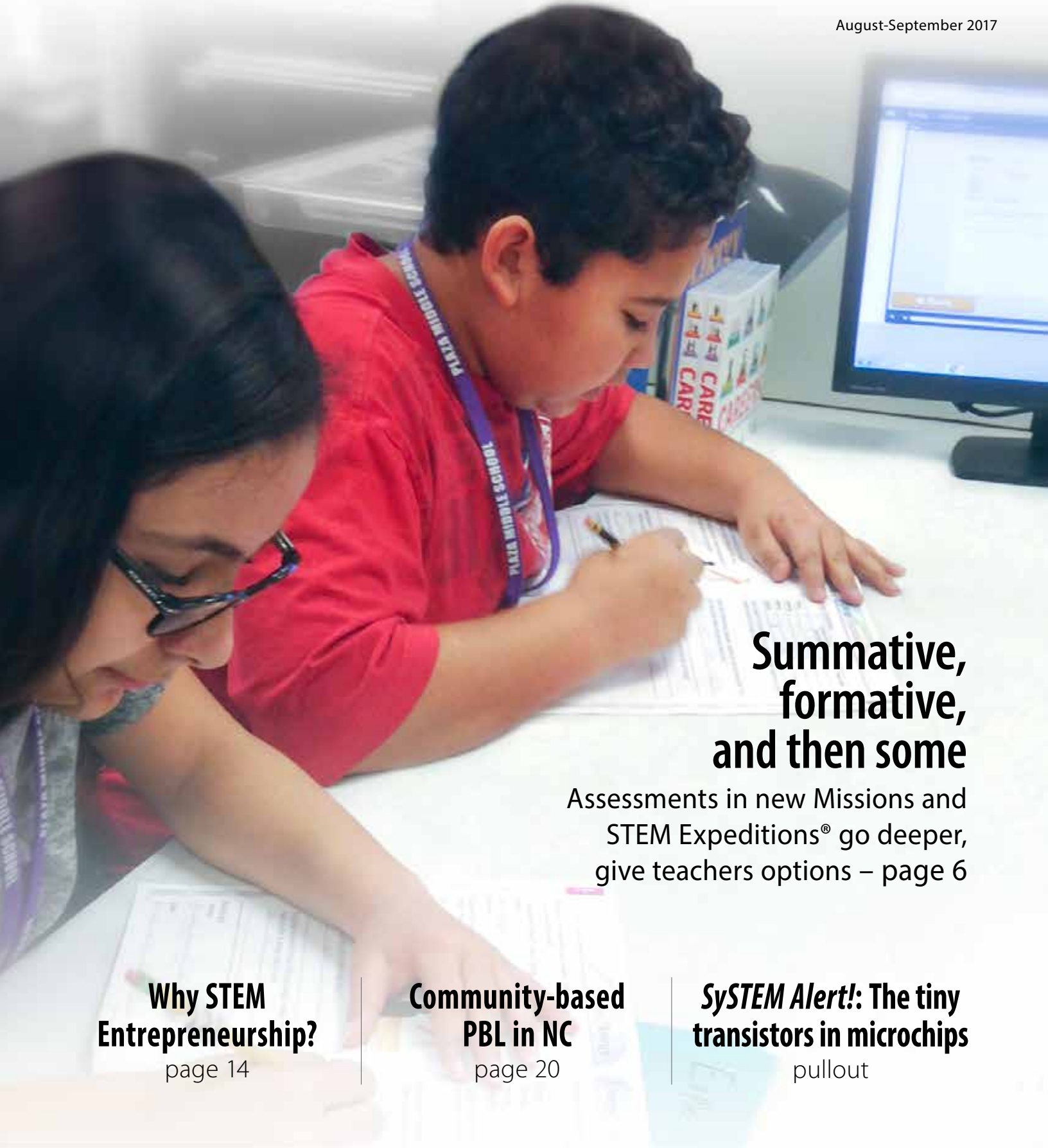
THE PITSCO NETWORK

August-September 2017



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***SySTEM Alert!*: The tiny transistors in microchips**
pullout

New school year, **NEW catalogs**!

The NEW *Elementary STEM*, *Maker Space*, and *Robotics* catalogs are on their way!

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PITSCO EDUCATION

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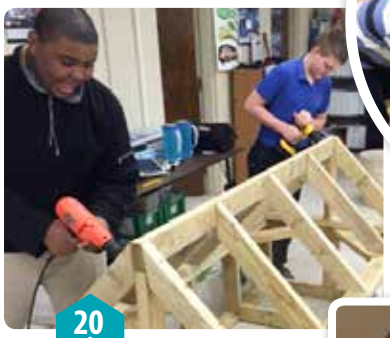

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THE PITSCO NETWORK

Volume 19, No. 1 | August-September 2017

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

The Pitsco Network is published by Pitsco, Inc., five times each year (bimonthly, except June-July). Information and articles are geared to Pitsco Education facilitators and administrators.

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2017 APEX® AWARDS FOR PUBLICATION EXCELLENCE

PITSCO EDUCATION

From the Executive Editor

Education beyond the four walls

The hard lines separating the traditional school subjects used to be a given. In the age of STEM, things have changed. Increasingly, our ideal is to discover how the disciplines interact, overlap, and merge. A single project might combine scientific knowledge, mathematical calculation, aspects of the engineering design process, a view of the history of technology, soft skills such as teamwork and presentation, and, with the advent of STEAM and STREAM, even art and reading.

But the power to dissolve boundaries doesn't end there. Innovative teachers across the country are using Pitsco's STEM tools to bridge what could be the greatest educational gulf of all – the one that separates the classroom from the real world. Whether that means curriculum that truly tackles the question "Why do I need to learn this?" or projects that literally put students in contact with their community, school can no longer be contained by four walls.

Take a stroll through this issue to learn more about the STEM breakthrough.

- STEM Entrepreneurship is brought to you by Pitsco and a consortium of leading educators. You can become certified in this area and learn strategies for bringing the entrepreneurial skill set and community connection to your students. Regardless of students' career aspirations, creativity, calculated risk taking, and communication skills will serve them in life.
- A Greensboro, NC, FTC® robotics team endeavors to make robotics a varsity activity. This is a growing trend.
- Students in Rochelle, IL, take on a class project to improve a local man's quality of life.
- In Ayden, NC, Modules serve as a launch point for activities that reach into the whole school and the community at large.
- STEM Expeditions® and Missions open assessment possibilities that transcend the traditional testing options.
- Handwriting is as relevant a skill as ever. Missions 2.0 have been fine-tuned to improve student abilities in this area. P

Matt Frankenbery

Matt Frankenbery
Vice President, Education & Executive Editor

By Kristina Davis, Educational Program Designer • kdavis@pitsco.com

What's new in Pitsco's 2017-18 *Maker Space* catalog?

For Pitsco Education's 2017-18 *Maker Space* catalog, we kept the individual projects in place and added more furniture, tools and equipment, and a variety of à la carte items. Here is a preview of some of the items you will see in the new catalog.

FURNITURE

- **Rolling Storage Carts** – These storage carts range in size from three drawers to 15 drawers and are available in black and white or multicolored. These carts are ideal for those with mobile makerspaces, storing kits, or lots of tools and miscellaneous materials.
- **Wire Bin Roll Files** – Do you have large rolls of paper, pieces of wood, or miscellaneous items that you don't know where to put? Look no further, as these roll files are the perfect solution! Both options feature swivel casters for easy mobility in the room. You will have the option of a black roll file with 5.5" openings or a white roll file with 8" openings.
- **Supplies Organizer** – As a former elementary teacher, I am partial to this storage addition! The wooden supply organizer includes 12 transparent plastic storage bins with lids and adhesive labels. Not only does this organizer allow for items to be stored, but finished projects can also be displayed on top of the organizer.

TOOLS AND EQUIPMENT

- **Afinia H400 3-D Printer Package** – The newest printer from Afinia offers touch-screen controls and Wi-Fi connection in a small and affordable package. This printer is great for a mobile makerspace because it's light and easy to carry using the handle. Combine this with our 3-D printing curriculum, and your students will be printing their own creations in no time!
- **Woodburning Pen Set** – This woodburning pen is equipped with five different decorating tips that can enhance any wood, leather, or cork project with unique designs and fine-line detailing. Your students will enjoy adding artistic flair to their projects with this pen.
- **Cutting Tools** – The Timber Cutter, Lumberjack Cutter, Coping Saw, and Easy Miter Box are some of our cutting tools featured in the new catalog. While both cutters are meant to cut balsa and wooden sticks, the coping saw and Easy Miter Box can be used to cut a variety of materials.

- **Glue Dots** – These clear adhesive dots are paper-thin with high-tack adhesive on both sides. They are perfect for bonding paper, artwork, foam board, photos, and so forth. If you would rather not pull off each dot individually, you might want to look at the Dot Glue Runner instead as it makes the dots portable and even easier to use.

À LA CARTE ITEMS

- **Bulk items** – We offer several items in packs for stocking your makerspace. These items include wheels, axles, balsa and basswood packs, straws, motors, balloons, spools, craft sticks, cable ties, and much more.
- **Wikki Stix** – These reusable, flexible, wax-coated sticks have applications throughout a makerspace. From creating a stop-motion video to building an imaginary creature, these sticks will be used again and again for various projects.

We hope this preview has made you as excited for this catalog as we are! Look for the 2017-18 Pitsco *Maker Space* catalog in your mailbox this fall, or visit Pitsco.com/catalogrequest and request that one be mailed to you.

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

Students print 3-D prosthetic arm

Pitsco Modules facilitator sees students gain national attention for problem solving

When representatives from Monsanto followed up with middle school teacher Vic Worthington to learn how he had put his grant winnings to use, they listened attentively, nodding along and taking notes. But it wasn't until he detailed a class project involving the use of an Afinia 3-D printer he'd purchased, that, in Worthington's words, the needle slipped off the record.

The project: Worthington, several of his technology students, and a few members of the community were collaborating to design and 3-D print a prosthetic arm for a local man who had lost his arm in a farming accident. It was a bold, ambitious project, and Monsanto was able to arrange for some much-deserved recognition for the group.

> Not all titles are for everyone, but everyone can find a place in the lab. And when a student finds their match, "man, you get to see them work their passion. It's really cool!"

On the day that the completed arm was presented, the classroom was abuzz with a dozen or more members from local media and the Associated Press. And the students were terrified. Unused to the spotlight, they were about to be interviewed for a segment on the national nightly news. . . .

But let's back up a bit. What seems to be a story about big sums of grant money and a brush with fame is, at heart, really a story about some inspired pedagogy and the rewards of doing a good work.

HARD WORK

Worthington had researched printing prosthetics, but it wasn't until he conversed at his church with Jake Hubbard that the notion took hold. Hubbard, the amputee whose arm had been lost after he was pinned beneath a tractor for several hours, already possessed a quality prosthetic. But there was an issue.

Hubbard wore the prosthetic during his farm labor, and the dirt and scuffs it sustained caused

him to leave it behind when he went out to dinner. In this, Worthington saw an opportunity to make a mutually beneficial arrangement. If Hubbard would visit his class as a guest speaker, Worthington's students would design and print an additional arm for him, one that he could wear on the town.

Not every student in the class latched onto the idea when it was presented to them, but a core group of students became very enthusiastic. "It was the three or four who really embraced it throughout the year; they got really fired up for the first time I've seen them get fired up that year," says Worthington.

The project wasn't done in conjunction with any particular Module, but Worthington likens this reaction to what his Modules lab offers. Not all titles are for everyone, but everyone can find a place in the lab. And when a student finds their match, "man, you get to see them work their passion. It's really cool!"

About a dozen of Worthington's students participated in the project. They were deeply involved, working with the design software, prototyping, making creative choices about the materials and color, and overseeing the printing process.

