

THE PITSCO NETWORK

December 2017-January 2018

STEM Units lay the foundation

K-2 students develop lifelong social and emotional learning skills – page 14



TETRIX® inspires
amazing creations
pages 4-9

Many STEM roles
in a small district
pages 18-20

SySTEM Alert!:
New tool edits DNA
pullout



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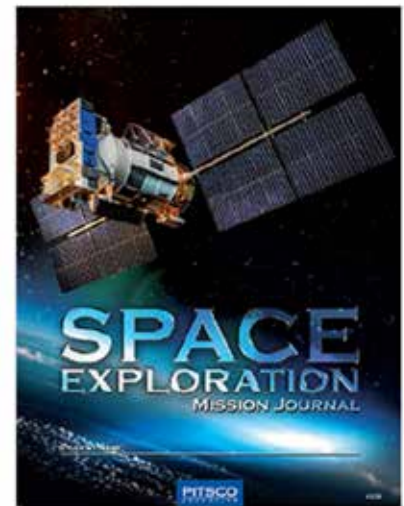
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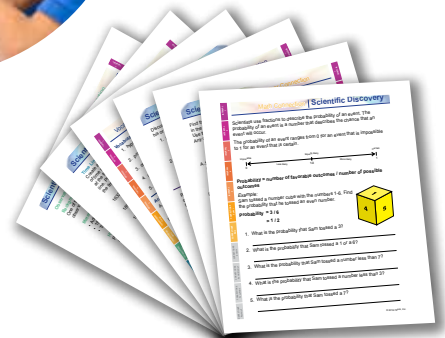


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On the cover – Photo by Crista Cunningham



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

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From the Executive Editor


Synthesizing a broader vision

The three *Rs* might be slightly easier to remember than the four letters of STEM. But the needs of the world have grown in complexity, and the classic model of reading, writing, and arithmetic is no longer sufficient. The paradigm shifted. A new emphasis on science, technology, engineering, and math was never meant to replace the old way, but it does reframe our outlook on education.

Yet, was something still missing? Some thought so. Hence, STEAM (art), STREAM (reading and art), and other variations aimed at synthesizing a broader vision of our societal and human needs. Movements such as SEL (social and emotional learning) expand the meaning of education even further. Viewed from afar, the long arc of educational change might be a quest to serve the whole person.

How is it that Pitsco has consistently been ahead of the curve in producing curricula that seem to anticipate these trends? Pitsco's vision began with something more fundamental than any new theory or acronym. It began with the lived experience of one person – a student who struggled, overcame, and then reflected on the conditions of his own success. That student went on to help found Pitsco, and, for more than 46 years, the truths he learned have helped us positively affect learners.

In this issue of *The Pitsco Network*:

- In Austin, Texas, a teacher trained in psychology recognizes how Pitsco STEM Units foster social and emotional learning.
- In San Benito, where more than 92% of one school's students take CTE courses, Modules are viewed as vital in preparing students for careers.
- The largest STEM school system in the United States turns to Pitsco when looking for curriculum to teach fundamental skills.
- Dave the Science Guy discusses the true meaning of authentic learning.
- The TETRIX® PRIZM® Coding Essentials Curriculum Pack teaches STEM principles through coding.
- Our new and improved website offers everything you want in STEM/STEAM/STREAM – and more!
- In this issue of *SySTEM Alert!*, we look at budding technologies that might have unpredictable effects on our lives. 

A handwritten signature in black ink that reads 'Matt Frankenbery'.

Matt Frankenbery
Vice President, Education & Executive Editor



By **Jessica Born**, Digital Marketing Manager • jborn@pitsco.com

Current Status: ONLINE. Meet the new Pitsco.com!

Do you ever wonder what we did before the Internet and the World Wide Web, before we had almost everything virtually at our fingertips? Knowledge, service, technical assistance, even household supplies and dinner can be delivered almost instantaneously. In my opinion, it is a seemingly strange blend of magic, technical prowess, and both artificial and human intelligence at work.

Well . . . that is when it all works as you expect – without runtime errors, searches that don't produce what you were actually looking for, or some other stumbling block that impedes your task. How many times do you abandon a search for a product or information if your web experience isn't meeting your standards? If a website is too hard to use, if information is too hard to find, or there are too many gates keeping me from getting to where I think I want to go, I know I have no trouble clicking the back arrow or shortcut keying my way to a new tab to find an alternative.

It isn't hyperbolic to say that a website can make or break a business. It is one of the most critical components to a business's livelihood and reputation, especially now, in our rapidly advancing digitally connected society.

And that, dear Pitsco family, is why we have spent the last year working on the new and improved Pitsco.com.

Drumroll, please . . .

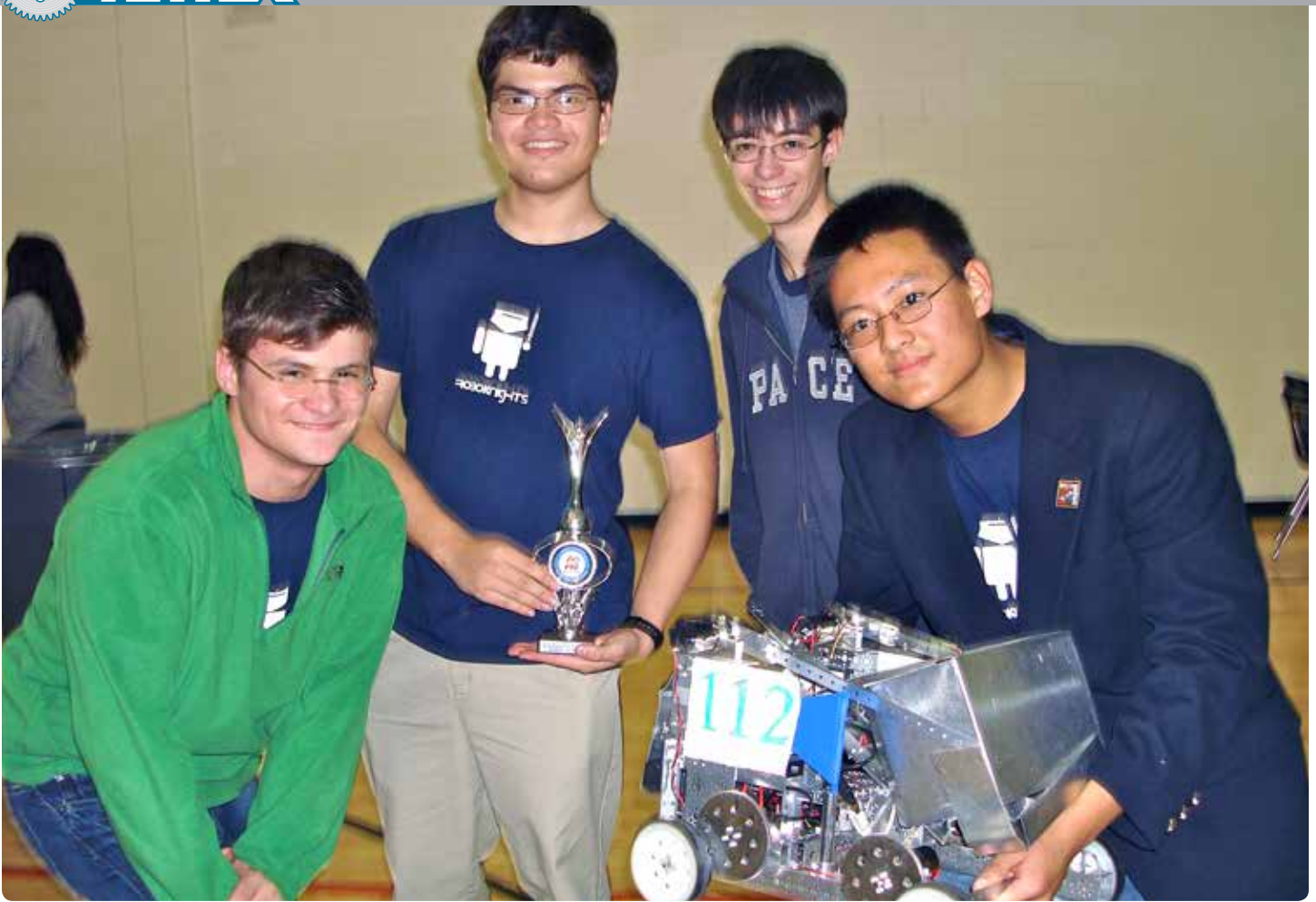
Yes, our company website has been completely overhauled to better serve Y-O-U.

We're excited to unveil the new site. It's a mobile-responsive design with a fresh flavor, and most importantly it's easier to navigate and even easier to shop. It is chock-full of product, curriculum, and solution information to help you bring hands-on, minds-on learning to your classroom or to support an investment you've already made with us.

And, the best part, this website supports the company you've known and loved since 1971. Our commitment to customer service is still paramount. We've just injected it even more enthusiastically into your web experience. We've not made these adjustments to discontinue or decrease the value we place on the relationships we have with you – our teachers, students and schools. We want this to complement

(continued on page 28)

The screenshot shows the new Pitsco.com website. At the top is the PITSKO EDUCATION logo, a search bar, and navigation links for Shop, Our Programs, Experience Pitsco, and About Us. A large hero image features a student working on a project with the text "A COMPANY BUILT BY EDUCATORS FOR EDUCATORS". Below this is a navigation menu with links for Our Approach, Our Impact, Leadership, Newsroom, Our Brand, Our Partners, and Careers. The main content area has a headline: "Through Decades of Change in Education, Hands-On Learning Has Been Our Constant." followed by a paragraph about the company's history and a "LEARN ABOUT OUR APPROACH" button. Below that is a section titled "OUR MISSION:" with the text "Leading education that positively affects learners" and an image of a student. The next section is "Measuring Our Commitment" with five icons and statistics: 321,513,194 students served since 1992, 7,000+ professional development services since 2005, 3,016 different careers to explore, 44% of current customers since 2000 or before, and 72 countries shipped to since 1971. A "SEE MORE ON OUR IMPACT" button is below. At the bottom, there is a "SUPPORT" section with links for Customer Care, Online Help Desk, and All Product and Order Support, and a "GET PROJECT IDEAS, EXCLUSIVE OFFERS, AND MORE!" section with a search bar and a "YES, PLEASE!" button. Social media icons for Facebook, LinkedIn, and Twitter are at the very bottom.



