

THE PITSCO

NETWORK

#THISISSTEM

ADAPTABILITY

PROBLEM-SOLVING

CREATIVITY

CRITICAL
THINKING

COLLABORATION
RESILIENCY



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'HEY,
GOOGLE,
WHY TEACH
CODING?'

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EDUCATING
THE WHOLE
CHILD

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THE 2030
WORKFORCE
PIPELINE



STEM Redefined

We believe STEM is more than academic knowledge; it's what happens during a project, a group discussion, a presentation, or an activity. It's the challenges, failures, and a-ha moments. It's the place where and the activity through which today's students can develop and practice skills that will prepare them for success in a world they'll live in that we can't yet describe.

Student success . . .

#THISISSTEM

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Competition, club, or program

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THE PITS NETWORK

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

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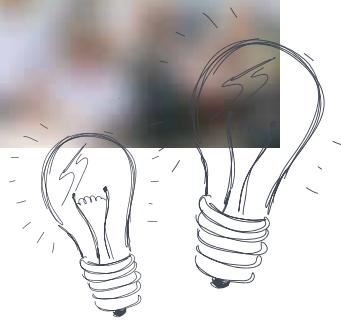
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**PITS
CO**
EDUCATION



From the Executive Editor

OUR BRIGHT FUTURE STARTS WITH THE WHOLE CHILD

In the few short years before your students enter their professions, the world will change. But it's shortsighted to prepare them only for that moment. Futurists and economists predict that change will continue faster and faster throughout students' whole lives. Work environment, tools, skills for employability, social dynamics – all are evolving, spurred on by technological advancement.

Knowledge and skills are not enough. Emotional fluency is not enough. Even grit alone is not enough. All these things and more must come together as we work to educate the whole child. As educators, we seek ways to grow in them the resources to be adaptable and to reach their human potential. Join us as we explore this idea and discover the path forward.

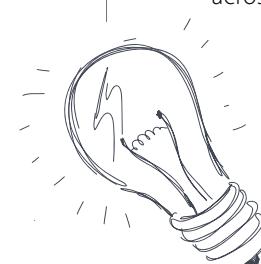
- Project-based learning is the ideal path to social and emotional learning, and Pitsco has the resources for bringing this to life in your classroom. Learn how a simple project – Pitsco's Engineering Sail Car – can result in rich SEL learning.
- Find out how STREAM Missions and STEM and Career Expeditions connect students to the competencies that will be vital to success in the future, according to the World Economic Forum and the OECD Education 2030 project.
- Don't teach coding because it is a work skill (which it is). Teach it because it is a life skill! From K-12, Pitsco has your robotics coding needs covered.
- TETRIX® puts the turkey on the table, and there are no shortage of appetizers and sides, from UBTECH's UKITs to TETRIX Ardublockly and more.
- A dragster competition is a great way to turn up the excitement in any class. Find great tips on getting started.
- The skills for success are not created, they are cultivated. Pitsco's #ThisIsSTEM campaign, featured on our blogs, gives you ample illustration of how educators across the nation are doing this.

#THISISSTEM



Matt Frankenberg

Matt Frankenberg
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.

FIND FULL ISSUES ONLINE



VISIT NOW!

IN THIS ISSUE:

THE COMING AGE OF ROBOT RESCUE

Saving human life – there is no more noble purpose for technology. Robots already play a part in some search and rescue operations. This trend is growing only as engineers develop robots able to open doors, climb ladders, drive, maneuver difficult spaces, and more. How soon until we have fully autonomous robots that can enter a disaster area and save people without risking the lives of rescue workers in the process?



DISCOVER A FEW OF TODAY'S ROBOT RESCUE INNOVATIONS:

- Swarms of HAMR microbots could revolutionize the search aspect of search and rescue.
- The Centauro project aims to create a robot piloted by a full-body telepresence.
- Snakebot can slither, climb, and stand. It has already been tested in a live search operation.
- SkillsUSA® Robotics: Urban Search and Rescue is a competition that gives students an opportunity to engineer the future of robot rescue.



abby

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SOCIAL MEDIA UNDER SCRUTINY

Several studies have shown a connection between social media use and unhappiness. But just because two things are connected doesn't always mean one causes the other. However, a new study claims to show that the cause-and-effect relationship is powerfully real.



956 likes

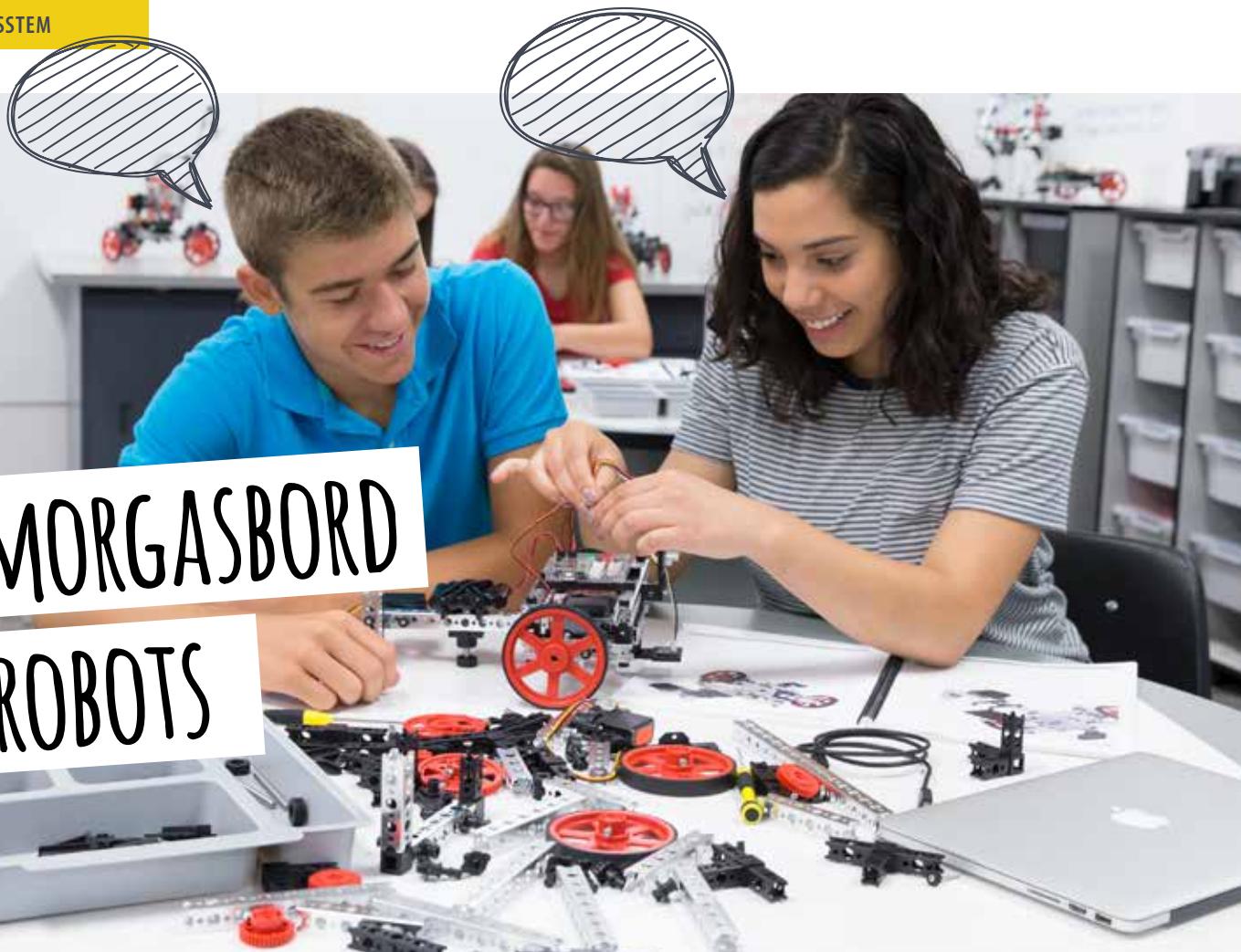
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2 HOURS AGO

MUSIC: WHERE MATH AND EMOTION MELD

Music without math is chaos. Music without emotion lacks life. Music is a technical creation, but it has also always been a product of deep human creativity. In our era, formulas, algorithms, and artificial intelligence are playing a larger role in the composition of popular and classical music. Will music hold onto its power to inspire?



by cortez
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mones, human, injury, med
dulla, naked, organ, pain
ent, pose, posture, ret
oids, supraranal, wdm
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A SMORGASBORD OF ROBOTS

By Aaron Locke
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SHOP NOW!



#THISISSTEM
ROBOTS

Another holiday season is behind us, and, if you're like me, you have overeaten, have underexercised, and are now reaping the consequences of your lack of discipline. Just like holiday feasts are a tradition in many families, robots are a tradition at Pitsco. And this year, Pitsco is bringing some new robot dishes to the dinner table. But I'm a dessert-first guy. Why save the best part of the meal for the end when you're too stuffed to enjoy it? So, before we jump into the smorgasbord of new robot offerings from Pitsco, let's start with dessert.

Have you ever eaten whipped cream by itself? Be honest . . . of course you have. All of us have tried to sneak a squirt of that aerosol-based Reddi-wip stuff. But here's the thing . . . whipped cream by itself is kind of disappointing. It's just OK. But there is something magical when you spray that fluffy stuff onto a piece of pumpkin pie. Whipped cream needs substance and so does coding.

Coding seems to be all the rage now. Everyone and their grandma has a recipe for getting kids to code. But coding for coding's sake is just fluff. We code to solve problems

and meet needs. This is contrary to so many coding platforms out there today. Everyone knows that hands-on learning is a key ingredient in every offering Pitsco brings to the table. Our coding solutions are the perfect blend of on-screen programming with real-world kinesthetic applications through robotics. So, don't settle for a shot of a whipped-cream coding solution when you can help yourself to a robotics solution from Pitsco that includes the coding on top.

Now that dessert is over, let's get to the main meal. Of course, no holiday dinner is complete without turkey, and TETRIX® is the turkey of Pitsco's robot smorgasbord. Just like how every other dish at the table supports the turkey, every other robotics solution that Pitsco offers supports our own TETRIX system. Recently, Pitsco has entered into partnerships with companies such as Arduino, UBTECH, Microduino, and Shape Robotics to fill out our dinner table and to enhance our robotics and coding portfolios. Let's take a look at a couple of these new robotic solutions and how they fit into our coding buffet.