Other individuals and organizations lent technical and material support, including a father-and-son firefighting team with 3-D modeling experience, a high school engineering instructor and a star student from a neighboring school district, and industrial supplies distributor Fastenal.

THE PAYOFF

After the printing was completed, all that remained was the media event.

Worthington describes the scene in the classroom: "13 people in a semicircle: four students and the other nine were all people who had to do with the project. And then we had the same number, if not more, adults across the room from us pointing cameras and mics, writing down everything that was said. The kids were all terrified of it when we first started."

The students might have felt nervous inside, but in front of the camera they acted like old pros.

"They acted like they'd been on camera their whole lives. They were confident and honest about what they did. They didn't try to make stuff up."

Hubbard was grateful for the work the students and others had done. He thanked the community for the new arm. The students, for their part, got an enticing taste of the engineering and manufacturing fields, which Worthington believes made a strong impression. But in the end, it was the recognition for his students for the work they had done that really pleased Worthington.

"They really got a chance to shine. Kids that age don't get a chance to shine and it is really rewarding to see that." P

Even great teachers can benefit from STEM PD

The prosthetic arm engineering project undertaken by Vic Worthington's students highlights the powerful potential of a STEM classroom as a creative space. Many believe the future success of our society depends on unlocking the spirit of innovation in our students.

The STEM Innovator professional development program offered by the University of Iowa's Jacobson Institute for Youth Entrepreneurship gives teachers the tools and know-how to turn their classrooms into learning laboratories where they work in teams with local business and industry leaders to solve real-world problems.

Worthington, who attended the course over the summer, has been thrilled with the vision it presents. "Students immediately have buy-in because they are solving a problem in the real world," he says. "In the process, they develop professional skills as they work with experts in their community."

Students aren't the only ones who get a boost to their networking abilities. "If I had taken this course before we did the prosthetic arm project, it would have gone even better. I'm learning how to build a network of people engaged in similar endeavors."

As part of Pitsco's K-12 STEM Entrepreneurship Education initiative, we are proud to partner with the University of Iowa to offer this opportunity to teachers. P

By Terry Carter, Curriculum Specialist • tcarter@pitsco.com

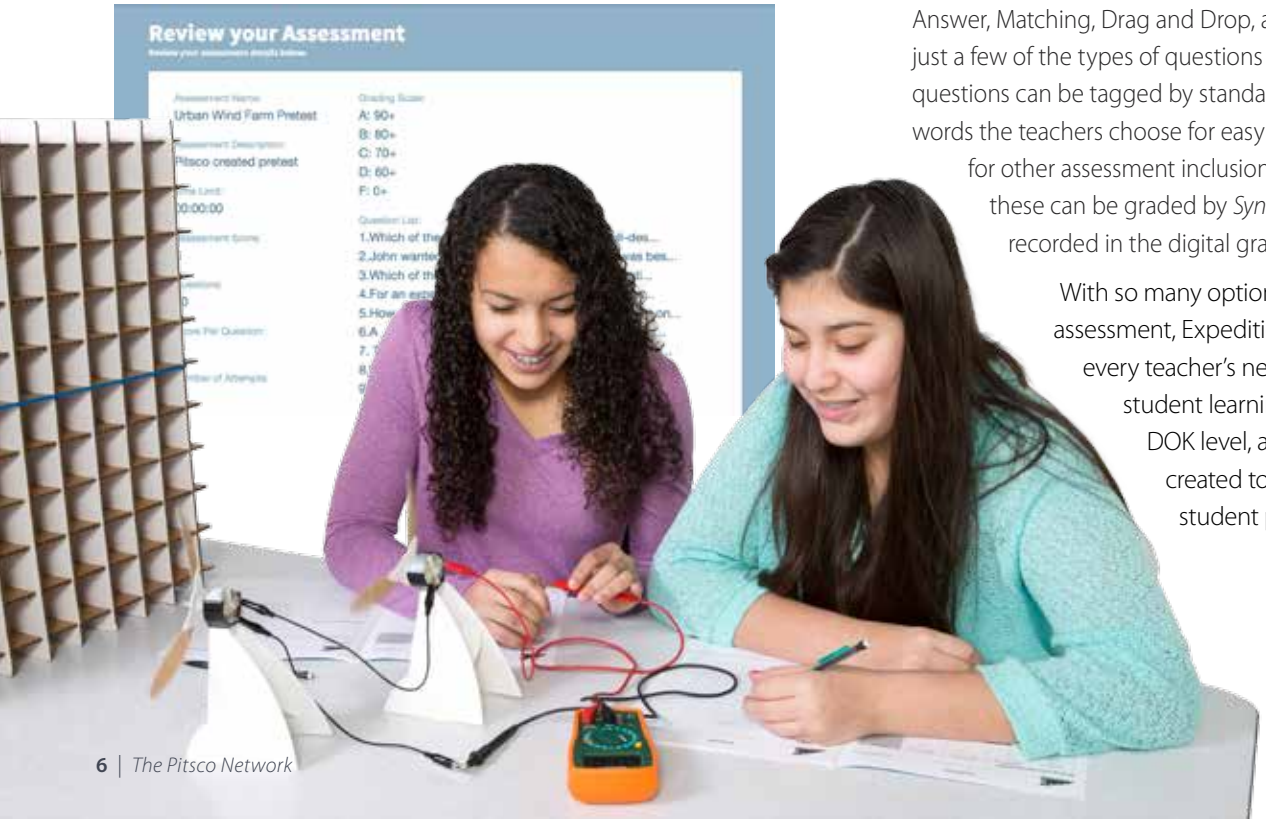
Expeditions assessments

Student logbooks, pretests, posttests, question bank, user-created questions – all available

Assessing student learning in STEM Expeditions® is as rigorous and flexible as teachers want. Student logbooks (print or digital), Pitsco-created tests, and teacher-created assessments are all available to monitor student progress throughout each Expedition. Let's take a look at how each of these can be used.

- Student logbooks come in both print and digital formats. Logbooks are at the heart of assessment in Expeditions because they show the students' proof of learning and allow for more in-depth and reflective feedback. Teachers can use the provided grading rubrics, modify the provided grading rubrics, or create their own grading rubrics to assess student logbooks. Whether assessed in print or digitally, teachers can provide feedback to the students and record their scores using the *Synergy ITC*® grading program.
- Each Expedition has a pretest and posttest created by the curriculum writers at Pitsco. Each test contains at least one question related to each focus standard as well as questions specific to the content presented in the Expedition. The total number of questions varies between 15 and 20 for each Expedition, but the number of pretest and posttest items are the same because each question on the pretest corresponds to a question on the posttest. If a teacher wants to change, add, or remove questions from a Pitsco-created test, it is as simple as opening the test, making desired changes, and saving it to his or her library. All that needs to be done after creating the new test is assign it to the students through their scheduling interface.
- Sometimes a teacher likes to insert formative assessments throughout the Expedition. This can be easily accomplished through teacher-created assessments using the assessment wizard in *Synergy*. After completing the basic information for the assessment and where it will be located, the teacher can select questions manually or have the questions selected randomly. There are more than 2,000 items in the question bank that are tagged by standards, depth-of-knowledge (DOK) levels, concepts, and related Expedition titles that a teacher can use to populate a test.
- If teachers would like to start from scratch and write their own questions, that option is available. Multiple Choice, Single Answer, Matching, Drag and Drop, and Open Response are just a few of the types of questions that can be created. The questions can be tagged by standards, key words, or any words the teachers choose for easy retrieval at a later date for other assessment inclusion. As with all assessments, these can be graded by *Synergy* and automatically recorded in the digital gradebook.

With so many options available for assessment, Expeditions can meet nearly every teacher's needs for measuring student learning. Whatever the desired DOK level, an assessment can be created to measure and grade student progress in Expeditions.



National Career Clusters

	Agriculture, Food, & Natural Resources	Architecture & Construction	Arts, A/V Technology, & Communication	Business Management & Administration	Education & Training	Finance	Government & Public Administration	Health Science	Hospitality & Tourism	Law, Public Safety, Corrections, & Security	Manufacturing	Marketing, Sales, & Service	STEM	Transportation, Distribution, & Logistics
A Closer Look	•				•			•	•				•	
Ahead of the Game			•					•					•	
Animals, Plants, and Populations							•	•						
Artificial Ecosystems	•													
Beyond Earth	•	•					•						•	
Bio Research	•			•			•	•						
Body Blueprint							•	•						
Building Bridges		•												
Communications			•											
Contraptions		•						•			•		•	•
Creative Composites		•									•		•	
Cultivating Our Future	•						•	•						
Design Time			•									•		
Dragster Design													•	•
Dynamic Disasters	•									•				
Electric Tech		•											•	
Engineering Rockets													•	•
Everyday Electricity		•												
Flight Dynamics		•												•
Fueling the Future		•											•	•
Future Footprints	•		•				•	•						
Get a Grip			•									•	•	
Growing Up	•	•						•	•			•		
Innovating Solutions				•									•	
Looks Like Rain	•		•	•			•							
Making Waves			•											
Mining Mechanics	•													•
Optical Solutions			•					•					•	
Projecting Light			•										•	
Rolling Robots													•	•
Safe Food		•					•	•	•					
Taking Control	•	•	•				•				•			
Theme Park Physics		•							•	•			•	
Thermal Physics											•			•
Tower Power		•												
Transportation Stations													•	•
Urban Wind Farm		•		•		•							•	

By Tammy Pankey, Elementary Curriculum Specialist • tpankey@pitsco.com

Missions offer many **assessment** and **customization options**

Pitsco's new Missions program provides a multitude of formative and summative assessments for teacher use. It also allows for customization by the teacher through the creation of their own tests and grading rubrics. Teachers can use the Pitsco-created assessments or create their own assessments and can print assessments through *Synergy ITC*®.

SUMMATIVE, FORMATIVE, AND THEN SOME

Each Mission contains a Pre-check and a Debrief, which are a compilation of the Briefing questions and vocabulary. The Pre-check evaluates prior knowledge before students start the Mission content. The Debrief serves as a summative assessment and should be given after students complete their Mission experience. Teachers can then make comparisons between the students' Pre-check and Debrief scores.

Grading rubrics are provided as formative assessments to assess student progress throughout the Mission. Students are graded on their completion of the Mission Journal and its contents as well as their completion of hands-on activities and deliverables. The Mission Journal, another type of formative assessment, is used by each student and serves as a proof of learning for their Mission.

WITHDRAWING FROM THE BANK OF QUESTIONS

For those wanting to shake things up a bit, there is also an immense question bank of content- and standards-based questions that teachers can use. Each Mission has 20 questions for the teachers to choose from covering each Briefing question and vocab term. These questions and assessments, available through Synergy ITC, can be used to create custom assessments that are all the Mission content questions if desired. Each question is tagged with "Mission," its Mission name, and level (MI3, MI4, MI5); by standard if applicable (NGSS or CCSSM); and by topic. Teachers can search by any of these tags listed.

Example question:

What two structures are responsible for your ability to breathe when you are asleep?

Question tags:

Mission ⊗ MI4 ⊗ Amazing Body ⊗ 4-LS1-1 ⊗ body systems ⊗

There are also Mission content independent questions. This means these questions aren't directly covered within the Mission content. Students would demonstrate their ability to transfer concepts learned in the Mission to different questions. These independent questions are divided into two sets: Math Bank and Science Bank.

These questions are tagged "Science Bank" or "Math Bank," any connections to Mission topics, their grade level, by standard if applicable (NGSS or CCSSM), and by topic. Teachers can search by any of these tags listed.

Example of Science Bank questions: Science Bank ⊗

1. Liquid water becomes a gas called vapor through the process of _____.
2. Outer planets are known as _____ planets while inner planets are known as _____ planets.
3. The center of an atom is called the nucleus.
4. A change of state refers to matter that has changed in form from solid to liquid or gas.
5. Ferns and mosses make spores.
6. A cuspid is a kind of tooth with a sharp point used to tear food. How many cuspids do adults have?
7. _____ is the process of water vapor becoming liquid water when it cools.

