture thinking to assist his district in continually living up to its official designation as a Kansas Innovative School District.
- In Sweeny, Texas, **Coordinator of Chaos** Matthew Way oversees 1,000 K-5 students each year as they pass through his lab. You'll be inspired by his takeaway: every child is a genius.
- As director of education at the Permian Basin Petroleum Museum in Midland, Texas, Mara Bland is a **Merry Maker**. And good thing too! Learn how the museum uses hands-on Pitsco kits and makerspaces to spread STEM learning in its community.

Of course, these individuals thrive because their colleagues, districts, and organizations also prioritize innovative student learning. Regardless of your style, Pitsco values what you do for students.

Matt Frankenbery

Matt Frankenbery
Vice President, Education & Executive Editor

SySTEM Alert!
Tomorrow is almost here

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. A corresponding knowledge quiz for use in your classroom is available online as well.

In this issue:

DRONE PATROL

January 15, 2009. Less than two minutes after takeoff, US Airways Flight 1549 suffered a catastrophic mid-air collision with a flock of Canada geese. Both of the passenger jet's engines were destroyed. There was no time to return to the airport.

In an amazing feat of skill, pilot Chesley Sullenberger landed the damaged plane on the surface of the Hudson River. All passengers survived.

This might seem like a rare occurrence, but bird strikes happen more often than you probably think. In fact, the first bird strike happened to the Wright Brothers in 1905! Though they are rarely emergency situations, Flight 1549 proved they can be. How can we prevent another disaster such as this?

Engineers at Caltech recently tested an ingenious idea to keep birds away from in-flight planes.

DISCOVER:

- Applications for drone technology.
- The ins and outs of algorithms.
- The strange mechanics of bird flocks.

Find full issues online at Pitsco.com/Experience-Pitsco/Resources/Publications

Visit now!

BATTERY INNOVATION IS CHILD'S PLAY . . . LITERALLY!

A popular (and fascinating) home science experiment has inspired an innovation that could make us all a little safer.

Lithium-ion batteries, used widely in applications from cell phones to electronic cars, are a fire hazard. They have led to personal injury, garbage truck fires, and even a tragic airplane crash. Unfortunately, the structure of the batteries has a critical weakness.

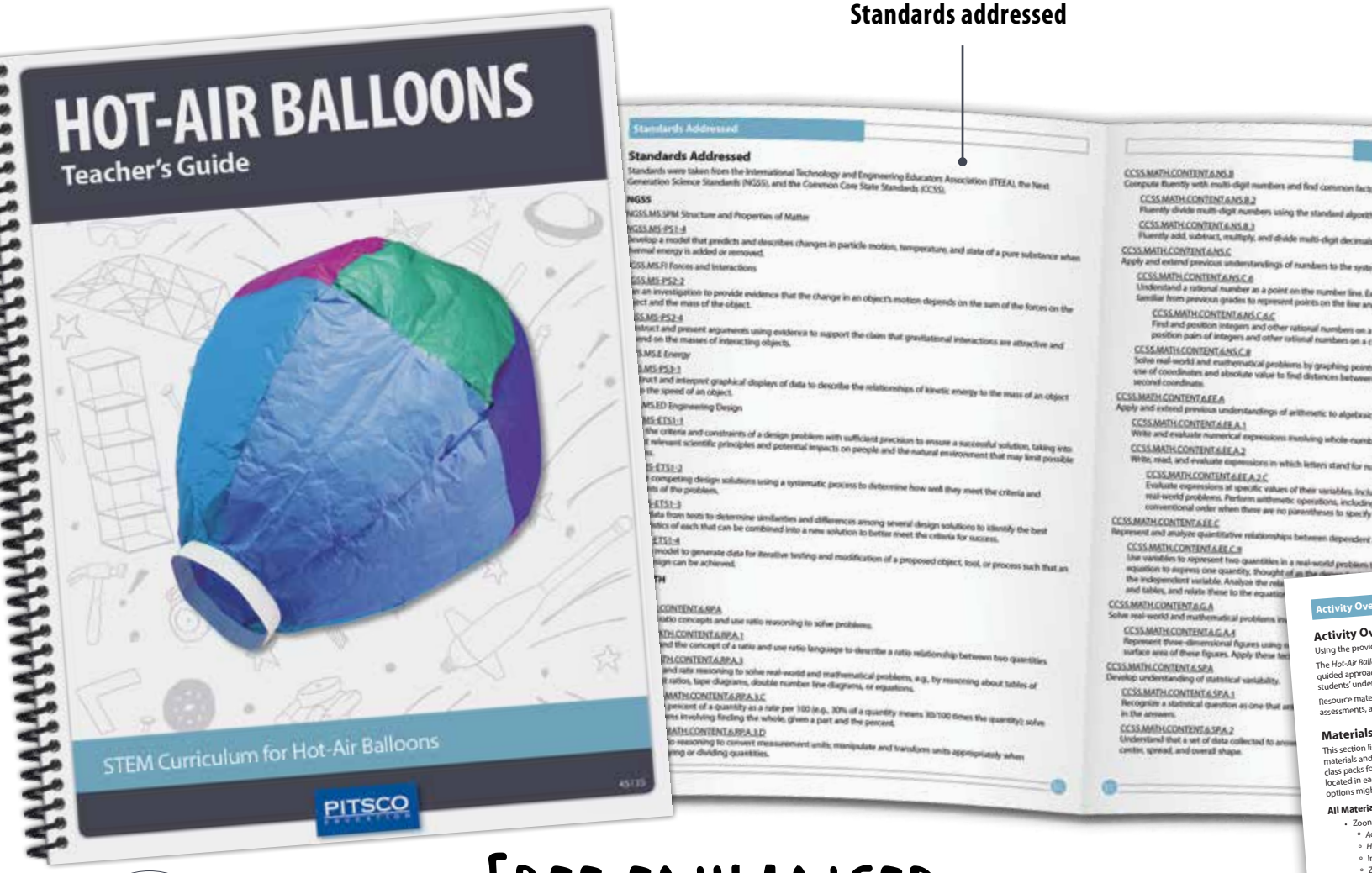
Researcher Gabriel Veith had a bolt of inspiration when playing with his children. The family was using oobleck, a homemade concoction with some perplexing properties.

LEARN ABOUT:

- The workings of lithium-ion batteries.
- The flow of current.
- How to make a non-Newtonian fluid.

NANOCRYSTALS – COMING TO A SCREEN NEAR YOU?

Quantum dots are a current frontier in nanotechnology. Laboratories around the world are scrambling to bring applications to market, from display screens to photovoltaic (solar) devices. What makes these tiny crystals so intriguing to developers? The answer demonstrates differences between the operation of our familiar everyday world and the mysterious world found at extremely small scales.



FREE ENHANCED TEACHER GUIDES HAVE IT ALL

By Terry Carter
Curriculum Specialist
tcarter@pitsco.com

From standards addressed to age-appropriate activities, every teaching type is covered

From Prudent Planners to Coordinators of Chaos and all teaching types in between, a getting started package from Pitsco is a great way to let students engage in hands-on learning while making connections to the standards that are being presented. I remember early in my teaching career when I received my first getting started class pack for hot-air balloons. Although I had requested the pack with a certain set of standards to teach in mind, the teacher guide was very helpful in providing many other suggestions and ideas. The standards addressed through the activities are listed for NGSS (Next Generation Science Standards), CCSS.MATH (Common Core State Standards for math), and ITEEA (International Technology and Engineering Educators Association).

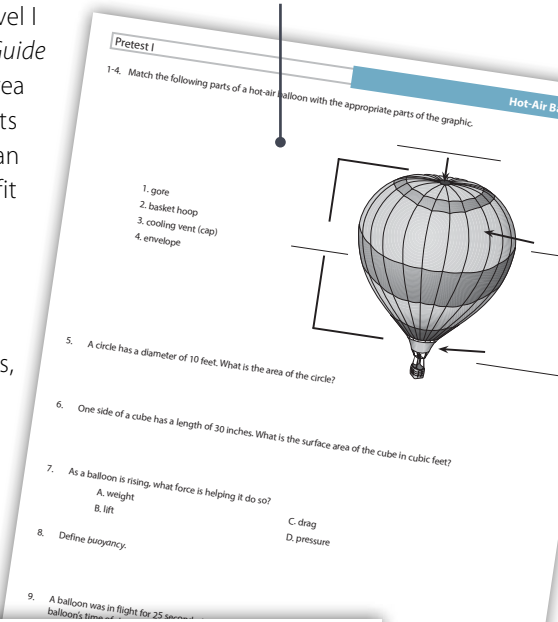
Pitsco has now made some teacher guides available as a free download. These online versions have some enhancements and updates from the original printed guides. For example, the new *Hot-Air Balloons Teacher's Guide* has an interactive table of contents, links to materials and equipment that can easily be purchased, iconic identifiers where the 4Cs (communication, collaboration, critical thinking,

and creativity) can be applied in activities, links to printable documents for students, suggestions for additional lessons, related career links with videos, pre- and posttest assessments, and a myriad of other resources.

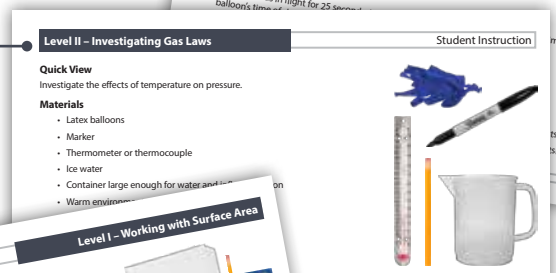
So, if you have ever seen a product in the catalog or in the online store and wondered how you can use it in your classroom, see if there is a free enhanced teacher's guide download available. In each guide, you can peruse at least six activities and two engineering challenges. They are divided into two levels of difficulty that range from middle school to high school. For example, a Level I activity in the *Hot-Air Balloons Teacher's Guide* has students working with the surface area of balloons. A Level II activity has students investigating gas laws. These activities can be completed as written or modified to fit your classroom.

