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# K-12 Robotics Guide

2019 Edition

**Everything You Need to Know.  
Everyone You Need to Reach.**

- Overview of K-12 classroom robotics landscape
- Analysis of where robotics education is heading
- How to start using robotics in schools today
- Marketplace Update
- Best practices and case studies
- Resources & Websites
- Company profiles and resources
- **...And much more**

# About eSchool News Guides

We are excited to bring you the very first in a series of **eSchool News Guides**, which are full of resources, tips, trends, and insight from industry experts on a variety of topics that are essential to the classroom, school, and district.

This first guide, the **eSchool News K-12 Robotics Guide**, offers expert insight on why robotics is quickly becoming a cornerstone of classroom instruction. In the guide, we take a look at resources to make robotics instruction a bit more manageable. Plus, we're giving you robotics grants and funding tips, showing you how real teachers incorporate robotics into their classrooms, and linking you to robotics learning apps.

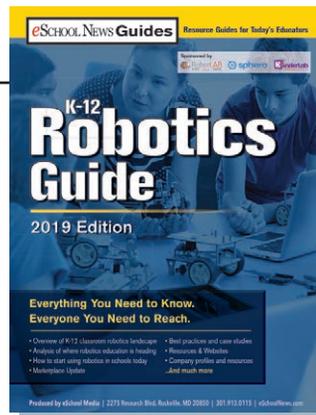
Have you dreamed of building a robotics education program in your school or district? In the **eSchool News K-12 Robotics Guide**, we feature a story outlining how one educator did just that. Do you want to introduce your students to robotics, but find yourself cash-strapped without available funding to finance that goal? We've compiled a list of robotics grants to help.

We also highlight examples of how real educators are teaching robotics in their classrooms, and we've included a story exploring the reasons why robotics education will give students skills they'll use throughout their lives.

You can find a complete list of robotics education partners and companies in the guide. Many of those companies offer free teaching resources to accompany their robotics kits, and they have teams dedicated to helping educators incorporate robotics into their instruction.

We'll release a new guide at the beginning of each month, and we'll feature content focused around each guide's topic throughout the month. Stay tuned for **eSchool News K-12 Guides** on STEM learning and makerspaces, physical and network safety, digital and mobile learning, online/blended learning, and more. Each guide also offers a comprehensive index of all the companies involved in that month's specific focus area.

We hope you'll share this **eSchool News K-12 Robotics Guide** with your colleagues and use it to learn a bit more about how every educator can fit robotics into their teaching.



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# Marketplace Update

## Three key trends in robotics education

Spending on K-12 robotics is expected to more than quadruple in the next four years. Here's why—along with key trends to watch.

### BY DENNIS PIERCE

Robots are hugely popular with kids. Want proof? Four of the 20 best-selling toys on Amazon during the 2018 holiday season were robots, robotics kits, or other electronic circuitry kits. So it's not surprising that K-12 educators would turn to robotics as a way to get students excited about science, technology, engineering, arts, and math (STEAM) education.

Worldwide, schools spent \$146.5 million on robotics products and curricula in 2018, and this figure is expected to grow annually by 28 percent through 2023, reaching \$640.5 million by that time. Some of the many companies that sell robotics kits to schools include RobotLAB, KinderLab, LEGO Education, Pitsco Education, Sphero, Ozobot, Modular Robotics, VEX Robotics, and BirdBrain Technologies.

### Reasons for this surge

Why is the K-12 robotics market exploding? Educators are finding that robotics is a great way to introduce STEAM skills and concepts to students of all ages.

For one thing, robotics helps bring STEAM concepts to life through engaging, hands-on learning opportunities. Students enjoy being creative, and building and programming their own robot to do simple tasks allows them to flex their creative muscles. Along the way, students are learning key concepts in math, physics, coding, and engineering, and they're seeing how these principles apply within real-world scenarios—so their learning is more likely to stick.

Another reason for the surge in robotics education is that robotics is a rapidly growing industry. Integrating robotics into the curriculum exposes students to practical skills that could lead to a promising career.

The research firm McKinsey & Co. predicts that automation will have far-reaching consequences on the global workforce, with about 50 percent of current work activities becoming automated by 2030. An article in *Forbes* says robots soon will become increasingly commonplace in homes, from robotic companions for the elderly to robots designed to feed, play with, and care for pets when their owners are gone.

As robots replace a growing number of workers, there will still be plenty of career opportunities for those who know how to design, develop, and program them.

But even if students have no interest in an engineering or coding career, robotics teaches them essential skills that are broadly applicable. Designing, building, and programming robots helps students learn logic, problem solving, perseverance, computational thinking, and a host of other skills that are invaluable regardless of what career path they choose.

At the Dwight-Englewood School in New Jersey, third through fifth graders use EV3 and WeDo robotics kits from LEGO Education in science classes, and sixth graders complete a full robotics unit in science using the EV3 kits.

"I want my students to dive deeply into how things work," says Technology

Director Trevor Shaw. "I think that's empowering for a lot of kids. Technology becomes something that they master and control rather than something they are dominated by, which is so often the case with kids and technology. Our goal is for kids to learn how to learn ... and to doggedly figure out the information they need to imagine something into existence. That's a really powerful experience for a student."

### Trends in robotics education

With tremendous growth in the marketplace, this is an exciting time for K-12 robotics. Here are three important developments in robotics education over the last few years.

#### 1. Robotics instruction is now reaching early learners.

Research suggests that early exposure to STEAM learning is a key factor in whether students choose a STEAM-based career later in life. What's more, young children are innately curious; with their propensity to take things apart and reassemble them to see how they work, they make natural scientists and engineers.

With these ideas in mind, several companies have come out with age-appropriate robotics kits that target students in the very earliest years of their education.

For instance, KinderLab Robotics' KIBO is a screen-free robotics kit that enables children ages 4-7 to design, create, decorate, and bring their own robot to life. Edison is a programmable

robot designed to teach coding and computational thinking skills to kids as young as four as well. And Eduscape's Photon is a robot whose five visual apps allow even non-readers to start learning to code at age five.

"Now more than ever, it's critical that we provide kids with an early on-ramp to STEAM learning—even earlier than we may have once thought—to prepare the workforce of tomorrow,"

dent's hands can pricey. Introducing students to robotics in a more easily scalable manner, the CoderZ platform gives students a cost-effective way to learn about coding and robotics without needing expensive equipment. Students use a game-like interface to program virtual robots as they aim to solve various challenges.

Because the program is offered online, students have access from any internet-

change this by engaging girls and other underrepresented populations in robotics.

During the 2019 International Society for Technology in Education (ISTE) conference earlier this year, Pitsco Education and SmartGurlz announced the launch of Smart Buddies, programmable robotic dolls (both male and female) that are accompanied by a curriculum focusing on increasing diversity awareness for third through fifth graders.