Example by title (more than 40 questions are tagged to the *Space Exploration* Mission): Space Exploration ⊗

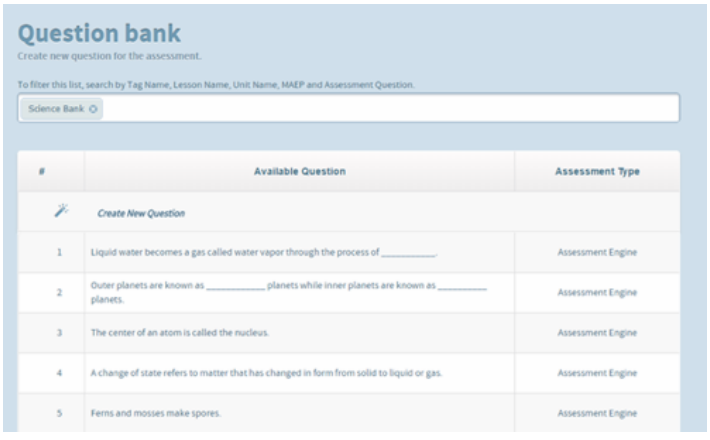
1. Judy's bill was $8.43. She paid with a $20.00 bill. How much money should she get back?
2. Tyler set up a drink stand at the football game. She sold 8 cups on the first day, 11 cups on the second day, 17 cups on the third day, 20 cups on the fourth day, and 26 cups on the fifth day. If this trend continues, how many cups can she expect to sell on the eighth day?

3. A total of 60 awards will be given away to the baseball team. Each box holds 8 awards. How many awards will be in the partially filled box?
4. Linda set up a lemonade stand at a local park. She sold 10 cups of lemonade on the first day, 15 cups on the second day, 17 cups on the third day, 22 cups on the fourth day, and 24 cups on the fifth day. If this trend continues, how many cups of lemonade can she expect to sell on the ninth day?
5. 1 quart holds more than 2 cups.
6. A pencil is 15 centimeters long. How many millimeters long is that pencil?

Example of searching for a specific standard (these are questions tagged to NGSS standard 4-LS1-1): 4-LS1-1

1. When the stomach has digested the food, where does it send it?
2. Plant cells have a special green material that helps plants use _____ to make food.
3. A shell that covers the outside of an animal's body is called an _____.
4. Which part of a vascular plant has tubes for carrying water and food?
5. Symmetry is when one side of an animal matches up exactly with the other side.
6. Fern and mosses are two kinds of plants that make seeds.
7. The exoskeleton on insects is on the _____ of their bodies.

So, no matter which Mission you use, the new Missions program gives you the flexibility to assess your students in a manner that works best for them – and for you!



By Niccole Wilson, Elementary Curriculum Specialist • nwilson@pitsco.com

Handwriting, standards, and Mission Journals

Peek into any Missions 2.0 classroom, and you will see students working together in cooperative groups on hands-on activities and writing in their Mission Journals. It doesn't matter if you're watching third-, fourth-, or fifth-grade students – all are writing in a Mission Journal. Mission Journals serve as proof of learning for the teacher and enable students to track their progress through the Mission.

Using pencil and paper might seem unusual in this time of advanced technology, maybe even a dying art, especially with the amount of texting and typing young students do these days. However, it's not dying! It is still a skill very much needed by students. Students will always need to know how to sign their name, write checks, work out math problems, do homework, take notes, sign cards, fill in forms and other legal documents – the list could go on!

Handwriting is a movement of the body and allows for graphic and artistic expression. Handwriting can help improve letter recognition, which can help with reading skills. Handwriting makes you think better by making you focus on what's important – the task at hand.

Research suggests that writing provides important cognitive benefits. It is a complex task that taps into and helps shape a variety of skills. Handwriting is a movement of the body and allows for graphic and artistic expression. Handwriting can help improve letter recognition, which can help with reading skills. Handwriting makes you think better by making you focus on what's important – the task at hand.

Every Mission includes Briefing questions and conclusion questions, which are also listed in the corresponding Mission Journal. Students are expected to answer Briefing questions at the end of every Briefing and conclusion questions at the end of every Exploration. Teachers grade the students on their accuracy, spelling, grammar, punctuation, and capitalization. Students are also expected to answer the questions in complete sentences and use the question as part of their answer.

Also, during the course of each Mission, students write vocabulary definitions in their Mission Journals as part of their Briefings. They write numbers in the form of math problems, data, graphs, and measurements in their Mission Journals as part of their Explorations. They even brainstorm engineering design challenge solutions in their Mission Journals, and they use the Mission Log pages in their Mission Journals to record answers to questions, take notes, and document ideas.

National and state English language arts (ELA) standards include specific writing requirements. When students complete a Mission Journal, they meet several of these national and state writing standards, and the *R* (reading) in STREAM is more significantly emphasized. If Mission Journals were offered only digitally, then students wouldn't be meeting several of these important ELA writing standards.

Technology can be great and make life easier, but writing is still an essential life skill. So, don't be surprised when you come across a Missions student with improved handwriting, spelling, grammar, and reading skills. A lot of that can be attributed to the writing and ELA work required in the Mission Journal!

You hold the key to unlock the excitement of STEM

DAVE THE SCIENCE GUY

David Meador

Curriculum Specialist | dmeador@pitsco.com

Science, technology, engineering, and math – when you list them individually, they seem to be discrete, stand-alone concepts. But something happened in education in the recent past. The overlap of these subject areas has always been obvious to teachers, but there's something about the acronym *STEM* that just feels right. The acronym *STEM* seems to make everyone more aware of the fundamental integration of these subjects.

I recently had an opportunity to see how this phenomenon played out at a gathering for teachers who focus on just one of the four subject areas. I attended the National Science Teachers Association (NSTA) conference in Los Angeles, CA, this summer, and the integration of STEM was unmistakable.

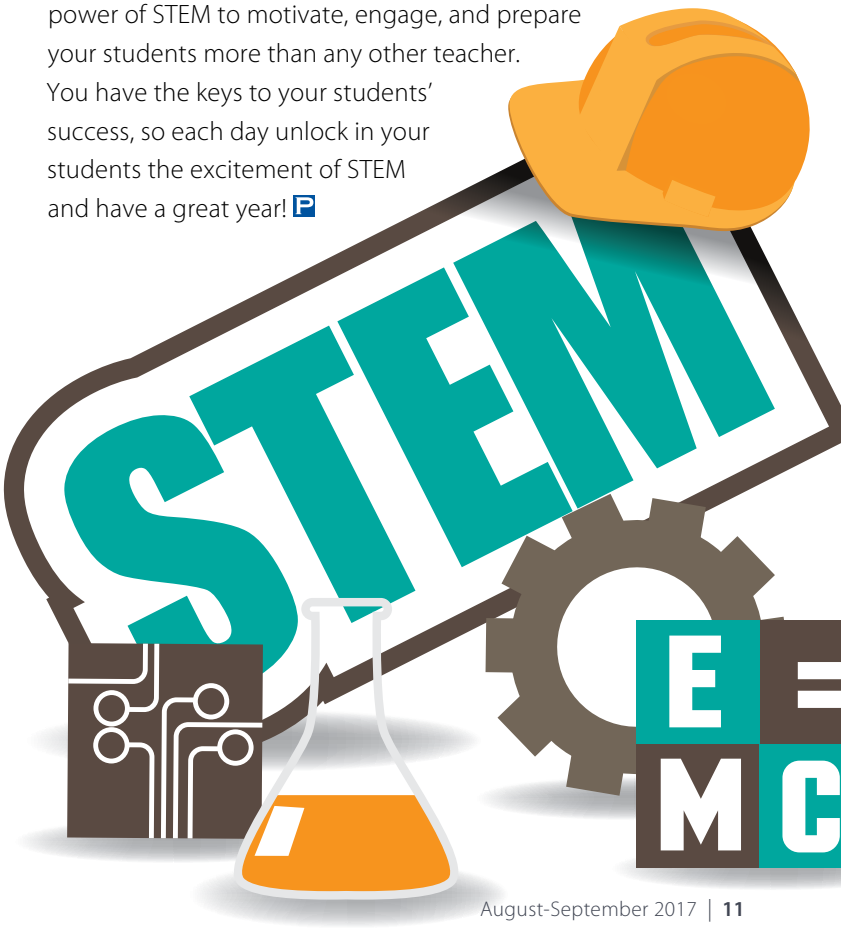
One of the charges we receive as curriculum specialists here at Pitsco is that we create curriculum that is as real world as possible when delivered in a classroom. While at the NSTA conference, I had an opportunity to visit with a teacher from Japan who is doing just that. He created a program through which his students and students from around the globe could collaborate. He had students speaking five different languages collaborating on the same project. What type of real-world project could provide this type of experience? A STEM project, of course, and in this case, it was robotics.

At lunch he discussed the other STEM opportunities that he would like to pursue in the future, and we talked at length about how STEM was so well suited to the idea of student engagement. One of the hurdles for any globally collaborative project is the different time zones. With five different countries in five different time zones and having to consider crossing the international date line, scheduling a meeting for the middle school students became a serious challenge. Somebody was going to have to be available before or after regular school hours.

But even with the extra work outside of class and the extra demands of the program, students in all countries involved were enthusiastic about the opportunity. This is the power of STEM: to excite students and motivate them to learn otherwise unexciting materials when delivered as single subjects. Students can suddenly understand how the concepts are relevant to their futures and to their ability to succeed in the world of work. STEM automatically answers the age-old question that we teachers have heard for years, "Why do I need to learn this?"

I was encouraged by this story, and I thought about how we have integrated into Pitsco curriculum these same opportunities to hone collaboration skills, albeit on a smaller scale. I've seen firsthand the student excitement for learning in an integrated STEM experience in a Pitsco lab. I thought about the hours we have spent making sure that all four distinct subjects are truly integrated and immersed into real-world experiences that satisfy students' curiosity and inherent need to understand.

As you begin this school year in a Pitsco lab or using Pitsco equipment and materials, you will have at your disposal the power of STEM to motivate, engage, and prepare your students more than any other teacher. You have the keys to your students' success, so each day unlock in your students the excitement of STEM and have a great year!



Compiled by Stephanie Manes, Research Coordinator • smanes@pitsco.com

What do you know about the **Pitsco Backhoe**?