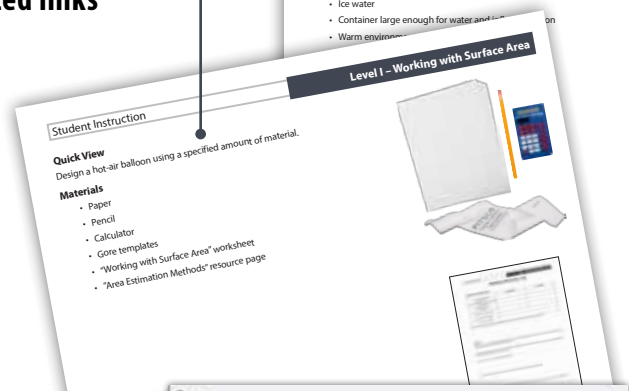
Merry Makers will find fun hands-on activities, Technology Trailblazers will implement ways to use the student materials within their own digital systems, Inspiring Innovators will generate many opportunities to challenge students, Prudent Planners will find the organization refreshing, and Coordinators of Chaos will want to have the students do everything! (P)

Pretest

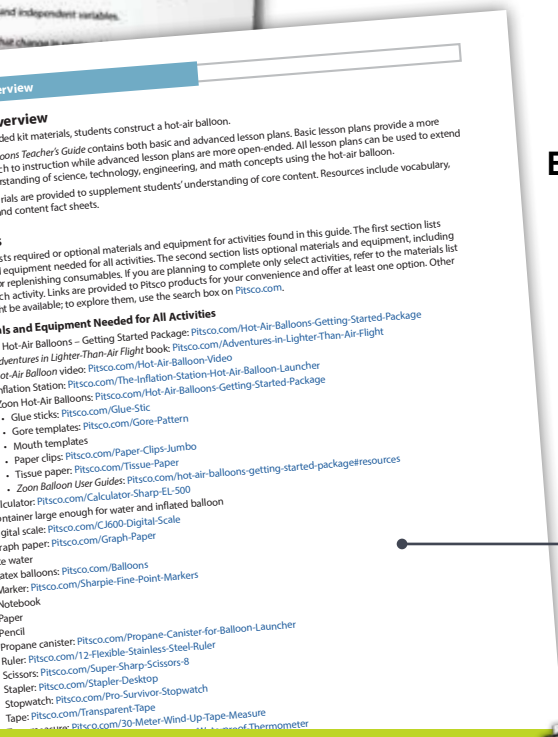


Two levels of difficulty





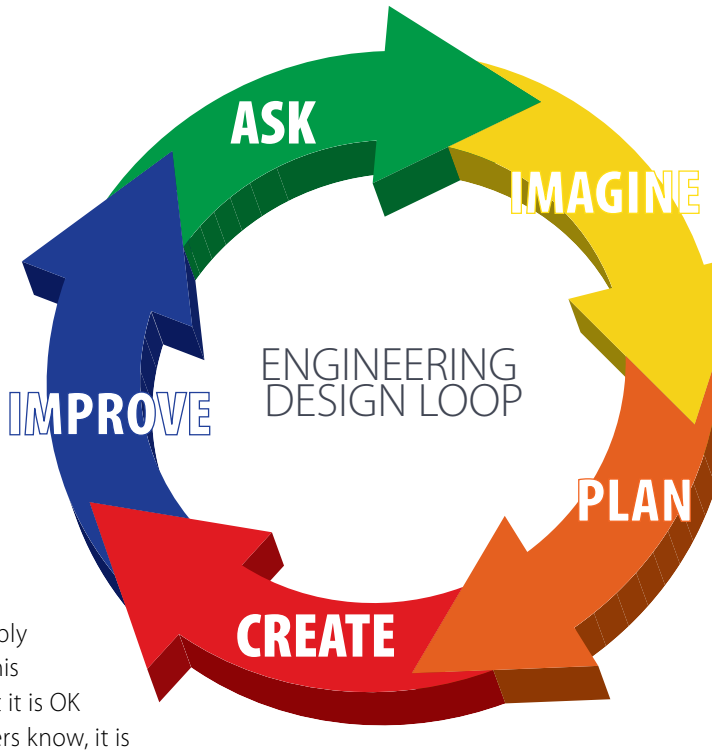
Enhanced links



Free downloads are available in the Resources section of the product detail pages on the web!

By Anna Gudde
Marketing Products Coordinator
agudde@pitsco.com

Reimagining products – WE REDESIGN WITH TEACHERS, STUDENTS IN MIND

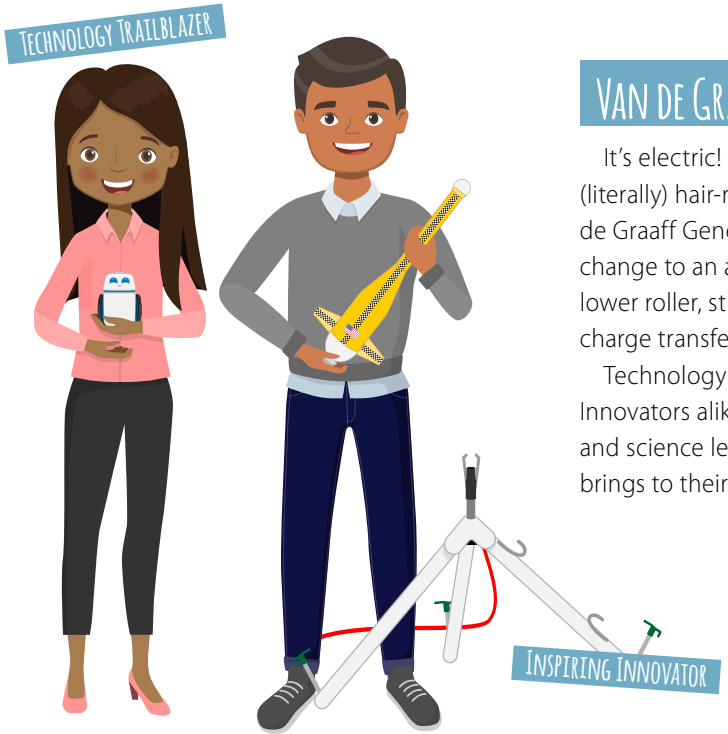


Improving customer experience has always been our mainstay, and in order to do that we have to drill down to the functionality and performance of our STEM products. Often, there is room for improvement, which initiates our reimagination process.

Similar to the engineering design process that you see in classrooms around the globe, our reimagination process begins with the Pitsco Product Development team, who first identifies opportunities for improvement. Next, they move on to the brainstorming – or as we call it at Pitsco, ideation – portion. This is the fun part, in which there are no limits to the discussion and all ideas are welcome.

Further on in the process we decide on a plan of action, and a prototype is created by our Research and Development team. This leads to testing and possibly a redesign. The glory of this process is in knowing that it is OK to fail. In fact, as all teachers know, it is through failure that we learn from our mistakes and have the opportunity to improve.

All teachers, regardless of their teaching type, understand that failure is a necessary part of learning. And just like all our other products, these reimagined products will definitely speak to one or more specific teaching types. So whether you are a Prudent Planner, Merry Maker, Technology Trailblazer, Inspiring Innovator, or Coordinator of Chaos, one of these recently redesigned products is for you!



VAN DE GRAAFF GENERATOR

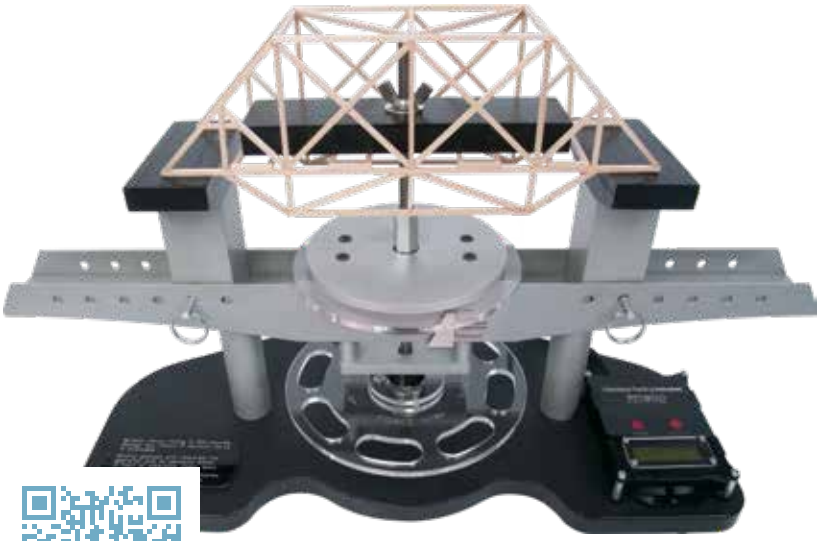
It's electric! We added more spark to the (literally) hair-raising mechanics of the Van de Graaff Generator. With our recent material change to an aluminum upper roller and Teflon lower roller, students can observe electrostatic charge transfer in no time!

Technology Trailblazers and Inspiring Innovators alike will appreciate the technology and science lessons the Van de Graaff Generator brings to their classrooms.

Structures Testing Instrument

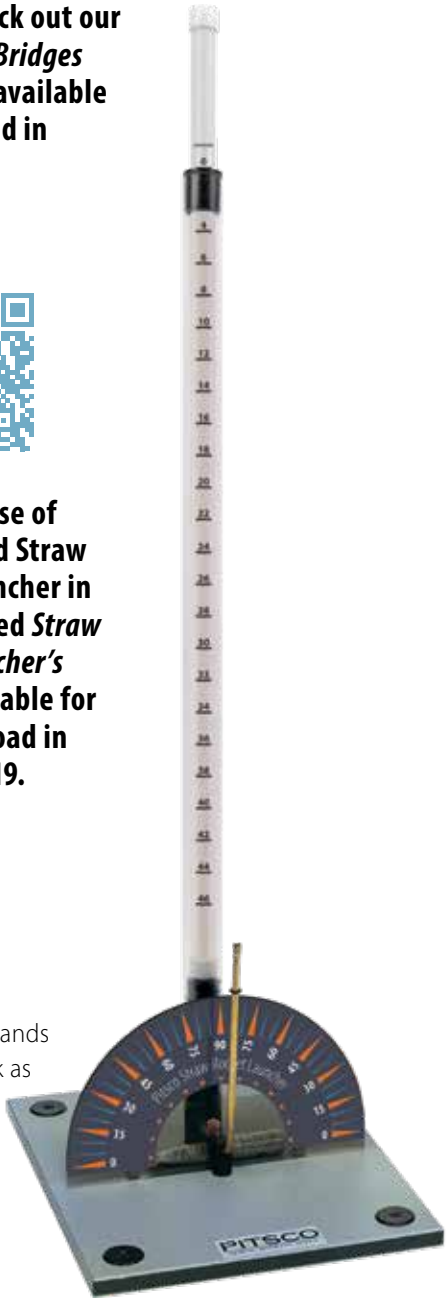
Testing, 1-2-3! Constructing towers and bridges is often a staple in STEM classrooms – and don't forget the testing! Our Structures Testing Instrument (STI) is one of our most popular pieces of classroom equipment. Attach a tower or bridge to the STI, apply pressure by turning the turn-force wheel, and test until the first sign of structural damage appears. The STI produces load readings at every level, which makes it easy for students to track their progress! The STI was recently updated to maintain the same performance but at a lower cost to our customers.