The 2011 RoboKnights team at Pace Academy, from left, Grant, Andrew, Taj, and Simon, show off their hardware and their bot at a FIRST® Tech Challenge qualifier.

By Tom Farmer, Editor • tfarmer@pitsco.com

The robotics launching pad

FIRST® Tech Challenge mentor in Atlanta inspires students to succeed in college and careers

Following an early exit from a FIRST® Tech Challenge competition years ago, members of the RoboKnights asked their teacher, Jo Ray Van Vliet, if they could build some of their own designs using the TETRIX® robotics building system.

If Van Vliet had said no, maybe those students wouldn't have been confident or curious enough to attend Georgia Tech, Penn, and Georgetown and eventually pursue even bigger dreams – careers in engineering, mechatronics, computer science, and international business.

To hear Van Vliet tell the story, her choice to let the RoboKnights team at Pace Academy in Atlanta, GA, follow their imaginations was an easy one to make. "They were all looking for extra challenges, and robotics was something that really engaged them. They were able to succeed at their

competitions, but they also wanted to have some time to experiment and do innovative things that they thought of."

FIRST Tech Challenge and the versatile TETRIX robotics building system proved to be a powerful launching pad for this team of students who are now wrapping up their college degrees and beginning challenging careers.

"Mrs. Van Vliet was a fantastic educator in every way," said Taj Gillani, who was on track to finish his bachelor's degree in aerospace engineering with emphasis in computer science at Georgia Tech in December 2017. "She had ideas, answers, a positive attitude, and she knew when to just leave us to it. After our FTC run in the 2012-13 season came to an early end, she asked us what we wanted to do and how she could facilitate that. We ended up with the car."

The car. . . . Not just any vehicle, of course, but a TETRIX-based contraption that only a group of curious and tech-savvy teenage boys could conjure. Gillani's partners in design were RoboKnights teammates Simon Wu and Andrew Schettino.

Their inventive vehicle sported a functional nine-speed transmission; planetary gear differential; a gear-free rack-and-pinion-style steering system; and nine motors to run the engine, handle steering, and engage and disengage the gears.

"It was absolutely crippled by friction and its own mass," Gillani said. "I don't think we ever got it into top gear without snapping an axle, but it had a theoretical top speed somewhere above Mach 1."

Not only did Van Vliet step aside when the boys wanted to test the boundaries of their engineering knowledge in the context of robotics and motors, but she stepped back in when they needed a test passenger.

"They brought the car to a robotics open house and let people stand on it while the guys used game controllers to guide it around. Fortunately, we didn't have a safety officer there. They were pushing the edge but smart enough never to go over it," Van Vliet said. "I had a fun ride on the car. They were nervous that the old lady was going to fall off and break something, but they controlled the vehicle very nicely."

Wu, who graduated from Georgetown University's School of Foreign Service in foreign policy, international business, and international trade law, remembers how empowering it was to know that Van Vliet trusted them.

"I can say with absolute certainty that this was an essential formative experience," Wu said. "All credit goes to her for understanding that latent desire to truly push the limits of our

creativity. As much as the FTC does spur unbelievably creative designs, fundamentally there are still size constraints, and these designs must be directly tailored to complete specific tasks."

Robotics competitions were an entry point that opened the boys' eyes to a bigger world of greater possibilities. "One of the things FTC did was give them a platform," Van Vliet said. "We got our TETRIX kits, and they were so excited because they'd done LEGOs forever. They could do more things with TETRIX, and the school gave the team money to buy extra parts and motors."

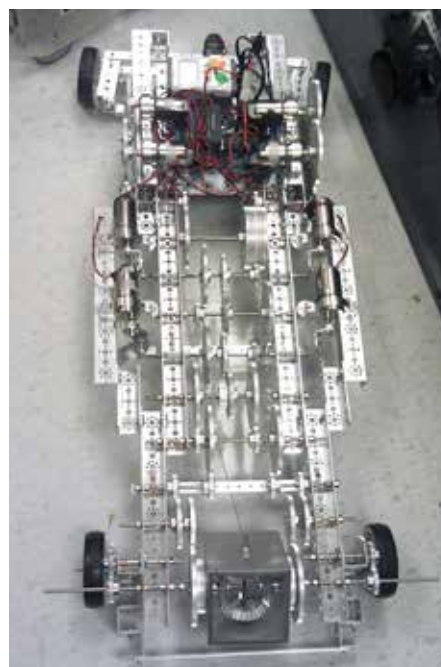
Providing the right materials and giving students the freedom to explore and experiment have led to some special accomplishments. Schettino went on to be class valedictorian and attend the University of Pennsylvania. Gillani expects to leverage his degree in a position where he can study complex wing aerodynamics and computational fluid dynamics modeling and simulation. Wu is a management consultant in Austin, TX, where many of his clients work in the technology space.

What advice do these robotics veterans have for TETRIX enthusiasts, whether they compete, create, or just tinker?

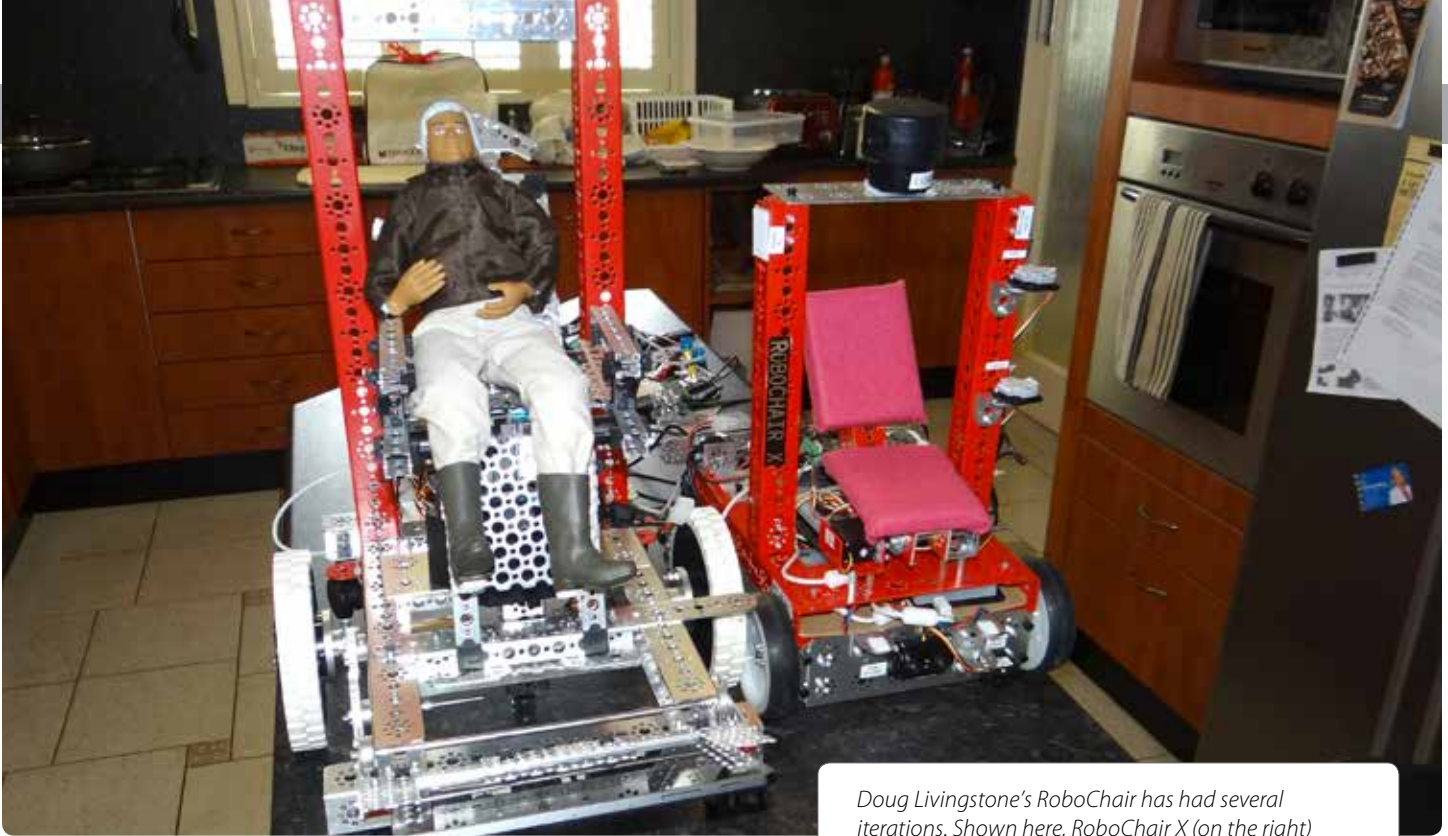
Wu: "One of the fastest-growing and in-demand practices is robotic process automation. It wouldn't be such a hot group unless our clients were seriously demanding it. Rest assured, robotics is a top space to be in, regardless of specific industry."

Gillani: "The more you work at it and think about it and enjoy it, the better you'll be at it. As a bonus, going your own way and making your own side projects is a great way to get some entrepreneurial practice."

Of course, there's one other necessary ingredient: a teacher who's willing to say, "Yes." 



Far left, team members put in long hours – and wore silly headgear – as they wrapped up a Lamborghini Bot. "The Car," left, perhaps the team's greatest build, sported a functional nine-speed transmission; planetary gear differential; a gear-free rack-and-pinion-style steering system; and nine motors to run the engine, handle steering, and engage and disengage the gears.



Doug Livingstone's RoboChair has had several iterations. Shown here, RoboChair X (on the right) eventually made way for the much larger RoboChair XI.

By **Patty Cooke**, Communications Assistant • pcooke@pitsco.com

The RoboChair project

Engineer uses TETRIX® to build proof of concept for innovative wheelchair

Pitsco's TETRIX® MAX building system was introduced in 2008 as a metal building system geared toward robotics competitions. Even then, though, as an education company, Pitsco was already researching ways to integrate TETRIX into hands-on, engaging curriculum.

The TETRIX line has expanded to include Mr. Robot, TETRIX PRIME, classroom curriculum, and autonomous controllers for both MAX and PRIME.

As we've seen, though, the most important part of the TETRIX evolution is the continuous innovation it inspires – both in and out of the classroom. Students, teachers, tinkerers, and innovators are constantly discovering new ways to use TETRIX, from having students recode Mr. Robot to using various TETRIX parts to create a walking, talking girl robot that empowers and encourages young women, and beyond.

Now, we're seeing the next exciting step in this evolution: a foray into the health care system using TETRIX to build a prototype wheelchair.