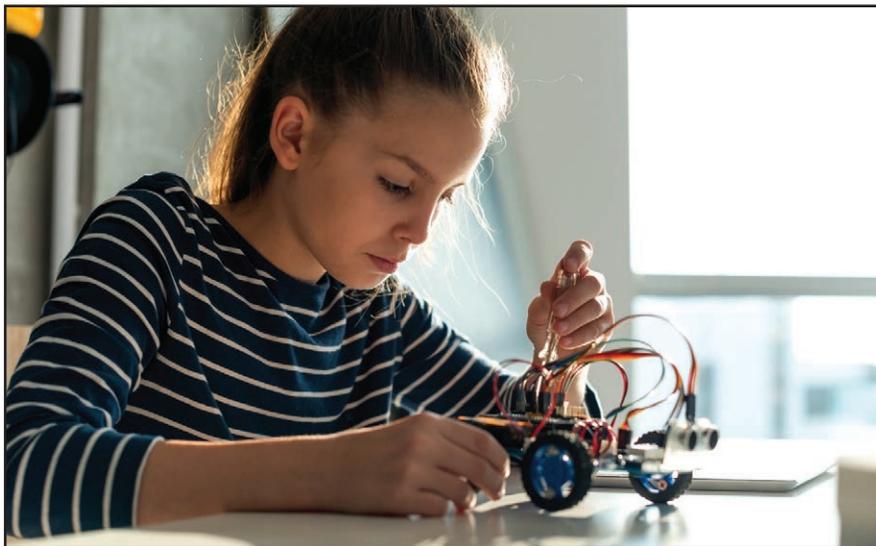
Many companies are also paying close attention to how their robotic devices are perceived and are trying to develop gender-neutral solutions. For instance, BirdBrain's original Finch robot was designed to resemble a bird so that it would engage both boys and girls. Wired reports that Wonder Workshop tested the design of its gender-neutral robots, Dash and Cue, on boys and girls to make sure the devices appealed equally to both genders.

"It's encouraging to see organizations take steps to reduce inequalities in access to STEM education," Bossi says.

Robotics isn't going to spark a passion for learning STEAM-based concepts in all students, Shaw concludes—"but it definitely will for some."

**Editor's note:** During the month of October, we'll take a look at robotics trends in K-12 education. As this piece points out, the skills students develop from learning robotics will follow them throughout their lives. We've put together a variety of content for you, including robotics grants and funding opportunities, teaching resources, a look at how educators incorporate robotics in classrooms, and more. Check back each day for new content—don't miss it!

*The former editor of eSchool News and eCampus News, Dennis Pierce is now a freelance writer who has been covering education and technology for more than 20 years.*



says Don Bossi, president of FIRST (For Inspiration and Recognition of Science and Technology).

## 2. Companies are trying to make robotics as accessible as possible for students—and teachers.

Two key barriers to integrating robotics into the general curriculum are cost and teacher capacity. Robotics manufacturers are taking several steps to reduce these barriers wherever possible.

Edison is one of many companies that offer supporting materials to teachers free of charge, such as lesson plans and guides that help teachers integrate the robots into instruction. BirdBrain Technologies also offers free tutorials for teachers, as well as a loaner program through which teachers can borrow classroom sets of the company's Finch robot free of charge.

Putting actual robots in every stu-

connected device either from home or at school. And the threshold for introducing it is minimal. A survey of teachers whose students took part in the finals of last year's Cyber Robotics Coding Competition organized by Intelitek, the company behind CoderZ, showed that more than 40 percent of teachers had no formal coding or robotics training.

## 3. New programs aim to reach underrepresented populations such as girls and minorities.

According to the National Center for Women and Information Technology, young women make up 56 percent of Advanced Placement test takers but only 19 percent of those who take the AP Computer Science exam—and just 18 percent of undergraduate computer science degrees are earned by women. Many robotics companies are trying to

# Here's why robotics education will help students for life

Why are STEM concepts, including robotics education, critical for all students?

**BY LAURA ASCIONE**  
Managing Editor, Content Services

Much of today's impactful teaching focuses on the "why" behind the concept being taught. When it comes to STEM concepts such as robotics, educators and students alike may wonder why they should learn robotics if they don't plan to pursue it in college or the workforce. The answer? Robotics education will help students for life.

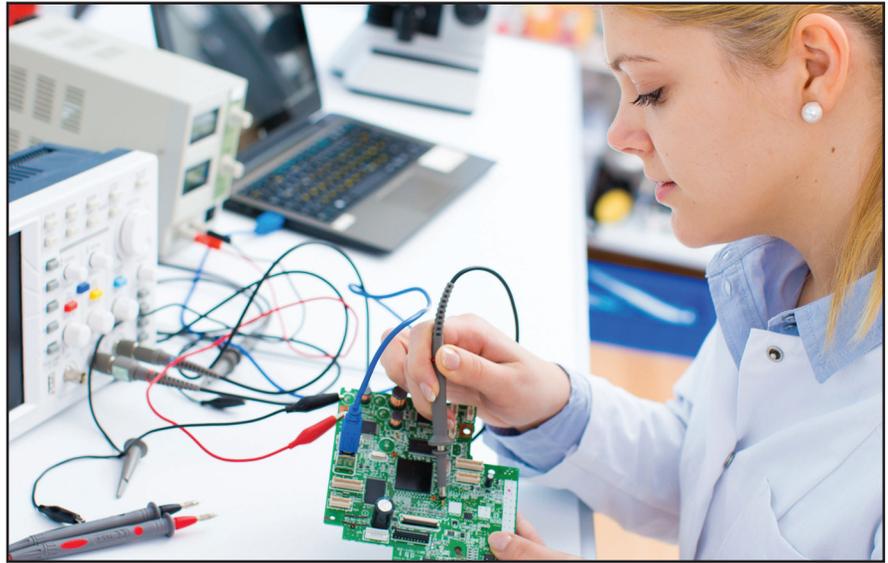
Students are more engaged when they understand how classroom concepts apply in the real world. Learning how robotics, science, engineering, and other STEM concepts are used to solve complex problems speaks to the "why" behind robotics education.

The skills students learn through robotics and other STEM activities are commonly referred to as "employability skills." These skills, also called soft skills or 21st-century skills, will follow students throughout their lives whether they pursue STEM careers or not.

When students tackle a group robotics challenge, for example, they're building collaboration and teamwork skills as they learn to work with one another and listen to each team member's input. Communication skills are emphasized, as is grit—the ability to persist in meeting a challenge even if they first experience setbacks or fail.

Here are some of the ways robotics education can help students for life.

**Learning to fail:** Many teachers focus on coaching students, instead of giving them step-by-step instructions, during robotics education. By coaching and not telling them what buttons to push or what sequence is correct, students are challenged to take ownership of their learning through design thinking. They grow to understand that it's okay not to arrive at the correct answer the first time. They learn that failing is



*When students tackle a group robotics challenge, for example, they're building collaboration and teamwork skills as they learn to work with one another and listen to each team member's input. Communication skills are emphasized, as is grit—the ability to persist in meeting a challenge even if they first fail or experience setbacks.*

part of the learning process.