UBTECH UKITS

Every year at our holiday feasts, there is that new dish that somebody brings and everyone wants to try. For Pitsco, that new dish is UBTECH's UKITs. They have all the key ingredients to make a great lead in to TETRIX or as a supplemental robotics solution to TETRIX. UKITs come in three levels (beginner, intermediate, and advanced) that are designed for third graders up through high school, depending on the kit. From an engineering aspect, each kit is a building system that includes structure elements, connectors, wheels, axles, and servo motors that can easily snap together to form structures and robots. The beginner and intermediate kits include a control box that acts as a brain for robot creations while UKIT Advanced includes Arduino-compatible components for students to build their own controller.

Students are guided through each activity with a free, easy-to-use app designed for iOS and Android devices. In the app, each activity starts with learning objectives that are connected to NGSS-aligned curriculum that can be presented by the teacher. From there, the app walks students through build steps, allowing students to zoom, rotate, and animate components coming together for each step.

For UKITs Beginner and Intermediate, the app also includes a block-based programming environment that lets students program their robot after it is built. Students can run sample programs or write their own program for each activity. The controller connects to the device through Bluetooth, enabling students to easily



test their code on their robots as they build their program. The UKIT Advanced includes its own block-based coding software that runs on a PC or Mac. Much like TETRIX's Ardublockly, the UKIT Advanced software uses the Arduino Software (IDE) to compile and transfer code from the computer to the robot control module.

One of the things I like best about UBTECH's UKITs is how they support TETRIX. The beginner and intermediate kits are a great way to introduce students to robots and coding that can lead right in to coding with TETRIX PULSE™ or PRIZM®. The UKIT Advanced provides a deeper dive into the electronics of controlling robots, enabling students to breadboard individual electronic components, sensors, motors, and servos.



UKIT Beginner

Grades 3-5



UKIT Intermediate

Grades 6-8



UKIT Advanced

Grades 9-12



Arduino Starter Kit

Grades 6-12

ARDUINO

Besides the new recipes that show up at each holiday dinner, there are those tried and true, never-fail dishes that everyone enjoys so much. Pitsco's new partnership with Arduino is like the mashed potatoes of our robot feast. You can't go wrong with them.

We're excited about this partnership for several reasons. First, Pitsco's own TETRIX controllers, PULSE and PRIZM, are both based on Arduino technology. The PRIZM controller is programmed using the Arduino Software (IDE); while PULSE uses the block-based TETRIX Ardublockly software, the Arduino Software (IDE) runs in the background of TETRIX Ardublockly, compiling and transferring code to the controller.

We're also excited about this partnership because Arduino brings an element of mechatronics to the table that we currently don't have through TETRIX. The Arduino kits we now offer enable students to get inside controllers similar to PRIZM and PULSE and see how individual electronic components come together to control devices and robots.

Pitsco offers three different Arduino kits depending on the experience and level of your students. The starter kit includes an activity book that walks students through 15 different

activities from blinking an LED to breadboarding and coding a knock lock that opens a box when a certain pattern is knocked out.

The Arduino Creative Technologies in the Classroom 101 (CTC 101) kit is a full mechatronics curriculum with content delivered through an online platform. A CTC 101 kit includes enough Arduino controllers, electronic components, sensors, DC motors, servos, and structural building elements for a class of 24 students. The kit includes more than 25 different projects and activities that include building and coding planet finders, crawling robots, and motion-activated security cameras.

The engineering kit is more advanced and is designed for upper high school and beyond. It comes with a one-year license for MATLAB, a programming environment designed for engineers and scientists, and Simulink, a simulation software for modeling systems.

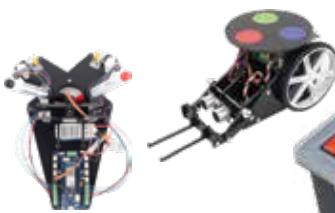
Everyone knows when you're filling your plate at dinner, you put your mashed potatoes right next to your turkey so you can dump gravy over the top of both of them. Just like that, TETRIX and these Arduino kits go side by side with text-based coding and the Arduino Software (IDE) as the gravy that ties them together.

So, welcome to our robot and coding smorgasbord. With TETRIX, UBTECH, and Arduino and the partnerships with Microduino and Shape Robotics (see page 9), there are plenty of opportunities for you and your students to dig in, fill your plate, and get your fill of robotics and coding. Oh – and overindulging – yeah, we encourage it! **P**



Arduino CTC 101 Kit

Grades 6-12



Arduino Engineering Kit

Grades 6-12

'Hey, Google, why teach coding?'



The reasons are countless and the results can be career shaping

"Hey, Google, how can I teach kids to code?"

It seems as though each and every day a new tool for teaching kids to code pops onto the scene. Similarly, every education publication you browse through contains an article promoting the benefits of students learning to program at the earliest possible age. A simple three-word Google search – *coding for kids* – now returns more than five billion results . . . yes, BILLION with a B.

And it's really no wonder. We've all seen the statistics that define the national STEM problem as a computer science issue, in which 58 percent of new STEM jobs are in the area of computer science, and yet only eight percent of STEM graduates specialize in this area (Code.org). Statistics also show that even though parents and students value computer science education, courses in support of this are simply not offered by the majority of elementary, middle, and high schools in America.

As it is for many schools, coding is new to Pitsco. Coding can be a tricky subject for many teachers, as it is for me. As Pitsco's coding portfolio manager, I have spent a lot of time thinking, researching, and pondering the benefits of every child being exposed to computer science. I come back to these questions: Is learning to code like learning a new language? Is coding the pen and paper of the next generation? Is this just the latest in a long line of trends that the education market has seen blow by throughout the years? What is coding really all about?

Referring to another one of my recent Google searches, *why kids should learn to code*, countless articles will outline the benefits for you. Coding assists in the understanding and application of math concepts. It helps build

communication skills and teaches students resilience. It enables students to break down a problem into smaller, solvable components, and it challenges them to not only meet requirements but also to optimize their solution so it is efficient and of the highest quality.

These skills illustrate why coding has a place in education. Looking into the future, by the time our young learners go out into the job market, it is likely the technology they have been exposed to will already be obsolete. But the life skills –problem-solving, critical thinking, collaboration, creativity, and communication – those will endure no matter what field of study or career path they choose. In essence, it is not about developing a generation of computer scientists, it is about equipping students with skills that can be used in any career or hobby and in everyday life.

This brings me to the role Pitsco plays in teaching kids to code. Up until the last few years, the majority of hands-on coding in the classroom has come in the form of robotics. And why not? Robotics offers a great tool for engaging students in true STEM learning. However, many times the study of robotics focuses more on the engineering design process rather than the programming.

Now, I am not advocating that one is more important than the other, but what we have striven to accomplish with our new coding portfolio is to amass solutions that have a robot component but are quick to assemble and enable children to begin coding within five minutes of opening the box. Plus, we have something for every age group, even four- and five-year-olds. So, let's start at the beginning, shall we?

By Pam Scifers

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CODE.ORG

#THISISSTEM
CODING



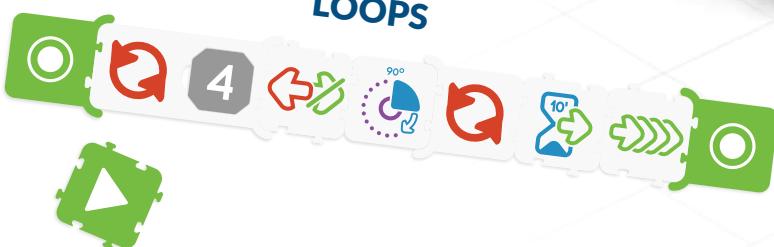
FUNCTIONS



ROUTES



LOOPS



KUBO ROBOTICS

With its groundbreaking TagTile® system, KUBO introduces the concepts of coding in an easy, hands-on, screen-free way so that children as young as four can become creators, innovators, and designers of our future technologies.

With KUBO, students piece together icon-based tiles to create instructions, or code, for their robot to roll over and execute. The solution requires no additional technology and is so simple teachers can be up and running in fewer than five minutes and well on their way to introducing the basics of computational thinking.

Plus, KUBO comes with free standards-based lesson plans, quick-start guides, and video tutorials that will have even the most tech-averse teacher brimming with confidence prior to every lesson. Available with KUBO is a basic set of TagTiles; a newer, advanced set of tiles; and activity maps that will grow with and continuously challenge Grades K-5 students as their coding skills sharpen.



SHOP NOW!



SHOP NOW!

MICRODUINO

Cocreated with teachers, administrators, and academic experts, the Microduino STEM MIX Kit Series 1-4 is a powerful learning system that progressively teaches elementary and middle school students in Grades 4-9 about electronic circuitry, coding, and product design.

Numbered 1-4, each MIX Kit includes a combination of hardware components, coding resources, and extensive instructional materials to guide students step by step through challenging in-class product development and coding projects. Each subsequent MIX Kit focuses on more sophisticated concepts so students can further their abilities to think logically and sequentially and solve life- and technology-focused problems.

Rather than focus on one project, each kit level offers 12 projects and encourages students to design and build their own applications based on the subject matter they learn. The intent is for students to take the STEM/STEAM knowledge they have acquired and then use it to create their own imaginative designs. Collectively, the four learning systems represent an innovative, hands-on approach to STEM education with an emphasis on learning coding using the mDesigner software that is based on the beloved Scratch platform from MIT.



SHOP NOW!