A LABOR OF LOVE

Doug Livingstone, a retired computer systems engineer in Queensland, Australia, met his wife, Kathy, in 1994 when

they were working on a project together. "I found Kathy to be intelligent, feisty, and attractive," he recalled. "The rest is history; we fell in love."

Before long, however, their "happily ever after" was threatened. In 2011, after experiencing several concerning health issues such as exhaustion, loss of balance, and a nagging cough, Kathy was diagnosed with what is known in Australia as MND: Motor Neuron Disease (ALS in the US).

"On March 17, we sat on the hospital bed prior to discharge and a neurologist . . . provided the diagnosis," recalled Livingstone. "Kathy had MND. And he said, 'There is no cure and no hope,' profound words that were etched into my soul."

Kathy's health deteriorated rapidly, and she quickly lost the use of her limbs, as well as her voice. As he watched his wife struggle to communicate, Livingstone became determined to find a way to help her. "I was researching everything as an obsessed and driven partner to find assistive aids and equipment to help Kathy," he said.

Frustrated with the lack of available resources, he leaned heavily on his technology background to develop his own aids. "Communication devices were too expensive and outside our budget," he said. "I started developing software to assist her

to communicate." Kathy's doctors, seeing what Livingstone had developed, encouraged him to continue. "I talked with Kathy and said I would carry on trying to develop aids to help people in her name."

PASSION BECOMES PROOF OF CONCEPT

After Kathy passed away in May 2012, Livingstone kept his promise to continue working in her name. To address the various needs of the disabled, Livingstone decided to start with a proof of concept (POC). "I devised an approach to build a POC project that would integrate many technologies into a central delivery hub application that I call MiNDcentrum," he explained.


While his main goal was to create a program to help patients communicate their needs and wants to others, Livingstone, armed with the knowledge that most MND/ALS patients would be largely confined to a wheelchair, used that as his POC base.

To create a sturdy prototype, he realized he would need a durable building system, capable of being programmed in various ways. "On further research, I found your TETRIX gear," he said, "and it was perfect. . . . The use of these kits (both PRIME and MAX) has allowed me to build prototype wheelchairs (11 versions to date), affectionately named RoboChair, to bounce ideas off medical professionals," said Livingstone. "Seeing a model helps people visualize the functionality. . . . The use of the TETRIX kits to build a demonstrable working model electric chair stages the observer to easily make the mental jump to visualizing new features and functions in a real-life wheelchair."

Livingstone's current wheelchair POC includes a seat that can be raised, lowered, turned left or right, and tilted to many angles to accommodate sitting, standing, and laying positions. RoboChair will have an autonomous driving ability to navigate itself around a home/care facility with a simple instruction. "RoboChair is only one part of my overall POC project," he explained, "It, however, will be a key delivery platform for much of the functionality."

WHAT LIES AHEAD

While Livingstone is still fine-tuning his prototype, medical professionals are already beginning to take notice. His BodyPointer communications program, for example, has already garnered mention on the blog site for Estimote, a technology company specializing in indoor positioning system beacons. And several doctors and health care technology organizations are following his progress with great interest. "Although it has been a few years, I have influenced a number of companies to modify products or take up my ideas," he said. "I have pushed the boundaries of trying to integrate technologies in ways that had not been envisaged."

From competitions and classrooms to health care and hospitals, TETRIX has come a long way. And through the ingenuity of inspired inventors such as Livingstone, who knows what the next great TETRIX innovation will be. 



Above: The latest version of RoboChair is made of TETRIX® PRIME parts and servos, with the exception of the base. Below: Livingstone decided to paint his RoboChair model red to give it a warm, comforting look and feel.



Livingstone and his late wife, Kathy, before her diagnosis, on the Skywalk overhanging the Grand Canyon.

PRIME goes to college

TETRIX® PRIME an important part of University of Waterloo's Engineering Design Days

WATERLOO, ONTARIO, Canada – Pitsco's TETRIX® PRIME building system was originally designed for middle school students to facilitate ease of use in building robots. We are starting to realize more and more, however, that PRIME has uses well beyond the walls of a middle school classroom. The University of Waterloo's (Ontario) Faculty of Engineering, for example, uses PRIME as an important component of their Engineering Design Days.

REAL-WORLD PROBLEM-SOLVING AT ITS FINEST

First implemented in the fall of 2015, Engineering Design Days provide undergraduate engineering students two days' worth of real-world, hands-on problem-solving. "The Engineering Ideas Clinic has been tasked with improving undergraduate engineering design education using immersive – and integrative – hands-on activities," explained the Ideas Clinic's Engineering Educational Developer Chris Rennick. "The idea of providing two full days to let students immerse themselves in solving real problems is a powerful one, and one that was immediately successful. Engineering Design Days have provided the Ideas Clinic with a powerful vehicle to deliver engineering design experiences to our undergraduate students."


THREE PROGRAMS, THREE CHALLENGES

Three different engineering programs hold Engineering Design Days using TETRIX: the Mechatronics Engineering program holds Tron Days, Mechanical Engineering has Mech Days, and Electrical and Computer Engineering has ECE Days. Each challenge is unique to the specific lessons taught in each program. In 2017, Tron Days students were tasked with picking up 3-D-printed bones and placing them vertically in a "patient." The Mech Days students were challenged to design and construct a "tipping bucket" water park feature that would tip over after 60 seconds of filling. Meanwhile, the ECE Days students had a list of challenges: building an electric motor and an H-bridge circuit to provide forward and backward control of the motor, getting a Ping-Pong ball launching machine up and running, and creating a robotic design that utilized the launching machine.

TETRIX PRIME: THE RIGHT FIT

The challenges might be varied, but the same robotics system – TETRIX PRIME – is used across the board. The TETRIX kits were originally purchased to work with LEGO® MINDSTORMS® kits used by mechanical and mechatronics engineering students for robotics projects. Now, however, the PRIME sets are pulling double duty, also being used in the various Engineering Design Days challenges.

Rennick says TETRIX PRIME is a great fit for several reasons. "Because the system interfaces nicely with the LEGO MINDSTORMS, it is a great resource for students who require more structural rigidity for their projects," he explained. PRIME's smaller scale and compatibility with other components and systems also impressed the engineering department. "In the Fall 2017 term, we tried integrating pre-engineered structural components with TETRIX and pneumatics to great effect," said Rennick. "This flexibility is crucial to our deployment of TETRIX in the classroom. We look forward to working with Pitsco to further stretch the capabilities of this platform."

To see more of the exciting things going on at the University of Waterloo's Ideas Clinic, visit uwaterloo.ca/ideas-clinic. 



By **Patty Cooke**, Communications Assistant • pcooke@pitsco.com

Coding made easy

Coding Essentials Curriculum Pack features relevant technologies such as smart cars

Robotics has become a popular subject, both in and out of the classroom. That’s because it is increasingly important in the workplace now and promises to be even more so in the future.

Coding, a crucial part of robotics, can be difficult to teach, especially for teachers new to the world of robotics. But with Pitsco’s new TETRIX® PRIZM® Coding Essentials Curriculum Pack, teaching – and learning – coding has become easier for novices and veterans alike.

The curriculum pack includes one teacher guide and seven student guides to accommodate a classroom of 24 students – one student guide for every four students plus an additional student guide for the teacher.

With its 60+ hours of activities culminating in six open-ended challenges, the curriculum helps students take their engineering and coding knowledge to the next level, preparing them for the robotics challenges of tomorrow.


Each activity includes an overview, the coding essentials covered in the activity, materials needed, planning and execution-of-code sections, and a “Hack the Code” section as well as real-world connections, challenge parameters, class discussion ideas, and activity extensions.

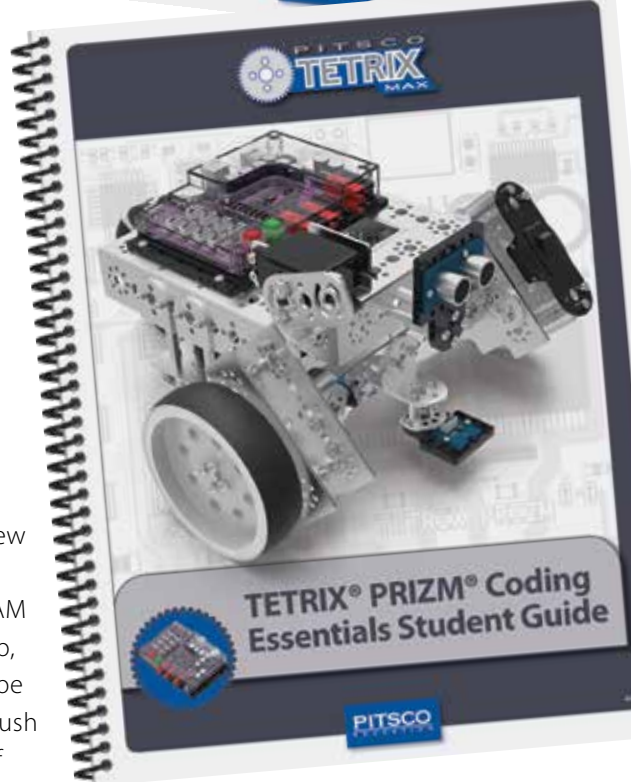
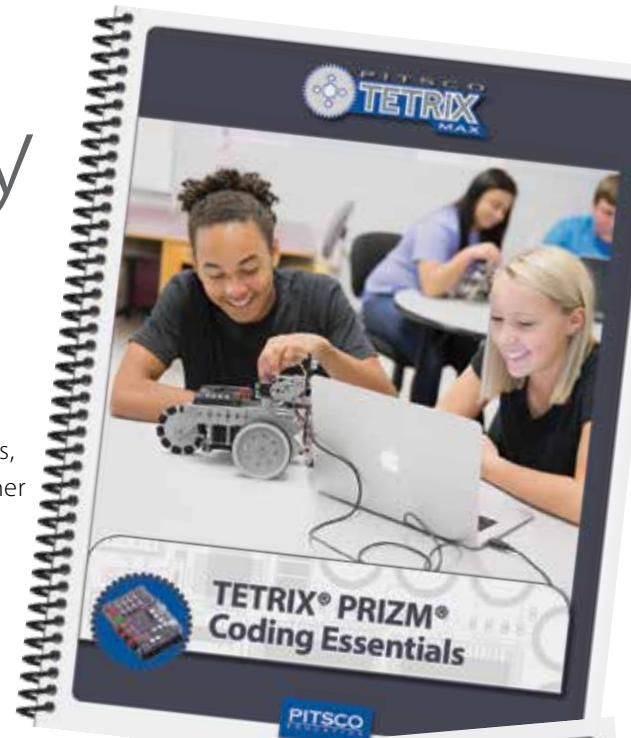
EXAMPLE ACTIVITY

The “Smart Cars, Smart Code” activity, for example, is particularly relevant to the current field of engineering. As the real-world connection in the student guide mentions, self-driving cars might be common in the very near future. To prepare students for such coding challenges, “Smart Cars, Smart Code” takes them step-by-step through the process of coding a pre-built robot to maneuver out of a parking garage and into a home garage. To do this, students must learn about coding essentials such as dead reckoning, motor power, pivot turns, and called functions. When coded, their vehicle must be able to flash turning lights, produce arm signals to match its turns, execute precise turns, and stay on a specified course. Much like driverless cars of the future, these robots must be coded perfectly to avoid accidents.