**Inquisitive nature:** Tomorrow's inventors and scientists are today's curious young children—as long as those children are given ample chances to explore and are guided by adults equipped to support them. Fostering a love of exploration and scientific inquiry will help students no matter what they pursue as adults.

**Problem solving:** Coding, robotics, engineering, and much of STEM in general focuses on solving problems—identifying the problem, testing solutions to see if they work, and reworking the solutions to try again if needed. This process can be modified for even the youngest of learners.

**Grit:** Call it sticking with it, not quitting, perseverance – whatever terms you use – robotics helps students build it. And in an increasingly competitive global economy, today's students will need to develop grit to be successful tomorrow.

A foundation that connects to every industry: STEM education is a "foundation to our economy" and "STEM connects to every industry," according to Project Lead The Way, which brings real-world and hands-on STEM learning into the classroom. Robotics education requires communication, collaboration, creative thinking, and reasoning—these learned skills are transferable to nearly every industry.

# 5 things to help you start teaching K-12 robotics

BY LAURA ASCIONE  
Managing Editor, Content Services

Robotics isn't yet commonplace in K-12 classrooms, but it's getting there. It might seem daunting, but don't let that deter you from exploring what promises to be an incredibly engaging and rewarding teaching and learning experience.

Introducing students to robotics and other STEM concepts that go along with it, such as coding and engineering, gives them early exposure to STEM in general. This early exposure, according to research, is key to the future of the workforce.

Aside from the cool factor K-12 robotics offers, students who learn to program through robotics learn a number of skills they'll take with them well into adulthood, including creativity, problem solving, and the ability to fail without quitting. These skills stick around even if students don't pursue STEM-related study paths or careers later in their lives.

Following are some tips and resources to help you start teaching robotics.

1. Most seasoned robotics educators will tell you that it's important to **find a community** to share ideas and solicit feedback. Look for professional learning networks and communities that can help, and also seek out online communities with other educators who teach the same topics. This can be especially helpful if you don't have any, or only have a few, robotics education resources in your school or district. Many companies that offer coding and robotics solutions also offer free curriculum to help you get started. You can also search relevant hashtags (like #roboticsedu) or follow robotics education accounts on social media for inspiration.

2. **Start small.** This may seem like a no-brainer, but it's easy to get caught up



in the oohs and ahhs of robotics and forget that you have to start with manageable content. Once students master the basics, they'll be well-equipped to handle more complex tasks. For instance, having students complete missions and code robots to move along a specified path or course helps them create skills they'll build on as they advance. These activities are not limited to STEM-focused classrooms, either. You can align a robotics activity with a concept from a novel, for instance.

3. **Don't give up if your school or district doesn't have the budget** for robotics kits. Many premade robotics kits are priced low, are targeted to different grade levels, and are easy for students to use right out of the box. However, most districts do have limited funds. Try DonorsChoose.org, write grants, and don't hesitate to ask your administrators if there's any way to find or raise money for the kits. If your school has a STEM team, consider sending home letters or emails asking for donated items or volunteer time from parents or community members who may have robotics knowledge.

4. Get students engaged by showing

them how robotics isn't a science fiction story, but something **relevant to them in reality**. Have students think about a problem they face regularly, or have them come up with a chore they don't like to do. Can a robot help? How might students design a robot to complete that chore? For instance, if a student doesn't like to make his or her bed, how might they program a robot to do it? What motions and capabilities would that robot need? Maybe a student gets the mail each day, but hates doing so when it's raining. How would he or she design a robot to travel to the mailbox, remove the mail and store it to keep it dry, and return to the house?

5. Be ready to **give up a little control**—by now, that should be second nature. We know students will take a fun, engaging idea and run with it. It's likely they'll come up with unique and relevant ways to use robotics in your classroom. Check out some of these examples from We Are Teachers—one teacher has her students code a robot to navigate a maze, and students must answer relevant questions along the way. Another hosted a robotics party to get girls interested in coding and robotics.

# 3 key parts of a K-12 coding or robotics program

Implementing a coding or robotics program can be challenging – here are key elements that can make the process easier

## BY DENNIS PIERCE

K-12 teachers and administrators have been listening to policy makers and industry leaders warn of the need for computer science instruction, such as a coding or robotics program, in U.S. schools for years. And the evidence they cite is compelling. For instance...

Global management consulting firm McKinsey & Co. estimates there will be 50 million new technology jobs created by 2030 as automation transforms the workforce. While artificial intelligence and robotics will change or eliminate many jobs, McKinsey says, these advancements will also create many new high-paying opportunities for computer scientists, engineers, and IT administrators.

According to Code.org, there are nearly 500,000 open computing jobs in the United States right now, and yet the nation is not producing enough computer science graduates to fill them. Last year, fewer than 50,000 computer science majors graduated into the workforce.

Although 58 percent of all new jobs in STEM-related fields are in computing, only 8 percent of the STEM degrees earned in the United States are in computer science, Code.org says.

Learning about coding and robotics can give students of all ages an effective on-ramp to computer science exploration. As educators Lynne Schrum and Sandi Sumerfield wrote for ISTE last year: “Robotics and coding provide hands-on and creative opportunities for learners to invent, solve problems, and create — perhaps the most appropriate implementation of STEM.” When taught well, these subjects can be fun and engaging for students.

Yet, introducing coding and robotics

into the K-12 curriculum can be very challenging. Few K-12 instructors have much specialized knowledge in these topics, especially at the elementary and middle school level — and tight budgets are often an impediment as well.

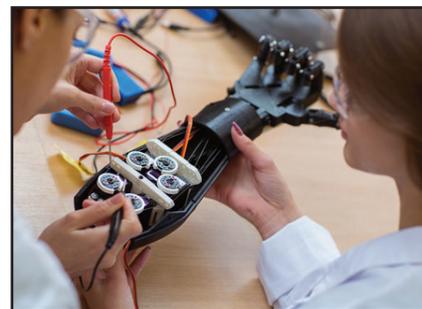
Fortunately, a number of companies have recognized these challenges and have created resources aimed at solving them. As teachers and administrators look for simple ways to introduce coding and robotics into the curriculum, here are three key elements to consider that will make the process easier for everyone involved.

## Is the coding or robotics program widely accessible for students?

To engage as many students as possible, a coding or robotics program should have multiple entry points that target various skill levels. Students should be able to learn and complete activities regardless of their experience or ability.

For instance, a coding program should include both a visual interface and a text editor, removing the intimidation factor for novice students by allowing them to drag and drop blocks of code into place. As beginners progress in their knowledge, they would be able to switch to a text editor to write the code behind these blocks — and students who have some prior exposure to coding would be able to jump into the programming at this more advanced level as well.