THE FABLE ROBOT FROM SHAPE ROBOTICS

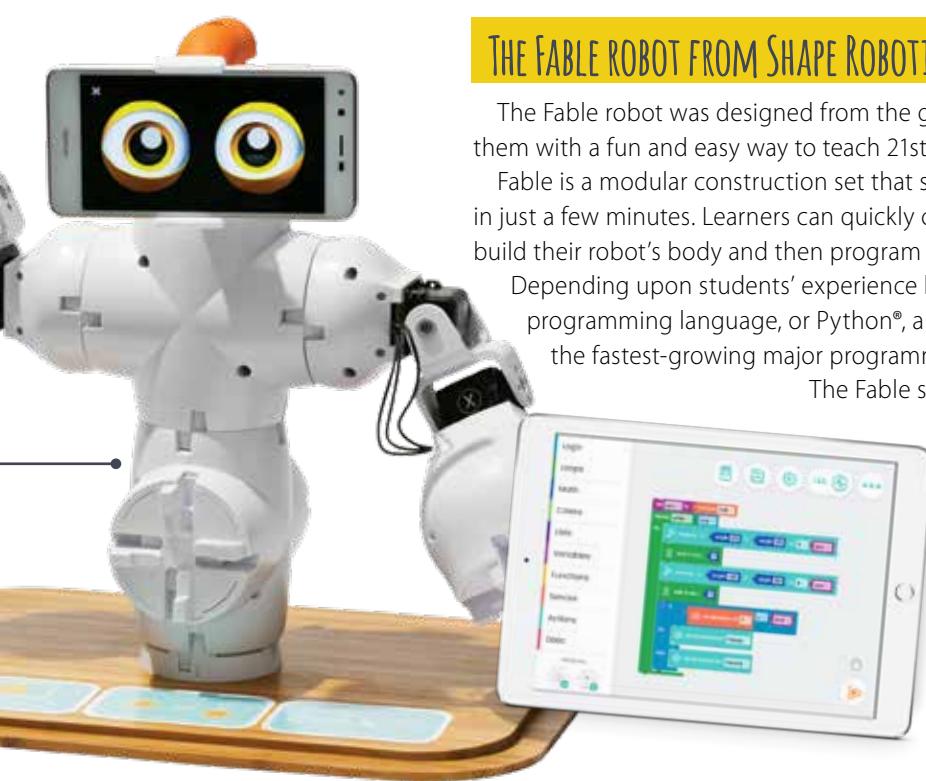
The Fable robot was designed from the ground up to meet the needs of educators – providing them with a fun and easy way to teach 21st-century skills and STEM subjects and bring coding to life.

Fable is a modular construction set that students in Grades 6-12 can use to create their own robot in just a few minutes. Learners can quickly click the different modules together in numerous ways to build their robot's body and then program it for sensing and movement.

Depending upon students' experience level, Fable can be coded using Blockly, a visual programming language, or Python®, a text-based language, which, by the way, is currently the fastest-growing major programming language available. Talk about career readiness!

The Fable system offers limitless learning possibilities and is also expanding with new building components in the spring of this year, so be sure to stay tuned!

As we all know, technology is constantly evolving as will the Pitsco coding portfolio. We have some exciting partnerships and projects in the works that we can't yet mention, but we promise that all new coding products will continue to deliver value to the classroom. Our hope is that the next time you go to google tools for teaching coding, the only search return you'll need is Pitsco Education. 





High school students from Yadkin Valley Regional Career Academy used KUBO to teach first graders from Davis-Townsend Elementary School about the world of coding.

By Patty Cooke
Communications Assistant
pcooke@pitsco.com



#THISISSTEM
COLLABORATION

KUBO PILOTS HONE SKILLS OF THE FUTURE

High schoolers as mentors also part of early success with coding tool

In March 2018, Pitsco announced an exclusive partnership with KUBO Education to bring its simple, intuitive, plug-and-learn robot to K-2 classrooms across the US. Designed like a puzzle, KUBO's TagTile® programming language is a simple, screen-free, hands-on way to teach coding to young students.

The logical next step was to get KUBO in front of some elementary students to see just what this engaging, interactive coding tool could bring to the classroom. In May, nine teachers were selected to participate in a KUBO pilot program using the new screenless coding solution in their elementary classrooms. Early indications point to success.

TACKLING 21ST-CENTURY PROBLEMS BEGINS WITH TAGTILES

Jennifer Bozeman, who teaches pre-K to fifth grade at Wildlight Elementary in Yulee, Florida, knows that a strong background in coding and robotics will give her students the skills they need to enter the workforce of tomorrow.

"STEAM careers are their future," she explained, "so the more I can incorporate robotics, coding, engineering, and so forth into their day-to-day lives, the more prepared they are to tackle 21st-century problems."

Bozeman began by allowing her students to simply explore KUBO and the intuitive TagTiles. After that, she began incorporating the free

KUBO lesson plans available at KUBO.education. "So far, we have completed the lessons on routes and are working our way through functions."

Bozeman is impressed with what KUBO has brought to her classrooms. "KUBO is fantastic!" she said. "Students are learning coding in a simpler form [vs blocks, Java, and so on]. My first and second graders grasp the concepts quickly and are able to be successful."

And because Bozeman has several types of robots, students can start with KUBO and then work their way up to more complex robots.

ROBOTICS SPANS THE AGE GAP

Using high school students – who live in a world of screens, downloads, and apps – to help teach a screen-free, hands-on coding program to much younger students might not seem like a brilliant idea at first. But this stroke of genius by LeeAnn Tuttle-Thomas proved beneficial to teachers and students alike.

In November 2018, Tuttle-Thomas, the CTE director for Davidson County Schools, partnering with Yadkin Valley Regional Career Academy (YVRCA) in Lexington, North Carolina, matched four high school mentors with four classes of first graders at Davis-Townsend Elementary School. The mentors, all members of YVRCA's robotics team, worked with the younger

students to teach them about coding, circuits, teamwork involved in being on a robotics team, troubleshooting, and much more.

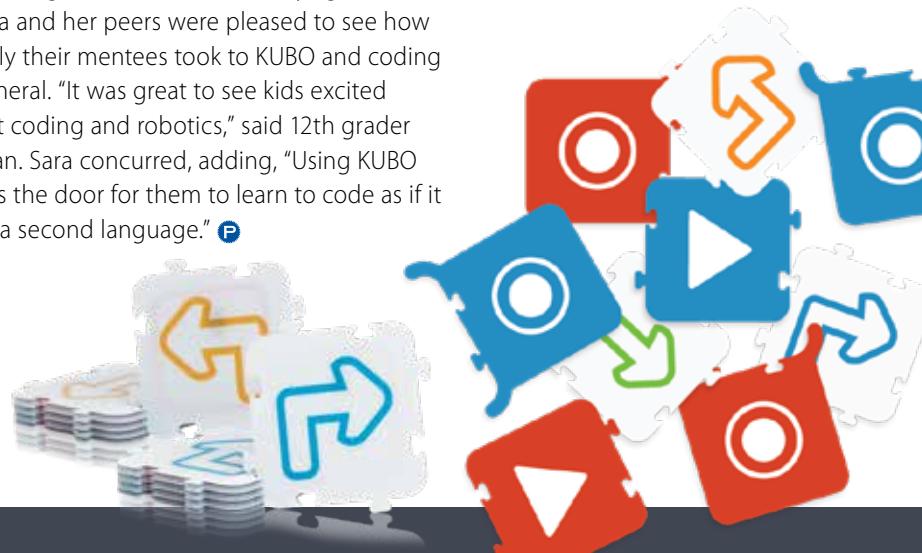
Having students who know the coding path their younger peers will eventually take mentor the younger students on coding at its most basic level gave both groups a deeper understanding of the coding and robotics continuum.

"This opportunity has not only bridged the gap between elementary and high schoolers," said 11th grader Sara, "it also introduces a world of endless possibilities while they are at their prime for imagination. This shows them that their dreams are possible if they work hard enough, which is a good value to learn at any age."

Sara and her peers were pleased to see how quickly their mentees took to KUBO and coding in general. "It was great to see kids excited about coding and robotics," said 12th grader Nathan. Sara concurred, adding, "Using KUBO opens the door for them to learn to code as if it were a second language." **P**



KUBO.EDUCATION



KUDOS FOR KUBO . . . AND TIPS FROM TEACHERS

Whether teachers piloting KUBO are still introducing their students to the new robot or have already designed and implemented lessons, the consensus seems to be that KUBO works!

Fourth-grade teacher Tim Vesco has just begun introducing coding to his students with KUBO, but he's already used KUBO to do a presentation on coding for fellow educators at the Greenbush Educational Technology Conference in eastern Kansas. "The participants loved it!" he said. "Everyone at the session got a hands-on opportunity to explore and play with the KUBO robots."

"I definitely would recommend KUBO for Grades K-2," added Vesco. "I am looking forward to having some time to develop some lessons involving KUBO and social studies."

"KUBO is easy to implement in any classroom to introduce students to coding and robotics,"

said K-5 teacher Natalie Vanderbeck. She suggests allowing students to simply explore when they first use KUBO. "Teachers will be amazed how easily and quickly students learn to work KUBO. Through exploration, students grow their excitement for using KUBO."

Vanderbeck said she will continue using KUBO in her math classes – and beyond. "I am planning to make grids on the floor that students will rotate through," she said. "Students will use the TagTiles® to determine the area and perimeter of the different grids and shapes."

She also wants to expand KUBO's reach to the whole school. "I would like to start using KUBO with classrooms during our STEM Focus Friday activities," she explained. "All grade levels take part in STEM activities on Fridays. This will give me opportunities to share KUBO with all students in our building." **P**

“

"KUBO IS EASY TO IMPLEMENT IN ANY CLASSROOM TO INTRODUCE STUDENTS TO CODING AND ROBOTICS."

– Natalie Vanderbeck

”



By Tom Farmer
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AN ORGANIC APPROACH TO EDUCATION

PBL, SEL, and whole-child education can be found in a single solution

Everything is going *organic*, and for good reason. Organic food is free of impurities and additives and is linked to better health. Organic fibers and materials are the basis for natural clothing and goods that are produced with little negative effect on the environment. And organic relationships are built upon natural encounters that occur over a period of time.

So, why aren't we promoting organic education? . . . Maybe we are, but we simply haven't labeled it as such. Instead, we call it "project-based learning," "social and emotional learning," and "teaching the whole child." All of these sound approaches to improved education have come to full light over the past decade and are organic at their core, embodying the essence and benefits of real-world, relational, experiential learning.

Now for the big question – how can all three of these organic approaches to bettering

education be rolled into a single solution? Is that even possible?

We at Pitsco Education believe, based on nearly half a century of experience, that hands-on STEM products, activities, curriculum, and solutions serve as the perfect conduit for delivery of an organic educational experience steeped in project-based and social and emotional learning that furthers development of the whole child.

To get the full explanation of Pitsco's efforts to create the most effective K-12 STEM classrooms that prepare students for an unpredictable future, read our white paper, "Knowledge for now, skills for later," by Pitsco Executive Vice President and Chief Strategy Officer Stephan Turnipseed (Info.pitsco.com/knowledge-for-now-skills-for-later). If you're pressed for time and want only the gist of this organic panacea for education, read on.

#THISISSTEM
PROJECT-BASED
LEARNING

PITSCO'S PACS

All educational products available through Pitsco – those developed in-house by our team of educators and developers and those created by others – are STEM related and hands on and fit within at least one of our four product portfolios (STEM/STEAM/STREAM, robotics, systems, and coding). All of these products, activities, curriculum, and solutions (PACS) were developed with success for all students foremost in mind, hence our mission of *leading education that positively affects learners*.