The hands-on learning – as well as the potential for a bit of a mess when the structures fail – make constructing and testing structures the perfect activity for the classroom of a Merry Maker or Coordinator of Chaos. Look for the latest version in our 2019 *Big Book* catalog!



Need more activities for your Structures Testing Instrument? Check out our enhanced *Balsa Bridges Teacher's Guide*, available for free download in January 2019.

Get a glimpse of the updated Straw Rocket Launcher in our enhanced *Straw Rockets Teacher's Guide*, available for free download in January 2019.



Straw Rocket Launcher

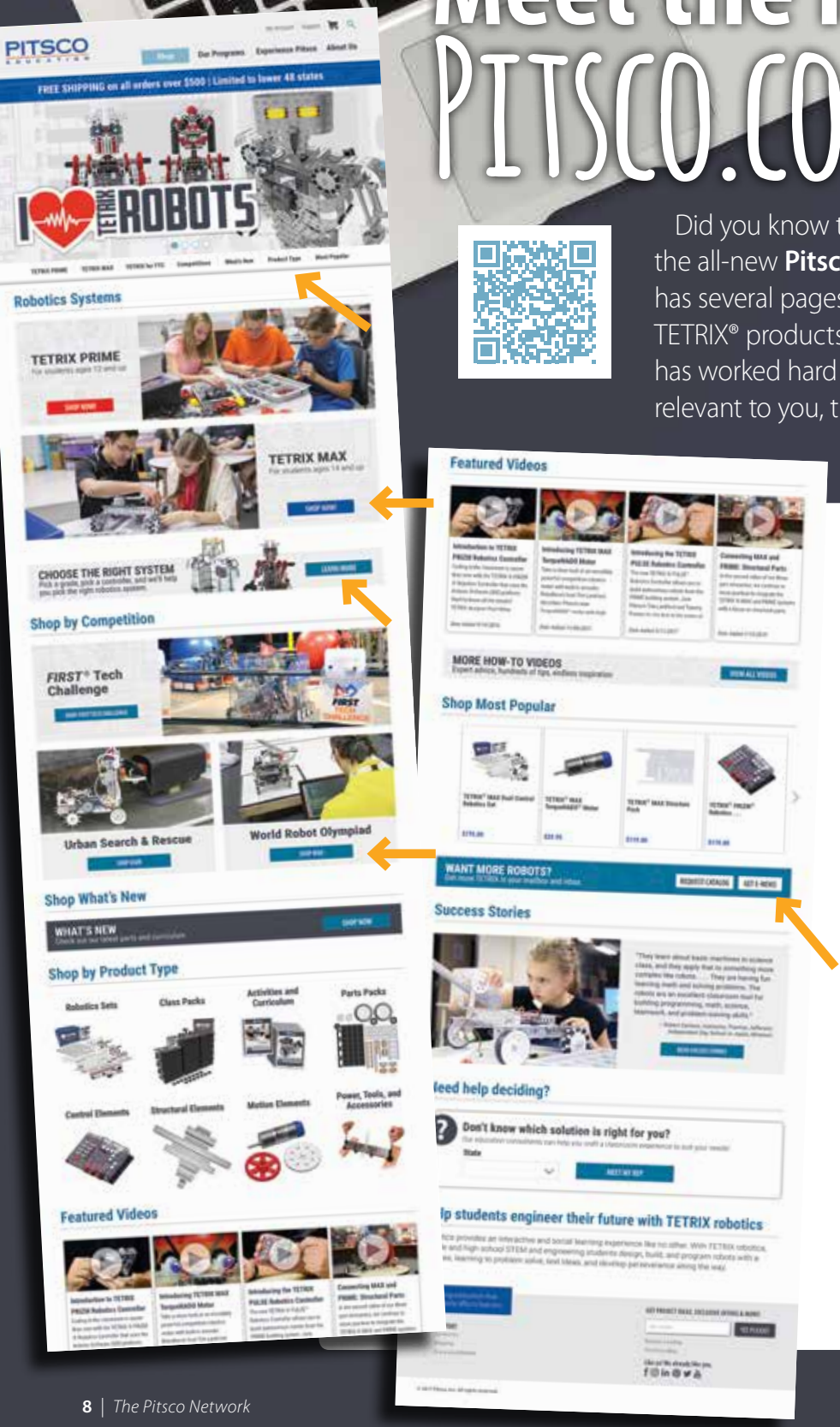
Blast off! One of Pitsco's most popular products just got a new look! Our Straw Rocket Launcher was released almost 20 years ago and has been in the hands of hundreds of thousands of students around the world! The Straw Rocket Launcher recently received an updated look as well as a new (and economical) way of packaging – an improvement all around.

Obviously, Merry Makers will love the creative aspect of straw rockets. But this activity is also great for a Prudent Planner teacher who will appreciate how the progressive nature of planning, measuring, creating, launching, and redesigning straw rockets fits nicely into their schedules. Add to that the inherent math and science lessons, and it's no wonder this is one of our most popular products.

By Corinne Pachl
Technical Editor | cpachl@pitsco.com

Meet the new PITSCO.COM/TETRIX

Did you know that TETRIXrobotics.com has shifted into the all-new **Pitsco.com/TETRIX**? It's true! Pitsco.com now has several pages and features dedicated specifically to TETRIX® products and curriculum. Pitsco's marketing team has worked hard to make the site more user-friendly and relevant to you, the TETRIX user!



PITSCO.COM/TETRIX PAGE

- This is the main webpage for all things TETRIX.
- Here, you can use the handy navigation bar to quickly shop for your robotics system of choice, find parts and information for your competition robot, and discover what's new! The modern interface makes it easy to browse and find what you're looking for – product types and most popular items are updated periodically – and featured videos and success stories are readily available for you to view.
- Buttons take you directly to videos, catalogs, or e-news subscriptions specific to TETRIX.
- As always, if you need more help deciding which robotics solution is right for you, you can chat online with our staff or use the link at the bottom of the page to get in touch with our representatives.

TETRIX PRIME AND MAX MAIN PAGES

- We've included more content relevant to you beyond just the products themselves (but you can find those here as well!).
- There's a guide to help you pick your robotics solution.
- Click and explore to see how PRIME is simple, easy to use, and versatile.
- Discover how MAX is real world, comprehensive, and robust.
- On the MAX page, you can even shop by your robotics competition of choice!

COMPETITION PAGES

- If you're on a robotics team for *FIRST*® Tech Challenge, SkillsUSA® Robotics: Urban Search & Rescue, or World Robot Olympiad, we've got a place just for you too! These pages are dedicated to your competition of choice.
- Find any applicable discounts for your team.
- Scroll down to see the robotics set tailored to your competition.
- Discover elements for building, motion, and more that are relevant to the current season's game.
- We've also provided links to resources such as the competition's rules, standards, and guides.

PRODUCT PAGES

- We've loaded up and revamped each individual product page!
- Just like the main TETRIX page, we've added a navigation bar so you can learn about the item more easily.
- See what you'll get alongside the product (does it come with all the wires and plugs you need?) as well as specific attributes for the product (how big is it and what is it made of?).
- It's easy to find downloads and resources – CAD files, software, activity guides, challenge samples, and more are available at the click of a button.
- Watch videos applicable to the element you're viewing and find additional related products that might be useful.

VIDEO GALLERY

- The TETRIX video gallery has received a facelift as well.
- We added rotating banners to the top of the gallery so you can more easily find the videos you'd like to watch.
- On individual video pages, we've added links to the featured products from the video. This means you can jump directly to the product in our shop – buying the displayed product is now a snap!

All in all, we hope the new **Pitsco.com/TETRIX** is more informative, more useful, and more fun for you. Build some robots and come back and see us!


CAN,
SHOULD,
BRAVE

By Cody White
Communications Assistant
cwhite@pitsco.com

Small district, big experiences

Fredonia (KS) USD earns spot in coalition for innovation, implements Pitsco STEM lab

FREDONIA, KS – Every September, in the small town of Fredonia, Kansas, the Wilson County Old Iron Club holds a festival celebrating the region's agricultural and mining heritage: Old Iron Days. Under the sprawling Kansas sky, antique equipment is fired up for demonstration, collectors show off their rigs in the tractor pull competition, and homemade ice cream and pie are sold at the food stands. Take a tour through the town, and this connection to the past is still plain to see. But Fredonia is not immune to the forces of change and uncertainty felt around the globe, nor is it passive in responding to them. And recently, with the support of the state of Kansas, this little town has become a voice for the future.

"We have problems in this world that need a lot of critical thinking to solve. We've tried solutions that don't work. We need kids who are going to be equipped to try things that are outside the box, that don't come out of the textbook."

These are the words of Brian Houghton, K-12 lead teacher in Fredonia, but they voice a mind-set that drives the district and recently led to its admittance into Kansas's Coalition of Innovative School Districts. Membership in the state's exclusive program is not only a recognition of creativity and forward thinking but also a weight of responsibility. (See related sidebar.)

The program gives Fredonia access to a professional learning community composed of other innovative, experimental districts within Kansas. Certain freedoms are granted along with the expectation that the school will use this opportunity to push the boundaries of educational thought. In Fredonia, this has meant tirelessly searching for ways to provide students with transformative, exploratory experiences.

PATHS OF EXPLORATION

"We want our kids to have experiences. Over and over again, experiences. We focus a lot on growth mind-set," said Jamie Camacho, principal of the Junior/Senior High School. These experiences range from in-school lessons at the project-based learning lab in the high school to organized tours of college, university, and trade school campuses. This starts in seventh grade with a visit to a two-year college and continues through high school until students have visited up to eight post-secondary schools.

The district has also made numerous community partnerships allowing students at the high school level to experience careers directly. Recently, Camacho was approached by a student who had been placed at TCI, a local metal fabrication company. "He wants to be a welder. He'd been on the job for two days out there, and he said he learned to TIG weld. Literally on day two they have a welder in his hand!"

Or another example: a student interning at the local hospital through the Fredonia Medical Academy

In the *Dynamic Disasters* Expedition, students not only learn about the cause and impact of natural disasters, they also try their hands at building disaster-resistant structures.

summer program was allowed to draw blood from a patient. Camacho personally went to witness her student's big moment. (The medical profession is deemed one of the most in-demand jobs in Southeast Kansas, and the Academy provides many such relevant experiences with nurses, X-ray technicians, anesthesiologists, and more.)