What’s more, the content should appeal to a wide range of students — not just boys or those who might be naturally drawn to math and technology, but also girls, students who are more



creatively inclined, and those who don’t expect to pursue a STEM career. Research suggests that computer science instruction is more broadly appealing if it’s grounded in authentic projects and applications that demonstrate a real-world impact.

“If you teach computing that is just focused on programming, you will attract some students, but to generate a diverse group, it is important to emphasize how computing makes a difference in society,” researcher Linda Sax from the University of California, Los Angeles, told the Financial Times.

## Is it accessible for teachers as well?

As researcher James A. Ejiwale from Jackson State University notes, a critical barrier standing in the way of successful STEM instruction is teacher capacity. That’s especially true when it comes to introducing coding or robotics, which are subjects that few K-12 teachers have much direct experience with.

Choosing a coding or robotics program that is easy for teachers to implement and doesn’t have a steep learning curve can help schools overcome this barrier. Introductory professional development to help non-STEM teachers become familiar with the world of coding and robotics will broaden the appetite for teachers to introduce the topic. In addition, a program that includes an online, self-paced curriculum for students would not require any specialized knowledge on the part of instructors.

But even then, teachers are likely to have questions at some point in the process. To help ensure a smooth implementation, an effective coding or robotics

program should include plenty of teacher support at no additional cost, such as videos, webinars, and teacher guides.

### Is it easily scalable?

Many schools have established after-school coding or robotics clubs that give students an opportunity to develop these skills within informal learning environments. Others offer coding or robotics instruction only to a select group of students, such as through a gifted education program.

should look for coding and robotics resources that can be scaled easily across an entire school or district, so that all students have a chance to participate.

One of the challenges to scalability is the capacity of teachers to lead this instruction, but choosing a program that is easy to implement addresses this challenge. Another common barrier is cost; if a program and its components are too expensive, then it's hard to get these tools into the hands of all students. Selecting a program that doesn't require

threshold for introducing these programs is minimal. A survey of teachers whose students took part in the finals of this year's Cyber Robotics Coding Competition organized by Intelitek, the company behind CoderZ, showed that more than 40 percent of the teachers had no formal computer science or STEM education training.

Although introducing coding or robotics into the K-12 curriculum can be difficult, school and district leaders can improve their chances of success by

*One of the challenges to scalability is the capacity of teachers to lead this instruction, but choosing a program that is easy to implement addresses this challenge. Another common barrier is cost; if a program and its components are too expensive, then it's hard to get these tools into the hands of all students. Selecting a program that doesn't require a lot of costly equipment can help schools bring coding or robotics to more students, thereby creating more equitable opportunities for everyone.*

While these programs are certainly valuable, they aren't reaching enough students to broaden the STEM community — and they aren't reaching every student in an equitable manner. What if students would like to take part in these activities, but they can't, because they play a sport ... or they work ... or they don't have a ride home after school? What about the students who aren't part of a gifted education program? What about those who have no idea what engineering or coding is, or that these are viable career paths that might interest them? K-12 educators and administrators

a lot of costly equipment can help schools bring coding or robotics to more students, thereby creating more equitable opportunities for everyone.

For example, CoderZ is a platform that gives students a cost-effective way to learn about robotics without needing expensive equipment. Students use a game-like interface to program virtual robots as they aim to solve various challenges.

Because both of these programs are offered online, students have access from any internet-connected device either from home or at school. And the

looking for programs that are broadly accessible to both students and teachers, as well as tools and resources that are easily scalable. Giving all students the ability to learn about these topics can engage them in STEM education and possibly spark an interest in computer science — opening doors to a highly successful, in-demand career.

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*The former editor of eSchool News and eCampus News, Dennis Pierce is now a freelance writer who has been covering education and technology for more than 20 years.*

# 8 resources for robotics education

As robotics education gains popularity, there are more and more resources to help educators integrate robotics into the classroom

**BY LAURA ASCIONE**  
Managing Editor, Content Services

Robotics education is gaining STEAM (pun intended) in classrooms across the nation, and for good reason—it's engaging, hands-on, and students learn real-world concepts as they solve challenges.

And as K-12 robotics education grows, so do resources for teachers to strengthen their own robotics skills and transfer that knowledge to students.

If your K-12 robotics program is in its early stages, you may feel you don't have enough resources to support the program as it progresses. If that's the case, or if you're simply looking for some new K-12 robotics resources, explore the following list to find something new to use in your classroom.

*[Editor's note: Many of these resources come from companies selling robots. We have not tested these robots, but the sites offer teaching tools, many of which are created by teachers, to help integrate robotics into your instruction.]*

1. Seek out robotics professionals in your school community. Spread the word that you're seeking to boost your K-12 robotics education and you want to bring in professionals with real-world robotics experiences. These professionals can help students connect what they learn in the classroom with what they can do in the real world.

2. The Arduino Project Hub features robotics teaching resources and project tutorials covering challenges such as a printing robot, a robotic arm, a robot controlled with a PlayStation controller, and a robot controlled by hand gestures.

3. Wonder Workshop, maker of Dot and Dash, offers robotics and coding curriculum for teachers, including lesson plans and individual activities. The

standards-based curricular resources spark creativity and self-confidence while helping students develop lifelong skills and competencies.

4. If you're using LEGO Mindstorms, browse these lessons, which range from beginning to advanced, for fun and engaging ideas for robotics lessons such as a breakdancing figure, a sorting machine, and a speed control system.



5. The mission of FIRST is to inspire young people to be science and technology leaders and innovators, by engaging them in exciting mentor-based programs that build science, engineering, and technology skills, that inspire innovation, and that foster well-rounded life capabilities including self-confidence, communication, and leadership. Engage kids in kindergarten through high school in exciting, mentor-based, research and robotics programs that help them become science and technology leaders, as well as

well-rounded contributors to society.

6. Carnegie Mellon University's Robotics Academy develops tools to make it easier for teachers to implement robotics curriculum into today's classrooms. The research-based curriculum aligns with standards and focuses on developing 21st-century skill sets in students. The Robotics Academy creates easy-to-use Robotics Education

Curriculum that allows students to go from having no robotics experience to programming advanced behaviors.

7. Got robots or physical computing kits? Use them with activities from Code.org and make a tangible Hour of Code for students of any age. Some activities even offer a simulator so you can get started without any hardware.

8. Khan Academy, which provides free lessons to anyone interested in learning, offers LEGO robotics education lessons including programming basics, a light guitar, and an ant bot.



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RobotLAB offers students an enhanced way to learn STEM by using robots.

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RobotLAB's Online Learning Platform [www.EngageK12.com](http://www.EngageK12.com) is an interactive and hands-on learning experience organized by eye-catching themes (such as soccer-playing robots or autonomous cars). Students and teachers can access the browser-based learning ecosystem from any device. A user-friendly interface allows teachers without programming experience, to bring their lessons to life with virtual or physical robots.

## Teachers love the lessons using the following robots:

### NAO Robot

Engage students in STEM and programming with the NAO Robot, a hands-on learning platform to teach coding and core subjects: Reading, Writing, and Math.