In addition to the activities, both the teacher guide and the student guide include helpful tips and detailed, colorful illustrations.

“The attention to detail, the color, the illustrations, and the showcase of code is what separates it from the rest,” said robotics teacher Aaron Maurer. “As a teacher and new founder of a nonprofit STEAM Innovation hub, I am going to be using this to push the learning of students and to provide a platform to allow them to learn the value of coding and problem-solving.”

If you’re looking for a great way to apply STEM knowledge and 21st-century skills with the excitement of engineering, robotics, and coding, you can find everything you need in the TETRIX PRIZM Coding Essentials Curriculum Pack (Pitsco.com/TETRIX-PRIZM-Coding-Essentials-Curriculum-Pack). 





By Corinne Pacht, Technical Editor • cpacht@pitsco.com

Sturdy mobile unit can accommodate most materials and, best of all, shipping is free

A makerspace is meant to be a place where students can breathe life into any creation they can dream up; it's a location in the classroom, the library, or another spot where students are given free rein to ideate, build, and improve whatever they like.

However, the flexible nature of the makerspace requires a great variety of materials such as art supplies, tiny robotics parts, balsa sticks, numerous


electrical components, and even clunky pieces of cardboard or PVC pipes. When you're creating your school's makerspace, you're going to need storage options that are as flexible as the space itself.

Pitsco recently unveiled a new Maker Space Cart specifically for this purpose. Standing more than three and a half feet tall, it's sturdily built and has enough space for almost anything you could think of. It's made so you can store materials on all four sides:

- Racks are hung down the center of the inside of the cart, where you could place any or all of the nine small bins and 12 medium bins – all of which are included! These small and medium bins hang facing one side and can be spaced out for prime accessibility to any organized small parts or supplies.

- The floor of the other side of the cart has ample room to stack large bins, such as those that come with the TETRIX® robotics systems, on top of each other and side by side.
- Even the sidewalls of the cart are opportune spots to hang extra shelves or hooks, as they come lined with pegboard. (The pegboard accessories are sold separately.) One wall even comes with a tube attached – the perfect place to store those unwieldy balsa sticks.

And, if you need a mobile makerspace or simply a mobile storage unit, the Maker Cart is on wheels! This will let you transport all your materials from room to room or station to station without having to juggle anything.

Best of all, there's free shipping! Visit Pitsco.com/Pitsco_Maker_Space_Cart to order your Maker Cart. 




Teacher excitement brews for Pitsco furniture

Did you know that Pitsco Education sells more furniture than just the Maker Cart? We have all sorts of options, from cabinets to teacher desks to standing workstations, and all of them are manufactured on-site in Pittsburg, KS! Each piece is developed with the whole child in mind and made to meet your learning needs, whether you need ample workspace or a collaborative environment.

And teachers are getting excited about the multitude of options! Sales Representative Alan Kirby recently attended the International STEM Education Association (ISEA) conference

in Branson, MO. He said, "Mandy Arck from George Nettels [Elementary School in Pittsburg, KS] had just done a workshop on makerspaces since we had just released our *Maker Space* catalog, and it was cool because afterwards, people were coming up to me asking about furniture. And after she finished her second workshop, even more people asked me about furniture! Never in the last five years had that happened to me."

With their rearrangement capabilities, the BuilderSpaces SpacePort™ and FLEX furniture are specifically designed to suit the versatile nature of makerspaces. 

Educators flock to Pitsco makerspace run in part by preservice teachers in OK



MAKER SPACE

Kristina Davis

Educational Program Designer | kdavis@pitsco.com

By way of a partnership with East Central University, Pitsco was asked to run a makerspace area at the Oklahoma Technology Association Encyclo-Media conference this fall. In its 36th year, the conference in Oklahoma City, OK, was attended by about 2,000 educators.

As this was Pitsco's first year at the conference, Staci Goodson and I had quite a bit to prepare for as we were running an informal makerspace. Our first step was to determine which projects to take. We considered many factors such as ease of build, structured vs open-ended instructions, age appropriateness of builds, and so forth.

In the end, we chose nine projects that met our criteria. The eight Pitsco Maker Projects selected were the Invention

Explore-A-Pak, TETRIS® PRIME, Straw Rocket, AP Bottle Racer, Balsa Glider, Sail Car, Large Structures, and KaZoon Kite. The ninth activity we set up included our card stock shapes, brads, a few Pushpin Paper Drill Kits, and scissors. While it is not considered a Pitsco Maker Project, the activity of making movable parts using various shapes is one that our Teacher Education team has used in numerous workshops.

You can also find these items and the projects mentioned previously in our new 2017-18 *Pitsco Maker Space* catalog.

After we selected the projects, we needed to figure out how we were going to promote our space. Staci came up with the idea of showcasing the projects using easel signs. These signs included the project name and an image of the project, as well as essential questions and career connections tied to that project. These same features can be found listed with each project within our catalog.

At the convention, we ran the makerspace in conjunction with ECU staff members Dr. Mark Jones, Teresia Harrison, Dr. Nanette Schmitt, Dr. Shelli Sharber, Dana Jordan, and Dr. Jessica Koch. We had the Pitsco Maker Projects set up at nine tables within the booth, and ECU had preservice teacher projects showcased around the perimeter. Their projects featured the use of the Hummingbird Robotics Kit by BirdBrain Technologies. The ECU preservice teachers also spent time inside the maker area creating new projects to take with them.

The makerspace area was open to all those in attendance throughout the two days of the convention. During that time, we had nearly 200 educators register to win one of our Pitsco Maker Projects. Those same educators also spent time creating in the makerspace. Some stayed long enough to create one or two projects, while others made it to almost all nine tables! Overall, the makerspace was well attended during the convention, and we look forward to our continued partnerships with ECU and OTA. [P](#)





Hector Rendon

CTE Director, San Benito (TX) CISD

Born and raised in San Benito, TX, Hector Rendon is passionate about his hometown and the school district for which he has served as CTE director the past 10 years. Prior to taking the position, Rendon worked for many years as a teacher, a regional CTE specialist, and a CTE supervisor. His main goal is and always has been to help prepare students for careers in the local workforce. His department sponsors more than 20 student organizations such as TSA, SkillsUSA®, FFA, HOSA, DECA, and BPA. Industry-standard certification opportunities for San Benito students include ASE – Automotive, ASE – Auto Collision, Medical Assistant, EMT – Basic, CNA, cosmetology, OSHA, and welding, among others.

Administrators' Corner

Connect with business leaders

South Texas CTE director has even knocked on doors to find internships

What is the aim of CTE in San Benito?

Our focus is to provide the opportunity for students to leave high school with more than just a high school diploma. Whether it be a licensure or certification or even just the training necessary for them to continue their postsecondary education, it makes a difference. In order for students to be successful, they have to understand that school is for them and that the teachers care about them. Otherwise, they feel they don't belong.

How many San Benito students enroll in CTE and earn certifications?

About 92 percent of our high school students take CTE courses. Last year, we had over 740 students receive a certificate through CTE. That's out of 2,100 here at the high school over all three grades – 10, 11, and 12.

How do you make connections with business and industry leaders in the area?

When I was the CTE specialist for Region One ESC, my goal was to promote our programs through which we emphasized certification and automotive programs. It took me a whole week, but I visited every single dealership from Brownsville all the way to Laredo. I went door to door and told them we are here for the communities. The businesses' resonating response was that the schools never call. Now, I tell the other directors that all you've got to do is pick up the phone and call the businesses and they will open the door for you. But you have to do the first step. The purpose is to get positions for students at the dealerships as job shadowing or internships.

Why is it important to prepare students for jobs in the local economy?

For us, the Hispanic community, it's very difficult to leave home. And so that is a driving

factor for us wanting to connect with local business and industry for jobs. We have some independent training schools here as well, and we take advantage of that.

Tell me about the Pitsco Education Modules course titled College and Career Readiness that eighth graders take.

We have three middle schools, and the emphasis there is to try to be as equal as possible so that we are able to focus on every single eighth grader leaving their campus with a choice of a career interest area. They do coursework throughout the semester to experience the Modules and research their top three career areas, and then they have to present a report before their peers. In a given classroom, the students may learn about 10-15 different occupations as they listen to their peers. This prepares the students to select the Career Pathway with the appropriate electives for the ninth grade. The Modules are chosen to align with the math and science concepts needing to be addressed from results in the seventh grade. Activities focus on integration of the academics with specific career emphasis in the respective math or science concepts.

Do the Modules provide any secondary benefits for students?

The Modules are aligned with the basic needs of math and science that we have identified and the emphasis for math and science in specific careers. The Modules are set up to where students have an opportunity to work with career-specific activities. They have their *Occupational Outlook Handbook* handy and online resources to be able to do research, and then they have a partner. They can always ask questions peer to peer. This allows them to look at things from a different point of view.

How important is House Bill 5, which restructured the state's graduation requirements and enables students to earn endorsements in specific areas of study?

House Bill 5 has put the icing on the cake, and I put it that way because we had been promoting career investigation all along. We've been preparing our students to have either a certificate or a licensure. And that's been talked about since 1995 – "it's coming, it's coming, it's coming." Now it's here. . . This is the fourth year of the implementation. This will be the first graduating class under House Bill 5. We want to get it right. We've asked, "What does a teacher need to do to turn the training around for the students so they leave high school with more than just a diploma?"

Talk about the vertical alignment of your CTE courses.