What do Pitsco's offerings have to do with the three approaches that shape an organic education? Everything – because they are tools for developing survival skills in the Fourth Industrial Revolution when advancements in artificial intelligence and automation are dictating rapid and constant changes in our world. We know firsthand that an education rooted in integrated STEM instruction and project-based learning that considers students' social, emotional, and physical needs will yield well-rounded citizens prepared for college and/or careers.

PROJECT-BASED LEARNING

Definition: "Project-based learning is an instructional methodology that encourages students to learn and apply knowledge and skills through an engaging experience" (Definedstem.com).

Classroom context: Teachers' greatest challenge each day is to engage students and ignite excitement about learning. This requires lessons and activities that students find relevant, meaningful, and purposeful. When students work in teams to address a challenge or issue that can yield a helpful solution or product, they buy in, they share, they collaborate, they problem-solve. Project-based learning, when rooted in real-world challenges that inherently and subtly incorporate aspects of science, math, and other subjects, has a far-reaching positive effect on learning because it engages students.

Examples: Team-based robotics competitions, STEM Units, STREAM Missions, Expeditions, and hands-on projects such as structures, rocketry, CO₂ dragsters, and solar cars are classified as project-based learning. These Pitsco programs and products are used by millions of students each year. The new STREAM Missions program has helped

elementary students achieve significant gains in standardized science, math, and even reading tests. Likewise, recent studies by the Friday Institute of North Carolina State University show how students experience qualitative and quantitative gains through the Expeditions program at the middle level. Such results prove that engagement in experiential, project-based learning has potential to help all students develop 21st-century skills that are transferable to all aspects and stages of life.

SOCIAL AND EMOTIONAL LEARNING

Definition: "Social and emotional learning (SEL) is the process through which children and adults understand and manage emotions, set and achieve positive goals, feel and show empathy for others, establish and maintain positive relationships, and make responsible decisions" (Casel.org).

Classroom context: Everyday interactions between people help them cultivate social and emotional skills, but in a world where virtual interaction via apps, video games, and social media have diminished personal interaction and communication, classrooms are where students most grow in SEL. As a relatively new focal point in education, SEL adoption and integration is slowly occurring. Programs designed to intentionally address SEL needs are being implemented, but why not take an organic approach and help students develop their essential academic and personal skills through hands-on STEM activities and programs?

Examples: Based on the SEL definition stated earlier, an ideal classroom experience would be collaborative so that students could work together and learn how to manage emotions, practice empathy, and build positive relationships. Angela Witt, a first-grade teacher at Harmony Science Academy – Cedar Park in Austin, TX, says Pitsco's STEM Units for Grades K-2 naturally achieve these aims and cultivate even more skills. "Kids coming from different backgrounds see the world differently," Witt says. "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."

“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.”

– Angela Witt

”

The STEM Units lead into STREAM Missions where students work in Crews of four in which every participant has defined responsibilities and roles. After that, the middle-level Expeditions take SEL practice to a new level with the incorporation of Microburst Learning's EmployABILITY Soft Skills Program in which conflict resolution, communication, collaboration, initiative, and productivity, among other skills, are demonstrated, discussed, and practiced.

EDUCATING THE WHOLE CHILD

Definition: "Research, practice, and common sense confirm that a whole child approach to education will develop and prepare students for the challenges and opportunities of today and tomorrow by addressing students' comprehensive needs through the shared responsibility of students, families, schools, and communities" (Ascd.org/whole-child.aspx).

Classroom context: The responsibility of educating a child often lies in large part with the education system in general and teachers specifically. The reality, though, is that the task of educating the whole child is the duty of family, friends, government officials, community members, and educators. Because of the amount of time students spend in school starting as young as three and going until at least age 18, the classroom is where a significant impact can be made.

According to ASCD's Whole Child Initiative, "A whole child approach, which ensures that each student is healthy, safe, engaged, supported, and challenged, sets the standard for comprehensive, sustainable school improvement and provides for long-term student success." While ensuring students are healthy and safe is an overarching aim for administrators and school boards, classroom teachers bear the responsibility for ensuring that students are engaged, supported, and challenged.

STEM learning addresses these three tenets. Students are actively engaged in learning that reflects real-world experiences, they are supported when they experience their preferred mode of personalized learning, and they are challenged academically to ensure they acquired the skills and knowledge necessary to become a contributor to their local community and the broader society.

Examples: Personalized learning – meeting students wherever they are academically and building up from there – is a commitment to equitable education. Students classified as English language learners (ELL) sometimes struggle in a traditional classroom setting where lectures and book work deliver most of the content. ELL students working with partners and teams in a Pitsco systems lab enjoy a much higher degree of success because of the multimodal, hands-on content where they experience learning.

Likewise, students in struggling socioeconomic areas where resources are fewer and disciplinary referrals are greater suffer because their opportunities are limited. Jeff Torrence, a principal at Honeysuckle Middle School in Dothan, AL, which was one of the lowest-performing schools in the state, said their Pitsco STEM lab engaged and challenged students, causing them to recognize the importance of their other classes. "When you walk in that STEM lab and you see those students in there working hands on, and you walk into some of our regular, normal classrooms, I mean, the scale is very unbalanced. It's night and day," Torrence said. "It's night and day because that Pitsco STEM lab gives our students the opportunity to work hands on and to move around and to work with a teammate to accomplish a goal. And I think our kids are excited about that."

When such excitement is generated through an organic STEM-based education, students are fully engaged, supported, and challenged, and the result is education of the whole child. **P**



Pat ForbesEducation Liaison | patforbes@pitsco.com

FUNDING TO EASE THE PROJECT BURDENS

From preschool to university and beyond, the United States educates one of the highest proportions of its citizenry on the globe. Coupled with the country's experience at growing smartly through immigration, there is a great amount of learning taking place and a significant need for grant sources that support projects enabling experimentation.

- Edwin Markham published a poem, "The Man with the Hoe," which includes the line, "and on his back the burdens of the world." Acknowledging the burden some families face, **Toshiba America Foundation** makes available grants for Grades K-12. They produce grants for project-based experiences in science and mathematics, offering up to \$1,000 for elementary schools and to \$5,000 for middle schools. These kinds of projects are important to students with language difficulties or social and emotional challenges. Toshiba.com/taf/about.jsp
- **Lockheed Martin**, through K-12 outreach grants, supports programs that encourage student growth along with gender and ethnic diversity. Lockheedmartin.com/en-us/who-we-are/communities/applying-for-contributions.html
- And that same focus on education for at-risk students drives the **Clara Abbott Foundation**. They are particularly generous to people in the Abbott business family. Clara.abbott.com/application-dates-us-and-puerto-rico/
- The **Chevron Foundation** focuses its funding in the areas of economic development, education, and health. There is considerable interest in the social well-being of students. Chevron.com/corporate-responsibility/creating-prosperity/education/partners-programs
- Following the same course, the **Alcoa Foundation** is deeply concerned for the improved educational and environmental skills of underserved students. They make assistance available on a worldwide basis. Alcoa.com/foundation/en/default.asp
- **Brinker International** has a goal to "make people feel special." They volunteer time for social services, education, and diversity. Through their ambition to ensure no students fall through the cracks, they support projects that lead to level roads for all, regardless of their backgrounds. Brinker.com/company/givingback.asp

Education seeks to foster the physical, social, and emotional health of the children in its care. The projects provided by grant assistance through the interpersonal contact between teacher and student fosters results that lighten the burdens carried by both. Neither student nor teacher will be burdened by the weight or emptiness of a missed opportunity.

The grants mentioned are a portion of those that seek to rejuvenate classrooms and see all students and teachers in collaborative projects. Pitsco enjoys a leadership role in providing a variety of curricula to meet the demands of a collaborative environment. 

Grant Application DEADLINES

February

1

Toshiba America FoundationFunds science and math projects.
Toshiba.com/taf/612.jsp

8

Lowe's – Toolbox for Education

Supports technology and all STEM projects.

Toolboxforeducation.com/home

March

1

Pentair Foundation

Supports STEM learning for underserved populations and gives greater support to areas where it has facilities.

Pentair.com/en/about/corporate-responsibility/pentair-foundation.html

1 (runs through May)

Target Community GivingSupports nonprofit programs that impact the arts, early childhood, reading, and family violence prevention in the areas where it does business.
We.riseup.net/giip+grants/target-community-giving

16

Lemelson Foundation

Addresses the need for next generation's scientist and inventors.

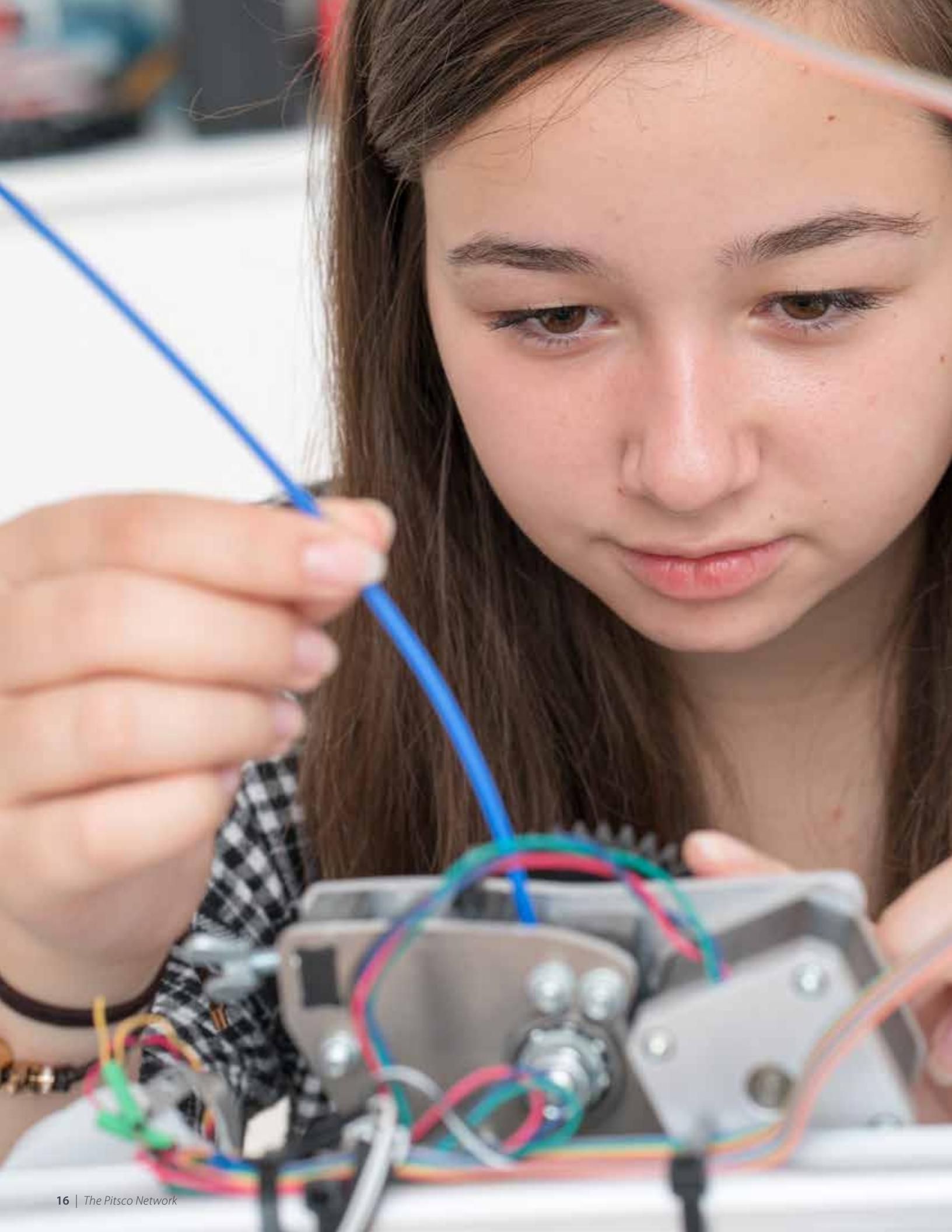
Lemelson.org/our-programs/us-programs/education