### DOBOT Magician Robotic Arm

An all-in-one and user-friendly Robotic Arm to engage students with STEAM & CTE. A great solution to teach Engineering and Coding.

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## The Role That Robots Play In The Classroom.

**By Tobe Roberts, Educational Technologist, Bergen County Technical Schools, NJ**

"The role that NAO plays in the classroom is by helping teachers design fun and engaging project-based learning activities for multiple subjects. The team at Bergen Schools realized that NAO was the tool for us when we saw the students become engaged and motivated to learn even more by working with NAO. He is a great instructional tool and over the years we have added more and more robots to schools in our district."

**By Clifton Bossong, S.T.E.A.M Coordinator, Carnegie Science Center, PA**

"We employ the robots as tools to teach how S.T.E.A.M. is used in the career and technology fields. The robots travel to community events, elementary and middle schools within the nine area school districts, to demonstrate the importance of knowing computer programming languages. Our favorite part about NAO is that it gives us the ability to teach programming to elementary through high school students."

To learn more about these educators and their projects visit [www.RobotLAB.com/blog](http://www.RobotLAB.com/blog) to join the discussion.

Get your free consultation today and claim your \$500 discount! Call +1 (415) 702-3033 or email [Sales@RobotLAB.com](mailto:Sales@RobotLAB.com)

# 5 real examples of coding and robotics in the classroom

It isn't as hard as you might think to bring coding and robotics into your instruction—learn how educators just like you are doing it with success

**BY LAURA ASCIONE**  
Managing Editor, Content Services

Coding and robotics go hand-in-hand, and they're becoming a more integral part of classrooms across the country.

Aside from the excitement students muster when they see a robotics kit morph into a controllable arm or a tiny programmable vehicle, coding and robotics offer a little bit more than a fun classroom experience.

When students participate in coding and robotics activities, they're learning employability skills such as teamwork and collaboration, problem solving, the ability to fail and persevere, and more.

Different schools teach coding and robotics in different ways, depending on the availability of funding, knowledgeable teachers or classroom volunteers, and time.

Here's a look at how five schools and districts are teaching coding and robotics. Use these examples as inspiration to integrate coding and robotics into your own classroom, or share them with colleagues to demonstrate how easy it is to start incorporating robotics in the classroom.

1. At The Village School in Houston, TX, instructional technology specialist Ruth O'Brien and middle school teacher Marc Abrate help students develop skills that help not only in coding, but in areas such as problem solving, critical thinking, and collaboration.

Coding has been a required part of the middle school and elementary school curriculum since 2014. Teachers attend coding workshops and receive training at school. Students in fourth grade are trained to use devices to code, and they also have to train their peers and students in other grades.

The school uses resources and apps such as Unplugged.org, Kodable,



Tynker, codeSpark, and Scratch Jr. Students use devices such as Ozobots, SAM Labs, Makey Makey, Code-a-Pillar, and Dash & Dot. In middle school, students use Scratch Studio and Code.org's Code Studio for creative applications such as making games, drawing animations, and controlling drones, O'Brien and Abrate say.

The school offers several LEGO robotics classes, and teachers introduce students to programming for the web, teaching them HTML, CSS, and Javascript in seventh and eighth grade.

2. Engineering and robotics challenges are a fun and engaging way to involve students in STEAM learning, says Leah LaCrosse, an eighth-grade science teacher in the Huron (OH) City School District.

"I love engaging my students in STEAM through engineering challenges. The challenges always connect to my state standards, and they require students to take content and build solutions for problems," she says.

"My Sphero Pollution Pick Up Challenge is probably one of my favorite engineering challenges. In it I ask students to design a method for cleaning water-based litter with Sphero

as the engine moving the system. It is so much fun! Students use so many critical-thinking skills and have a blast."

LaCrosse's Sphero Pollution Pick Up Challenge book supports teachers interested in using Sphero robots to explore literature, science, coding, engineering, and more. It includes lesson plans, materials, assessment, and examples to help jump-start ideas for a fun unit of study.

3. This collection of real-life classroom examples from We Are Teachers highlights two common elements all successful robotics lessons need: curiosity and creativity. Lessons range from animal habitats and parades to sports competitions and musical jam sessions.

For instance, an Oregon-based tech literacy teacher tasks students with using Wonder Workshop's Dash and Dot robots to solve math problems and code various challenges.

In Arizona, Allison Davis, who is a 2018 Arizona Teacher of the Year Ambassador for Excellence, uses Wonder Workshop's robots across the entire curriculum. Science experiments, number challenges, reading – you name it, students use Dash to navigate the assignment.

4. Robotics and coding play a big part in Mableton Elementary School's transition from STEM to STEAM. A big part of the new spark in the STEAM program has come from introducing coding and programming, says Alana Davis, the school's innovation specialist. Davis works with teachers to help them feel comfortable with coding and robotics technology.

For instance, teachers use Sphero robots, which are app-enabled programmable robots that allow students to learn basic coding language using commands such as drive and draw. In addition, students can run programs using block coding and HTML text. All of this learning happens through the Sphero Edu app, which lets students and teachers connect, code, and learn from others around the world. This robot has allowed teachers to integrate technology into content standards for other subjects and has increased student engagement and student interest in coding and programming.

To assist this process, Davis created an

anchor chart for the classroom wall. Students can refer to it while they're learning how to create block coding programs, which tell the robot what to do. Imagine a classroom of 8- and 9-year-olds, huddled on the floor with a diagram of the water cycle, figuring out, with coding commands, how to get a paint-dipped robot to follow the path of that diagram. When they succeed, the robot makes colorful trails along the floor.

5. When robotics teacher Mike Causey had the chance to build a K-5 robotics class "from the lab up," he knew he'd struck paydirt. Katherine Johnson Technology Magnet Academy in Texas just opened last year, and educators are committed to exposing students in all grade levels to a variety of STEM learning opportunities.

Causey designed the school's robotics course to be progressive, starting simply in kindergarten and becoming more advanced. This sets up students for continued success in middle and high school robotics. Students in these early grades

use two products—LEGO's STEAM Park and KinderLab's KIBO. Second and third grades use WeDo 2.0, also from LEGO, and third grade also uses the robots4STEM suite from RoboKind. Robots4STEM comprises a two-foot-tall humanoid robot named Jett, a visual coding language, and a curriculum. In 4th and 5th grade, students continue to work with Jett, but they also get to start working with LEGO EV3s, which uses the Scratch-like, block-oriented programming language.

"No matter what the project, the excitement the kids show when they have the opportunity to create something and get a robot to move just the way they planned is amazing," Causey writes. "We had a little girl start clapping because her robot was moving for the first time, and it was just overwhelming to watch. Providing kids opportunities to be successful and to believe in their own potential—it's what makes teaching the best job in the world."

