TETRIX® Robotics Anywhere

Why Hands-On Learning Is Important

Pitsco has a clear mission statement: Leading education that positively affects learners. That is a statement we truly believe in and what motivates our employees every day. The company was started in 1971 by three teachers in a garage; it's truly an American success story. From that small beginning, we have grown into a company that serves three million students worldwide every year.

Our founder and CEO, Harvey Dean, was the student who needed to be actively engaged in his learning. He then became the teacher who enabled his students to create, tinker, build, and experience the content rather than memorize it. This is the core reason why hands-on education has always been our focus. All Pitsco STEM solutions are hands on. STEM is content in motion. It is creativity, critical thinking, communication, grit, and persistence, fueled by daring to fail in order to succeed. For nearly 50 years, Pitsco has seen the effectiveness of hands-on learning and the engagement it brings to students. Even though times are changing, the power of hands-on learning has not diminished.

As of August 2020, the COVID-19 pandemic has changed many aspects of "normal" life. Education had to pivot from an in-school setting to a remote online setting, which exposed gaps in student learning opportunities. A spotlight has been shown on educational inequity, access to educational technology and Internet is an issue, and the list goes on. There have been a multitude of discussions and proposed plans to address the upcoming school year, but a three-tiered approach has emerged that is almost universally being implemented in all states.

- Face-to-Face Instruction
  - Students and teachers are at the physical school building and respect social distancing guidelines.
- Blended Instruction
  - This is a combination of both face-to-face and remote online instruction.
- Remote Online Instruction
  - All instruction is provided via an online platform. The student and teacher are in different locations.

There are no doubt challenges associated with each of these approaches, but hands-on learning can play a major role in solving these challenges. Pitsco knows the power of hands-on learning, but research also supports this method. Studies have found that students who do not experience hands-on learning are 1.5 times more likely to fail a course than students who experienced hands-on learning opportunities. Hands-on education gives students choices by providing the freedom and creativity to solve problems in a manner they have designed and choose to implement. Hands-on learning increases students' responsibility to learn by having them engage in an authentic experience rather than only listen to a teacher lecture about a concept. Hands-on learning better engages the brain. When students are involved with tactile or kinesthetic learning, both hemispheres are required to process the information. As a result, students overwhelmingly recall a hands-on learning experience versus a traditional teacher-delivered lecture. When the hands-on activity is authentic, it also opens the doors to careers associated to that activity. For example, in a bridge building activity, students are not just introduced to the concepts an engineer would be responsible for but also act as the environmental scientist who performs the impact study of the bridge.

Hands-on experiences create student-driven learners who become self-directed workers. A hands-on activity is, by design, student centric and not teacher directed. In that environment, the teacher becomes a facilitator of learning and supports and guides students as they strive to complete the task. Employers increasingly want employees who demonstrate initiative and skill when communicating, working collaboratively, and creatively solving unexpected problems. The ownership students take over their projects in school is the foundation for the ownership they will take over their projects in their careers.

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Ideas for At-School, Blended, and Remote Learning Using TETRIX®

Digitally Delivered Curriculum

We want to help you get back to your classroom, your kitchen table, your home office, your co-op, or wherever you'll teach and learn from for now. For a limited time frame, Pitsco would like to provide the TETRIX® curriculum you previously purchased in a downloadable digital format. Please contact our Order Support team at 800-835-0686 to validate your past purchase and receive access to a downloadable digital version of your teacher and student guides.

Code at Home with Video Demo by Teacher

Pitsco.com/c/code-at-home.pdf

Students who are learning to code robots using TETRIX PRIZM® or PULSE™ have the option to write their code at home in either the Arduino Software (IDE) (TETRIX MAX or PRIME) or Ardublockly (TETRIX PRIME) on their computers.

Code Using the Arduino Web Editor

Pitsco.com/c/code-using-web-editor.pdf

The Arduino Web Editor enables anyone to create Arduino sketches and save them to the cloud without having to download software to a device. A free Arduino account must be created before access to the web-based platform is granted. The web editor can be accessed through most web browsers (Chrome is recommended) and works on computers, Chromebooks, and most tablets.

Blended Coding and Robotics

Pitsco.com/c/blended-coding-robotics.pdf

Have students in a hybrid school environment complete the on-screen coding of their robots while they are learning remotely. They can explore coding concepts, write their code, and verify it for syntax errors. Then, when they return to school, they can complete the hands-on portion of the lesson by building robots, uploading their code, testing, and modifying their code as needed.

Sanitizing and Cleaning TETRIX Sets

Pitsco.com/sanitation-guide

TETRIX robotics is a hands-on learning experience. Unfortunately, hands on means an increased risk of spreading germs as robots, kits, and components get passed between students. To minimize this risk, we recommend following the guidelines for cleaning and disinfecting your classroom, workstations, tools, and TETRIX components.

Key

Remote Learning
Students learn in an environment away from a traditional school building.

Blended Learning
Students spend some time learning at school and some time learning remotely.

At-School Learning
Students learn at school with modified procedures to increase safety.

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Blended Learning Scope and Sequence Documents

Robotics can be difficult to teach in a blended learning situation where students alternate between learning at school and learning remotely. In most situations, it isn't feasible to send TETRIX home with students. In these example scope and sequence documents, all hands-on TETRIX activities are done at school with alternate robotics activities completed remotely.

- TETRIX MAX R/C Builder's Guide
- TETRIX PRIZM Programming Guide
- TETRIX PRIME R/C Builder's Guide

TETRIX Individual Engineering Kits and Build Challenges

Pitsco.com/c/engineering-sets.pdf

TETRIX is much more than a robotics building system. It is an engineering system. By breaking TETRIX sets down to individual building sets without the electronic control elements, students can still engage in hands-on problem-solving as they solve engineering challenges and complete activities.

Creating 3-D Models of TETRIX Robots in a CAD Software

When it isn't feasible for students to build with TETRIX due to remote, blended, or in-class situations where sets can't be shared, consider having them learn to model TETRIX robots in a 3-D CAD software. Developing 3-D modeling skills is great for engineering and usually makes prototyping and building the actual robot go much smoother. After 3-D models are built, students can print out their parts lists and build the physical robot according to their designs.

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