The other emphasis of House Bill 5 is that it requires a student to take a coherent sequence of courses. We've been pushing for that all along. The more they know about what the jobs are going to be, the more likely they're going to stick to it because they made the choice, not mom and dad. They chose it. All we're doing is nurturing those thoughts that they have in their mind.

What are the three most important 21st-century skills that students acquire in CTE courses such as College and Career Readiness?

I think the first would have to be communication – getting them to know that they need to ask questions in order to

receive answers. Because if they never ask, they'll never get a response. And the fact that they're working with a partner and they need to communicate to ensure they're both on the same page. . . . Teamwork is another key component there. And I've seen it in various reports and then when we visit businesses as well. One thing that they emphasize is the fact that it's a team effort. Then there is a learning process like when they are in science and they use the scientific method. That is a process. So, the more exposure they have to that, the more they're going to be able to internalize it and then use it in their daily activities.

What is authentic learning?

Authentic learning is where we need to be. For some people it's a new thing, but for us in CTE, that's what we've been focusing on all along. That's what we do. The application component of education is in CTE, and that's authentic learning. An example we have is building a 1,200-square-foot home on campus.

How do you stay connected with the community and share the story about your efforts to strengthen CTE?

We have advisory committees in automotive, law enforcement, and other areas. I belong to the Lions Club and I meet with other civic organizations. I present before the Rotarians as well to let them know where our programs are. And then I try to have meetings at the Central Office as well so that our industry partners can meet our upper administration. **P**

Hector Rendon has served as San Benito CISD's CTE director the past 10 years. Industry-standard certification opportunities for San Benito students include ASE – Automotive, ASE – Auto Collision, Medical Assistant, EMT – Basic, CNA, cosmetology, OSHA, and welding, among others.





By Tom Farmer, Editor • tfarmer@pitsco.com | Photos by Crista Cunningham, Multimedia Graphic Artist • ccunningham@pitsco.com

Addressing **social and emotional learning** in first grade

Pitsco STEM Units lay the right foundation, say educators at Harmony Science Academy, Austin, TX

AUSTIN, TX – Angela Witt is not a typical first-grade teacher. She has a degree in Psychology, and she uses it daily. So, if any teacher understands the intricacies of social and emotional learning (SEL), it's Witt, who facilitates one of the two Pitsco Education STEM labs at Harmony Science Academy – Cedar Park in Austin, TX.

When she says that the Pitsco STEM Units are a natural incubator for SEL skills, the message is delivered with an air of authority.

At the beginning of the school year, her six-year-olds exhibited typical behavior – occasional selfishness, defensiveness, tears, and fear of failure. That was nothing new to Witt, who is in her sixth year with Harmony. But as the students became comfortable with their first STEM Unit, *Exploring Structures in Literature*, a transformation began to occur. Each child brought something unique to their four-member teams as they worked through the activity-based unit steeped in reading and art as well as science, technology, engineering, and math.

"Kids coming from different backgrounds see the world differently," Witt said. "When those different cultures and backgrounds and life experiences come together, it creates such a wonderful harmony, and it's really teaching the kids not only how to problem solve, but they're learning social skills. And they're learning not only independence but that it's OK to rely on other people to help you."

SOCIAL EMOTIONAL LEARNING

Studies show that educators are taking on a bigger role in the development of children's social emotional learning skills in the areas of relationships, decision-making, self-management, and awareness. Officials with Harmony Public Schools believe their environment and culture naturally attend to these student needs.

"What we do here is create a safe environment where they can learn," says Harmony Science Academy Principal Ilker Yilmaz. "Every child can learn but in different ways. That's what we believe. We have a really positive culture, really positive campus."

Yilmaz has observed students at several grade levels working with the Pitsco curriculum, and each time he's

Exploring Structures in Literature STEM Unit: Helping Henry and Mudge

Pitsco's K-2 STEM Units are designed to meet the needs of nearly any classroom, as they can be delivered individually to supplement existing curriculum or they can be a full hands-on curriculum solution. At Harmony Science Academy – Cedar Park, facilitator Angela Witt spends three 45-minute class periods each week with each group of kindergarten and first-grade students at the school.

They spent a large chunk of the Fall 2017 semester working through the *Exploring Structures in Literature*

STEM Unit based on a popular book series, Henry and Mudge. A STEM Unit is composed of five activities, each of which lasts six to nine class periods.

Witt recently explained and showed the step-by-step process during which students worked on their problem-solving, collaboration, and communication skills in a single activity based on the book *Henry and Mudge and the Tall Tree House*. **P**



1. *I love reading stories to the kids, and I've noticed that even weeks later the kids could tell me something from the story. They make real-life connections to the stories, which is a big thing with the STEM program, and they're finding a problem in the real world and coming up with solutions.*



2. *I think them being able to see an actual problem versus us giving them some big concept that doesn't matter to them is meaningful. When you bring in something they can really connect with, they put a lot of effort into trying to fix the problem because they put themselves in the situation.*



4.

Then, the next class they come in and actually start building. I can look at it and tell if it's going to work, but I don't tell them. They figure it out all on their own. They go through and figure out their problems.

3. *At the beginning of every lesson, we talk about the problem and brainstorm it, and then they go to their teams and talk about how to approach the problem and design their structure.*



3.



5.

We tell them failure is OK, it's normal, and that it's not the end. And then they keep going. So, they're getting that experience, building that confidence, and taking it back to their regular classroom.

found them to be respectful of each other, fully engaged, and eager to work cooperatively. "They share the things that they learn," Yilmaz said. "Sometimes you learn, but if you don't repeat it or write it down, if you don't give it out to someone else, that becomes passive knowledge. But gaining something and passing it along to another by sharing it, then you have active knowledge."

Witt, meanwhile, makes the most of her three class periods per week with each group of kindergartners and first

graders who come into her Pitsco lab, where they develop a host of skills and a high level of confidence that are foundational and transferable.

"I really feel that children cannot learn if they don't think they can learn," she said. "We have to build their self-confidence as teachers and as parents. It's not about making sure they know how to read. It's about making sure they believe that they can and that they believe in themselves and have faith in themselves to do it." **P**

The **STREAM** solution for any type of learner

STREAM Missions from Pitsco reach all students, says Harmony elementary facilitator

AUSTIN, TX – Seven different activities going at once. Twenty-eight students talking excitedly and loudly. The teacher scurrying about the room, checking on each group of four and answering myriad questions on myriad topics.

Nope, it's not a substitute teacher's worst nightmare. It's a dream come true for Pitsco STREAM Missions facilitator William Dickson in his bright, energy-laced lab at Harmony Science Academy – Cedar Park in Austin, TX.

The beehive of activity, the questions, the equipment and materials in every student's hands – this is exactly what Dickson wanted. "They approached me with the opportunity of doing this pilot program, and I was all in because everything that I do is hands on," said Dickson, now in his fourth year teaching with Harmony Public Schools after working in the radio industry. "And this is hands on taken to the next level because I have seven different groups doing seven different things. I'm teaching seven lessons at once, and it's fun."

The STREAM Missions are available in either a rotational setup – as is Dickson's lab – or in a whole-class format where all students work on a single activity at the same time. Either way, students explore in a real-world context that brings learning to life in a most memorable way.

GETTING OFF TO A GREAT START

Harmony Public Schools has 54 STEM-focused campuses across Texas and in 2017 began spreading its model outside the Lone Star State. The two Pitsco labs at the Cedar Park campus are an elementary pilot.

Before deciding to make the purchase in hopes of deepening students' understanding of authentic STEM learning, officials from Harmony visited an elementary Pitsco STEM lab at nearby Hays CISD.

One particular experience during the site visit convinced Dickson that the Pitsco curriculum would be a true equalizer that meets the needs of all students, regardless of their dominant learning style. "When I saw the kids at that school who are English language learners, I just watched them, and I interacted with them. And when they were speaking, they weren't always speaking English, but they were still getting the concepts. It was really cool! So, I came back and I was like, 'Where do I sign up?'"

Dickson and other Harmony teachers then went through a summer professional development program led by Pitsco's trained education staff.

"Aubrey was a great trainer, and she trained us in the same method that we teach the class. It was all hands on," Dickson

said. "She showed us how to log on, and then we actually had a class. We went through a whole interval as part of our training. It was good to see it from the kids' perspective."

FACILITATING

Perhaps the highlight of every STREAM Missions class is when Dickson gets to observe students working through the activities without instruction or help from him, unless they reach a standstill. He watches as they share and discuss ideas before experimenting in a true engineering design process to see which of their approaches works best.

"It's like when they were building the pipeline (at the *Transportation and Power* workstation) – I'm down there on the floor with them asking, 'What do you need to do to make the water actually get there?' It's all about them thinking outside of what they know, and that's when they become innovators."

Principal Ilker Yilmaz is another STREAM Missions convert, but for another reason – every student participates every day in the four-person Crew because each one has specific

Harmony Science Academy Principal Ilker Yilmaz observes STREAM Missions teacher William Dickson interacting with students who build a pipeline at the Transportation and Power workstation.



responsibilities as the Commander, Communications Specialist, Information Specialist, or Materials Specialist.

“Each of them is involved because each one has a position,” Yilmaz said. “One is in charge overall, somebody is in charge of the computer, somebody is managing the materials, and somebody is reading. It’s great.”

And all students document their work in a personal Mission Journal that also serves as a proof of learning and a well-rounded assessment tool.

Harmony finds its elementary **STEM** solution

AUSTIN, TX – As the largest STEM school system in the nation – and getting an unprecedented number of students into STEM majors and programs – Harmony Public Schools could be confident that its secondary STEM programs were hitting the mark.

But being relatively new to the elementary school scene, Harmony went in search of a STEM solution that would develop students’ fundamental skills and feed seamlessly into the middle level. The answer came not in the form of a traditional STEM lab but in a more robust STREAM Missions/STEM Units program from Pitsco Education.

The K-5 solution is in its first year at Harmony Science Academy – Cedar Park in Austin, TX, and could soon expand to other Harmony locations across the state and even the US as the district spreads its successful model. For now, though, Austin is the logical first stop for Pitsco’s elementary STEM program because of the burgeoning area’s need for a STEM-literate workforce.

“Austin is such a tech-happy city. We’re still one of the top cities in the nation for the tech boom,” said Victoria Stockstill, Austin director of outreach and development for Harmony Public Schools. “Harmony produces a lot of STEM graduates. We want to try and fix that workforce problem here.”

Pitsco’s STEM programs can be found in several Harmony middle-level programs, but because the district is STEM focused overall, it has developed its own project-based learning activities and programs at the high school level.