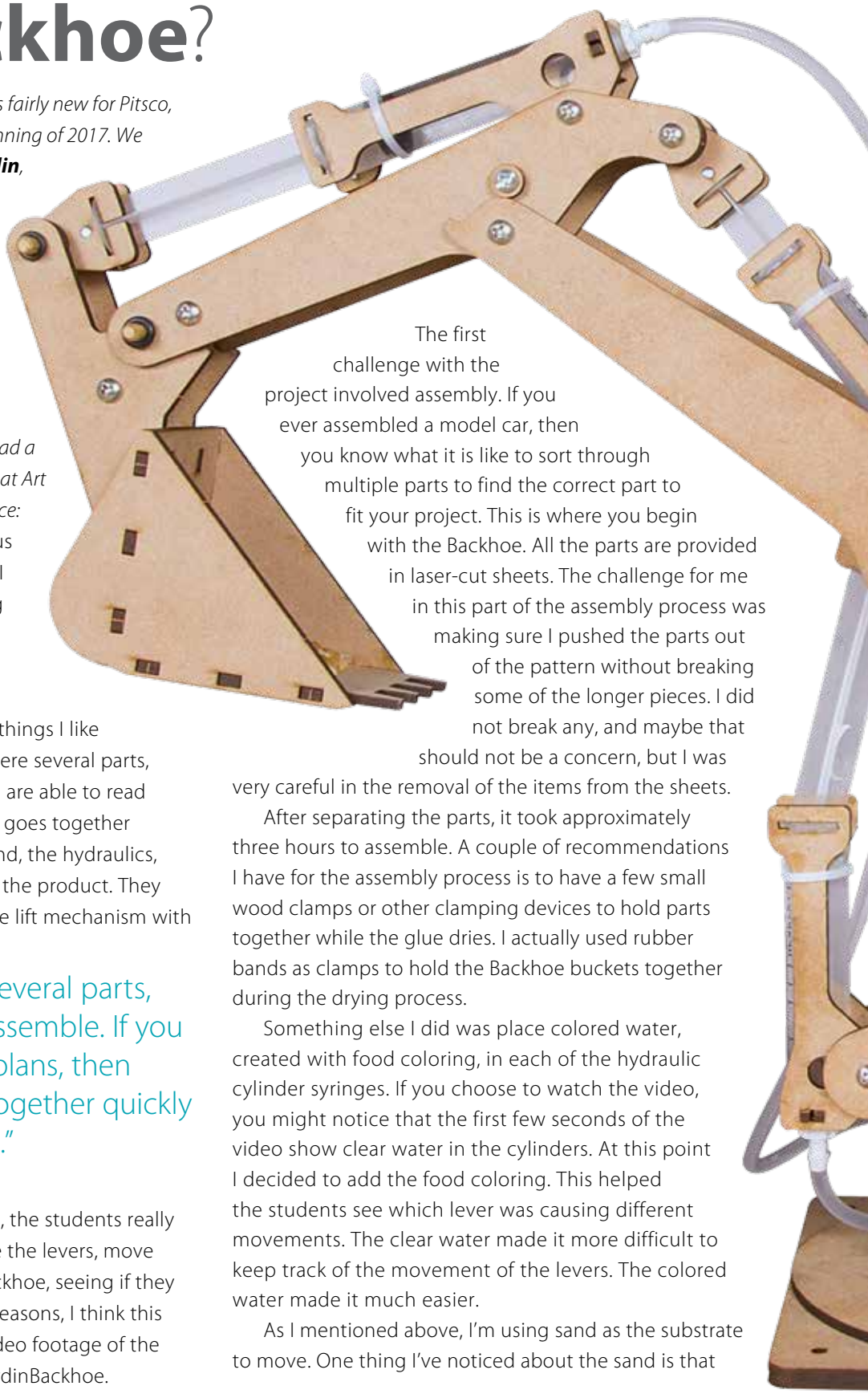
Art Hardin
TAG member

The Backhoe Kit is fairly new for Pitsco, releasing at the beginning of 2017. We sent one to ***Art Hardin****, one of our Teacher Advisory Group (TAG) members, to get his thoughts on this hydraulic machine. Art teaches preengineering technology at Edythe J. Hayes Middle School in Lexington, Kentucky, and by his account, his students had a great time trying out the Backhoe. Here's what Art had to say in a blog post about the experience:*

"As a person who has operated various types of machinery, including backhoes, I was very interested in building and using the Pitsco Backhoe in my classroom.

Let me tell you about some of my challenges both good and bad with this project. First, let me discuss some of the things I like about this product. Even though there were several parts, the Backhoe was easy to assemble. If you are able to read assembly plans, then most of the project goes together quickly with just a little wood glue. Second, the hydraulics, provided by eight syringes, work well on the product. They move all of the levers, the bucket, and the lift mechanism with ease. Next, and probably most important, the students really were interested in attempting to operate the levers, move the sand, and generally play with the Backhoe, seeing if they could make it move the sand. For these reasons, I think this is a great project. You may also watch video footage of the Backhoe at work at video.pitsco.com/HardinBackhoe.

> "Even though there were several parts, the Backhoe was easy to assemble. If you are able to read assembly plans, then most of the project goes together quickly with just a little wood glue."



The first challenge with the project involved assembly. If you ever assembled a model car, then you know what it is like to sort through multiple parts to find the correct part to fit your project. This is where you begin with the Backhoe. All the parts are provided in laser-cut sheets. The challenge for me in this part of the assembly process was making sure I pushed the parts out of the pattern without breaking some of the longer pieces. I did not break any, and maybe that should not be a concern, but I was very careful in the removal of the items from the sheets.

After separating the parts, it took approximately three hours to assemble. A couple of recommendations I have for the assembly process is to have a few small wood clamps or other clamping devices to hold parts together while the glue dries. I actually used rubber bands as clamps to hold the Backhoe buckets together during the drying process.

Something else I did was place colored water, created with food coloring, in each of the hydraulic cylinder syringes. If you choose to watch the video, you might notice that the first few seconds of the video show clear water in the cylinders. At this point I decided to add the food coloring. This helped the students see which lever was causing different movements. The clear water made it more difficult to keep track of the movement of the levers. The colored water made it much easier.

As I mentioned above, I'm using sand as the substrate to move. One thing I've noticed about the sand is that

the drier sand moves easier with the current mechanism than wet sand. It works either way; however, you can get a bigger scoop of sand when it is dry.

In the last few days, my students and I have been practicing with the Backhoe project provided by Pitsco. This activity has proved interesting and challenging. I'm working to develop a unit on these activities, which will include vocabulary terms, a comparison between hydraulic and pneumatic controls, movement of differing amounts of sand with the bigger or smaller shovel, and so forth.

WHAT CAN YOU DO WITH THE BACKHOE?

Michelle Hendrick
TAG member

TAG member Michelle Hendrick created the following activity for the Backhoe.

Grade Levels: 6-12

Subjects: STEM, Engineering

Duration: Two to three class periods

Materials: Small items to scoop (gravel, mini marshmallows, marbles, and so forth)

ACTIVITY

Objective: To understand fluid power and how it relates to pressure, friction, and work in a hydraulic system

Activity: Using the Pitsco Backhoe, students work in groups of two to three to:

- Scoop the heaviest load possible and transport it to the dumping location.
- Deliver the most objects in a given amount of time.
- Dig and recover objects without damaging them.

Extension Ideas:

- Pascal's law
- Different syringe sizes
- Different liquids in syringes

By Tom Farmer, Editor • tfarmer@pitsco.com

STEM Entrepreneurship

Pitsco-led consortium aims to develop an entrepreneurial mind-set

PITTSBURG, KS – Who will invent our future? Entrepreneurs; specifically, STEM entrepreneurs.

Who is filling the entrepreneurial talent pipeline? Teachers, especially those who facilitate and encourage their students to engage their hands and minds while communicating, designing, creating, and thinking critically in the classroom.

To prepare these K-12 teachers – and their students – a consortium composed of leading STEM advocates, educators, and service providers has developed a comprehensive program through which teachers can become certified in STEM entrepreneurship. This effort to shape the future by reshaping learning is spearheaded by Pitsco Education, the Jacobson Institute for Youth Entrepreneurship, Startup Genius, and zSpace.

"We have assembled in this consortium some of the top minds in STEM education," said Pitsco Vice President of Education Matt Frankenbery. "We want all kids to have the opportunity to be part of the ownership success equation. Whether they are in Nuevo, California, or in Dothan, Alabama, or anywhere in between, they deserve an opportunity to become entrepreneurs."

- **Pitsco Education**, a STEM pioneer with more than 45 years of experience developing and implementing educational products, prepares learners for the future through the integration of science, technology, engineering, and math concepts using relevant hands-on applications to connect school, community, and work.
- The University of Iowa's STEM Innovation and Entrepreneurship program was developed by the **Jacobson Institute for Youth Entrepreneurship** to equip educators with skills to infuse innovation, invention, and entrepreneurship into their schools.
- **Startup Genius** is an entrepreneurship social networking platform that facilitates meaningful community engagement through problem-based active learning surrounding development of students' ideas.
- **zSpace** mixed-reality STEM labs are equipped with hands-on activities and multimedia STEM instruction that enable students to interact with the topic they're learning about through leading-edge augmented and virtual reality technology.

The STEM Entrepreneurship continuum prepares teachers from all levels – elementary, middle, and high. Foundational STEM professional development is a starting point from which teachers can scale their expertise, and each teacher has access to a curriculum tool kit for STEM innovation as well as the opportunity to build partnerships with local, state, and national industry leaders.

The two-phase professional development process prepares educators to empower budding entrepreneurs; cultivate soft skills such as communication, collaboration, problem solving, and conflict resolution; implement the engineering design process in age-appropriate ways; and embrace the learning potential in student failure. Upon successful completion of professional development, teachers are University of Iowa STEM Innovator Certified Instructors and can earn four graduate-level credits. P

Administrators' Corner

STEM Entrepreneurship fuels original thought

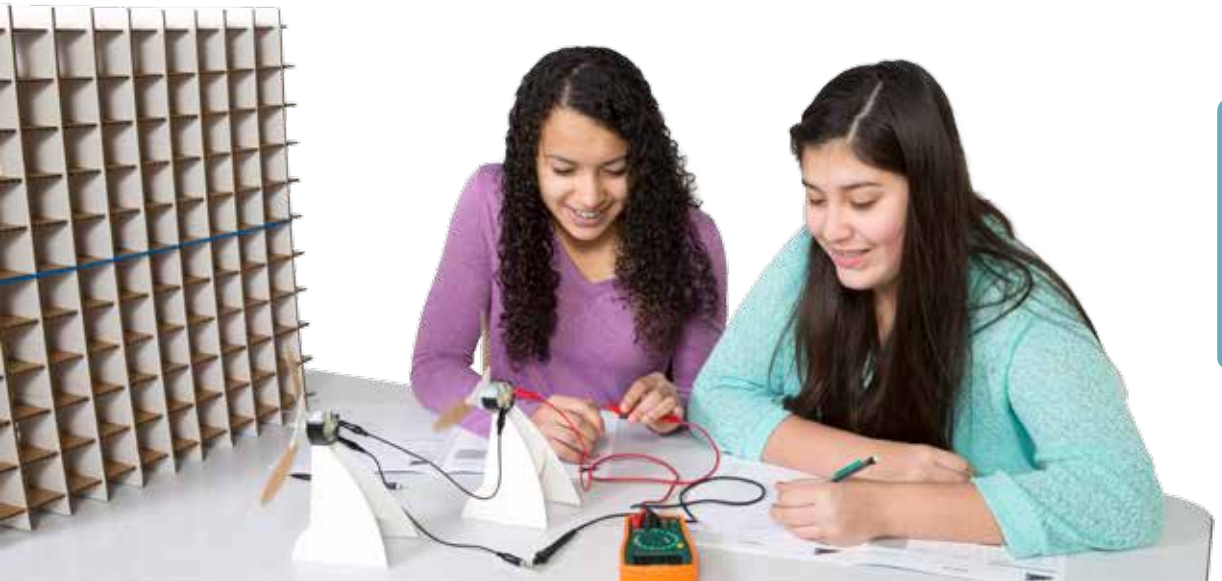
Why is Heritage Academy adding Pitsco STEM programs for Grades 3-12?
Heritage introduced a robotics program five years ago. A robotics club was formed based on student interest, which created a launching pad into the STEM. Our robotics club went to regional competitions four of the last five years and gained valuable experience. In developing our one-to-one iPad program, more application was needed; therefore, we used robotics as a segue into STEM.

How did you manage to work STEM in among the existing curriculum?
During the development of our science and math wing as a project of our recent capital campaign, we explored computer-based STEM options. However, Pitsco STEM encapsulated our vision for applied learning opportunities, the application of STEM to real-world problem solving, the cultivation of innovation, and the collaboration component. It became apparent it could be weaved effectively into our curriculum. We have strong academics at Heritage, and STEM should provide the means for our students to take further ownership of their learning.

Why did you opt for the STEM Entrepreneurship program specifically?
Pitsco offered a partnership opportunity with Mississippi State University and the University of Iowa that includes an entrepreneurship program. Our choice to pursue Pitsco STEM was reinforced during our visits to Lamar Academy in Meridian, Mississippi, and Jackson Academy in Jackson, Mississippi, as well as through the Pitsco seminar at the 2016 Southern Association of Independent Schools (SAIS) Annual Conference.