31

Ezra Jack Keats Foundation

Supports literary programs in elementary programs.

Ezra-jack-keats.org/how-to-apply-for-a-mini-grant





By Stephan Turnipseed
Executive Vice President & Chief
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PREPARING YOUNG LEARNERS FOR LIFE BEYOND THE FOURTH INDUSTRIAL REVOLUTION

How do we use education technology to enhance learning when the technology itself is outpacing our ability to deploy it in education?

(Editor's Note: This excerpt reprinted with permission; the full version originally appeared on Education Reimagined [education-reimagined.org], Voices from the Field, October 23, 2018.)

Every day, we discover bloggers and pundits crying for an end to education as we know it, favoring their version of what will prepare children for the fourth industrial revolution. Having been born in the second, fully experiencing the third, still working into the fourth, and planning to be around for the fast-approaching fifth and sixth waves of industrial revolutions, I find this position – thinking one revolution ahead – far too limiting.

The future of education has nothing to do with preparing children for industrial and technological trends. We must prepare children to be uniquely human in an increasingly unhuman (and occasionally inhuman) world. A 2018 PricewaterhouseCoopers study estimates that by the early 2030s, 38% of jobs held currently by US workers will be automated.

And, there is no consensus on what people will do when faced with this reality. Our economic and social systems might not be prepared for this transformation, but one thing is certain – today's children must be empowered to grapple with this dilemma as adults.

Children must learn empathy, socialization, and the oft-cited life skills of creativity, critical thinking, problem-solving, communication, and

collaboration. Education technology (devices, computers, software, and pedagogy associated with these tools) must be utilized to create an experience that enables children to acquire the knowledge, skills, and dispositions for life, not just for the next industrial revolution. Considering this collective need, how should instruction be carried out, and what role should technology play in our world of instant access?

WE DON'T NEED TO PREDICT THE FUTURE; WE NEED TO LET CHILDREN CREATE IT

I am often confronted with people stating that kids today are smarter than they were in my day – when education technology was a filmstrip projector. My observation of today's children is not that they are smarter, rather that they are more connected and therefore able to bring to bear resources previously unavailable.

Education during the second industrial revolution was essentially the acquisition of content that individuals could leverage to create value for society. Entry into the third industrial revolution, which occurred around 1969, was much heralded as fundamentally changing this landscape of learning. However, the facts remain remarkably disappointing as achievement on the National Assessment of Education Performance (NAEP) has been flat throughout the past 45 years.

(continued on page 27)

By Ruthie Muller
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Manager and Systems
Portfolio Manager
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#THISISSTEM PREPARING STUDENTS FOR THE FUTURE



The elementary student = THE 2030 WORKFORCE PIPELINE

The year 2030 will be here before we know it. Students in first grade right now will be graduating. Technology will have advanced at a pace like we have never seen before. Students have to be prepared for a world much different from the one that exists today. And schools play a critical role in talent identification, workforce development, and community impact.

Groups like the World Economic Forum and the OECD Education 2030 project have made some staggering predictions that, when we really stop and think, might not be all that astounding after all, considering how rapidly technology has changed our world in just the past 10 years.

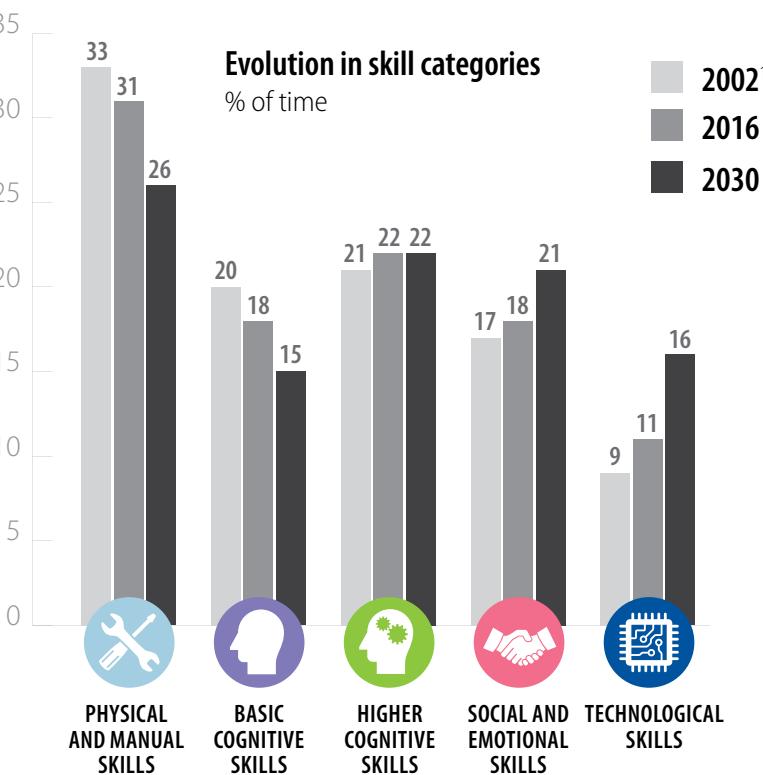
The World Economic Forum predicts the top five technologies to impact daily life by the year 2030 will be:

- Virtual reality.
- Gene editing.
- Biofacturing.
- Advertising (to pay for all of the change).
- Implantables.

The US Bureau of Labor Statistics anticipates skill shifts due to automation and artificial intelligence. The need for physical and manual skills as well as basic cognitive skills decline while social and emotional skills and technological skills increase. Higher cognitive skills remain steady.

AUTOMATION AND AI WILL ACCELERATE SKILL SHIFTS.

Based on McKinsey Global Institute workforce skills model, United States, all sectors, 2002-30



¹ Calculated using the 2004 to 2016 CAGR extrapolated to 14-year period.

Note: Based on difference between hours worked per skill in 2016 and modeled hours worked in 2030. Numbers may not sum due to rounding.

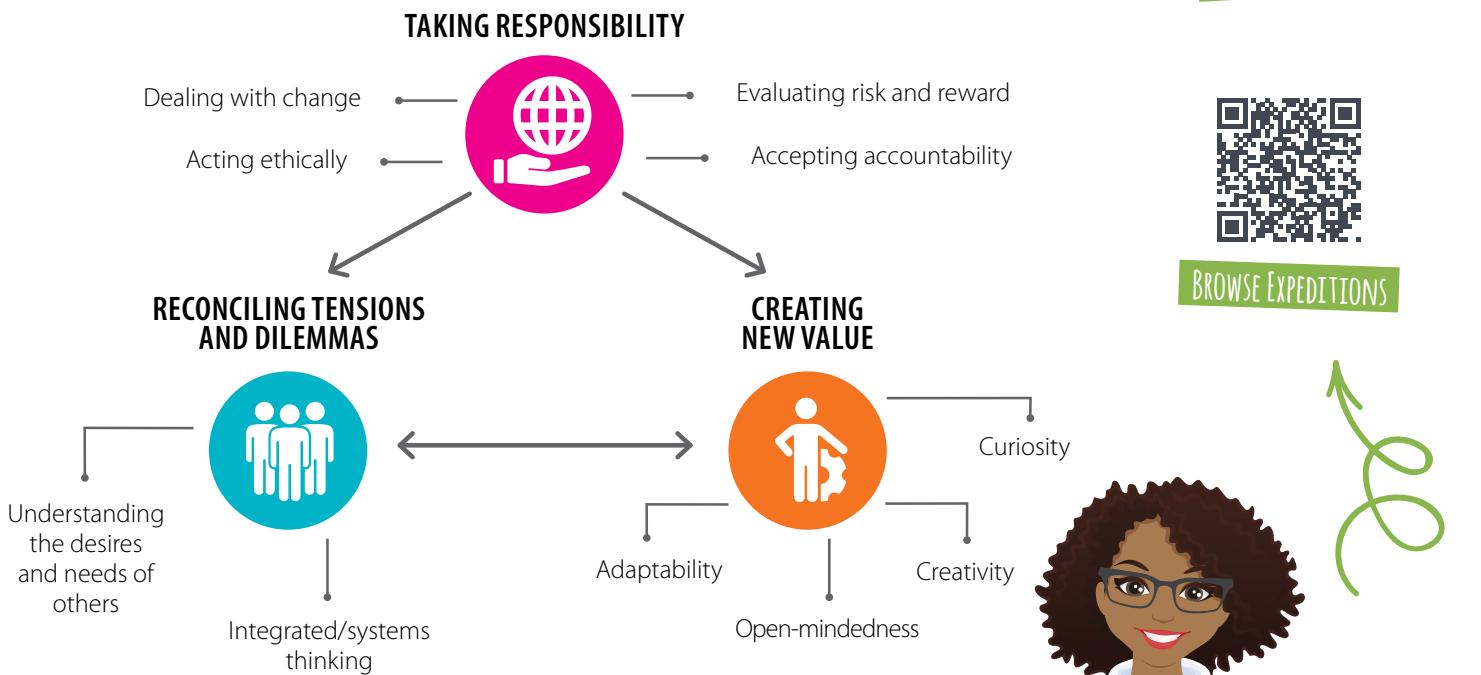
Source: U.S. Bureau of Labor Statistics; McKinsey Global Institute workforce skills model; McKinsey Global Institute analysis

The Future of Education and Skills: Education 2030, a report released by OECD, highlights three transformative competencies that will be necessary for students to be innovative,

responsible, and aware. These competencies are interrelated and learnable and, when paired with STEM education, can create students prepared for a fast-paced, ever-changing world.