Dickson concludes each class with a whole-class period of reflection when he asks students what they learned. On this particular day, he questioned a group of students who earlier had demonstrated for him a flawless understanding of how magnets work.

“How can you make them be attracted, Isabel? . . . Yes, you have to line them up like that. . . . When they’re lined up like this, it means what? . . . They’re attracted because of the two poles – north and south. Yes. . . . You guys are awesome! I love it.” **P**



Pitsco curriculum and materials at Harmony Science Academy were purchased with funding from the Michael & Susan Dell Foundation.

“We’ve been doing it for so long [since 2001], we’ve really refined our model,” Stockstill said. “One of the reasons we’re so interested in Pitsco at the elementary level is because it looks very similar to the work that we’re doing at the secondary level. So, it’s a good marriage between the two.”

The Pitsco curriculum and materials were purchased with funding from the Michael & Susan Dell Foundation. Coding and robotics solutions were also implemented at the academy with Michael & Susan Dell Foundation funding.

“Our aim is to get kids really interested and confident at the elementary level and build the right foundation,” Stockstill said. “That’s something we want to do system-wide for Harmony. . . . Our hope is to have Pitsco up and running all over our elementary campuses as the years progress and we work out the kinks and the scheduling.” **P**

Harmony Public Schools

- 54 schools across Texas (7 in Austin)
- 64 percent of graduates choose a STEM field or a STEM major
- 61 percent of students are economically disadvantaged
- 64 percent of alumni are the first in their family to attend college
- In the early stages of replicating its model nationally



By Tom Farmer, Editor • tfarmer@pitsco.com

Second graders work collaboratively as they attach ties on their hot-air balloon as part of a Pitsco STEM Unit at Collins-Parr Elementary School in San Diego, TX.

Anything but luck

Proper planning and all parties pulling in the same direction – toward STEM – give San Diego, TX, elementary students hands-on, career-focused experiences

SAN DIEGO, TX – Call it a \$5 million opportunity. Call it a chance to prepare students for their future careers. Call it a concerted effort. But whatever you do, don't call it luck. The focused efforts of many administrators, staff, teachers, and students in San Diego, TX, have resulted in a revitalization rooted in STEM at Collins-Parr Elementary School.

The key word in that sentence is *many*. Only when all key players – from the superintendent to the paraprofessional – carry out their roles is it possible to achieve the transformation that is under way in this small independent school district about one hour west of Corpus Christi. San Diego, TX, is small, but the collective heart of its educators and residents is big. And so are the goals for what they hope a \$5 million Texas Title I Priority Schools (TTIPS) grant can help them achieve at Collins-Parr.

Funding comes first, naturally, and a TTIPS grant was awarded in 2016 to provide resources over a four-year period in hopes of raising student performance at the academically struggling elementary school.

The funds have been used to purchase Chromebooks, tablets, summer reading camp materials, two STEM labs, and professional development for teachers and administrators. Pitsco Education was selected to outfit the two labs with K-2 STEM Units and the company's new STREAM Missions for Grades 3-5, a science-laden cross-curricular program that develops students' 21st-century skills such as critical thinking, collaboration, career exploration, and problem-solving that are transferable and will serve them well for life.

Here's how individuals at all levels have played key roles to ensure the Pitsco STEM labs are leveraged to maximize student benefit.



SUPERINTENDENT

Dr. Samuel Bueno's experience in the Navy taught him that teamwork is essential, so his leadership style is rooted

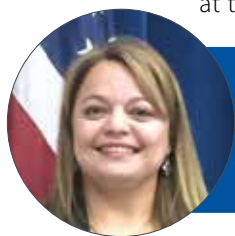
in listening to all parties and building consensus.

"When we submitted the grant, we put together a team of teachers and administrators, so the buy-in started from the very beginning," he said. "I learned a long time ago when I was a campus principal that you don't just get an idea as an educational leader and try to jam it down a teacher's throat."

Bueno has made a habit of observing students in the lab, and he likes what he's seeing. "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. I have this term that I call noisy good. It can be an extremely loud classroom, but there's a lot of learning going on."

As the leader within the district, Bueno now is working on a growth and sustainability plan to spread STEM to all grade levels. He has a personal stake in the game as his daughters are in high school. "Our school board is really supportive, and financially if I can put the budget together, they will approve it," said the 17-year San Diego ISD veteran. "Our administrative team, we all have buy-in

at the community level. I'm not here because I want to eventually move up to a larger district. I plan to retire here."



DIRECTOR OF EDUCATIONAL SERVICES

Another district leader with a long-term vested interest in the community

is Director of Educational Services Gracie Pizzini. She worked for 15 years in the district as a teacher, moved away to serve as a principal and a director at a regional service center, and then came back to San Diego with ideas for making things better.

"When I came back I was kind of, 'What kind of opportunities are students missing out on?'" she said. "What can we offer our students to become a part of that global society where technology is driving everything? At the service center, I saw districts putting in robotics programs. I saw districts putting in STEM programs. And I came back here and we were not. So there was a great opportunity to advance math and science course offerings and we applied for the grant and we got it."

The STEM labs, though, needed to be aligned seamlessly with math and science classes in order to be most effective, Pizzini reasoned. "I really wanted an aligned lab. That was important to

me because we serve an 80 percent economically disadvantaged population. These kids need to be able to make connections with their learning, and hands on makes that happen. . . . I can tell you from last year's common assessments to this year's the level of achievement is much higher, and I attribute that to the hands on."



GRANT ADMINISTRATOR

Dr. Bueno knew that proper oversight was the only way to ensure the TTIPS grant would be carried out most effectively, so he tasked former Collins-Parr principal Yvonne Munoz with the assignment.

"Science has been a struggle here – low, low scores," Munoz said. "Now we have a new science teacher and a STEM lab, and common assessment scores are nearing 70 percent. That's pretty cool. Last year our state assessments were in the 40s for fifth grade. I can't wait to see the benchmark that we take in

February. If the scores are high, it'll go to show that the additional time in the lab and the additional work in the classes is working."



PRINCIPAL

As the person held most responsible for ensuring that Collins-Parr turns out well-rounded students, Principal Monica

Perez is most excited about the Pitsco curriculum's development of multiple soft skills.

"I like that we're making students become quicker thinkers. That way they are able to make adjustments quickly and move on," Perez

Numerous individuals in San Diego (TX) ISD play key roles to ensure the Pitsco STEM labs are leveraged to maximize student benefit.



said. “They’re learning skills that they can use in any subject area going forward. . . . Sometimes as teachers and administrators we want to take over and not let students solve their problems. In the lab, the teachers facilitate and allow collaboration to occur.”

Even social and emotional learning skills are developed and sharpened. “Even in this first year of implementation, we’re getting a lot more students who are finding more confidence in themselves, and they’re ready to try new things and not be afraid of failure,” Perez added. “I want them to be ready for the next year, and I think this is going to assist them in that process.”



STEM COORDINATOR

Amanda Morgan spent countless hours leading up to and during the first few weeks of this school year ensuring that the STEM lab content – STEM Units and STREAM Missions – was aligned with what all K-5 students were doing in their core classes. Every one of the school’s K-5 students spends two class periods per week in the lab, so Morgan’s task was monumental – but essential.

“I got the TEKS [Texas Essential Knowledge and Skills] correlations for all of the Missions, and then I cross-referenced our scope and sequence, what teachers needed to teach every six weeks. So we kind of got the most bang for our buck doing these particular Missions,” Morgan said.

SCIENCE TEACHER



Kristella Laso is in her first year teaching fifth-grade science after serving the previous year as a math instructor. She couldn’t be happier to have students splitting their time between the STEM lab and her science classroom, completing closely aligned activities.

“Since they go to the lab on Mondays and Tuesdays, they’re exposed to lessons I’m going to be doing on Wednesday, Thursday, and Friday,” she explained. “So they have that background knowledge versus if it was just random. Those kids make a connection and are more likely to remember it.

The design of the Pitsco curriculum and the collaborative approach also provide opportunities for students to hypothesize and then experiment further. Laso cited a solar car experiment earlier in the day when students explored how a lamp would power the vehicle and then how it would perform outside under the Sun. Then they had an idea.

“They wondered what would happen if they covered half the solar panel. The kids made that connection. They said it didn’t have enough energy,” Laso said. “They put that in their own words



and went back into the classroom and jotted it down in their journals.”

LAB MANAGER

The teachers and administrators admit that the STEM labs would not be as high functioning without the attention to detail from lab manager Jessica Trevino, a paraprofessional who ensures all materials and equipment are prepared and ready to go when classroom teachers bring their students to the adjoining labs.

“Any program that you want to be successful, the people running them have to be vested. They have to know the vision and why they’re doing this,” Pizzini said of Trevino.

As the overseer of a pair of labs used by 650 students per week, Trevino relied on the Pitsco-supplied professional development sessions to prepare her. “At the training I was just like, ‘How am I going to do this?’ But I got it that first week. I just like doing it with the kids. I learn stuff with them, so it’s perfect.”

Perhaps her favorite aspect of the lab is that students can try, fail, and try again without being penalized. “Earlier when they were working with shapes, a couple students said, ‘I can’t do this.’ We just kept telling them, ‘You just need to keep trying.’ And we tell them there is no can’t. You just need to do it. And they did it. You just have to encourage them.” **P**

Hands on, minds on, and eyes on – all at the same time – as a Collins-Parr Elementary student explores solar power inside before heading outside for further experimentation.



What titles do you have?

Title I funds can be used on a variety of Pitsco Education products



Pat Forbes

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Society has long been enamored with titles. We have titles for people such as duke, doctor, poet laureate, and lieutenant. In the education world, we have titles (from the Elementary and Secondary Education Act) that reflect efforts to improve the disbursement of quality education.

Title I is a major contributor to that effort, as the largest federally funded education program. It is an attempt to assist students who might be in danger of failure, living at or near poverty, or classified as disadvantaged. To qualify for Title I funds, low-income students must be enrolled in the free and reduced lunch program, or for a whole school, 40 percent must be low-income students.

There are a variety of stipulations regarding state academic standards and assistance for “limited English proficient children, migratory children, children with disabilities, Indian children, neglected or delinquent children, and young children in need of reading assistance.” Title I emphasizes “holding schools, local educational agencies, and States accountable.”

That accountability rests with the current efforts to adopt technological advances in STEM curriculum. Title I funds can be utilized to support a variety of Pitsco Education curriculum products. Pitsco has been a leading resource in education and has paved the way in STEM solutions. Among the latest is the TETRIX® building system, even more effective now with the addition of the TETRIX PULSE™ Robotics Controller. Educators suggest it is especially effective for middle school and lower-division high school, and Title I funds would effectively support such efforts.