How did school leaders respond to the proposal to add STEM Entrepreneurship?
We have a board of trustees with 16 members. They were very supportive right from the beginning in terms of the science and math wing and creating hands-on learning experiences and real-world problem-solving opportunities for our students. . . . Some of the major donors to our capital campaign and other friends of the school met with the Pitsco representatives to discuss this. So, we just kept growing that conversation.

Did board members personally connect with the aims of the STEM Entrepreneurship program?
Many of our board members manage or own companies, and STEM Entrepreneurship resonated with them. These members loved the idea of our students having a stress-free environment to develop their ideas. They saw an opportunity for our students to have entrepreneurship experiences as teenagers. It was mind blowing because typically the process is you go to university if you have an interest, you start developing ideas for companies, and you have your hits and misses. You're in your late 20s, trying to start families and all those



Dr. Greg Carlyle
Headmaster, Heritage Academy, Columbus, MS

Heritage Academy opened its doors in 1964 with the aim of providing a great educational experience for students. Today, with an enrollment of 500 in Grades PreK-12, Heritage is among the top-performing institutions in the Southern Association of Independent Schools. Headmaster Dr. Greg Carlyle has been in education since 1990, working as a teacher and administrator in Costa Rica and Mississippi. A native of St. Catharines, Ontario, Canada, Dr. Carlyle is in his sixth year as headmaster at Heritage.

ONLY ONLINE:
Visit Pitsco.com/Network to read more of the interview with Dr. Greg Carlyle.

things; that's a stressful environment. This could be preempted by an Entrepreneurship program.

How was the multipronged structure of STEM Entrepreneurship received?

One of the things that really spoke to us was the fact that there's a partnership with Mississippi State University as well as the University of Iowa and Startup Genius. Having this creates opportunities for the students to be apprenticed by graduate students from Mississippi State's entrepreneurship program and for our STEM teachers to be effectively supported. Our science and math teachers as well as other stakeholders recognized quickly that there was going to be meaningful learning for the students in the realm of entrepreneurship.

Why are you implementing the full STEM continuum at Heritage?

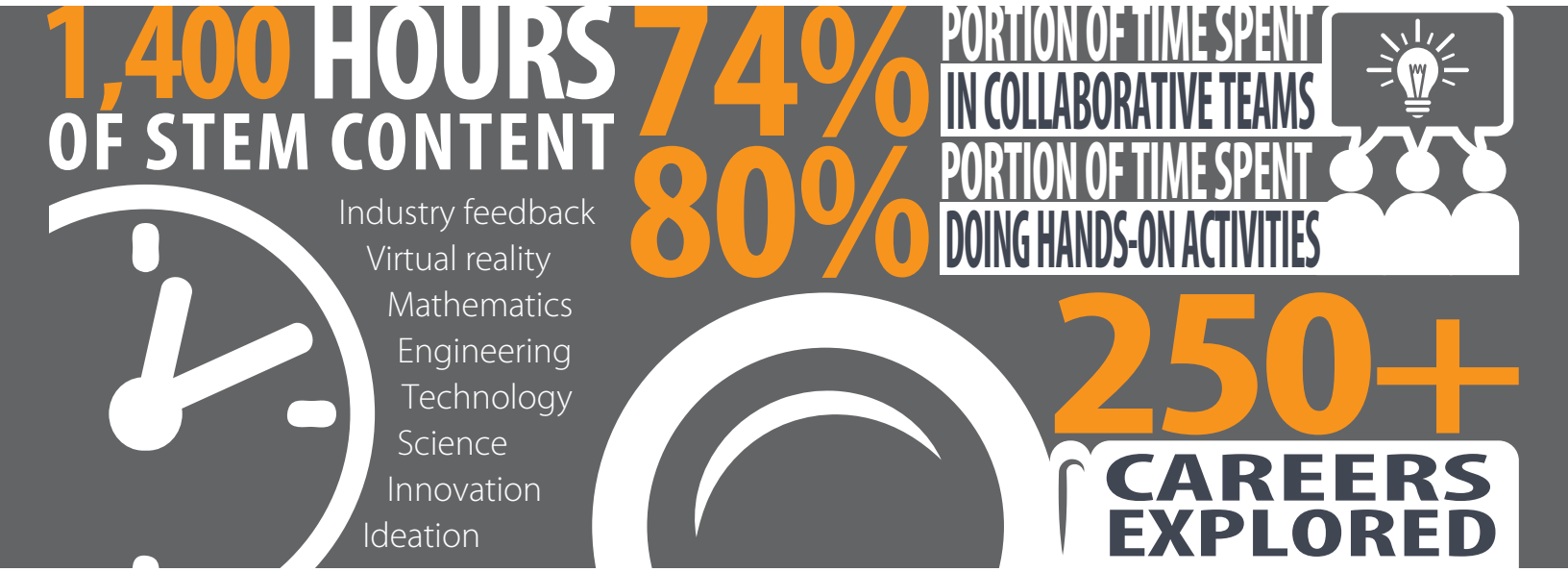
We are wanting to develop this entrepreneurship continuum to instill in our students and faculty at the elementary an understanding of the entrepreneurship focus within STEM. As a result, this should enable students to build a set of STEM skills from grade level to grade level that will ultimately culminate in exceptional entrepreneurship experiences in high school.

How are you growing your personal knowledge of entrepreneurship as this new program takes root at Heritage?

I am currently reading Adam Grant's *Originals*. Grant chronicles how to build nonconformity through deliberate creative expression and hands-on learning experiences. We seek to facilitate that direction through supporting students with mentorship. We have strong facilitator-teachers who can help guide that process, not inhibiting growth but instead directing it.

What do original creators such as Steve Jobs and Thomas Edison have in common?

They were very calculated risk takers. They took initiative in things, but they sought peer feedback. They were deliberate in the process that they used to develop and grow ideas. In reading *Originals*, I am more excited about entrepreneurship opportunities that will be provided at Heritage. Pitsco has done it right, cultivating students' experiences to help them be innovative and successful.



By Tom Farmer, Editor • tfarmer@pitsco.com

Equipped in mind and matter

That's the aim of Kenston Forest School's STEM Entrepreneurship program

BLACKSTONE, VA – After years of waiting and hoping for things to change in their economically challenged area of Southside Virginia, officials at Kenston Forest School in Blackstone shifted gears to better fit into a world where they saw adaptability, creativity, and relevance being rewarded.

Planting seeds in problem-based learning, growing career-based STEM and STEAM offerings, and outfitting students with the mental tools needed to thrive in an uncertain world, Kenston Forest has reversed the tide to become the only school in the region with an upward-trending enrollment.

Kenston Forest teachers received extensive professional development from Pitsco this summer.

"When people talk about the economic recovery that the country seems to have been in for the last five years not reaching everywhere, this is one of those places," says Kenston's third-year headmaster, Paul Zanowski. "It's happening in bumps and starts. We're starting to see some investment. . . . They're building a $100 million hospital in South Hill, which is 25 minutes from our campus. Centra Health is investing. Microsoft has built a facility south of here. So, there's a tremendous opportunity to build a pipeline of STEM-literate happy adapters."

With that goal in mind, Kenston opened this fall a $300,000 STEAM lab that serves all of the school's 300 students, Pre-K-12. Pitsco Education's new STEM Entrepreneurship program is the centerpiece of this push to position Kenston on the leading edge in preparing students for an uncertain yet exciting future.

"Anyone who tells you what things will look like 20 years from now is guessing. We can't predict it," said Zanowski, who believes learning how to learn is equally as important as what is learned. "People are solving problems and developing new approaches and reacting to changing environments and circumstances. This notion of adaptation is no longer optional, it's necessary. It's mandatory. And happy adapters are always going to find a way to thrive."

STEM Entrepreneurship is a fertile – and surprisingly broad – context in which Zanowski, Kenston's Board of Trustees, and parents are planting their seeds. "Entrepreneurship isn't just business and commerce. It's really a mind-set dedicated to solving problems and coming up with innovative solutions, adapting to change, and finding ways to thrive from change," Zanowski said. "Entrepreneurship is an umbrella word, and underneath that umbrella is this idea of a healthy attitude about solving problems, a healthy attitude about change, about constantly reinventing and seeking new approaches."

When researching options for curriculum to outfit Kenston's sparkling new STEAM lab, officials considered multiple programs, but a visit to Pitsco labs in North Carolina cemented a decision to go with the longtime STEM education company.

"They set us loose in classrooms with eighth graders and seventh graders and fourth and third graders, and they let us ask the kids, 'Well, tell me what you're doing.' The kids were explaining the relevance of why they had to learn about torque and ratios," Zanowski said. "It felt like play but also established the groundwork for the academic learning that should take place and the relevance. And the kids were hungry to learn, and their teacher was floating around and was more like a coach and a facilitator."

With age-appropriate STEM Units for Grades K-2, cross-curricular Missions for Grades 3-6, STEM Expeditions® for Grades 7-9, and innovative

(continued page 28)

Funding Opportunities

All aboard the STEM Entrepreneurship train

Pat Forbes
Education Liaison | patforbes@pitsco.com

The streamliner that is education has left the station loaded with a shifting and changing variety of cargo, and teachers need to stay abreast of the challenges. Families are expecting their districts to be in the forefront of the latest technology and expertise so their children can utilize innovative educational discoveries to prepare for the future.

In anticipation of these needs created by advances in science and engineering, **Pitsco**, in conjunction with a consortium of leading educators including the **University of Iowa**, **zSpace**, and **Startup Genius**, seeks to provide educators with the opportunity to reshape learning. Armed with the knowledge that professional development is fundamental to teacher support in an ever-changing landscape, this consortium has developed a program through which teachers can become certified in STEM entrepreneurship.

Today's path to assimilating new techniques for the latest educational tools is fraught with time restraints or lack of accessibility. The **STEM Entrepreneurship** program provides time and credit for efforts expended, in addition to obtained expertise. This road to enablement enhances teaching skills and provides a valuable awareness of the world on the horizon. The occasion might arise that funds are lacking to provide Pitsco's STEM Entrepreneurship program, so a search of grants – both private and federal – is a good place to start. An example of government assistance could be:

- **Improving Teacher Quality State Grants**, which seek to increase student achievement by improving teacher and principal quality. (www2.ed.gov/programs/teacherqual/index.html)

Other possible sources of grants for additional development of tech expertise could include:

- **The Blandin Foundation**, which supports programs focused on community success and entrepreneurship. (blandinfoundation.org/programs/expanding-opportunity/grants/about-grants/)
- **The Lumpkin Family Foundation**, with a mission of supporting long-lasting improvements in education. (www.lumpkinfoundation.org/HOWtoapply/Eligibility.aspx)
- **The Kauffman Foundation**, as they are enamored with entrepreneurship programs. (www.kauffman.org/grants)
- **The AT&T Foundation** has been an ardent supporter of education, and improvement has been a major focus. Involvement in the STEM Entrepreneurship program would be a sound investment of their largesse. (giving.att.com/Account/login.aspx)
- **Chevron** gives priority to programs that encourage creative STEM programs. (www.chevron.com)
- The **Toyota grants** are dedicated to improving the teaching of science, technology, engineering, and mathematics. (www.toyota.com/usa/community/articles/community_grants_foundation.html)
- **The PGE Foundation** supports equipping communities with the technology to improve their educational facilities to help students obtain the skills to compete in the coming world. (www.pgefoundation.org)
- **The National Council of Teachers of Mathematics**, which makes grants up to $8,000 available for instructors. (www.nctm.org/Grants/) P

25 GRANT APPLICATION DEADLINES

September

22 Verizon Foundation
A major foundation priority is STEM education for K-12 youth.
www.verizon.com/about/responsibility/giving-and-grants

25 Northrop Grumman Foundation
This program heavily supports science, technology, engineering, and mathematics (STEM) for students and teachers.
www.northropgrumman.com/CorporateResponsibility/Corporate-Citizenship/Philanthropy/Pages/Foundation.aspx

30 Captain Planet Foundation
Projects must be performed by youth and provide hands-on environmental stewardship opportunities for them.
www.captainplanetfoundation.org/apply-for-grants/

October

1 Toshiba America Foundation
Program fosters encouragement of science and mathematics for Grades K-5.
www.toshiba.com/taf/k5_grants.jsp

31 CVS Health Foundation
Supports education and awareness programs that are helping students on their path to better health.
www.cvshealth.com/social-responsibility/our-giving/foundation-giving

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

Funding STEM fun

Virginia PE teacher lands grants for STEM in the Gym™ event

A brief demonstration and some help with a grant led to what teacher Nick Jensen calls the "most successful large-scale event I have ever done."