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# How this school designed a robotics program from the ground up

An innovative math teacher lays out his multi-year approach to teaching STEM with a brand-new robotics program

## BY MIKE CAUSEY

As a former computer engineer with a background in applied math, I'm a firm proponent of STEM education. As a math teacher with 14 years of experience facilitating robotics clubs for students, I'm also an ardent supporter of programming and robotics as a vehicle for STEM ed, so when I had the opportunity to build a K–5 robotics program from the lab up, I leapt at the opportunity.

Our school is a brand-new Title 1 campus. We're in our first year and just opened in August, so we're still tweaking and learning as we go, but we've developed a solid foundation for introducing students—even those who are very young—to a range of STEM and other concepts in an environment that feels more like fun than work. Here's how we did it.

## Kindergarten & 1st grade

When I was designing the robotics program, I wanted to make sure we were building a bridge from kindergarten all the way to 5th grade and beyond, so our program is designed to be progressive throughout the six years students are with us and to set them up for more advanced robotics in middle

and high school, should they choose to pursue it.

For kindergartners and first graders, we use two products: LEGO's STEAM Park and KinderLab's KIBO.

STEAM Park uses Duplo LEGO bricks and gears, pulleys, and other simple machines to help very young children begin to understand concepts like leverage, chain reactions, motion, measurement, and even buoyancy, which isn't usually introduced until 2nd grade.

The KIBO kit allows students to build robots using a series of sensors and then program them by arranging a series of scannable blocks. The sensors are critical for them to understand going forward, of course, and the block coding helps them become more comfortable with the basic ideas of coding, such as creating sequences and other design concepts.

## 2nd and 3rd grade

In 2nd and 3rd grade, we use WeDo 2.0, also from LEGO. WeDo offers a motor, some basic sensors, and programming software that helps students understand basic functionality and how all these things work together.

Our 3rd-graders work with the

Robots4STEM suite from RoboKind. Robots4STEM comprises a two-foot-tall humanoid robot named Jett, a visual coding language, and a curriculum. Students can program a digital avatar as they learn programming, then switch over to run the actual robot with the code they have written.

When students are working with the Robots4STEM program, I talk a lot about abstraction, and I think that's at the heart of the value that robotics provides students. Abstraction is the ability to make things based on your ideas, to extend your knowledge about your environment, and work with what's there to be creative and successful in solving a problem.

We also try to encourage students to use other things in the environment around them to solve their robotics challenges. Recently, we were working on a flow-charting exercise. The instructions included cutting pieces of paper with scissors but, being a 1:1 campus, my students and I decided to use the tools available to us and they completed the exercise in Keynote, so now, in addition to everything they're learning from the robotics curriculum, they're also learning to use Apple presentation software.



*No matter what the project, the excitement the kids show when they have the opportunity to create something and get a robot to move just the way they planned is amazing. We had a little girl start clapping because her robot was moving for the first time, and it was just overwhelming to watch.*

This is part of our effort to become an Apple Distinguished campus.

### 4th and 5th grade

In 4th and 5th grade, students continue to work with Jett, but they also get to start working with LEGO EV3s, which uses the Scratch-like, block-oriented programming language.

I love marrying the two products, robots4STEM and EV3. Students build their confidence and understanding of coding with the robots4STEM tools, and then we take that learning and finally they get to go ahead and start building robots and trying to make them work.

Students can use EV3s all the way through high school if they choose to stick with robotics, and they can incorporate other programming languages, like Python, as they progress. I've been reaching out to the middle school and

the high school to make sure we have some continuum in the flow and growth of the students that we send up there.

### Creating a flow from grade to grade

A recent example from class helps to shed a little light on how the structured flow of the program throughout the grades is so helpful. Robotics forces students to think in a structured format or their robot won't work. The other day, some 2nd-graders were trying to get a robot to walk, but the robots never stood up. Then, when the students told it to walk, it never went anywhere because it hadn't been told to stand up first. This offered every one of those students a practical lesson in why it's important to think in an organized, structured manner when you're trying to accomplish something, whether it be

getting a robot to walk, conducting a science experiment, solving a math problem, or writing an essay.

No matter what the project, the excitement the kids show when they have the opportunity to create something and get a robot to move just the way they planned is amazing. We had a little girl start clapping because her robot was moving for the first time, and it was just overwhelming to watch. Providing kids opportunities to be successful and to believe in their own potential—it's what makes teaching the best job in the world.

*Mike Causey is the robotics teacher at Katherine Johnson Technology Magnet Academy in DeSoto, Texas. He can be reached at [mcausey@desotoisd.org](mailto:mcausey@desotoisd.org).*

## 6 cool programmable robots for K-12

**BY LAURA ASCIONE**  
Managing Editor, Content Services

Introducing a robot into the classroom is a surefire way to grab students' attention—but robots do more than excite. When educators use programmable robots for K-12 learning, they're helping students develop important skills such as critical thinking and teamwork.

Robots are accessible for students of all ages—even younger students who don't yet have strong coding and programming skills. Research says students are more likely to maintain their interest in coding if they're exposed to it at an early age. One engaging solution: robots for K-12 classes.

### Related content: 3 ways to tell stories with robots

Maybe you know that robots are a fantastic way to teach students programming skills while making sure they're engaged. Or maybe bringing coding to your classroom was one of your New Year's resolutions.

Whatever your reason, you're here

and you're checking out these programmable robots for K-12. This list can get you started as you explore different kits and decide which robot is the right fit for your students and classroom.

### 6 fun robots for K-12

1. **Ozobot** features robots Evo and Bit. Bit gets kids coding and loving robots with the stroke of a marker. Once students learn to code Bit with color codes, they advance to OzoBlockly, the programming language. Evo, for slightly more advanced students, can be coded with color codes or with OzoBlockly.

2. **Wonder Workshop's Dash, Dot, and Cue** are aligned to different skill levels. Coding ranges from block-based, state-machine, or text-based. The site also features comprehensive curricular resources with lesson plans aligned to various standards.

3. **Edison** is a programmable robot designed to be a complete STEM teaching resource for coding and robotics education for students ages 4-16. Edison's robotics capabilities can be unlocked with

ease through simple barcode programs. Students can then progress their robotics, coding and STEM education journeys using Edison with three progressive programming languages.

4. **Sphero SPRK+** is equipped with Bluetooth SMART, programmable sensors like motor encoders, LED lights, accelerometer, and a gyroscope—all these components allow for countless experiences and coding conditions. The Sphero Edu app empowers anyone to program their robot. Drag and drop actions, controls, operators, and more to give your bot the orders.

5. **littleBits** features STEAM-focused activities for educators and students, and there are a number of programmable robots and machines on the site, including a programmable droid that's sure to be a hit with Star Wars fans.

6. **Makeblock** has a variety of programmable vehicles and robots for K-12, but the most entry-level one is Codey Rocky, which combines hardware with software and lets children learn about programming as they play.