THE FOUNDATION FOR INNOVATION

With the addition of Pitsco STEM Expeditions® in 2017, students are receiving exposure to career experiences even before high school. The Expeditions are utilized in science class at the seventh- and eighth-grade levels. For this reason, every student passing through those grades experiences the curriculum. This is by design as the STEM Expeditions are an ideal lead-in to the exploratory approach at the high school level.

Core science concepts are brought to life through Essential Questions and projects that emphasize career connections, engineering, and hands-on problem-solving. The Expeditions were implemented as part of the STEM plan the district outlined when applying for the Coalition of Innovative Schools.

"Pitsco poses students with a problem, if you will," explained Camacho, "and they are set free to find a solution. They're not told what it is or how to get there. For the kids who find it aggravating, good! Life is full of problems that we don't have solutions to. And for the kids who find that exhilarating, good! We'll need them to go out there, excited about solving the problems we don't even know exist today."

For science teacher Regina Thompson, adjusting to such a student-driven approach has been a rewarding challenge. "One of the things we have discussed [in class] is becoming thinkers and problem solvers. This has been really good for them."

Principal Camacho described Thompson as "truly a teacher" and said she enjoys watching her interactions with students who call on her for help. Instead of simply handing a solution to the students, Thompson poses questions designed to spur their own thought and inspiration. "The students light up and get back to work," said Camacho. "It is a very different teacher and student dynamic."

LABORATORY FOR LIFE

One feature of the Expeditions that made them attractive to Fredonia officials is the use of student logbooks. The point here is not for students to demonstrate a set of right answers but to demonstrate trial and error.

"It gives them a chance to really dive in and write out their ideas, their hypotheses," said Houghton. "This worked. This didn't work. That kind of thinking about thinking, metacognition

if you will, has been a big push for them. . . . Students learn to explore and not be afraid to fail. They can swing the bat as many times as they need to until they hit the ball, essentially."

Thompson agrees that the Expeditions encourage an unusual amount of open-ended exploration. "The student sets the pace. Yes, there is a hard deadline. But they can spend more time on stuff they are really interested in. They enjoy learning at their own pace."

Persistence in pursuit of solutions is a major part of what makes Fredonia an Innovative School District. It is a value they are clearly sharing with students in hopes that they will become innovators in life.

"A diploma is not a how-to book for success after high school," said Camacho. "You're going to come across problems where you have to be willing to work on solutions. . . . Higher-order thinking, thinking critically, being patient, looking for the answer, compromise – all of those things happen in the classroom, but all of those things also happen in life."

As the class experienced the *Looks Like Rain* Expedition, Hurricane Florence struck the East Coast. Ms. Thompson did not miss an opportunity to make a real-world connection; students created posters about hurricanes that included knowledge from the Expedition.

'A THINK TANK OF CREATIVE MINDS'

When Fredonia Unified School District was accepted into Kansas' prestigious Coalition of Innovative School Districts, it represented a step forward for the district but also a validation of its ambitions.

The program brings together districts recognized for innovation and organizes them into a professional learning community. Forward-thinking districts are able to network and exchange ideas, to become laboratories that test and share approaches and strategies. This is a major perk and has spurred some adventurous ideas at Fredonia, including a robust STEM program.

"I like to think of it as a think tank of creative minds," said Jamie Camacho, principal at Fredonia's Junior/Senior High School. "We share what worked, what didn't work. We share ideas and even documents."

Officials from the schools meet regularly either in person or online in Zoom meetings. Occasionally, they will pay visits to one another's schools to review programs and share thoughts and assistance.

An interesting aspect of this think tank is that the districts vary widely. Fredonia is a 3A school, but the Coalition ranges in schools all the way up to 6A. By and large, the schools are dealing with the same issues, but the specifics are different. Brainstorming with such a mixed group has led to some new perspectives.

In the long run, the Coalition will be successful if it generates ideas that spread beyond its small group.

"We are expanding those new ideas into our redesign," explained Camacho, "and we are encouraging all of the schools in Kansas to start looking at education much differently. It can't look the same way it did in 1950. We're not raising *Leave It to Beaver* anymore."

Jamie Camacho
Principal, Fredonia Junior/ Senior High School

Inspiring Innovator from Fredonia, KS

Houghton fits the bill as he prepares students for a tech-centric future

True innovation is not driven by finding more efficient ways to check boxes. In fact, it can mean getting outside the boxes altogether in pursuit of a vision. Fredonia (KS) USD's elevation into the Coalition of Innovative School Districts was premised upon a vision of the service it could provide for students. K-12 Lead Teacher Brian Houghton is a standard bearer for this vision.

One aspect of being a key player in an innovative district is preparing students for the shifting, multifaceted career landscape that awaits them. Key to this readiness is breaking down subject matter silos and getting students to focus on the big picture. Houghton checks in as an Inspiring Innovator on the Teaching Type chart, and he's the man for the job in Fredonia.

As Houghton puts it, "It's not like you say, 'Oh, now it's time for the science of my day. Oh, now it's time to stop and read, or now I'll stop and do a little bit of math.' It's all part of what we do as human beings, whether you are a teacher, a construction worker, a farmer, or in sales – you're merging all of those things together."

Students who have been taught to think big picture will have an edge in life. Unfortunately, older education models sometimes reinforce those silos, and at times moving forward can be more about checking boxes than meaningful progress. Houghton and the team at Fredonia are working to make a better path.

"Sometimes, it seems like you have to jump through hoops to get to a goal. Why do we do that to kids? We want to remove some of the hoops."

By Tom Farmer
Editor | tfarmer@pitsco.com
@tfarmer

PREP-ING STUDENTS FOR THEIR FUTURE

Pea Ridge School District doing its part to address workforce needs of Fortune 500 companies in Northwest Arkansas

PEA RIDGE, AR – Walmart, Tyson Foods, and J.B. Hunt Transport Services – Fortune 500 companies – are in our backyard and they're growing. Opportunities like this don't come along very often, a fact not lost on Northwest Arkansas Council Chief Operating Officer Mike Harvey. What these corporate giants need, though, that they can't readily buy is a pipeline that yields a steady flow of STEM-trained employees who possess well-developed transferable soft skills.

With a plummeting unemployment rate due to explosive business growth in the region, Northwest Arkansas had an issue when Harvey arrived seven years ago. So, he interviewed hundreds of business leaders to determine their specific needs.

"We're getting feedback from them on, 'What are your issues, the burrs in your saddle, what might they be?' The responses covered everything from community services to education," Harvey said. "With zero surprise to me, the results showed that workforce was issue one."

Instead of turning to only higher education, trade schools, and certification programs, the usual producers of new technology-literate employees, Harvey dug a little deeper, recognizing the lack of a true long-term solution. "What I was more concerned about was the 80-some thousand kids that we've got coming up through the public school systems in Northwest Arkansas and how that could, within a decade or less, really start to put a dent in the issues that we're having," he said.

A TECHNOLOGY TRAILBLAZER

When Harvey went knocking on educators' doors, one of the first to answer was Pea Ridge School District Superintendent Rick Neal, a longtime career and technical education proponent who wanted to make more and better career inroads for the students of his small district in Benton County, just east of the burgeoning Bentonville-Rogers-Springdale area that serves as the hub of business activity and growth. (See Leadership Perspective, page 20.)

"Rick was one of the first ones to step up," Harvey said. "He came to us, as a matter of fact, and PRMBA [Pea Ridge Manufacturing and Business Academy] was conceived through some discussions and hard work between him and Cheryl [Pickering, the Arkansas CTE

coordinator]. They were pretty much the first ones out of the gate, saying that we can put together a careers high school. We can give a kid that academic credential, but we can also give them some walking-around skills once they get out if they don't pursue postsecondary and have to be ready for a job on day one."

Within a few years, PRMBA blossomed at Pea Ridge High School as courses were established in career pathways such as computer science, health care, industrial technology, and marketing and logistics. But upon close inspection, Neal still saw a gap. He realized that getting students exposed to careers and developing communication, critical thinking, collaboration, and creativity (the 4Cs) as soft skills even earlier could yield better results.

After considering multiple options for planting these seeds at the elementary and middle school levels, Neal and his team worked with Pitsco Education over a two-year period to clarify vision and map a custom collection of hands-on K-8 STREAM/STEM programs and curriculum that aligned with standards and laid a foundation for all eight career pathways in PRMBA. The K-8 program was named PREP (Pea Ridge Exploration of Pathways).

"It came to me the second year of PRMBA, when I saw the impact it was making on kids, how interest was driving them to come to school and then to get a job," Neal said. "The personalization of that resonated with us, and I brought our elementary principal in, and I said, 'This is where I'm headed, this is what we're going to do, and I want you to figure out how to personalize learning at the K-2 level.'"

PREP IS A GAME CHANGER

PREP extends from kindergarten through eighth grade this school year with Pitsco's STEM Units, STREAM Missions, and STEM Expeditions®. Intermediate Principal Mindy Bowlin said the hands-on STREAM Missions have been a game changer for her students and teachers alike.

"I think our test scores should go up because of our nonfiction exposure through the journals and things like that that last year I know was not happening to the level it is this year," Bowlin said. "Also, our math and STEM teachers, they meet a lot like a content PLC [professional learning community] and talk about different standards that the STEM curriculum can help support or help introduce."

Every student in the school has STEM every day to ensure they get ample opportunity to develop those 4Cs through hands-on, career-rich experiences. Harvey visited the intermediate STEM labs and observed firsthand students working collaboratively in four-person crews, communicating and creating while employing critical thinking.

"You don't just pick up these skills in a week's time. The longer they're doing it, the better they're going to be for our employer community," Harvey said. "In my interviews with businesses, it was mostly not about specific skills but about getting employees that they could train, somebody that's flexible, somebody that's a learner. That's what you're doing here is creating learners. . . . They're always going to have to be adapting and changing to stay relevant. And so you're giving kids the DNA to be lifelong learners. That more than anything is what's important to employers."

A SOLUTION FOR SMALLER DISTRICTS

Some of the larger school districts in the region – the Big 5 as they are known – have CTE programs targeted at growing the workforce for Walmart, Tyson, J.B. Hunt, and other regional employers, but to adequately address the area's growing need for IT professionals, health care providers, programmers, and technicians,

Mike Harvey
Chief Operating Officer, Northwest Arkansas Council

Officials with Fortune 500 companies Walmart, upper left, and Tyson, below, say workforce development is the number one issue they face in Northwest Arkansas, where both companies are headquartered.

smaller school districts such as Pea Ridge have to add programs such as PREP and PRMBA to do their part.