Jensen, the physical education instructor at Three Oaks Elementary in Virginia Beach, VA, saw a demonstration of Pitsco's STEM in the Gym™ program at the James Madison University (JMU) Health and Physical Activity Institute in the summer of 2016. STEM in the Gym, the 2016 GESS Education award winner for Best Product to Promote Health and Fitness in the Classroom, is geared toward elementary grades and uses simple machines to connect fitness, kinesthetic learning, and STEM concepts.

Intrigued by the program, Jensen purchased the *STEM in the Gym – Simple Machines Teacher's Guide* and reached out to Pitsco for detailed information about the program to complete an application for a grant from the Virginia Beach Education Foundation. "Pitsco was wonderful in helping me fill out this application," recalled Jensen, who after securing the funding combined it with a PTA grant from the school to purchase the STEM in the Gym – Simple Machines Package.

AN EVENT TO REMEMBER

Next, Jensen set up the STEM event to rival all STEM events. "It took place over a month ago, and staff, students, and parents still talk about it," he said. The event combined Pitsco's STEM in the Gym program with Connect a Million Minds' STEM in Sports program to create 15 unique stations where students could apply STEM concepts to real-world physical activities.

Jensen spent the week prior to the event familiarizing students in Grades 1-5 with the various STEM concepts used at the stations, and on the big day, each grade had 45 minutes to participate in the stations of their choice, including Wheels & Axles, Inclined Plane, Pulleys, Screw Hatch, Wedges, and Levers.

EXCITEMENT LEADS TO HANDS-ON LEARNING, SHARING

The STEM in the Gym event was a huge success in more ways than one. "The students had an absolutely amazing time," said Jensen. "They came in excited and were eager to try each station out for themselves."

(continued page 28)

Fund your own STEM in the Gym fun

Nick Jensen's "STEM in the Gym" day took quite a bit of planning and several helpers and volunteers. Your STEM in the Gym can be any size you want, however. For more information on Pitsco's STEM in the Gym products, visit Pitsco.com.

For help with funding a STEM in the Gym program, check out the following foundations and grants:

- The Lumpkin Family Foundation
- IDS Foundation
- Adidas Group
- Finish Line Youth Foundation

For more information on education grants, visit Pitsco's Grants page at www.pitsco.com/About/Grants.

Submit your Winning Suggestion to Editor Tom Farmer at tfarmer@pitsco.com and you could win a $50 gift certificate and a T-shirt!

By Tom Farmer, Editor • tfarmer@pitsco.com

Parlaying the Pitsco experience into community-based PBL activities

Editor's Note: *Teacher Jason Wade of Ayden, NC, recently shared examples of how he challenges students to build upon what they learn in Pitsco Modules. For his contribution, Wade will receive a $50 Pitsco prize and a T-shirt.*

AYDEN, NC – The conditions were ripe for the perfect middle school academic storm:

- Eighth graders with two years' experience in a Pitsco Modules lab, ready for another challenge
- A teacher open to trying something totally different – a course centered on project-based learning
- A school and a community with plenty of problem-solving opportunities
- Module equipment and materials for prototyping and myriad possibilities

The storm's aftermath in this small eastern North Carolina town? Students enjoyed unprecedented learning experiences that left them poised to achieve even more in high school and beyond.

Pitsco Modules lab facilitator Jason Wade played the role of Mother Nature two years ago in coming up with this new and challenging STEM course for eighth graders at Ayden Middle School, but he's quick to pass along credit to students, administrators, and community members when talking about the practical projects his students have spearheaded.

When he started the year-long course, Wade envisioned project-based learning activities for eighth graders that were more open ended than the Modules that had whetted their appetites for hands-on learning as sixth and seventh graders. He felt they would be ready for more – and they were!

The students were familiar with the equipment and materials at the Pitsco workstations where they had learned about sustainability, horticulture, agriculture, innovation, and other engaging topics, all in the context of careers they might one day pursue. Naturally, they were curious and ready to spring from this knowledge base to more challenging problem-solving and critical-thinking activities posed by Wade.

One such idea stemmed from an informal student research project at the school cafeteria that revealed food items and milk valued at $1,400 annually were being thrown away during breakfast and lunch. Instead of discarding this food, students reasoned, perhaps they could use it in a compost bin that would provide fertilizer for a school garden and a couple of the Modules.

Students built the compost bin, which led to construction of a greenhouse where seedlings were grown and used as part of the *Horticulture* Module. Concepts

From start to finish, eighth graders at Ayden Middle School took project-based learning to new heights by brainstorming a water-catching system, an aquaponics system, and a greenhouse that they built for use at the school in Ayden, NC.

learned in the *Sustainable Agriculture* Module were taken a step further with the design and creation of a gravity-fed rain catcher/watering system for plants. An aquaponics system for growing food and plants was also designed by one of the student teams.

Before these projects could be completed, though, students had to raise money to pay for materials. GoFundMe pages brought in a few dollars, but Wade resorted to an idea he had learned during summer professional development at nearby East Carolina University – pull together potential investors within the community and have students pitch their ideas in a *Shark Tank*-type setting. "We got about $500 for the projects, and then we went to a town council meeting and got another $500," Wade said of the funding that was more than enough to cover costs.

Not all the projects were completed that first year, so students in Fall 2016 picked up where their predecessors had left off and later worked on new ideas for helping the community and school. Another project this past school year entailed a system for diverting rainwater away from a door where it would seep into the STEM lab. The *Ideas & Innovations* Module provided students the TETRIX® building system for creating prototypes of possible solutions they had brainstormed.

Wade says these problem-solving exercises are a natural next step. "I think that being able to do these projects with kind of unlimited space and more time, they can think more outside the box and apply what they're learning in the Modules and put it to work in building these projects."

More importantly, the students are developing skills they can use the rest of their lives. "I told students at the beginning of the year that I wanted to get them out of their comfort zone as far as being able to present and talk to people," Wade said. "Getting them in front of people is going to prepare them for anything they do in high school or down the road. . . . They'll be ready for bigger and better challenges."

Call it the calm after the storm.

By Tom Farmer, Editor • tfarmer@pitsco.com

Real student ownership of learning and one way to get there

DOTHAN, AL – Getting student buy-in is sometimes the most difficult first step for a teacher. Without it, success is unlikely. With it, the sky's the limit. Alvin Wiggins, Pitsco Education STEM lab facilitator at a Title I middle school in Dothan, AL, explains his strategy for getting students to own their education.

"When you deal with our students, you learn that sometimes it's not about being aggressive or so confrontational because when you look at their demographics and their background, that's one thing that's not tolerated in the community is confrontation because confrontation begets confrontation. So, I took a different approach. I told my eighth graders, 'Look, you guys are closer to being adults than you are kids. I'm going to treat you accordingly. If at any point in time you feel as if this is not what you want to do, it's no problem. Raise your hand and say, 'Hey, Mr. Wiggins. This isn't for me.' And what we'll do is we'll get you an alternate curriculum, something that you can do, and you can just remove yourself from the program, and you won't be penalized because this is not what you want to do.'

"You will be surprised how many I thought would have walked out that didn't walk out. And now, they had ownership. This is their lab. They made a choice. Instead of me saying, 'OK, be quiet, sit down, and blah blah blah,' now when they might not have good days, it's one of those things where I can say, 'Hey, sir, listen. Hey, ma'am, listen. I told you from the beginning. Now you're not being fair to me. OK?'"

As for the handful of students who have taken him up on the offer to work outside the STEM lab, "I've had students that decided that it wasn't for them, and they would hear the chatter from the other students, and they would come back, 'Mr. Wiggins, can I come down today and check out what's going on?' 'No problem, come in.' And now they're more receptive because it's their choice, and I'm not forcing it on them."

Submit your Winning Suggestion to Editor Tom Farmer at tfarmer@pitsco.com and you could win a $50 gift certificate and a T-shirt!

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

CO_2-powered learning

Dragsters give students a fun, engaging entry point into math and science

Editor's Note: *Nancy Pehl, math teacher at Terry High School in Terry, Montana, shared this great story about how she and a couple peers started the CO_2 dragster activity to add more meaning to student learning. For her contribution, Pehl will receive a $50 Pitsco prize and a T-shirt. Submit your Winning Suggestions to Editor Tom Farmer, tfarmer@pitsco.com.*

In September 2016, Terry (MT) Public Schools created a STEM committee in a concerted effort to make STEM a daily part of students' lives, and Nancy Pehl, math teacher for Terry High School, jumped at the chance to help. "I joined the committee to give the students a fun reason to learn math and science," she explained. "I want them to see that the ideas we teach are important and apply to the real world.

Pehl, along with the other two committee members – a first-grade teacher and a high school science teacher – decided to concentrate their efforts on the district's sixth through eighth graders. And to grab their attention, the group settled on Pitsco CO_2 dragsters. "These are the years where they decide if they like academics and are going to work hard at their studies," said Pehl. "We wanted to complete a very hands-on project and felt that building and testing the dragsters would accomplish this."

The committee's intuition was right on target. While waiting for the dragsters to arrive, the students learned about forces, laws of motion, friction, and speed and acceleration. They also researched occupations within the automobile industry.

When the kits arrived, the students were ready to get started. Although most of them had little to no experience with building models, using tools such as sandpaper, chisels, and small saws, and racing with CO_2-powered cars, Pehl said they tackled the task with enthusiasm and little fear. "We only had to glue one car back together!"

After the cars were built, preliminary races were held in anticipation of the finale – a race-off during halftime of a basketball game. "The audience loved it!" reported Pehl. "The fourth and fifth graders were especially enthusiastic at the finals."

The top three racers won "chamber bucks," but it sounds like Terry Public Schools is the real winner, with a new batch of incoming sixth graders already excited to learn more about STEM and how it applies to the world around them.

Pitsco updating current version of **Modules to HTML5**

Older Modules will be affected when web browsers no longer support *Flash*

In July 2017, Adobe announced plans to officially retire *Flash* but pledged support through the end of 2020. However, several web browsers (Chrome, Firefox, Internet Explorer, Edge, and Safari) will remove support before 2020.

Pitsco Education announced earlier this year that after 25 years it is retiring Modules, which operate on *Flash*. Despite having already announced the end of life for Modules, Pitsco will support customers as best as possible. In anticipation of Adobe's announcement, Pitsco has been working to convert the current version of Modules to the new open standards of HTML5.

If you plan to continue using your Module lab beyond the end of support for *Flash*, contact your Pitsco sales representative to ensure that your Modules are current.

Following are a few commonly asked questions and answers regarding changes with Pitsco Modules. If you have a question that isn't addressed here, call us at 800-828-5787, chat with us at www.pitsco.com, or visit our Support page at www.pitsco.com/support.

Will the Modules I already have still work after *Flash* is officially retired?

If you are running the most current version of Pitsco Modules, the Modules will be updated to HTML5 at no extra charge to you. If your Modules are not the current version and you choose not to upgrade before the end of 2017, your Modules could stop working when *Flash* is retired.

Why is Pitsco transitioning from Modules?