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# We need to put robotics in rural schools

Learn how this district decided to get competitive and put robotics in rural schools to help students be successful

## BY PATTY COOKE

Rural schools in the United States face challenges many of their suburban counterparts couldn't fathom. For example, access to challenging and engaging STEM courses such as robotics and coding is not as prevalent in rural schools as it is in larger districts. But one district is aiming to make it easier for students to access robotics in rural schools.

"Out of the Loop," a 2018 report from The National School Boards Association Center for Public Education, notes that "rural students have significantly less access to STEM-focused AP courses" and that gaps such as this "may indicate that rural students have limited access to academically rigorous programs."

One rural district in North Dakota is fighting this statistic with a K-12 STEAM program that prepares students for the future by teaching 21st-century skills necessary in today's—and tomorrow's—workforce.

Alexander, North Dakota, epitomizes small-town America. A 2017 estimate puts the population at 308, and the Alexander Public School serves around 260 K-12 students. Seeing a need to instill future workforce skills in their students, the district implemented their K-12 STEAM program, which includes coding and robotics, about five years ago. Superintendent Leslie Bieber attended a conference and had the opportunity to learn to program robots. When she returned, she worked with former robotics team coach Alexandria Brummond, who at the time was the school's second-grade teacher. "The program developed over the years," says Bieber, eventually including a TETRIX class, which then became a FIRST Tech Challenge class and team.

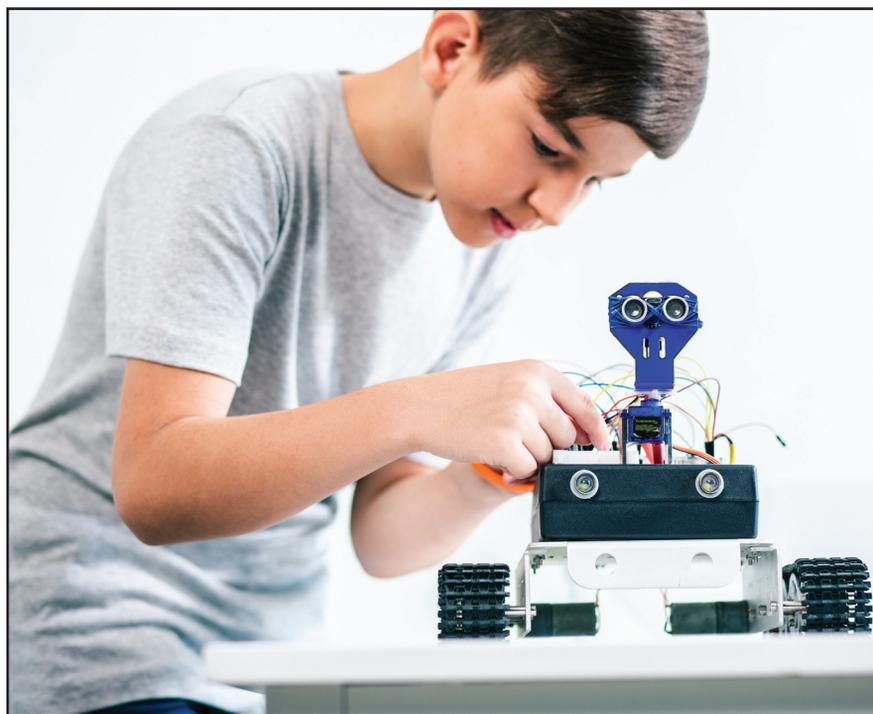
"STEAM and robotics are the future of our world," said Bieber. "We are

preparing our students for jobs that we don't even know will exist in the near future."

## TETRIX: Tools for the trade

An integral part of the district's STEAM program is the FIRST Tech Challenge class (formerly a TETRIX class) for sophomores through seniors. "When the class was created, we want-

competing against larger districts in robotics competitions. In their four years of competing, the Alexander Comets have received Rookie Team of the Year, Second-Place Alliance, Fourth-Place Alliance, and Design awards. Additionally, they have shared their robot design with the governor of North Dakota as well as with state legislators and area teachers, students, and



ed to give students an opportunity to pursue another CTE credit through a 21st-century skill-based, hands-on program that incorporates the FIRST philosophy," says Brummond, who is now the school's pre-K-12 STEM and robotics teacher. Students in the class use TETRIX robotics sets and form a team to compete in the FIRST Tech Challenge each year. The class currently has six students, all of whom are on the team.

What the district lacks in number of students, they more than make up for in enthusiasm, especially when it comes to

community and business members.

"We have wonderful community support," says Bieber. "Two years ago, we started an annual showcase of our technology programs and invited our stakeholders and businesses to the event. We have also gone to the state capital for the last three years with all grade levels to showcase our robotics programs to our state government."

## PRIME (and MAX) lessons

In addition to the TETRIX FIRST Tech Challenge Competition Set, Alexander's high school students also

work with TETRIX PRIME, which Brummond says they went with “because of the ease of use.” PRIME sets come with everything needed for students to hit the ground running and are designed to enable students to assemble and disassemble robots quickly within a class period.

After students master PRIME, learning to build and code with TETRIX MAX comes easily. After that, they

new part is all part of the critical thinking and collaboration that is done in the [FIRST] program,” says Brummond.

It’s also a big part of how things are done in today’s workforce. Employers look for workers who can quickly jump into any given situation and help solve a problem, which is exactly what robotics teaches. A well-designed robotics and coding continuum such as the one in Alexander doesn’t just put robotics in

have begun to integrate coding into other subjects,” she says. “The entire concept of STEAM education is now cross-curricular.”

### The future looks bright

As we prepare students for a labor market where the skills required are not well-defined and a world where technology advances at a pace faster than anyone can keep up with, we must

*“Out of the Loop,” a 2018 report from The National School Boards Association Center for Public Education, notes that “rural students have significantly less access to STEM-focused AP courses” and that gaps such as this “may indicate that rural students have limited access to academically rigorous programs.”*

begin building the skills they need to become a strong FIRST team.

### Taking robotics in rural schools and bridging to the real world

Learning robotics and coding has given Alexander students critical-thinking and problem-solving, communication and collaboration, and creativity skills they can use in the real world.

“When a part on the robot doesn’t work, being able to quickly work together to brainstorm, design, build, and test a

rural schools—it connects students to real-world applications through hands-on activities and challenges, immersing them in a variety of STEM subjects. When students measure, choose gear and motor sizes, connect wires, write code, and work with others to troubleshoot and solve issues, they see their classroom lessons on fractions and ratios, electricity, engineering design, and even spelling and language arts used in practical applications.

Bieber is already seeing this connection. “A few of my elementary teachers

ensure that the knowledge children develop in school is flexible.

Alexander’s K-12 STEAM program is doing just that, creating lifelong learners ready to tackle whatever challenge comes their way. “Our program continues to grow,” says Bieber. A sure sign that where there’s a will to prepare students for jobs of the future – even in rural school districts – there’s a way.