"There's zero connectivity between most of the rural school districts and the employers that, quite frankly, would hire more of their students than they would out of the Big 5 because most of those kids are going on to postsecondary," Harvey said. "But get out to Gravette or Gentry or somewhere like that and you don't have as high a percentage of the kids going on to something else, and you want to be able to offer those kids some opportunity that's going to pay more than minimum wage when they get out of school."

Principal Bowlin has two daughters, Emory, a sixth grader, and Linley, a second grader, and is personally excited at the prospects of STEM education increasing her children's career opportunities. "Emory needs to know what else is outside of Pea Ridge and what else is outside of her direct family contact. She knows about schools, she knows about Walmart, and my husband is a mechanic so she knows about mechanics. But outside of that, she doesn't know a lot. For her to be able to choose some things later on, it's our responsibility to expose her to that now."

Harvey hopes that more educators, administrators, business leaders, and parents see the benefits of getting education and the business community working hand in hand to ultimately improve the local economy by growing the workforce and preparing students not for jobs that have been growing for the past 25 years but for those coming over the next 25 years.

"We've proven that the schools are good faith partners, and now it's time for the business community to step up. . . . The proof of concept is done," he said. "We can do this. But it needs more industry support, and it needs more employer support for these things to be successful. . . . If we don't adapt and start moving kids into these types of career fields, we're going to be left behind as a region."

Pea Ridge Exploration of Pathways

Pea Ridge Exploration of Pathways (PREP) is a hands-on K-8 STEM initiative that introduces and cultivates employability skills and leads into the district's eight high school career pathways: Agriculture/Animal Science, Culinary Arts/Food Science, Education, Health Care, Industrial Technology, Logistics/Marketing, Manufacturing/Plastic & Metal Fabrication, and Robotics/Coding/Computer Science.

ELEMENTARY (PRIMARY)

STEM Units

- Exploring Air
- Exploring Flight
- Exploring Heated Air
- Exploring Packages
- Exploring Structures for Animals
- Exploring Structures in Literature
- Exploring Transportation

KUBO robotics/coding

ELEMENTARY (INTERMEDIATE)

STREAM Missions

- Adaptations and Survival
- Amazing Body
- Being Healthy
- Body at Work
- Design and Solutions
- Earth Processes
- Ecology, Electricity
- Ecosystems
- Energy
- Energy and Work
- Engineering Structures
- Environment and Climate
- Extreme Earth
- Forces
- Fossils and Survival
- Limited Resources
- Magnetism
- Matter
- Matter Properties
- Motion
- Motion and Force
- Plants
- Science Inquiry
- Science Skills
- Scientific Discovery
- Seasons and Weather
- Simple Machines
- Skyscrapers
- Solar System
- Space Exploration
- Structure and Function
- Technology and Design
- Transportation and Power
- Under the Microscope
- Waves

MIDDLE SCHOOL

STEM Units

- 3-D Printing: Vehicle Engineering
- 3-D Printing: Design Solutions
- Green Machines
- High-Flying Rockets
- TETRIX® Manufacturing

STEM Expeditions®

- A Closer Look
- Ahead of the Game
- Artificial Ecosystems
- Bio Research
- Communications
- Cultivating Our Future
- Design Time
- Dragster Design
- Dynamic Disasters
- Electric Tech
- Everyday Electricity
- Fueling the Future
- Future Footprints
- Growing Up
- Looks Like Rain
- Making Waves
- Mining Mechanics
- Optical Solutions
- Projecting Light
- Rolling Robots
- Safe Food
- Taking Control
- Thermal Physics
- Tower Power

Cultivating Nik's Future

Pea Ridge, AR, students begin weighing career options, opportunities early in STEM

PEA RIDGE, AR – *Cultivating Our Future*, a STEM Expedition® about agricultural food production and sustainable farming, could just as well be titled *Cultivating Nik's Future*. An eighth grader at Pea Ridge Middle School, Nik had been exploring the Expedition for only about a week yet was already observing three- to four-inch growth in radishes he and his partner planted in a hanging glove garden.

Nik is fully engaged and excited not only because he enjoys learning in a hands-on manner but also because he wants to be a farmer. The Pitsco Education STEM Expeditions are Nik's first experience in the school district's new Pea Ridge Exploration of Pathways (PREP) program, which is designed to lead into the Pea Ridge Manufacturing and Business Academy (PRMBA) at the nearby high school. Based on his natural interests and the content-rich Expedition he was exploring, Nik is considering going down an agriculture-, science-, or engineering-focused pathway at the high school.

For now, though, he is totally immersed in *Cultivating Our Future*. He and his family raise chickens and ducks on their 20-acre farm, and his dad has discussed with him the risks and benefits of going into farming as a career. Perhaps those factors explain why Nik can vividly recall details of what he's learned in just five class periods working at the Expedition.

He's already learned about differences in seeds, pesticides, optimal growing conditions, germination, and sustainability. But that's not all – integration of core subject areas makes the STEM lab the most future-relevant and practical class on Nik's schedule.

"I'm at the point right now where we are starting to design a farm, and math and science are a huge part," he said. "Science is in all the biotechnology and things, and math is about what kind of crops you want to grow because not only does each crop make a different income, it also has a different cost to plant."

Nik
Student, Pea Ridge Middle School

Q&A

Pea Ridge, AR, district gives residents, businesses what they want – and need

Cross-section of community members embrace STEM/career approach as much as college

Rick Neal
Superintendent, Pea Ridge (AR) Public Schools

Q **You recently added Pitsco Education K-8 STEM curriculum, which you call the Pea Ridge Exploration of Pathways (PREP). Why is it important to extend STEM to a full K-12 approach?**

A It's the only way kids are going to understand it. They're not going to get it just at the junior/senior level. . . . This is a marathon, not a sprint. It's going to be exciting the next five to six years to see those kids come up through those programs. I'm especially excited for the sixth-grade kids coming up through seventh, eighth, and ninth, and by the time they get to 10th, you've got PRMBA (Pea Ridge Manufacturing and Business Academy [high school career pathways]). And kids will have already had STEM for five years.

Q **When did you recognize the need for a K-8 PREP program?**

A It came to me the second year of PRMBA, when I saw the impact it was making on kids, how interest was driving them to come to school and then to get a job. The personalization of that resonated with us, and I brought our elementary principal in, and I said, "This is where I'm headed, this is what we're going to do, and I want you to figure out how to personalize learning at the K-2 level."

Q **What stopped you from getting on the STEM train sooner?**

A I've had this internal struggle with STEM because it's always been hodgepodged. It's never been a program; it's always been a buzzword to me. It's never resonated with me that this could potentially be the vehicle for people to understand work. So, during our conversations with Pitsco over two years, that educational piece helped us create this and say, "OK, this is the foundational piece we need."

Q **How did you eventually come to invite business and industry to the education table?**

A I recognized during this journey over the last five years that business and industry have never been invited to the table. Schools are notoriously territorial of their educational principles and values, and business and industry have never been a part of the conversation. When we opened that door, business and industry came right through. Everybody that I have a conversation with in business and industry, they understand it. They get it. They know that they need to be a partner in educating their next employees, rather than being out there waiting on the next employees to be trained by them.

Q **Give an example of Pea Ridge's program directly benefitting local business and industry.**

A It costs J.B. Hunt and Wal-Mart (headquartered in nearby Bentonville), on average, $15,000 to train an individual employee. And when you tell them, "Hey, we're going to train them the way you want them, and they're going to be able to do the things that you need done immediately when they come to work for you," that's an immediate savings

to them. So, you're really benefiting the business and industry partner by bringing their environment into your school.

Q What role do business and industry play in Pea Ridge's CTE efforts?

A They are the evaluators and they are the teachers of our people to design what they want. We've let them have the latitude to say, "This is what we need, this is what we want, and this is how it needs to be done." And we grant that latitude to do those things.

Q Has your district's shift to STEM been noticed by others?

A It resonates with an organization called ForwARd Arkansas; it resonates with the Walton Family Foundation; it resonates with the Arkansas State Chamber of Commerce; it resonates with the governor; it resonates with a lot of different groups and entities that are reaching out to us to share some of our ideas. We've kind of developed a model with a lot of different pieces that small schools haven't developed before. A lot of people have bits and pieces of different things, but we have now aligned career education from K through 12 using the STEM model. We've aligned a community engagement model with personalized learning K through 12. We've aligned and linked everything to business and industry and to all colleges.

Q Why was this new focus implemented in Pea Ridge?

A What we deal with right now in education is that when kids get to 16-17 years old, they really don't know where they're going or what they're doing. They've not been exposed to anything else other than college. College is what everybody talks about, which is fine. . . . College and career are the same, in my opinion. What we've done in our society is looked at career education as an afterthought that doesn't have the value that college has. And it does. And so I drive them together when I speak about them.

Q Do you have community support for this shift to a STEM/CTE focus?

A That's where our community's flipped. They understand why we say that your kids are going to have the opportunity to be exposed to different pathways and different life experiences while maintaining those college aspirations. We're not devaluing what you want to do, but we're going to offer you a funding source for how to get there. We're going to show kids how to get that job that's going to draw them $16-17 an hour, then they can fund college.

Q Are there opportunities in this region for students coming out of high school with certain aptitudes and certifications to land a great career and raise a family?