We recognize that 25 years brings a lot of change in our society, school dynamics, and student needs. To that end, we set about thinking about the next revolution in STEM education, and from that we launched STEM Expeditions™.

Can I still buy Modules in 2017?

Yes. Modules are still available this year if you'd like to update or add Modules to extend the life of your lab.

How long can I buy consumables for Modules I already have?

We are a company founded on quality customer service. We will do our very best to ensure you have the materials you need to use in your lab if it's in operation. While we might not have the exact consumable kits to which you are accustomed, we will have a good alternative that can serve your needs.

Will the Modules I already have continue to be updated?

Modules will not be updated after 2017.

Can I still call and get customer service for my Modules?

Absolutely. Our customer support team is standing by to answer your questions for as long as your Modules lab is in operation.

Is anything replacing Modules?

Yes – STEM Expeditions. Different from Modules in a few key ways, Expeditions are for Grades 7-9 and are rooted in the engineering design process and the 10 best practices for teaching math and science. We are not aiming at a title-by-title replacement, and instead are focusing on developing Expeditions that meet the flexible implementation and integrated STEM needs of schools today. P

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

Status update: In a relationship

Do you remember the year you signed up for MySpace? Facebook? Twitter? It probably wasn't a monumental day. But, with your click, you officially joined a digital community and became part of a movement that was, and is, certainly monumental.

As of June 2017, there are two **billion** users on Facebook. Yes, two billion! That is mind boggling. Our world is more connected than ever.

SPEAKING OF WHICH . . .

Are we friends? Do we follow each other and like one another? Pitsco has always been a company rooted in relationships, so it's important to us that we continue to connect with you. We have many ways you can reach us. Even more importantly, we provide platforms through which you can gain new information and the chance to interact with like-minded colleagues. We hope to give you some "STEMspiration" and entertainment every now and then too. Plus, our social accounts are one of the first places you'll get company news as well as access to contests and freebies.

You might have noticed a slight change in our tone and content in recent months on social media accounts. We hope you're enjoying the refresh. We're working to give you more actionable information and a few more smiles. We'd also like to officially invite (or re-invite) you to join the conversation. Comment on photos and posts, share tweets and images that strike you, or alert us to articles and ideas that you think we should see.

And, our favorite part, tag us in your classroom photos, please. (Remember that you must have written permission from legal guardians/parents to post photos of students in social media posts.) We love to see your students showcasing the #handsonmindson approach. We generally share your photos too, which is fun for students to see themselves featured as a brand.

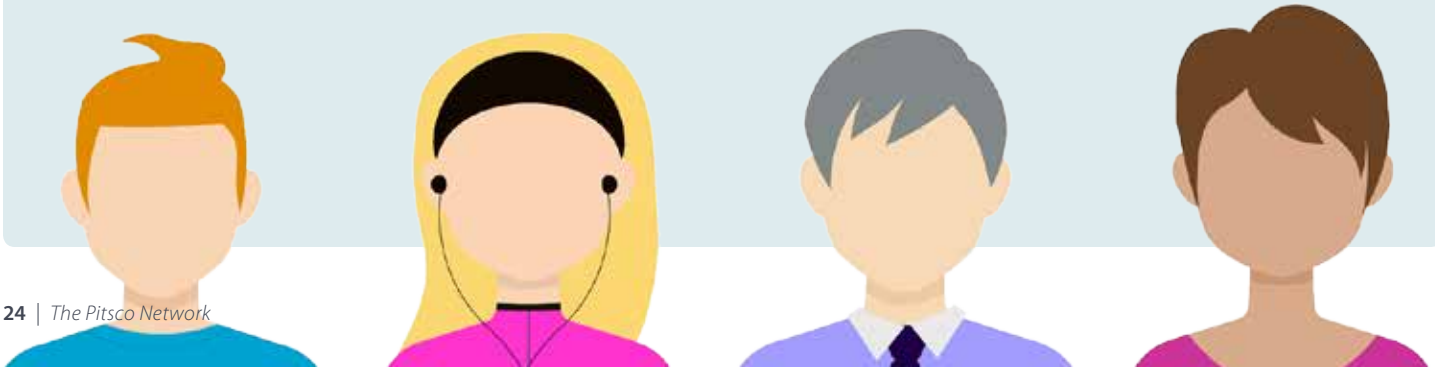
Ultimately, our social media presence is an extension of our desire to help you and your students succeed through hands-on application of STEM/STREAM concepts. So, please let us know if there's anything we can do to improve your social experience.

We're on Facebook, Twitter, Instagram, Pinterest, YouTube, and LinkedIn. Find us. Follow us. Let's be social.

SOCIAL MEDIA TIPS FOR TEACHERS

Take it to class! Here are the top five tips for using social media in your work this school year!

1. **Find a Twitter chat or podcast** that interests you. Join or listen regularly. Not sure where to start? We suggest @KSEDChat/#KSEdChat or #EdChat on Twitter.
2. **Use Pinterest for brainstorming** and initial, informal research for student projects. This can be via a class board or individual student boards.
3. **Partner with another classroom** in a different part of the state, country, or world. Use Skype, Facebook Live, or Instagram Stories to connect with each other. Interview to learn more about their area, school, and so forth. Or, collaborate on a project together virtually at the same time or to share results.
4. **Have students follow specific STEM-related subjects**, concepts, and accounts on a platform of their choice. Encourage discussion of trending topics or articles at a dedicated time in class (for example: a class opener or afternoon brain break).
5. **Be an example!** Help students see and experience digital citizenship through your social interactions. Explain how social media is a tool, a resource, and a liability. Students are watching you and soaking up what you're sharing; model how to lead, contribute, and enjoy social platforms.



Treat People Right – lessons learned at Pitsco

Editor's Note: *Pitsco advocate, TAG member, and leading STEM educator Aaron Maurer spent a couple days on the Pitsco campus in July and left with a renewed vision, passion, and inspiration. Read what he said on his blog about Pitsco's impact on him and his approach to STEM education.*

Aaron Maurer
Pitsco Education TAG Member
Bettendorf Middle School, Bettendorf, IA

A simple concept. When I had a chance to visit PITSCO Education I did not realize the treat I was in for. In the town of Pittsburg, Kansas, there is a company that understands culture. They understand what it takes to find people who are proud of their work. They understand the importance of creating a sense of family in the workplace. This was clear the minute I checked into the hotel to have a little gift box from PITSCO welcoming me on my trip.

When I finally arrived on the campus I was met by Nancy Peterson. She is someone who I admire so much over my years of knowing her. She has provided me countless advice, ideas, and book suggestions. I was given a tour by the president, Lisa Paterni. I had a chance to meet the owner Harvey Dean. Each and every single person I came across treated me like I was one of their own. Nobody was too good to speak to me. Nobody is too good to not do any of the work in any of the buildings when needed. I had the chance to hang out with VP Matt Frankenbery for several hours to help me understand my vision, STEM education, and how to fit all the pieces together. I could go on and on with each person I met, but in every single case I was blown away by their treatment of me and their interest in me as a person.

This matters. It matters so much that I started to think about why we always gloss over this element when we try to figure out how to improve schools.

I kept thinking over and over again how many times we act like we are better than others? Maybe not intentionally, but it happens. I felt like I belonged. I was able to walk through all of their buildings. I walked from corporate to packaging, to R&D, to where they print materials, to the marketing wing. I spoke to the IT department and everyone else in between. In every single case, the people were genuine. The people cared about their work. They were proud and wanted me to know. (Check out the rest of Aaron's blog post at coffeeforthebrain.com/treat-people-right-2/.)

And be sure to visit **blog.pitsco.com** to see the new Pitsco Blog design and to read more great posts.

"Your STEM resource just got better!" – By Jessica Born
Pitsco's Digital Marketing Manager Jessica Born introduces the Pitsco Blog's new look and feel. We hope you're as excited about the change as we are!

"Pitsco legend's advice for your dragster race day" – By PJ Graham
Get great dragster advice from a great man – and a Pitsco CO_2 dragster legend – Steve Snider. Here, PJ Graham shares some of Snider's gems from the short time he was with us.

"Let me tell you 'bout my best friend – Pitsco products style" – By Nevin P. Jones
Ever wondered if there are other Pitsco products that might enhance the ones you already have or are planning to purchase? In this blog post, Nevin Jones breaks down the relationships of some of our more popular products.

"Writing in the STEM lab" – By Debra Rouse, Pitsco TAG member, North Cedar Community School District
If you're looking for ways to integrate language arts in your STEM lab, Pitsco TAG member Debra Rouse has you covered.

"On-site visit: Pittsburg HS math classroom" – By Terry Carter
Curriculum Specialist Terry Carter visited Pittsburg (KS) High School to see our Math Expeditions in action. Read his observations and learn how you can apply similar methods to your classroom.

ONLY ONLINE:
Visit blog.pitsco.com to read more!

By PJ Graham, Web Content Specialist • pgraham@pitsco.com

Robotics team makes push for varsity status

We often associate high school varsity teams with athletics, but today academics-based varsity activities are gaining a strong foothold. In 2012, Minnesota became the first state to recognize both *FIRST*® Tech Challenge and *FIRST* Robotics Challenge as varsity activities.

For *FIRST* participants, this was a big development. Since then, a handful of other states have added *FIRST* Robotics as one of their approved varsity activities. If one *FIRST* Tech Challenge team has a say in the matter, North Carolina will soon be added to the list. This past year, Team 731 Wannabee Strange from Greensboro, NC, started the process to persuade its state to apply varsity status to FTC and FRC teams.

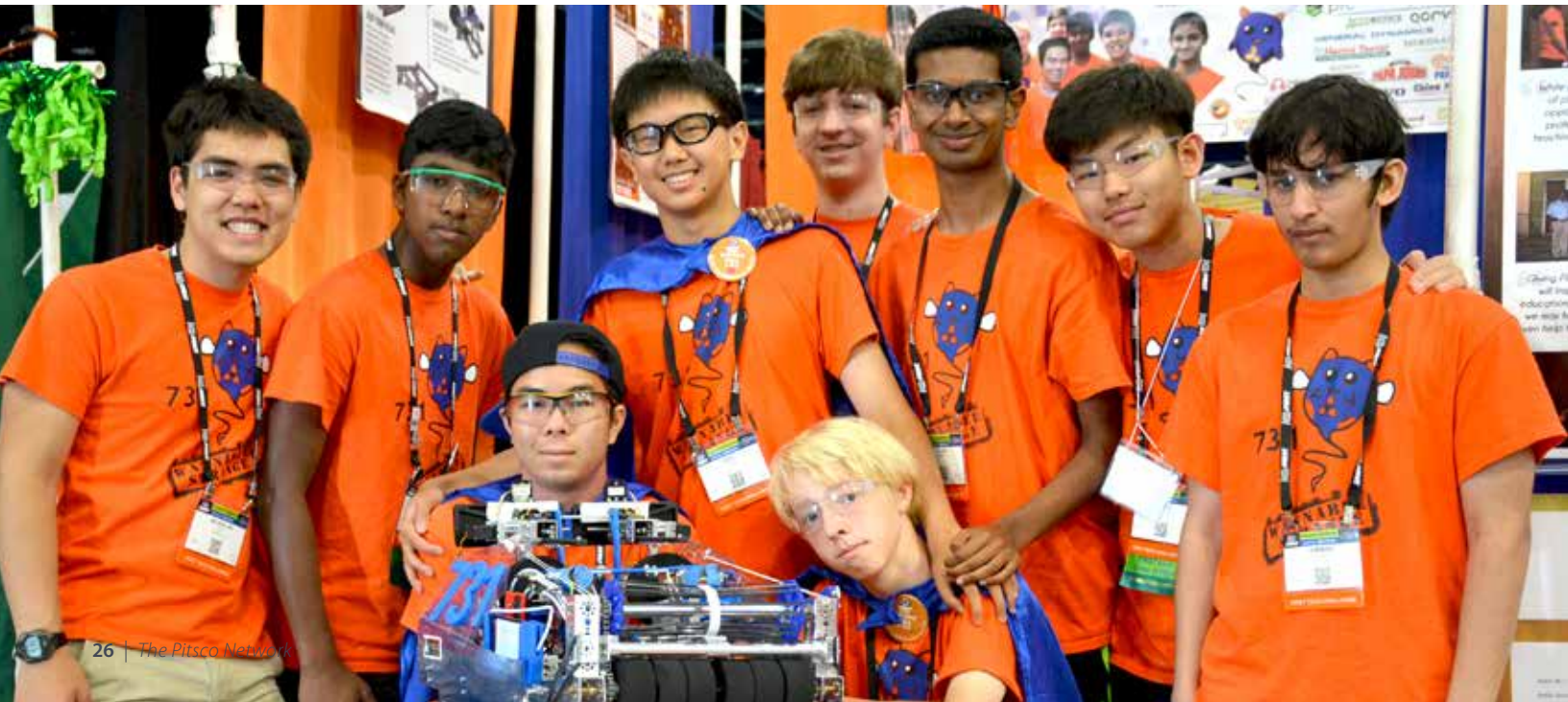
This team is up for the challenge. At the 2017 *FIRST* Tech Challenge Championships in Houston, TX, the team placed eighth in its division and 13th overall out of 128 teams. Their team's robot, made of TETRIX® MAX, 3-D printed, and other parts, specialized in speed and maneuverability and used a holonomic drive with field-oriented drive to achieve that. The team, made up of all sophomores and juniors, also focused on shooting the game's particles with consistency and accuracy and dealing with the beacons, leaving alliance partner teams to focus on a device for lifting the large cap ball on the center vortex. Anyone who saw their robot speeding around the competition field with amazing command and shooting speed and accuracy knew this was a well-designed robot.