The educational staff must be on board to help foster change. As labs are created, teachers must be prepared to cooperate and let students engage as owners, fail sometimes, and learn that to fail is not fatal. There is a litany of successful people who failed at one time or, for some notables, several times.

Where language, home life, or disadvantage interferes, the Pitsco classroom will be a haven for students to enter. They will have access, because of the Title I funds allocated, to acquire the knowledge to meet future challenges in their educational journey. Should Title I funds be exhausted, perhaps one of the following grant sources might assist.



Much more online:

Pitsco.com/Grants



GRANT APPLICATION DEADLINES

January

12 Kerr Foundation

The foundation supports math and science education.

thekerrfoundation.org/guidelines.php

15 Captain Planet Foundation

The foundation's ecoSolution and ecoTech grants support environmental literacy and action.

www.captainplanetfoundation.org/grants/

February

TBA Lowe's Toolbox for Education

The organization is focused on future needs and basic educational projects.

toolboxforeducation.com

1 Astronauts Memorial Foundation

The foundation's Alan Shepard Technology in Education Award recognizes educators using technology in the classroom effectively.

www.astronautsmemorial.org/alan-shepard-award.html

28 Monsanto Fund

The foundation supports art and literacy programs in school for younger classes.

www.monsantofund.org

March

31 Ezra Jack Keats Foundation

The foundation supports art and literacy programs in school for younger classes.

www.ezra-jack-keats.org



By **Cody White**, Communications Assistant • cwhite@pitsco.com

Finding the right STEM fit

Iowa district and facilitator strive to continually improve their STEM program

MECHANICSVILLE, IA – As STEM reveals itself to be more than just another trend, schools are giving careful consideration to their individual implementations. This is no simple issue. Situations range widely from school to school and even from class hour to class hour. The expectations that states and that parents hold for STEM success are still evolving. And of course, the many heady offerings in the marketplace must be weighed against practical considerations of time and budgets.

When Iowa's North Cedar Community School District went looking for the right tools to make STEM a priority at the elementary level, these factors and others hovered around the decision. The elementary program was not a stranger to STEM. The tools already in place were valuable, but the district wanted to go further. There was a desire to meet more of the Next Generation Science Standards, to emphasize literacy, and to incorporate a Multi-Tiered System of Supports (MTSS).

Surveying the available solutions, K-6 STEM Specialist Deb Rouse toured several schools, including those with Pitsco Missions. "I really liked that the Missions classrooms were almost entirely student driven," she said. "Students have an opportunity to take on roles that might surprise others. They might find they shine as a leader or as a communicator, or they can show off some other soft skills that are critical in a work environment but not always easy to foster in the regular classroom."

After this period of consideration, Missions and Elementary STEM Units were incorporated into two K-6 STEM labs (one at each of the district's two elementary centers) with Rouse as the facilitator. It wasn't long before Rouse observed objective improvements brought by the labs.

Here is one. Previously the schools met their STEM ambitions in part using traveling science kits that had to be regularly unpacked and packed. This took time. Rouse saw that the lab curricula addressed many of the same science standards, however, and without the time-management issue. This recognition has led to less reliance on the kits and more reliance on the labs. This has given some valuable time back to teachers.

"Moving the NGSS to the lab seemed like a natural way to take some of the pressure off of [teachers] and maintain a student-centered, inquiry-based environment since the lab is fully equipped at all times and students access the materials with ease," said Rouse.

The other line of evidence for the labs' success is more subjective – but no less important. Witnessing the reactions, realizations, and enthusiasm of students has given her confidence in the new program the district has chosen. "Not only are our students becoming more interested and knowledgeable in science and engineering, they are applying skills from their math classes to real-life science. They are making observations, they are drawing and labeling diagrams, they are making connections and bringing in objects from their home or trips with family to share with me and with their Crew."

The elementary program at North Cedar is still evolving, but Rouse states that excitement is in the air. She regularly sends updates to parents and the community about what students are up to in the STEM lab. And she is working to include STEM on the report card, focusing on a few key "power standards." The administration and school board are supportive. And Rouse often hears feedback from parents and from classroom teachers that students are bringing their newfound excitement for STEM into life outside the lab.

"I feel like we are onto something here," said Rouse. "I am very proud of all the work our district has done at every level to make STEM a priority K-12." **P**

Missions Connections cover six subject areas

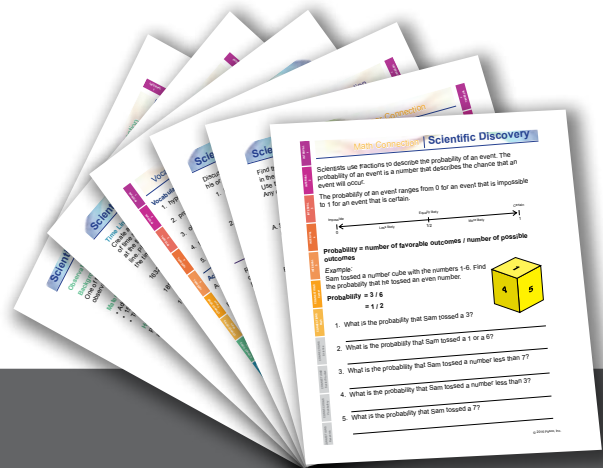
In the back of every student's Mission Journal, you can find six different types of Connections pages. The information found on these Connections pages is unique to each Mission title. These Connections pages provide additional activities in specific subject areas that can be supplemental to the Missions curriculum. The six types of Connections are Career, Math, Science, Social Studies, Vocabulary, and Research.

- The **Career Connection** contains four careers related to the Mission topic. Detailed information about these careers can be found in one of the careers books sent with the Mission. In addition, five activities based on the careers are provided. Students can also utilize online resources to find more career information.
- The **Math Connection** gives students the opportunity to apply their math skills to the topic of the Mission. Students can work on graphing, comparing numbers, time, temperature, perimeter, area, volume, fractions, and basic computation skills.
- The **Science Connection** is a two-page document containing several sections. It provides a science experiment that can be completed using common materials. This can be completed in class or at home. An adult helper is usually needed. The student follows the scientific method and completes each step.
- The **Social Studies Connection** provides Mission-related activities using time lines. Each historical event

provides a summary and the year the event happened. It allows students to see how the topic from the Mission has changed and improved through history.

- The **Vocabulary Connection** contains the 10 vocabulary words from the Mission's Briefings and five activities to help students learn them.
- The **Research Connection** contains eight topics for research, information on a famous person or group, and two open-ended questions. Students are given the opportunity to work on their communication, reading, and writing skills while further investigating the Mission's topic.

These pages are great to complete if students finish early, as homework or enrichment, or as substitute activities. As the teacher, you can decide how many of the Connections you want the students to complete. Students can complete their Connections in their Mission Journal on the Notes or Mission Log pages or on separate sheets of paper. **P**



Clever solution turns a problem into a feature

STEM Specialist Deb Rouse understands the benefits for the elementary students who rotate into her STEM lab. So, last year, when one plus-size fifth-grade class threatened to overwhelm the lab's capacity (30 students in a lab optimized for 20), Rouse had a puzzle to solve. Her initial thought was to split the class into two sessions, but there was a problem: the lab time was meant to serve as

the classroom teacher's preparation period. If the teacher sent only half the students at a time, how could there still be a prep session?

An ingenious solution was devised. Bring the Title I reading teacher into the equation. Rouse explains: "If I would take the students who needed a little extra support in reading all at one time while the regular classroom teacher taught reading, and then we switch groups so

the Title I reading teacher could teach the group I'd just had, it just might work. Then both teachers would still get a prep, I would get the smaller groups the lab was built to accommodate, and the students would spend all of their time in Mission work."

Not only did it work out, but it also had a great side benefit. Rouse was able to give the reading-challenged students tailored attention in the lab. **P**



Connecting with Expeditions, Pitsco lagniappe

Some of my favorite food is Cajun. I like the spicy, exotic flavors. Coming from the center of the continental United States, I find these flavors interesting and different from my everyday experience. I've even learned a Cajun word or two as I have traveled in Louisiana. My favorite word, especially when it is used in a place where I am eating, is *lagniappe*.


For those of you who don't know, *lagniappe* is "a little something extra." If you've ever had a *lagniappe*, then you probably know why it would be my favorite Cajun word. A *lagniappe* brings some added flavor, makes the dish even more filling, provides a new and unique

experience to something familiar, and just makes the experience more rewarding. Pitsco has captured the essence of *lagniappe* with the Expeditions in the form of Connections, that little something extra to enhance the Expeditions experience.

Currently, Pitsco offers four Connections: Career, CADD, Research, and Safety. These can be used with any Expedition and at any point in an Expedition. They can be used to help extend the content at the end. They can be used to enhance the content during the Expedition experience. They can even be used as an introduction before beginning an Expedition. Each Connection brings something unique that adds a little something extra.

In the *Building Bridges* Expedition, for example, you could incorporate the **CADD Connection** to have the students create a CADD drawing of their bridge design. During the *Bio Research* Expedition, you could use the **Research Connection** to help students extend their research into bioengineering and see how to conduct and recognize good research they find.

Concerned about safety? The **Safety Connection** covers topics related to classroom safety, workplace safety, and even personal safety, all topics that would benefit your students and can be taught at any point during the Expedition experience, providing students with meaningful context to the guidelines provided. The **Career Connection** offers many different opportunities for students to explore careers that are directly related to the Expedition content. This could easily be used as the lead-in to an Expeditions experience in your classroom.

If you are looking for ways to provide supplemental instruction, maybe even just to fill some calendar days, the Connections are a meaningful solution. The activities contained within the Connections range in time from 15 to 45 minutes. But one thing they all provide is that little something extra that takes the Expeditions content from great to incredible. So, if you haven't already explored the Pitsco *lagniappe* of Connections, I would encourage you to try them and see how they can make your students' classroom experience even better. 





Hundreds of products all in a day's work at Pitsco Manufacturing

Editor's Note: In this issue's Blog Log feature, Pitsco Web Content Specialist PJ Graham takes us behind the scenes of Pitsco's Manufacturing division. Learn a bit more about the many items produced and placed in classrooms by our hardworking Manufacturing men and women. And be sure to check out some of our other blog posts as well at blog.pitsco.com.