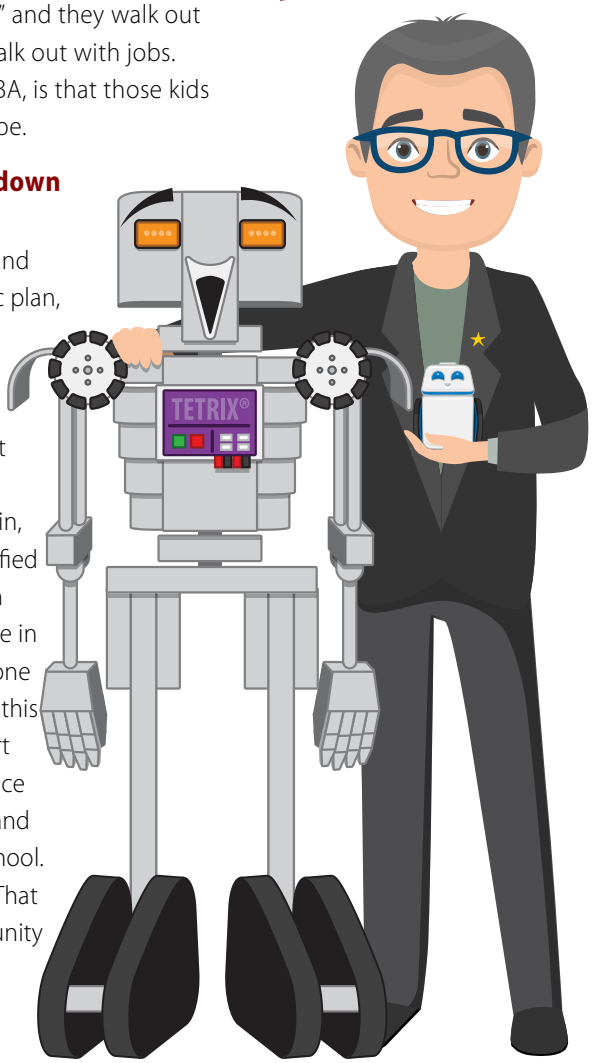
A There are multiple options and multiple opportunities. And when students become high school juniors and seniors, they make themselves marketable. They give themselves hope. They can see the pathways they can get into by the time they're sophomores, and they say, "Oh, I want to take that, and I'll take that because I know that," and they walk out of here with jobs. They walk out with jobs. That's the beauty of PRMBA, is that those kids have jobs, and there's hope.

Q What got you started down this path?

A ForwARd Arkansas came and helped us build a strategic plan, and we brought all of our community in, and we brought faith-based organizations. We brought business and industry in, and we brought teachers in, and we brought our classified staff in, and we brought in personnel, different people in the community. And the one thing that they wanted in this five-year plan was this. Part of their goal was to enhance and improve the college and career readiness of our school. And that was their voice. That wasn't me. . . . Our community values career education.

(continued on page 32)

RICK NEAL
TECHNOLOGY TRAILBLAZER



'EVERY KID IS A GENIUS'

Coordinator of Chaos in Texas sees 1,000 students a year in his STREAM lab

SWEENY, TX – The right solution at the right time in the right school. That's what it took to prove Matthew Way's theory that every student is a genius.

The solution added at Sweeny Elementary School in summer 2017 was a Pitsco Education STREAM lab that Way volunteered to run and facilitate. Something told him that the innovative, hands-on lab would help even more of his students experience success. After one year, the results are in.

"Many educators have a difficult time, I think, accepting the idea that every kid is a genius. And through testing and labeling and tracking and textbooks and mediocre content and the constrictions of a skills-driven curriculum, the school environment can be counterproductive to the development of that genius," Way said. "What I love about STREAM and what I've seen in the past year is that it is essential to reaching students who may not excel in that traditional classroom by giving them the opportunities to discover who they are, what they love, and even potentially what they want to do when they grow up. I've seen that happen in this past year, and it's remarkable."

Way is the walking definition of a Coordinator of Chaos teacher type. After all, he is tasked with getting all 1,000-plus K-5 students through his lab each year. K-2 students experience whole-class STEM Units for 30 minutes each week during the school year, and students in Grades 3-5 explore the rotational STREAM Missions for one hour every third day for a semester.

By Tom Farmer
Editor | tfarmer@pitsco.com
@tfarmer

"As far as really getting to know the students, I don't have that opportunity. Of course, the flip side of that is I get an opportunity to have some impact on every student in the school, which is great," he said.

Other teachers have taken notice of student excitement and engagement in the STREAM lab and carried some of the lab's principles and approaches back to their classrooms, particularly after seeing how the difficult-to-reach students have responded to the opportunity to tap into their genius via the student-centered content and delivery.

More than once, Way has had a lunch conversation with classroom teachers that's gone something like this. "I'll mention a student's name and I'll say, 'It amazed me what they accomplished today in the STREAM lab.' Or, 'What they said, it was just really genius.' They all stop eating and look at me and they'll say, 'Who are you talking about?' And I'll tell them again, and they're like, 'No, not that student.' And I'm like, 'Yes, it's that student.'"

Having students fill distinct roles – Commander, Communications Specialist, Materials Specialist, and Information Specialist – and eventually experience all of them is a real-world approach that hones social and emotional skills as well as soft skills such as collaboration, problem-solving, and critical thinking. "I love that because in the workplace you're given certain responsibilities. That's what you do in a job," Way said. "The fact that they're learning that now at the elementary age is amazing."

Sweeny ISD Superintendent Dr. Tory C. Hill effusively praises Way for his approach with the versatile new program, how he enables students to develop and flourish in whatever learning style they favor. "Tapping into the genius of every student, that has just really become sort of a tagline for the STREAM lab," Hill said. "[Way] has proven to be just the right fit. He builds great relationships with students. He understands how to manage a classroom environment where students are actively engaged. It's noisy and busy but yet focused on projects that are based on very clear outcomes."

Hill added that the student energy he's witnessed in the lab is "unparalleled," and parents are equally inquisitive and excited about the STREAM content their children are learning. Better yet, at the end of the first year with STREAM, scores on State of Texas Assessments of Academic Readiness (STAAR) testing went up across the board – in math, science, and reading. "We selected Missions to support areas where our students could grow in math and science. We witnessed unprecedented growth in those areas this year, despite losing 10 days for construction due to the hurricane."

Call that the fruits of having the right solution at the right time in the right school – with the right Coordinator of Chaos at the helm.

> "What I love about STREAM and what I've seen in the past year is that it is essential to reaching students who may not excel in that traditional classroom by giving them the opportunities to discover who they are, what they love, and even potentially what they want to do when they grow up. I've seen that happen in this past year, and it's remarkable."

Above, Teacher Matthew Way never has a dull day. The walking definition of a Coordinator of Chaos, he gets about 1,000 Sweeny (TX) Elementary School students through his STREAM lab each school year.

By Jessica Born
Digital Marketing Manager
jborn@pitsco.com

Digital Skills Are Employability Skills

Common Sense Education is a vast resource for all things digital. Their stated mission is to be "the leading independent nonprofit organization dedicated to helping kids thrive in a world of media." In our world of hyper-connectivity, it seems only fitting there's an organization such as Common Sense. Furthermore, today's students are digital natives, meaning they don't really know a life without MacBooks, cellphones, Google, and Facebook.

Many schools now have a one-to-one ratio of digital devices to students or, at the least, have multiple computers and tablets available. And there aren't many projects that don't begin with an Internet search of some kind or aren't supported with online resources in some capacity. But when it comes to social network sites, districts often thwart access to many of them. Now, to be clear, limitations and safety protocols are absolutely warranted, but social networking sites are a part of students' daily lives and engrained in their natural mode of communication, so we need to find a happy medium. When today's students head to the workplace, digital skills will be listed in among the minimum qualifications. These students will know how to navigate Microsoft Office and the Google G Suite as well as how to interface in a digital space.

Education and industry repeatedly assert that today's learners and tomorrow's leaders must be equipped with 21st-century skills. We often rattle off a list of necessary skills such as problem-solving, communication, collaboration, and empathy. Generally, we think about them as personal skills not digital skills. But let's consider:

- Need to find a solution to a question or an example of a situation? Google or Facebook
- Need a product recommendation? Instagram or Pinterest
- Need instruction on a task? YouTube or Reddit
- Need to work as a group? Google Drive, GroupMe, or Skype
- Need to give someone a quick message? Messenger or Snapchat
- Need to brighten someone's day? E-gift card or funny meme text

Looks like problem-solving, communication, collaboration, and empathy at work!

We turn to digital sources to supply an answer, method, or direction for so many things. It is now an inherent first response. These skills transcend person-to-person and person-to-problem skills.

DIGITAL SKILLS ARE EMPLOYABILITY SKILLS

Instead of closing these networks off from the learning process, let's integrate these social networks. And, more than that, let's help students learn to craft a positive social profile, contribute content, and develop their digital marketing skills. Because, ultimately, that's what their social accounts and histories are – digital résumés for their personal brands. We must help them learn how to use the platforms better, understand how to decipher valid information from hype, and set boundaries and barriers.

So, what does this look like tactically speaking? A few suggestions could be to allow students to create content in Google Hangouts or on their own WordPress sites. Let them create YouTube videos to help teach a topic. Encourage them to learn how to craft reviews or provide feedback for fellow students in platform comment sections. The possibilities and interactions are almost limitless. Also, take this opportunity to have an open discussion on how social media can affect their physical, mental, and financial health. Help them develop healthy, purposeful habits.

Not sure where to start? Common Sense has created a list of the top 24 social networks for students and teachers (Commonsense.org/education/top-picks/social-networks-for-students-and-teachers). It summarizes the application or site, its cost, the grade-level reach, and a thought or use case.

For some educators like our Pitsco teaching types (Pitsco.com/FindYourType) such as the Inspiring Innovators – status quo fighters and big picture thinkers – or Technology Trailblazers – the gadget gurus and early adopters – this kind of work is likely thrilling or enticing, but any teacher of any personality can make work a little more social and, in turn, make students more employable.

COMMON SENSE

TEACHING TYPE

Past and future connect at the Permian Basin Petroleum Museum

By Cody White
Communications Assistant
cwhite@pitsco.com

Pitsco products prove a powerful resource for the museum's educational outreach

Outside of Midland, in the stark West Texas landscape, pumping units tirelessly rock back and forth. They are drawing up petroleum from the subterranean ocean of oil that is the Permian Basin. One technology among many helping humanity meet its energy needs, they point to the engineering odyssey that has driven the last century.

Thanks to the region's resources but also its industry and innovation, the economy burns white hot in Midland, fueling arts, culture, and education. The city is home to the Permian Basin Petroleum Museum. Here, visitors can chart the evolution of petroleum extraction technology – surveying steam, gas, and electric drilling rigs. They can visit a re-created 1930s boom town. They can learn about the energy sources of tomorrow. And they can even peruse an art gallery that highlights the region's cultural past.

"Our mission is to share the petroleum and energy story and its impact on our daily lives through educational programs, interactive exhibits, an archives center, and our Petroleum Hall of Fame," explains the museum's director of education, Mara Bland.

In fact, the museum recently completed an $18 million renovation of its petroleum exhibits that includes hands-on, interactive exhibits featuring new technologies in the industry alongside advances in supplemental energies. Only with an appreciation of the region's past and its present will students be prepared to lead its future.

"The museum's education programs focus on both STEM and STEAM programming to inspire students and help them make connections within those fields to become better problem solvers," said Bland. "We acknowledge the fact that not every student will become a scientist or an engineer, but we believe in the importance of thinking critically and developing skills at an early age."