Transformative Competencies

(Source: OECD Education 2030 project, [www.oecd.org/education/2030/E2030%20Position%20Paper%20\(05.04.2018\).pdf](http://www.oecd.org/education/2030/E2030%20Position%20Paper%20(05.04.2018).pdf))



Preparing students for this future requires interdisciplinary instruction, collaborative environment, soft skills lessons and practice, and more. All these are integral to STEM education and incorporated in Pitsco's STREAM Missions and Expeditions programs. #ThisIsSTEM

STREAM MISSIONS

In the elementary years, students want and need to be active in their learning. They are social and need opportunities to practice channeling their social nature into productive and positive communication. In the STREAM Missions program, students learn how to work in groups, solve interpersonal and scientific problems, and communicate effectively with peers and adults through the use of student roles. Reading practice, art, math, and social and emotional learning are woven in to core science instruction in every Mission providing teachers a complete program that provides limitless opportunity for the transformative competencies mentioned before.

Browse Missions titles: Pitsco.com/Our-Programs/Grades-3-5/Titles

STEM AND CAREER EXPEDITIONS

In the middle school years, students are exploring their passions and trying to identify what path they should take for their future. They excel with opportunities to explore potential careers and gain transferable skills such as communication, collaboration, decision-making, and creativity. Expeditions not only provide valuable STEM and career content but also opportunity to learn and practice the soft skills that will prove instrumental to them as they progress toward the year 2030. The Expeditions program is the only middle-level curriculum aligned to ACT® WorkKeys®. For ACT Work Ready Communities, the goal is to drive economic growth by improving the skills and work readiness of the workforce and provide businesses a reliable way to identify skills of potential employees. Why not start this work at the middle level to provide more time to practice skills and gain necessary knowledge?

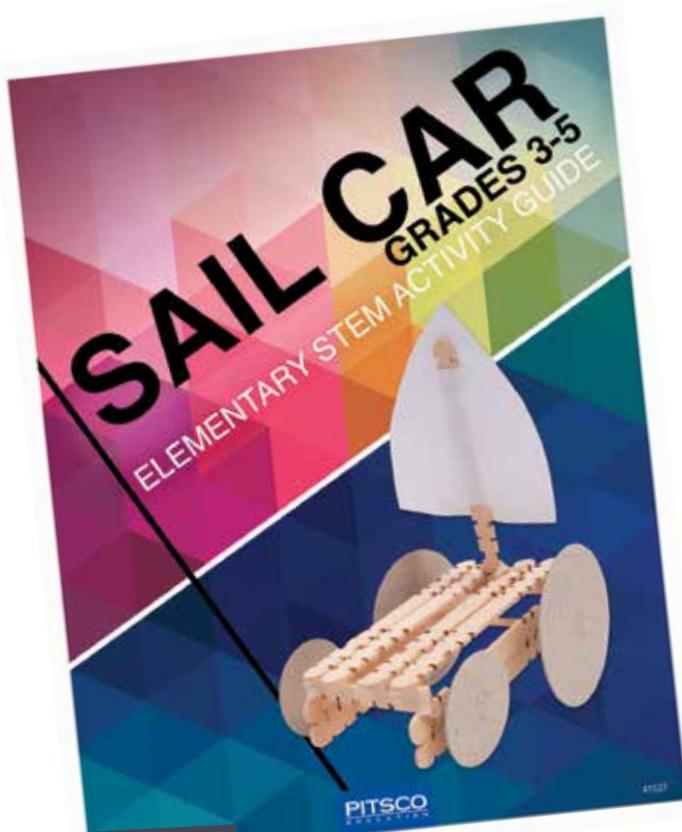
Browse Expeditions titles: Pitsco.com/Our-Programs/Grades-6-9/Titles

BROWSE MISSIONS



BROWSE EXPEDITIONS





LEARN MORE!



SAIL CAR ELEMENTARY
STEM ACTIVITY GUIDE



SEL THROUGH ESC (ENGINEERING SAIL CAR)

By Anna Gudde
Marketing Products Coordinator
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Product is one example of the side benefits students can experience via STEM

How do you feel about SEL? I'll be honest, it's hard to keep up with trending acronyms! But I definitely think this one is worth the time and study. Google didn't take long to get back with me. Social-emotional learning (SEL) basically demonstrates how students relate with each other – and their teachers, parents, and other adults – in any type of interactions.

This new way of thinking helps create a caring environment for learning and forms relationships among families, teachers, and community members. Applying SEL concepts in the classroom builds on student engagement, collaboration, and trust. Exactly how can

educators introduce SEL competencies in the classroom? We have the answer: project-based learning (PBL).

While the SEL framework is still in the beginning stages, Pitsco has fine-tuned the art of PBL. From our project kits to our curriculum and activities, we have exactly what you need.

Take our **Engineering Sail Car**, for example: this hands-on activity provides students with the materials needed to construct a sail car using STEM concepts. We have created the *Sail Car Elementary STEM Activity Guide* that will take students from construction and collaboration to testing using the design process and then off to racing the final product with our EZ Track Raceway. These projects can be done individually or in teams. Each step of this project can include SEL integrations – and you'll find this is the norm for many of our STEM products.

#THISISSTEM
SOCIAL-EMOTIONAL
LEARNING
CREATIVITY

The five SEL competencies according to CASEL, an organization dedicated to promoting academic SEL, are **self-awareness, self-management, social awareness, relationship skills, and responsible decision-making**.

- **Construction** – Hands-on learning is the core of what we do at Pitsco, and it's a way of learning that translates to all students. During the construction of the sail car project, students exercise self-awareness and self-management skills. As they work through the building phases, they will recognize their strengths and weaknesses as well as practice organizational skills and self-motivation. The goal of the project is to have a well-constructed sail car, and that might require more patience and emotional control for some students than others.
- **Collaboration** – When students collaborate and work on projects in teams, they communicate their ideas and opinions on how the product should be built. They also practice using respectful behavior with their team members. Social awareness and relationship skills are key in order to be successful as a team – members will practice handling different perspectives and building relationships with one another to accomplish their goal.
- **Testing and racing** – At this point in the project, the sail car is built and it's time to test it. Students will be faced with scenarios in which they might or might not be happy about the outcome. As with every engineering design process, problems are identified and redesign is needed – possibly more than once. This process includes a reflection of responsible decision-making in which students identify and solve problems and evaluate and reflect on their actions. When students have a final prototype, it's off to the races! Using our EZ Track Raceway, pairs of students can compete in a race to see how their car performs. Competition among children can stir up mixed emotions, and this is an opportunity for students to learn how to manage any strong emotions or impulses they might experience.

Many of the Pitsco products can be used to incorporate SEL in the everyday classroom



EZ TRACK RACEWAY



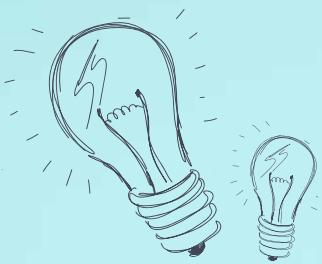
experience. Our balloon cars, AP dragsters, and Fold-N-Roll cars are all project-based products that can be used in the same way as the Engineering Sail Car.

At Pitsco, we recognize and understand the importance of students' relationships and emotions as they develop mentally, emotionally, and intellectually. We strive to create opportunities to help students become successful in the classroom, at home, and in the local community. 



CASEL.ORG/WHAT-IS-SEL





YOUR READING LIST FROM THE PITSCO BLOG



By Jessica Born
Digital Marketing Manager
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MORE
#THISISSTEM
ON THE PITSCO BLOG

Pitsco's Executive Vice President and Chief Strategy Officer Stephan Turnipseed has frequently made the statement that today's students will work in a world that is unknown at this time. We can't completely predict the jobs and careers students will obtain. We can't totally forecast their earning potential. We might not even be able to tell them all the content areas available to concentrate their learning. But we CAN prepare them with skills that can make them ready for the uncertainty and opportunity that lie ahead.

WE CAN HELP THEM DEVELOP CAPACITIES IN:

- Problem-solving
- Critical thinking
- Collaboration
- Creativity
- Communication
- Initiative
- Flexibility
- Resilience
- Leadership



These are the skills that will carry this generation of young learners to success in the present day and in the future. These capacities are not created overnight; they are cultivated. They can begin in primary years, at the middle level, and even still in high school. But we must start. We must offer many opportunities for quick (and repeated) failure. We must provide scenarios that are relevant to their real world. Experiential, immersive learning the chance to apply knowledge and build frames of references.

THE DEVELOPMENT AND PRACTICE OF THESE SKILLS . . . #THISISSTEM

Each week on the Pitsco Blog, we share examples of educators just like you from across the country curating #ThisIsSTEM (STEAM and STREAM too!) experiences in their classrooms. Pop over and read the following:

- "21st-century skills take flight in Texas" – Educator Charles Richardson from Lancaster (TX) ISD combined hands-on STEM with a service-learning opportunity; his students restored a plane and gained a few other life skills along the way.

Blog.pitsco.com/blog/21st-century-skills-take-flight-in-texas

- "A day in the life of a first-year robotics teacher" – Get to know educator and Pitsco TAG teacher Joe Slifka as he and his students worked their way through his first year as a robotics teacher and FIRST® Tech Challenge coach.

Blog.pitsco.com/blog/a-day-in-the-life-of-a-first-year-robotics-teacher



- "Customization: Just what the educator ordered" – Check out how two California educators in Placentia-Yorba Linda USD used STEM Expeditions® to tweak the way they conducted assessments and built in efficiencies to aid in the execution and management of their students' hands-on, minds-on experiences.

Blog.pitsco.com/blog/customization-just-what-the-educator-ordered



- "Using inquiry-based learning in your elementary classroom – including coding education" – Learn how Pittsburg, KS, educator Natalie Vanderbeck uses screen-free coding as part of her inquiry-based learning approach to help students begin developing their computational thinking and many other skills.

Blog.pitsco.com/blog/using-inquiry-based-learning-in-your-elementary-classroom-including-coding-education



The Pitsco Blog is also the place to snag STEM ideas and inspiration for you to explore with students or to incorporate as support for an existing classroom activity.