PJ Graham
Web Content Specialist


On October 6, 2017, manufacturers across the US held events to educate the public about the importance of manufacturing and its related careers. The first Friday of October was Manufacturing Day, and here at Pitsco we are incredibly proud of our Manufacturing division – and for good reason!

With a staff of 31 people, Pitsco Manufacturing produces more than 480 unique products. That's a staggering number of different items to work on, and many of these products run through several departments before being shipped out.

Not only is the number of products produced high, but Manufacturing works closely with the Pitsco distribution center to produce products as needed. For example, instead of having to order more than 1,000 of a specific product from an outside source annually because they won't accept small orders, Pitsco's warehouse can instead receive 100 a month from Manufacturing to help manage overhead and inventory. This adds another layer of difficulty to managing the division, but it's part of why Pitsco can offer the variety of items that it does.

There are many departments that make all this happen: Assembly & Electronics, Finishing, Machine Shop, Plastics & Kits, Panel & Installations, Finishing, Engineering, and more. Most Manufacturing employees are cross-trained to work in more than one department so they can help out when their own department has time available. Learning new things and meeting the creative challenges that come their way must appeal to

them, because 60% of them have worked at Pitsco for 15 years or more. In just the Machine Shop, there are three machinists with a combined 70 years of experience and product knowledge!

We took a closer look at three departments and the processes they use, the challenges they face, and what they enjoy about their work. . . . (Read more at blog.pitsco.com/blog/100s-of-products-at-pitsco-manufacturing.) 

Check out these and other great posts at blog.pitsco.com.

"The Science Behind Fall . . ." – By Jessica Born

While admiring the beautiful fall foliage, have you ever wondered what causes leaves to change colors? Digital Marketing Manager Jessica Born gives us a lesson on the science behind the beauty of fall.

"SySTEM Alert! puts the story in STEM" – By Cody White

Communications Assistant Cody White, creator of Pitsco's *SySTEM Alert!* publication, explains why *SySTEM Alert!* is an important supplement for STEM lessons in middle school classrooms.

"Make your makerspace work for you" – By Patty Cooke

Need a few tips and ideas on how to start a makerspace or make yours better? This blog post can help!



ONLY ONLINE:

Visit blog.pitsco.com to read more!



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To learn more about the Teacher Advisory Group, see examples of the work they created, and get to know the current members, head to [Pitsco.com/TAG](https://pitsco.com/TAG).

By **Stephanie Manes**, Research Coordinator

TAG members play key role in **product development**

Did you know that Pitsco Education is located in Kansas? Also known as the Land of Oz, Kansas was made famous in the classic movie *The Wizard of Oz*. In the movie, the Scarecrow is looking for a brain, the Tin Man is looking for a heart, and the Cowardly Lion is looking for courage.

In 2017, Pitsco was looking for a PULSE™, and our Teacher Advisory Group (TAG) was integral in helping us discover it. Three teachers – Aaron Maurer, Carrie Wilson Herndon, and Michelle Smith – were part of the beta test for our new TETRIX® PULSE Robotics Controller, completing test runs over the summer and providing feedback to our development team. We used their comments to refine the final product, which hit classrooms in September.

TEACHERS AND ACTIVITIES

Other members of our TAG team were busy this summer as well. We asked five teachers to write activities around products. When the activities were complete, we asked other TAG members to peer-review them. This collaborative process produced some great activities we can't wait to release on our website for educators to use!


- Dr. Mary Webb – EZ Shake Table and Invention Explore-A-Pak
- Michael Clark – Gravity Jousting
- Paul Casey – Balloon Buggy and Propeller Buggy

- Sharon Cutler – Prop Racers
- Greg Reiva – Prop Racers

SHARING TIPS AND RESOURCES

Earlier this year, three of our TAG teachers took up the pen to share their classroom expertise with educators. As the humanities get more integrated into STEM, we're often asked how to keep students engaged in writing activities in the STEM lab. We tapped TAG member Debra Rouse, a K-6 STEM coordinator who has a lot of experience in this area. She wrote a blog post filled with tips to spark interest in scientific writing.

Art Hardin and Michelle Hendrick tackled another subject matter for us. Art wrote a blog post on the Pitsco Backhoe, detailing his experience and giving recommendations for assembly and use. Michelle wrote an activity around the Backhoe. Combined, these two pieces give other educators a teacher-tested and easy jumping-in point.

In addition to the projects our TAG team was willing to take on, they provided a classroom viewpoint all year long, serving as a sounding board for ideas that Pitsco is considering and answering questions on a private website. They might have helped us develop the PULSE controller, but this team was really the pulse of development this year. Thank you for all the contributions, 2017 TAG team! 

Pitsco, your classroom certificate of authenticity



DAVE THE SCIENCE GUY

David Meador

Curriculum Specialist | dmeador@pitsco.com

We've all seen the signs on various retail outlets: "Authentic Mexican Food" or "Authentic (Insert Team Name) Sports Merchandise." Perhaps you have purchased something online that came with a certificate of authenticity. No matter how you have encountered the word *authentic*, you have an understanding that the item in question is the real thing.

This is true in education as well. One of the phrases making the rounds in education circles currently is authentic learning. Does this mean that the education that has been going on for decades before this phrase came into being was somehow fake or counterfeit? By no means is that the case.

The term has brought to light the practices that make education authentic. One fortunate aspect of this is that as a teacher who uses Pitsco products or curriculum, you have authentic learning baked into the materials in your classroom.

First, let's start by identifying what makes learning authentic. According to Educational Research Newsletter, there are four basic characteristics of learning that make it authentic.



- 1. The learning is tied to the real world.** Pitsco has always striven to make real-world connections, starting with Modules and now extending into our Expeditions and Missions connections. Students are given problems with real-world applications and questions in the form of Essential Questions that focus the students' learning on what is happening outside the classroom.
- 2. The learning is open ended.** If you've used either Expeditions or Missions in your classroom, you probably recognize this characteristic. With open-ended curriculum, students are invited to extend their learning beyond what is simply contained in the material and extend those learning opportunities to other situations and beyond their time in the classroom.
- 3. It is collaborative in nature.** This aspect has always been a part of the Pitsco model of education. It is students working together in true collaboration to solve problems and develop solutions along the way. The experience of working together toward a common goal and having to practice communication and cooperation in order to achieve common goals is a necessary part of the experience for every student in a Pitsco Expedition or Mission lab. Students are set up for success in the 21st-century workplace by being given the opportunity to practice and develop these skills from such a young age.
- 4. It is student centered and directed.** Students make choices. In both Expeditions and Missions, students are given many opportunities to choose which way to direct their learning experience within the curriculum. Students make design decisions for a solution and then pursue the knowledge necessary for them to be able to implement that solution. This provides to learners the motivation to learn.

These four aspects make learning authentic, and as you can see, Pitsco solutions offer you the mechanism to make the learning authentic. Real learning has always taken place in the classroom, but with this approach it's just easier to recognize those classrooms where it is happening. **P**

what we've already developed face-to-face – a resource at the ready whenever you need it.

So, in a nutshell, what can you expect at the new Pitsco.com? There are four main sections to explore.

SHOP

You'll find thousands of products just a click away in our Shop. It's been categorized to help you find what you're looking for faster while also providing you more specific resources within that product section or individual page. The checkout process continues to improve. And you can even place items on a wish list or in a cart to share with a colleague, principal, or purchasing department.

OUR PROGRAMS

Pitsco began as a catalog company, but we have always been more than products. We have curriculum offerings and full-scale implementations for single classrooms, whole schools, and entire districts. And we've provided this type of offering for years. We've just never had such a robust web presence for Our Programs, sharing rich details about them as we do now on the site. You can gain some really valuable insights about the programs your school might consider adding to your active learning pipeline.

EXPERIENCE PITSCO

Looking for resources such as videos, sample teacher guides, or marketing material? Or testimonies from current and past customers and students? Perhaps a copy of our most recent newsletter or the schedule of upcoming events and workshops we'll be at? It's all here in the Experience Pitsco section. You can also apply for our monthly Pitsco grant and find other funding opportunities too.



ABOUT US

We're a company for educators, by educators, and there's no better place to get to know us than in our About Us section. Learn how and why we operate as a company as we do. Check out the latest Pitsco news. Meet the Pitsco leadership team.

Please, grab your nearest device – laptop, tablet, or smartphone – and check it out soon. Any will work and provide you the same awesome experience. We can't wait to connect with you online!



UPCOMING EVENTS

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

January

- 23-26** FETC, Orlando, FL
- 24-27** Bett, London, England
- 28-31** Texas Association of School Administrators (TASA), Austin, TX

February

- 1-3** Texas STEM Conference, Galveston, TX
- 8-9** Virginia Children's Engineering Convention, Roanoke, VA
- 8-11** National Title I Conference, Philadelphia, PA
- 6-10** TCEA Annual Convention, Austin, TX
- 22-25** Texas Alliance of Black School Educators (TABSE), Houston, TX
- 27-M1** GESS, Dubai, UAE

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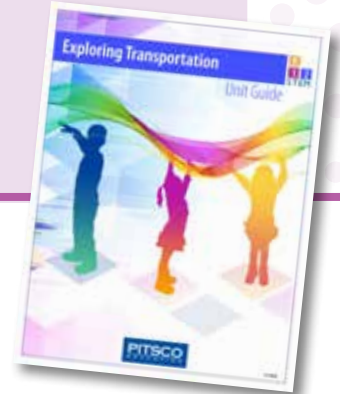
ELEMENTARY STEM UNITS

Hands-On Explorations Engage Imagination

- Whole-class cross-curricular activities containing problem-solving explorations
- Creative application of the engineering design process
- Adaptable for easy implementation
- NGSS and CC Math and ELA standards correlations provided

Each unit contains:

- Unit Guide
- Teacher's Guide
- Teacher Notes
- Setup Instructions
- Scope and Sequence
- Student Pages
- Assessments



Sample Activity: Exploring Transportation

Build a Ride

- Think about what you have learned about movement, time, and control.
- Use what you have learned from studying the pictures to help you and your team design and build a ride.

Challenge

- Design and build a ride that you would like to have on your school playground or in your neighborhood park.
- Make it interesting by including a bridge, a tunnel, and a snaky or a hilly section.
- Include a way to reach the beginning of the ride.
- Provide a safe place to land or end the ride.
- Try making the ride last as long as possible.
- Your ride must safely carry a test marble from top to bottom at least five times.

SEE RELATED ARTICLES ON PAGES 14-15.



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