PITSCO KITS, MATERIALS GENERATE EXCITEMENT

During summer science camps this year at the petroleum museum, students unleashed their creativity with the help of maker space carts and projects purchased from Pitsco Education. Young minds – and hands – explored hydraulics, gears, pulleys, and more. Pitsco's Maker Space Materials

Package and Elementary Maker Space Tools Package provided unlimited resources for creativity.

Kits such as the T-Bot® II, which gives students a hands-on experience creating and working with hydraulics, proved popular at the summer camps and beyond. "The students assembled the hydraulic arms, and then we reutilized them in our STEM-gineering Family Science Night," said Bland.

Robotics is clearly a growing trend in industry, and the petroleum museum is ensuring that kids in Midland are poised for this future. The Robotics Outreach program and Building Bots Robotics & Engineering Funlabs are loaded with robotics options, now including a wealth of TETRIX® PRIME products. The high-grade aluminum and plastic kits, combined with the EV3 controller module, allow for programmable robots. Students become the programmers and engineers working to bring innovation to our energy future.

In fact, the benefits go beyond the walls of the museum. A plan is underway to create a lending library of trunks with Pitsco's Straw Rocket Launcher kits that can be checked out by teachers in surrounding communities. The straw rockets are a popular activity that can be used to teach rocketry, aerodynamics, the scientific method, and more.

According to Bland, students, parents, staff, and school teachers have all expressed enthusiasm for the Pitsco kits and applications. And working with Pitsco has been a positive experience as well. "The Pitsco products have been extremely easy to utilize in our programs," said Bland. "They come with detailed instructions, and if we do happen to have any questions, the Pitsco team is amazing and helps us out in any way possible."

Pitsco is proud to now play a part in the mission of the Permian Basin Petroleum Museum, an extraordinary model for the ways an institution can bolster a community's educational infrastructure. The connections students discover with their region's past are immediately apparent. But the connections they make with its future are just as real.

The Permian Basin Petroleum Museum in Midland, Texas, offers a wealth of STEM activities for youth in the community, from robotics to makerspace projects.

MARA BLAND IS A MERRY MAKER

What do you call an educator who loves to tinker and loves to pass that creative passion on to students through makerspaces and open-ended projects? A Merry Maker!

That description perfectly fits Mara Bland, the Permian Basin Petroleum Museum's director of education – though she admits that Coordinator of Chaos would also be a fitting descriptor.

What is your teaching type? Learn at Pitsco.com/FindYourType.

Pat Forbes
Education Liaison | patforbes@pitsco.com

Beyond the school walls: FUNDING STEM EDUCATION IN OUR MUSEUMS

President John Kennedy pronounced, "I don't say that all people have equal talent, but what I do say is that everyone should have their chance to develop their talent equally." It is gratifying for Pitsco to participate in the advent of a variety of new curricular approaches that develop the talents of our youth. The future is exciting.

Many museums, big and small, are becoming involved in providing tech opportunities. One such opportunity is offered by the Permian Basin Petroleum Museum in Midland, Texas. Exploring petroleum and other energy-related technologies creates a path toward STEAM learning. In camps and other youth programs, visitors experience TETRIX® robotics, T-Bot® II hydraulics experiments, and makerspaces from Pitsco.

There is also a significant number of smaller museums that receive federal, state, and private funding for providing educational experiences in their locales. Different museums will find their fit with different funding sources. Here are a few ideas.

Flight is a popular STEM education area where museums could supplement the education students get in school. The National Airline History Museum in Kansas City, Missouri, provides the resources for students to investigate tech and history. The TWA Museum, also in Kansas City, is another that presents a living history of the industry. The Hall Family Foundation focuses on bringing benefit to students in the Kansas City Public School system and could be an ardent supporter of airline museums.

Another region offers new possibilities. In the mid-Atlantic region, the Small Museum Association serves small museums by sharing knowledge and support. Within that area, the Grable Foundation provides support for several worthy organizations and projects in Pennsylvania. And don't neglect the corporate social responsibility initiatives that many companies manage. The Krystal Foundation, for example, is an arm of the well-known restaurant chain and focuses on targeted giving to nonprofits with an educational motive.

Additional support for extra-curricular opportunities are available from other sources listed here. (P)

Grant Application **DEADLINES**

December

17
Northrop Grumman Foundation
The program stresses STEM learning.
Northropgrumman.com

January

1 (Opens)
Monsanto Fund
This organization stresses math and science.
Monsantofund.org/about-us/#content

18
Kerr Foundation
This foundation supports challenging STEM programs.
Thekerrfoundation.org/guidelines.php

18
Toyota Tapestry Grants
Toyota and NSTA promote science education.
Toyotatapestry.com

Activities such as CO_2 dragster design, left, and rocketry, right, have been a hit with Byron Clemsen's students for nearly five decades.

Pitsco a constant for this Prudent Planner

With nearly five decades in education, VA teacher says kids are still kids

By Tom Farmer
Editor | tfarmer@pitsco.com
@tfarmer

WINCHESTER, VA – Teacher Byron Clemsen remains passionate as ever when talking about students and how their basic needs haven't changed during his 47 years in education.

"Kids are kids – they're still kids," said Clemsen, who facilitates a materials and processes course at historic John Handley High School in Winchester, Virginia. "All you gotta do is capture their interest, show them a little bit of respect, and then intrigue them. Once you do that it's easy."

Another constant throughout his nearly five decades in schools has been Clemsen's allegiance to hands-on products and projects from Pitsco Education. True to his Prudent Planner teaching type, he has been a customer for 45 of the 47 years the company has been in business, citing quality products and superior customer service as reasons to stick with Pitsco.

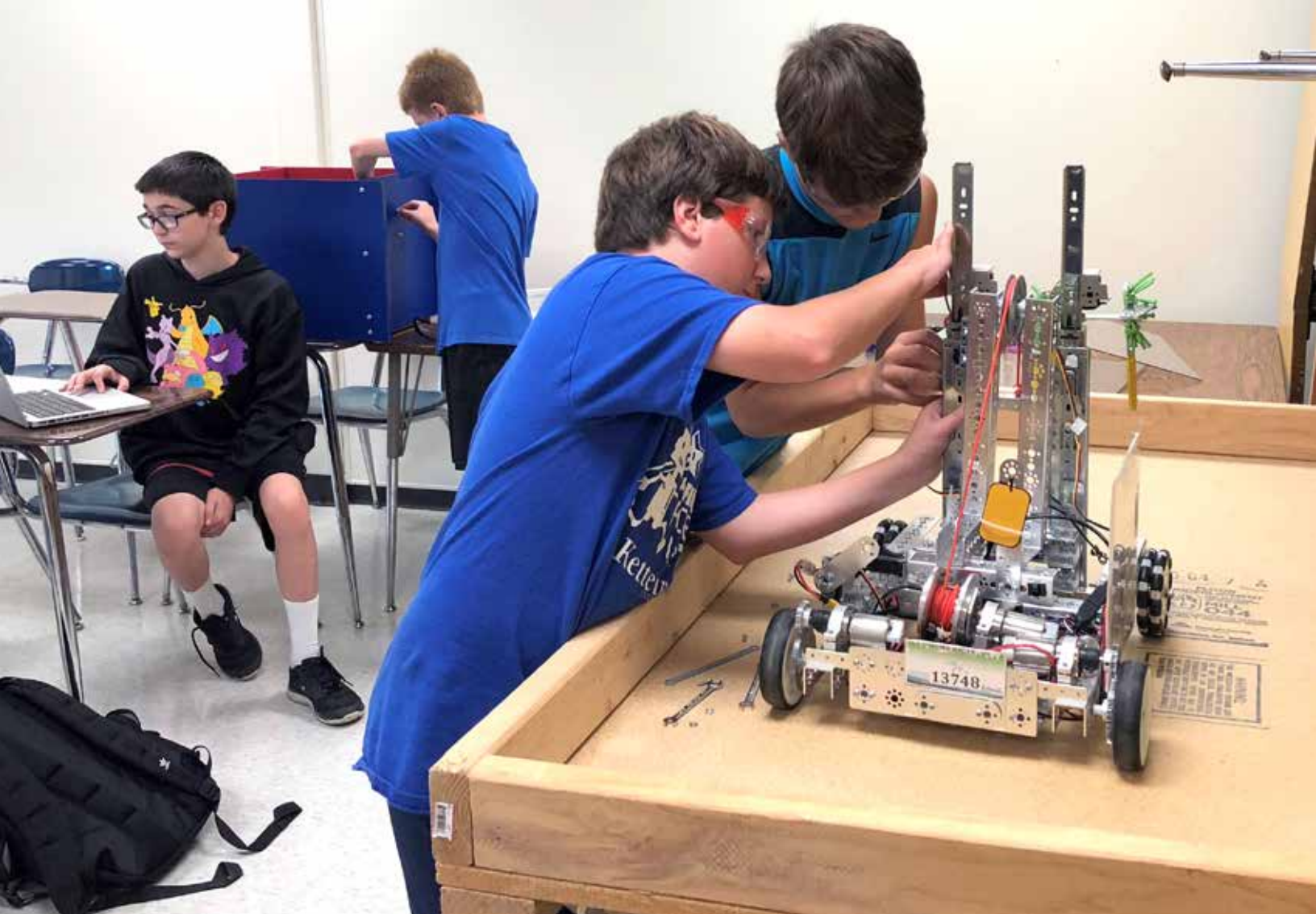
Nearly that entire time he has facilitated a CO_2 dragster unit because the activity has proven timeless in pointing kids to possible career paths of interest. "I tell the kids, 'You can have a career in designing cars. You're going to use your drafting skills. We're using some woodworking skills. In car design, you want to make it aerodynamic, so maybe you want to get into racing cars. Because we paint, maybe you'd be interested in being an auto body painter or a detailer.'"

For about five weeks each semester, Clemsen's students use Pitsco materials to learn and experience many of the 77 technology competencies required in Virginia. In addition to dragsters, other Pitsco projects that Clemsen says never fail to engage students or deliver academic enrichment are toothpick bridges, Delta Dart airplanes, and rockets.

Clemsen discovered the toothpick bridges activity and its inherent math and science applications after a Pitsco representative suggested he try it. "I've never once called Pitsco and not had them treat me like I was their most important customer," he said. "I can call anytime, and they have the answer, whatever I need. I need ideas for summer school activities, and they have something for me."

A passionate and outspoken advocate for technology education, Clemsen has been recognized multiple times for excellence in the classroom. Just this past summer he was named the High School Teacher of the Year by the Virginia Technology and Engineering Education Association.