- "Your next STEM mentors: Senior citizens" – Mentors can be an invaluable part of the

education process. Read more about how senior citizens can be a great addition to your mentorship program.

Blog.pitsco.com/blog/senior-citizens-embrace-stem-by-mentoring



- "Interest in school garden programs is growing" – Hands-on education opportunities grow as interest in gardening in schools grows. And it's an awesome way to help life skills flourish too.

Blog.pitsco.com/blog/intrest-in-school-garden-programs-is-growing



- "That sinking feeling – what the plunge of a roller coaster causes" – Students will love learning about STEM in real life with this theme-park favorite.

Blog.pitsco.com/blog/that-sinking-feeling-the-plunge-of-a-roller-coaster



- "The science of dogs: It's more than puppy love" or "The science behind Hollywood's spooky special effects" – We like to celebrate everything! Especially the science behind common holidays and everyday instances. Read on to learn more!

Blog.pitsco.com/blog/the-science-of-why-we-love-dogs



Blog.pitsco.com/blog/the-science-behind-hollywoods-spooky-special-effects



The blog is just one of the many ways we work to support your efforts with students. We hope you log on regularly to read. Together, we can support students. We can make them education ready. We can make them career ready. We can make them citizen ready.

PS: If you're on social media, search the hashtag #ThisIsSTEM to see more related content! 



DRAGSTER COMPETITIONS: MAKING IT TO THE STARTING GATE



By Preston Frazier
Educational Account Representative
pfrazier@pitsco.com

SHOP TSA



"THE ULTIMATE VICTORY IN COMPETITION IS DERIVED FROM THE INNER SATISFACTION OF KNOWING THAT YOU HAVE DONE YOUR BEST AND THAT YOU HAVE GOTTEN THE MOST OUT OF WHAT YOU HAD TO GIVE."

— Howard Cosell

Fun. Exhilaration. Adrenaline. Victory.

Defeat. These are a few words that describe competition. Whether you're aware of it or not, competition is happening around you every day, and it's human nature to want to compete in some form or fashion – not only in sports, music, and work, but in everyday life.

Many people know that now is the time of year for college basketball teams to compete to be the highest-ranking team in the country. How many students have dreams of competing at the college level or higher? Also, what musician wouldn't love to receive an award for best album of the year? And then think about competitive pricing; whether you're beating out a competitor with a one-cent-lower gas price or you found

the best sale on an amazing thingamajig, the feeling that you've won is powerful. On the flip side, competition teaches us how to learn by failing and how to commit and not give up. There is tremendous value in competition.

An organization that Pitsco has supported since 1978 and that promotes competition to enhance personal development, leadership, and career opportunities in STEM through hands-on learning is the Technology Student Association (TSA). The relationship began with the CO₂ dragster competition which begins on the state level and finishes on a national level with around 200 students from all over the country competing for a championship spot. More recently, Pitsco started supporting the Junior Solar Sprint (JSS) competition through kits and designing the race system specifically for use at the national convention.

Competing with dragsters is a valuable learning experience. You could start a program for your students to compete locally against classmates or join an existing competition on a state or national level such as with TSA. To help with your planning, here are three important aspects of dragster competitions: the dragster

#THISISSTEM
COMPETITION

(of course!), the track, and the launcher. Make sure to check the rules if you and your students join an established competition.

DRAGSTERS: THE HEART OF THE COMPETITION

What's a dragster competition without a dragster? It's as important as the football is to a football game. But to compete in a race, the players, or rather students, have to build their vehicle. There are many blanks available, and you can choose from various shapes and types of wood or use Styrofoam for prototyping. Here are a few options:

- Pine Racer Dragsters come in basic shapes that get things rolling quickly and use gravity to power them along. These are popular with Scouts who have been racing in Pinewood Derbies for 50+ years.
- Popular balsa wood bodies are triangular and leave plenty of room to create unique, streamlined designs. Balsa wood seems like a great idea for young students because it's soft and easy to cut, but for the same reason, it can be challenging to use for those with poor motor skills. Balsa wood isn't recommended for a student's first attempt at building a dragster if they're going to do a lot of cutting.
- The rectangular balsa Custom Cruiser Kit has a plethora of design options and could even be carved into a truck, van, or other unique racer for CO₂ competitions.
- The Metric Dragster Kit is an option with more than just a blank. This kit comes in balsa and basswood. Basswood isn't as soft as balsa, but it's more durable. The kit comes with everything you need to build a dragster, including the wood blank, axles, wheels,

and CO₂ cartridge. And it teaches the metric system and the design process with an illustrated, self-directed student workbook with step-by-step instructions.

As you can tell, it's important to understand the nature of the wood you choose to make sure your students have a great experience. While balsa and basswood aren't the only options, they're very popular.

PICK YOUR TRACK

What does everyone use for a track? Some use the floor for a racing surface, but it can sometimes be unpredictable with unevenness or unseen bumps. CO₂ cars can travel close to 70 mph, so you might want to consider a more controlled situation, such as using a manufactured track for reliability and consistency.

- The EZ Track Raceway allows for a quick setup and easy storage, and it's compatible with many launchers. It includes 20 one-meter high-strength PVC sections that easily slide together. This system is only slightly elevated off the ground and can be one or two lanes.
- The FasTrak Elevated Racetrack is made of strong, durable aluminum and simulates to scale a quarter-mile racetrack. The height improves viewing for spectators. Note that this is the track used for TSA's national dragster competition.

EZ TRACK RACEWAY



DRAGSTER BLANKS



TOP ELIMINATOR DRAGSTER KIT



CO₂ CARTRIDGE

EZ START RACEWAY



These tracks can be used for more than only CO₂ racing, as they can be shared with classes building mousetrap vehicles, bottle racers, solar cars, and more.

START YOUR CARTRIDGE!

Without a launching mechanism, the vehicles won't get very far down the track, at least not CO₂ dragsters! Let's say your students have designed dragsters using one of our dragster kits and inserted a CO₂ cartridge in the back end. The launching mechanism is what pokes a hole in the cartridge to propel the dragster forward at an incredible rate of speed. The design determines just how fast the vehicle moves.

Used for more than just launching, the Impulse G3 Race System uses state-of-the-art electronics and times the dragsters as they

cross the finish line. It also has two modes. Auto mode launches the cars simultaneously with a single button, and manual mode launches them using two thumb triggers. The reaction time adds another element to the race and is accurately displayed to the nearest 0.001 second. Students love this part of the race!

By the way, if you're going for a non-CO₂ competition, take a look at the EZ Start Raceway. It's easy on the budget and uses a monofilament line to keep air-powered vehicles on the track.

CROSSING THE FINISH LINE

Whatever you choose to use for your dragsters, track, and launcher, this type of fun hands-on, minds-on activity allows students to learn through failure while also learning STEM concepts such as mass, acceleration, friction, drag, and engineering design.

The beauty of dragster competitions is that you can start one right in your classroom or you can race to the finish through a national organization such as TSA. At the end of the day, it's about developing 21st-century learners through their successes and failures. The thrill in students' eyes when they see how fast their dragster has flown down the track is an extra bonus. **P**



Preparing young learners for life beyond the fourth industrial revolution (*continued from page 17*)

In today's world, one is confounded by the rate of change that Ray Kurzweil states is accelerating to a pace 1,000 times that experienced in the 20th century. How do we use education technology to enhance learning when the technology itself is outpacing our ability to deploy it in education?

In a sense, schools are competing for mindshare of a child. The traditional setting has an outmoded ability to introduce technology compared to the environment the child lives in outside of school. The shortsightedness of preparing children for the fourth industrial revolution is akin to teaching them how to make fire in the face of clickable gas lighters. What is needed is to shape children's experiences such that they focus on how to acquire and apply knowledge, not just possess it.

This is contrary to the notion that we open a child's head and pour in knowledge. Each child must individually make sense of the world. That is, we can give children experiences but not knowledge. They must personally create the knowledge.

We must approach education technology and learning as a set of parallel creation processes. To keep pace, the experiences we give children should focus on their passions. We need to provide them with the tools to create, rather than relying on a futile attempt to stay ahead of the obsolescence curves of emerging technology.

In this brave new world, children are equipped with a love of learning and the tools to make sense of the world through experiences that are collaborative, creative, and richly communicative. The elements of this approach are built around three fundamental ideas – mind-sets, tool sets, and skill sets.

MIND-SETS

Through the recognition that failure is the best teacher, we must provide a safe environment for children to experiment and fail early and often on the path to success. Only in this manner will they begin to appreciate the truth of Edison's words, "I have not failed. I've just found 10,000 ways that won't work." This enables students to see that failure is not some value-laden word of despair, derivative of the current test-and-punish culture. Rather, they will see it as an opportunistic stop along the path to success. It is through this process of

failure-driven success that children will develop the mind-set needed to confidently face the challenges of the future.

TOOL SETS

If we are to fully take on this mind-set, children must be given the tools to experience failure and create success through access to a rich and vibrant tapestry of learning assets and choices. Learning must become more personalized, relevant, and contextualized. Children born in the second industrial revolution, as I was, were afforded significantly more access to a rich environment of tools in garages and on farms. These were places where we could create and revel in the joy of newfound abilities using the tools of the day. These garages and farms were the makerspaces of that generation. Schools must become the garages and farms of the future, where access to a wide array of physical and digital tools is the rule rather than the exception.

SKILL SETS

Skill sets are cultivated through practice and the mentoring of adaptive educators. In a facilitative and mentoring role, educators become curators of a child's interactions with learning from peers, industry, and civil society. They socially embed the child in a relevant and authentic ecosystem of relationships. Education technology becomes an artifact while the community becomes a library of opportunities from which students select experiences that foster the acquisition of skills needed to follow their passions.

The role of education successfully evolved from the 18th- and 19th-century mandate of teaching English and basic skills to the 20th-century call to address mass manufacturing and the evolving family. Now, it must evolve to prepare children for the greatest, most challenging adventures of their lives – operating professionally and personally within a society dominated by more and more technological innovation, not least of which will likely be self-aware machines.

Because these new norms do not yet exist, we cannot directly prepare younger generations for them. This is why, in order to yield positive outcomes for young people and their collective future, we need to prepare them for the unpredictability of a technologically advanced life – not just the fourth industrial revolution. **P**





By Cody White
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NJ Army National Guard AN EDUCATION ALLY

Guard's STEAM Team taps into TETRIX® and other Pitsco products to connect with students

STEM teachers dream big. They conceive of transformative experiences for their students – immersive activities that combine relevant, exciting technology with collaboration and critical thinking. But too often the thrill of inspiration is followed quickly by a familiar sense of resignation. The same old story: too few resources, too little funding.