So why would a team that has already experienced such success be interested in state varsity recognition? There are two very good reasons for putting in this effort.

> To further their goal, the team has created a research paper with evidence to support its petition and is in the process of creating a short presentation to help persuade various committees and individuals.

"Varsity sports, athletics, have booster clubs where they can get their funds from. The reasons we want to do this are because making it a varsity sport kind of inspires kids to invest more in their education – and helps them to get more allocated funds for their club," said sophomore Jayraj Jonnalagadda, the team's spokesman for this initiative. "The funding is very important for the materials they can get and what they need to access for each match."

Team 731 from Greensboro, NC, is making a strong case for varsity activity status for robotics teams after a strong showing at the 2017 FIRST *Tech Challenge Championships in Houston, TX.*



Most teams based as a school club have a limited budget because clubs don't receive as much financial support as sports or other school-funded activities.

Team 731 has already created a letter of appeal for their board of education, drafted a code of conduct, contacted *FIRST*, and sought the support of their school board chairman and school principal. In March, Jayraj and teammate Aarushi Ahuja presented their concept to the county's board of education.

To further their goal, the team has created a research paper with evidence to support its petition and is in the process of creating a short presentation to help persuade various committees and individuals. Team members have even written an editorial for their local newspaper. Even with all that, they know they are still at the beginning of their journey and that this might be a case of helping future teams more than helping themselves.

"We don't want to rush it, and it's going to take some time and we just started it this year," Jayraj said. "Hopefully, we can get this done in the next few years, and it's a project that we can hand down to others."

They still have to make more contacts, create a joint committee, and prepare for other steps they have not yet reached. Currently, the team is at a decision-making point before they can continue.

"Right now, we're kind of at a crossroads because our varsity athletics and activities departments in the state of North Carolina are structured differently from other states, where it's split between varsity athletics and varsity activities." Jayraj said. "We have to decide which path we want to pursue because each one has benefits and drawbacks, like the amount of funding or the restrictions put on the club. The team has to decide how we want to go about that."

If you or another *FIRST* team you know wants to lead the charge in your state to make robotics a varsity activity, resources are available. Check out the *FIRST* website, where there is an entire section of resources to help you on the mission.

PRIZM® Coding Essentials Curriculum

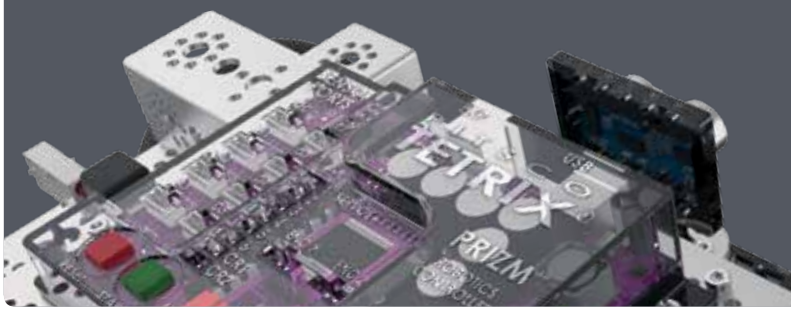
Intended for use with the TETRIX® MAX Programmable or Dual-Control Robotics Sets, the TETRIX PRIZM® Coding Essentials Curriculum Pack enables teachers to deliver engaging robotics lessons that challenge students to take their engineering and coding knowledge to the next level.

Designed to build student confidence and generate enthusiasm for the fields of programming, engineering, and robotics, the curriculum delivers more than 60 hours of standards-based, project-based activities and related assessment materials.

Curriculum features:

- More than five activities and six open-ended challenges
- Extensive coverage of programming concepts using the TETRIX PRIZM Robotics Controller and *Arduino Software* (*IDE*)
- Application of STEM knowledge and 21st-century skills
- Progressive series of activities that culminate with open-ended challenges
- High school correlations to the Computer Science Teachers Association, Next Generation Science, Common Core Math and Language Arts, Skills for the 21st Century, and ITEEA standards
- Resources such as building instructions, assessment tools, and glossary along with teacher and student procedure outlines

The curriculum is delivered as a spiral-bound notebook. To order or to learn more, go to https://www.tetrixrobotics.com/TETRIX-PRIZM-Coding-Essentials-Curriculum-Pack.



Funding STEM fun *(continued from page 19)*

But learning was evident as well. "I had first graders explaining to me how levers and fulcrums worked and fifth graders who figured out how to design airplanes that could fly 30 feet straight. It was a very enlightening day for everyone."

So enlightening, in fact, that Jensen wants to share the experience with others. "This event was absolutely fantastic," he said, "and I am sharing it with my colleagues this summer at our summer professional learning class, as it is something almost everyone can replicate. . . . When parents leave saying, 'Man, we didn't have anything like this when I was a kid,' you know you did something amazing."

Spreading STEM in the Gym

Jensen is so thrilled with the success of his STEM in the Gym day, he wants to share it with as many teachers as possible. His Summer 2017 professional learning classes brought STEM in the Gym to other Virginia Beach City Public Schools teachers, but he believes almost every school could benefit from the program. If you have questions for Jensen or would like some advice on how to get started, he is available via email (njjensen@vbschools.com) or on Twitter (@3OaksPE) and is more than happy to help!

Equipped in mind and matter *(continued from page 17)*

entrepreneurial programs for Grades 10-12, Pitsco designed a comprehensive and cohesive program rooted in collaborative, career-based experiences. Teachers received extensive professional development that served to connect the aims of the curriculum with the school's mission and core values.

"When students have graduated from college and gone on to graduate schools or gone into the work world, wherever their path leads them, we want them to be equipped in mind and matter – their attitudes, their spirit, and their enjoyment of change and adaptation," Zanowski said. "We want them to have the tools to be successful learners and re-learners. We don't want them to think, 'For me to have a really exciting, meaningful career, I need to leave Southside Virginia.' They can come home and build it here."

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!

October

4-7	National Indian Education Association Convention, Orlando, FL
8-10	International STEM Education Association Expo, Branson, MO
11-13	Texas Charter Schools Conference, Dallas, TX
22-24	Southern Association of Independent Schools Annual Conference, Atlanta, GA
24-25	Bridging the Gap STEM Education Conference, Raleigh, NC

November

9-11	Conference for the Advancement of Science Teaching, Houston, TX

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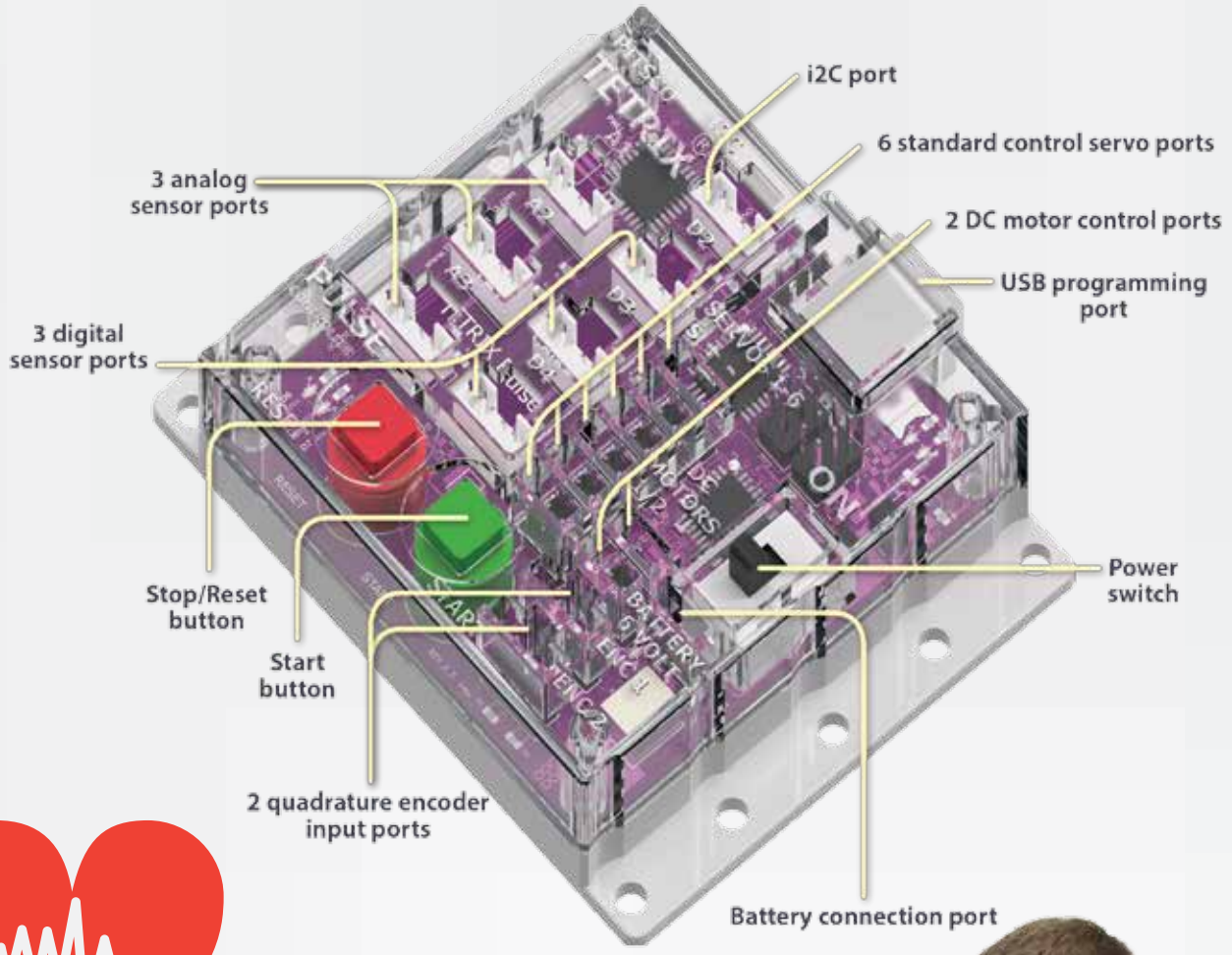

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