"We are so proud of Mr. Clemsen and the work he does with all students at John Handley High School," said Principal Michael Dufrene. "His family nights have become a nice tradition at Handley, a time when students can show off their skills in front of their families and friends."



By Patty Cooke
Communications Assistant
pcooke@pitsco.com

Inspiring Innovator imparts love of discovery to her students

Sally Coughlin likes to dream big. And like most inspiring innovators, she doesn't let fear of failure stand in her way. While some might say, "Failure is not an option," for Coughlin, "failure is expected and planned for. Perseverance is the answer to success."

And she loves nothing more than passing that mantra on. When she retired in 2017 from teaching after 22 years, she and her husband, Mike, relocated from Livonia, Michigan, to Brooklyn, Michigan, and opened Fiddle Brickers, a STEM activity center where children could come to learn the engineering process.

Fiddle Brickers gave the Coughlins a taste of the world of robotics competitions. When their son Phil began attending Columbia Central Junior High School, they discovered the school didn't have a robotics team. So, true to their innovative traits, they started one.

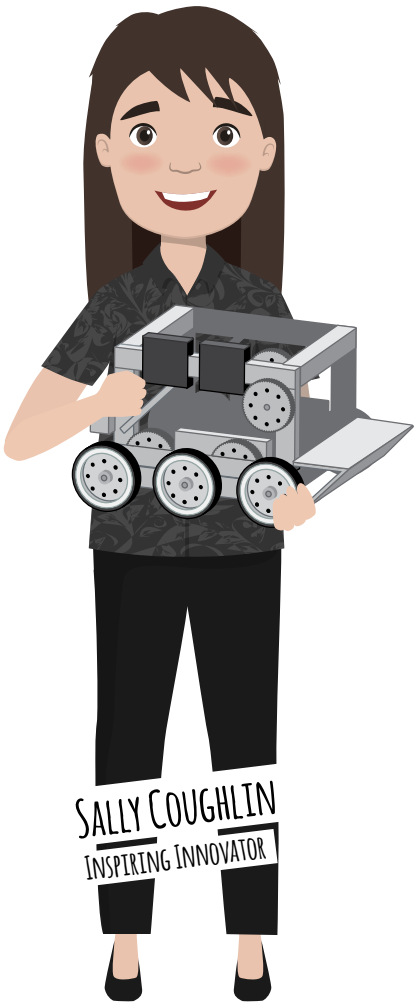
The Fiddle Brickers Columbia Central Junior High School Robotics Team named their first robot – made of TETRIX® parts – Tesla. "We went to two [*FIRST*® Tech Challenge] competitions and learned that Tesla needed an overhaul to be more competitive," said Coughlin. "Some parts we just couldn't afford, but the team came up with a new idea, and we took the robot apart and rebuilt it."

That's the kind of innovation she loves to see. "It takes grit to keep building, unbuilding, and rebuilding, and programming, deleting, and reprogramming, but the kids came eagerly every Wednesday and Thursday right after school and stayed until 5 p.m. It was amazing

For members of the Space Breakers *FIRST*® Tech Challenge team, working on a TETRIX® robot involves teamwork and developing hands-on skills.

Below, left: Tesla, the first robot created by the Fiddle Brickers team, is still used by students as a valuable learning tool.

> "I love to see the amazement of the students when the robot works," she said. "I like to take my students so far and watch them fly on their own. I was so proud of our team last year. They worked so hard, but they worked. . . . When Tesla broke down, they stepped in and fixed her."



to watch the intensity and pride the team had designing and building their robot."

But beyond the building and programming, Coughlin was thrilled with the life lessons the students learned. "Perseverance, getting along with others, and *FIRST*'s lesson of gracious professionalism" are takeaways the students can carry with them for the rest of their lives.

And they're lessons she wants to impart to her new students as well. Now that Fiddle Brickers has closed, Coughlin has returned to teaching, and she and her husband are coaching five robotics teams, including a junior high *FIRST* Tech team named the Space Breakers, which will be competing with a TETRIX kit.

And like any inspiring innovator, Coughlin lets her students problem solve until they find a solution. "I love to see the amazement of the students when the robot works," she said. "I like to take my students so far and watch them fly on their own. I was so proud of our team last year. They worked so hard, but they worked. . . . When Tesla broke down, they stepped in and fixed her."

With a whole new group to inspire, this innovator seems ready for the task at hand!

Q How is your approach different from traditional CTE programs and career centers?

A The difference that I see in career technical education models and this one is that they'll tell you that they've linked it to business and industry. But our model is driven by business and industry. In our model, teachers are hired out of business and industry. They come from business and industry. Yes, they're certified as teachers, but we have them alternatively certified through career and technical education.

Q How have parents embraced this change?

A If you're a parent and you're looking at this, and you see that your kid is going to be able to see everything that he might go into by his sophomore year, that's powerful.

Q Tell us about the highly successful logistics course at Pea Ridge High School.

A That's all designed around J.B. Hunt. They had direct input on that; they designed the work. And so it cuts the time and effort to get quality applicants and quality employees. It's like developing a farm club. We're going to build the farm club for them to do that. J.B. Hunt's had the latitude to tell the teacher what they want, the curriculum that they want to be taught, the processes and the procedures and the rules of business.

Q Is there any danger in giving business and industry too much leeway and input?

A They're not monopolizing the process. They see it on the basis of economy, how we can improve the local economy. This benefits them, but everybody wins here. Everybody's happy. It's like closing day when you buy a house. The real estate agent's happy, the homeowner's happy, the seller's happy, the title company's happy, everybody's happy. Same concept. In this situation here, the student is coming to school and he's engaged. Everybody's happy. The parents are happy, the stakeholders are happy, the economy is going to continue to get good people in the workforce that allow things to continue working and doing and moving. And so it's just a win-win for everyone.

Q Talk about the importance of K-8 students developing transferable soft skills that will eventually prove essential to their employability.

A It needs to be ingrained in them all the way up and down – the speaking skills, the soft skills – and it takes more than two years to develop these skills. The STEM model forces kids into having those conversations, making connections, and collaborating. That's why we think PREP is so important; you're putting kids in a position where they have to talk to each other. PREP is going to push them into working together. It's the piece where we can say, "OK, this is where they're going to get the soft skills."

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!

January

27-30 **FETC – Future of Education Technology Conference, Orlando, FL**

30-Feb 2 **National ESEA Conference, Kansas City, MO**

February

4-8 **TCEA – Texas Computer Education Association, San Antonio, TX**

7-8 **VCEC – Virginia Children's Engineering Council Convention, Roanoke, VA**

QUICK CONTACT **REFERENCE**

Customer Service

PHONE: 800-828-5787, 800-774-4552

FAX: 620-231-2466

EMAIL: support@pitsco.com

CONTACT US: www.pitsco.com/support

Websites

HOME: Pitsco.com

CURRICULUM: Pitsco.com/Our-Programs

***NETWORK* MAGAZINE:** Pitsco.com/Network

***SYSTEM ALERT!* FOR STUDENTS:** Pitsco.com/SySTEMalert

TETRIX® ROBOTICS: Pitsco.com/TETRIX

Sales and Professional Development

PHONE: 800-828-5787

WEB: Pitsco.com/STEMPD

PROFESSIONAL DEVELOPMENT: workshops.pitsco.com

CONTACT US: Pitsco.com/HelpDesk

During an in-service at Kookaburra's new product showroom in Newcastle, Australia, local teachers were able to get hands-on practice with Pitsco's TETRIX robotics sets.

Bringing Pitsco to Australia

From straw rockets to TETRIX® robots, Kookaburra reveals Pitsco STEM to Australian students

Science, technology, engineering, and math (STEM) education is picking up speed all over the world. And thanks to Kookaburra Educational Resources, Australian teachers and students are keeping pace.

"The focus on STEM skills has been gaining a lot of momentum in Australia over the last decade," said National Sales Director Justin Bielefeld. And Pitsco STEM products have been an integral part of that plan since 2016. "Once I was made aware of Pitsco, I'll admit I must've been calling [Pitsco International Sales Manager] Mohit [Abraham] almost every second day. I spent hours watching YouTube videos and studying the range. I was excited that we could have the opportunity to bring Pitsco to Australia."

Since then, Kookaburra has implemented a wide variety of Pitsco's hands-on products, including balsa gliders, water and straw rockets, dragsters, TETRIX® MAX and PRIME sets and curriculum, the T-Bot® II hydraulic kit, mousetrap vehicles, siege machines, balsa bridges, and maglev and solar vehicles.

"Pitsco is a natural fit given their focus on developing STEM skills within students and the various solutions they offer to engage students in hands-on projects," Bielefeld explained. "Pitsco believes, and I agree, that if students are actively involved in their learning experience, they're not only more likely to be engaged but also to retain the information learned."

Bielefeld and his Kookaburra staff work hard to ensure they are getting good STEM products into the hands of as many teachers and students as possible. Whether teachers are Prudent Planners, Merry Makers, Technology Trailblazers, Inspiring Innovators, or Coordinators of Chaos, Kookaburra knows there's a Pitsco product that will work for every type of teacher in every type of classroom.

"We exhibit at tradeshows and competitions; we mail out catalogs and email campaigns. Our team knocks on school doors every day with a TETRIX® PRIME Codee Bot under their arm and offers to provide demonstrations for staff. We also have a brand-new showroom located within our new Distribution Centre in Newcastle, and we've already had more than a dozen schools bring their staff through to touch, feel, and play with Pitsco STEM and robotics products."

Kookaburra is a "complete solution provider," and Bielefeld is excited to have Pitsco along as a partner. "As the education market's needs and wants grow, we look to meet those needs, wants, and desires, and Pitsco performs an integral part of our STEM and robotics offerings. What excites me moving forward with our relationship with Pitsco is that they want to continue to grow and evolve and meet market needs with solutions that engage students and empower teachers. So, when coupled with a foundation of amazing products and content as it is, I know we're well positioned to grow with our market's needs into the future."

By Patty Cooke
Communications Assistant
pcooke@pitsco.com

THE PITSCO NETWORK

P.O. Box 1708
Pittsburg, KS 66762

CHANGE SERVICE REQUESTED

PRESORT STD
US POSTAGE PAID
KANSAS CITY, MO
PERMIT #69

Pitsco is the **STEM** *company!*

View back issues of *The Pitsco Network* at Pitsco.com/Network.

What is THIS?

THIS is STEM

Request your 2019 *Big Book* today!
Pitsco.com/CatalogRequest

PITSCO EDUCATION