Teachers in New Jersey tired of watching their big ideas fade have a new ally: the New Jersey Army National Guard STEAM Team. In 2018, the team began visiting classrooms and schools to provide customized hands-on robotics and programming experiences for students at no cost.

The Guard's STEAM Team shares the vision of a classroom fully engaged with 21st-century

technology and skills. And they have the tools and expertise to make it happen. Through projects with TETRIX® robotics, students get hands-on with a major growth technology – one that happens to also be loaded with strong connections across the curriculum.

How this plays out is largely up to the teacher. According to Lieutenant Colonel Joseph Gagnon, Commander of the Recruiting and Retention Battalion for the New Jersey Army National Guard, the team meets the needs of a school by expanding or condensing any program. If a teacher needs a classroom session, the team has that covered. If a school wants to do a full-day assembly, they can handle that too.

In fact, the STEAM Team has even provided multiple week-long training sessions at schools. In the primary robotics program, students engineer search and rescue robots. Then students work against the clock to find and remove unexploded ordnance in simulated

#THISISSTEM
SEARCH-AND-
RESCUE ROBOTS



disaster scenarios. This activity is based on the Urban Search & Rescue competition designed by Pitsco and popularized at SkillsUSA®, but it also mirrors the high-tech rescue missions carried out by National Guard forces, lending authenticity to the program and credibility to the presenters.

Robotics is just the beginning. The New Jersey Army National Guard has two additional STEAM programs under development that will use different Pitsco STEM products. The first program is aligned around the CO₂-powered car curriculum which incorporates wind tunnel technology as well as a 100-foot race track. The second program incorporates the use of air- and water-powered rockets.

Lieutenant Colonel Gagnon's vision is to provide STEAM opportunities throughout the entire school calendar. All program offerings connect with a bevy of science and engineering concepts. Further, the STEAM initiatives clearly align with the education

priorities of New Jersey State Governor Phil Murphy in developing a world-class STEM curriculum in the state's K-12 schools.

First Lieutenant Douglas Mattei, a member of the team, spoke of the great benefits the program provides. "The STEAM program my commander has initiated is an opportunity to provide academic institutions with a vehicle to engage their students with new resources. In exchange, we are given the precious time needed to explain how the Army National Guard is an organization that serves the community, requires sharp young minds, and is a supplementary route to higher education – we pay for it!"

Though the program has just begun, early reports show that it is a runaway success. And no surprise: hands-on learning experiences led by experts have immeasurable value. The New Jersey Army National Guard is doing an incredible service for its state's educators and students. **P**

The New Jersey Army National Guard STEAM Team is bringing powerful robotics learning experiences directly to classrooms at no cost to schools. Plans are under way to expand STEAM offerings to include CO₂ cars and rocketry.



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PITSKO 2019 TEACHER ADVISORY GROUP INCLUDES EDUCATORS FROM AROUND THE COUNTRY

By Patty Cooke
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Pitsco recently announced the members of its 2019 Teacher Advisory Group (TAG). This year's group of 20 educators from across the United States are eager to learn more about Pitsco and share their classroom experiences and expertise with Pitsco's Development and Marketing teams to support the mission of "leading education that positively affects learners." To learn more about the individual team members, and about TAG in general, visit Pitsco.com/TAG.

HERE'S A BRIEF LOOK AT THE 2019 TAG TEAM!

1. **Erin Barr** teaches several subjects at the Montana School for the Deaf & Blind in Great Falls, MT, including Earth and space science for Grade 9, biology for Grades 10-12, and English for Grades 7-12.
2. **Allison Bogart** is in her 18th year of teaching. She currently teaches eighth-grade physical science and STEM electives at Paul L. Cato Middle School in Kern County, CA.
3. **Christine Chiodo**, the STEAM teacher at Pontiac Junior High in Pontiac, IL, also serves as a technology coach for her colleagues. She is passionate about teaching, learning, leadership, and making.
4. **Michael Clark** is a STEM teacher and assistant director for Volusia County's CTE Program who enjoys promoting hands-on, project-based learning.
5. **Cindy Doze**, a fifth-grade science teacher at Mabank Intermediate in Mabank, TX, loves connecting with hard-to-reach students and considers these her greatest successes.
6. **Chris Gibson**, currently in her 15th year of teaching, is the STREAM lab teacher for Grades K-6 at S.F. Austin STEM Academy in Jones Creek, TX.
7. **Everton Henriques** teaches engineering and technology at Staten Island Technical High School in Staten Island, NY. He believes growing, helping others grow, and forging solid relationships are what life is all about.
8. **James Jones** currently teaches at Wedgefield School in Orlando, FL. He has been teaching science and engineering for more than 22 years and working with and teaching robotics for the past 20.



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9. **David Lockett** is the STEM/IT/robotics teacher at Edward W. Bok Academy in Lake Wales, FL. He is passionate about technology integration, aerospace, astronomy, and robotics.
10. **Aaron Maurer** is the STEM lead for the Mississippi Bend AEA, serving 21 school districts in Iowa in all things STEM, makerspace, and computer science.
11. **Matthew McGuire** teaches Design and Drawing for Production, Robotics, Production Systems, and Architectural Drawing and Construction at Elwood-John H. Glenn High School in Elwood, NY.
12. **Phil Moskowitz** teaches STEAM classes to seventh and eighth graders at Eisenhower Middle School in Succasunna, NJ. He enjoys sharing his passions of technology, tinkering, and making with his students.
13. **Joe Slifka** is the technology teacher for LaBrae Local School District in Leavittsburg, OH. He is passionate about integrating robotics in his daily lessons and helping students become creators through technology.
14. **Michelle Smith** teaches in a Pitsco STEM Expeditions® lab and serves as the TSA advisor at Tucker Creek Middle school in Havelock, NC. Her teaching experience includes high school agriculture and middle school biotechnology.

15. **Natalie Vanderbeck** is the K-5 title math teacher at George Nettels Elementary in Pittsburg, KS. She is an ESOL mentor and practicum supervisor and has lectured part-time at Pittsburg State University.
16. **Michelle VandyBogurt**, the secondary science teacher at Northwest High School in Jackson, MI, is in her 26th year of teaching. She enjoys helping her students become more engaged with the world around them.
17. **Tim Vesco** is now in his 18th year at Frank Layden Elementary in Frontenac, KS. He currently moderates #ksedchat on Twitter and is the lead organizer for EdCampKS in Southeast Kansas.
18. **Sam Warwick** has been teaching at Heritage High School in Maryville, TN, for 15 years. He teaches technology and engineering classes and enjoys seeing his students overcome their fear of failure.
19. **Matthew Way** is the STREAM lab teacher at Sweeny Elementary in Sweeny, TX. He is in his third year of teaching and hopes to continue to teach and reach students for many years to come.
20. **Steve Zoeller** teaches technology at John Jay High School in Cross River, NY. Now in his 15th year of teaching, he is passionate about robotics and automation, teaching the engineering design process, and helping students develop 21st-century skills. 

LEARN MORE ONLINE



#THISISSTEM – Pitsco's 2019 *Big Book*

PITTSBURG, KS (January 14, 2019) – For 48 years, Pitsco has helped teachers and their students experience success through hands-on learning solutions. Our 2019 *Big Book* catalog is perfectly in line with this timeless strategy!

The 2019 *Big Book* is brimming with exciting products, activities, curriculum, and solutions to better serve teachers and students! New this year is the Coding section. Coding in the classroom adds another avenue of problem-solving, cooperation, and computational thinking. We have new offerings in our KUBO line as well as products from our new partners: Microduino, Fable, UBTECH, and Arduino. From single kits to classroom packs, our coding products span Grades K-12 and include screen-free programming as well as visual and text-based coding – a variety of options for all students.

After years in the making, Mr. Robot II has finally made his debut. Perfect for a capstone project or makerspace, Mr. Robot II comes with everything needed to build a five-foot-tall robot that can move forward and backward, lift at the shoulders, bend at the elbows, and turn its head, not to mention take your students' interest in robotics to the absolute max. Mr. Robot II is paired with and controlled by the brand-new Tele-Op control module and SONY PS4 DUALSHOCK 4 remote control, which allow for the programming of endless movements and functions. Mr. Robot II is ready to make his appearance in your classroom!

More exciting additions to the catalog are nine enhanced teacher guides with FREE digital downloads – yes, they are absolutely free. Select teacher guides are now enhanced with a variety of math, science, and technology activities; pretests and posttests; resource pages; and links to video resources. The guides contain separate activities for middle school and high school students as well as links to career information and applications of the 4Cs (communication, collaboration, critical thinking, and creativity). Equipment and supplies needed to complete the activities are listed in the teacher guide. Guide downloads can be accessed on our website or by using links throughout the catalog.

Along with a new year comes new challenges, and Pitsco is here to provide solutions that lead to success in the classroom. Be sure to check out the rest of our new products in the catalog by downloading it at Pitsco.com or requesting a mailed catalog for your school. We wish you all the best in 2019! 



[LEARN MORE](#)



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!

February

19-22 American Camp Association, Nashville, TN

27-Mar 1 Global Educational Supplies and Solutions (GESS), Dubai, UAE

March

4-7 SXSW EDU, Austin, TX

15-18 National AfterSchool Association, New York, NY

16-18 ASCD, Chicago, IL

27-30 International Technology and Engineering Educators Association, Kansas City, MO

April

11-14 National Science Teachers Association, St. Louis, MO

17-20 FIRST®, Houston, TX

24-27 FIRST®, Detroit, MI

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Hands-on STEM



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With a teacher's guide and Pitsco products, follow a sample outline to be on your way to STEM fun!

Visit **Pitsco.com/Camps** to explore a list of recommended products and corresponding teacher's guides.

Four-day STEM Camp for Grades 3-5 **Sample Camp: The Power of Air**

DAY 1	DAY 2	DAY 3	DAY 4
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Balloon Car Explore-A-Pak (15790)	Sail Car Maker Project (42962)	KaZoon Kites – Getting Started Package (23613)	Straw Rockets Maker Project (42963)
 Balloon Car Elementary STEM Activity Guide (41526)	 Sail Car Elementary STEM Activity Guide (41527)	 KaZoon Kites Elementary STEM Activity Guide (42608)	 Straw Rockets Elementary STEM Activity Guide

30+ hours of instruction | Unlimited fun!

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STEM CAMPS

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

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

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