*Patty Cooke is a communications assistant with Pitsco Education.*

# 8 grants to fund your robotics education dreams

It isn't always inexpensive, and school funds are limited—but grants can support educators' robotics education plans

**BY LAURA ASCIONE**  
Managing Editor, Content Services

Robotics kits and resources can be expensive, and schools don't always have money in their already-tight budgets to accommodate robotics tools. But you don't have to say goodbye to plans for robotics education in your school.

Luckily, as interest in robotics education grows, so, too, do the funding opportunities for students and educators. We've gathered grants, scholarships, and internship opportunities to help educators increase their access to robotics education.

Bookmark the following grants to have a list of active funding opportunities throughout the year. Some have deadlines and some accept applications

Mentors are committed to offering informative webinars, Q&A sessions, one-on-one Skype conversations and more.

2. **Amazon Future Engineer** is a comprehensive childhood-to-career program to inspire, educate, and train children and young adults from underserved and low-income communities to pursue careers in computer science. The site points users to scholarship and internship opportunities.

3. **DonorsChoose.org** and **AdoptA Classroom.org** are great opportunities for educators to connect with donors for smaller needs—say, for instance, a single robotics kit or a handful of starter resources. You can also try Digital Wish and Class Wish.



experiences that: (1) increase awareness and interest of STEM and ICT occupations; (2) motivate students to pursue appropriate education pathways to those occupations; and (3) develop STEM-specific disciplinary content knowledge and practices that promote critical thinking, reasoning, and communication skills needed for entering the STEM and ICT workforce of the future.

6. **Pitsco Education** offers a \$350 grant each month to assist with making hands-on learning possible. This grant is awarded in the form of a gift certificate that may be used to purchase

*Luckily, as interest in robotics education grows, so, too, do the funding opportunities for students and educators. We've gathered grants, scholarships, and internship opportunities to help educators increase their access to robotics education.*

on a rolling basis, and some of those deadlines may have already passed for the year, but you can mark your calendars for next year's deadline.

## 7 robotics education grants

1. **Samsung Solve for Tomorrow:** This nationwide contest is designed to boost interest and proficiency in Science, Technology, Engineering and Math (STEM), and challenges public school teachers and students in grades 6-12 to show how STEM can be applied to help improve their local community. Samsung employees are volunteering to advise on projects and offer their expertise to all 100 state winners.

4. The **Motorola Solutions Foundation** supports many programs, including programs that advance science, technology, engineering and math education, preparing the next generation of innovators.

5. **ITEEST** provides direct student learning opportunities in pre-kindergarten through high school. The learning opportunities are based on innovative use of technology to strengthen knowledge and interest in science, technology, engineering, and mathematics and information and communication technology careers. To achieve this purpose, ITEEST supports projects that engage students in technology-rich

hands-on STEM products, curriculum, and more on the Pitsco website.

7. When writing a grant, educators sometimes have to provide details on what they plan to do with it or why they need the grant. **LEGO Education** offers guidance and samples for writing grants for LEGO-specific purposes—and this includes robotics with LEGOs.

8. **NEA Foundation** STEM grants provide the resources for districts to build and expand their STEM programs and the professional learning for educators to lead them well. The shared goal: giving more students access to the high-quality STEM learning they'll need to succeed.

# Great K-12 robotics apps for users of all abilities

If you're looking for a way to add another engaging element to your robotics instruction, check out these K-12 robotics apps

**BY LAURA ASCIONE**  
Managing Editor, Content Services

K-12 robotics is having more than a moment—it's on its way to establishing itself as a necessary component of a 21st-century education.

While it can seem overwhelming, it's not as hard to incorporate K-12 robotics into your classroom. Apps offer an

are having fun programming their own virtual cyber robot. Since coding can be gamified, kids at early age can start learning how to code using visual coding interfaces. Programming a virtual Lego robot, with inputs (sensors) and outputs (motors) can give all students the opportunity to get into coding without having any prior knowledge in pro-

cedures, loops, and conditional instructions, while making programming fun and accessible, regardless of prior experience.

**Sphero Edu:** If you're using Sphero in your classroom, the Sphero Edu app is a great extension of classroom learning. Sphero also offers its Play app, which lets you drive and play games from one app with your Sphero Mini, SPRK +, Sphero 2.0, SPRK Edition and BOLT robots.

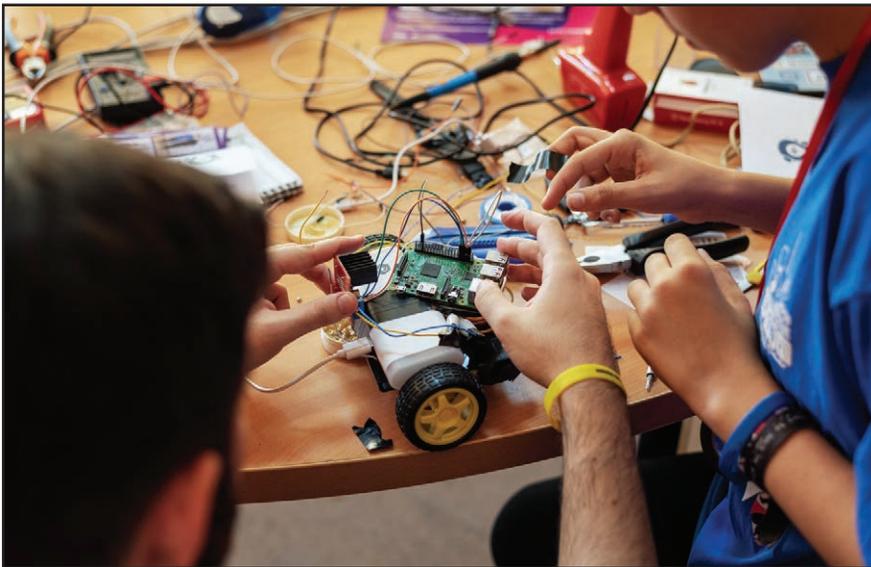
**Virtual Robotics Toolkit:** This app can import files created using a number of free 3D modeling tools. Within minutes, users can easily import a model into a physics enabled simulation. Experiment with how various physical forces act on a robot, change the friction on the playing surface, or modify gravity to see how a robot would behave in a weightless environment.

**Wonder Workshop:** The free in-app challenges give kids hundreds of hours of STEM learning in fun and engaging ways. Kids can give Dash, Cue, and Dot voice commands and explore loops, events, conditions, and sequences. It's more than learning to code.

**iCircuit:** This app lets users design and experiment with circuits and Arduinos. The simulation engine can handle both analog and digital circuits and features real-time analysis.

**Ozobot:** Users can connect to Evo through the app and control Evo's speed, sounds, and LED lights. Evo can move from target to target and learn new tricks based on new code.

**Jimu Robots:** Users can build, control, and program Jimu Robots with this app. The app features a 3D video guide on how to assemble the robot, along with pre-programmed actions for each robot to model.



*While it can seem overwhelming, it's not as hard to incorporate K-12 robotics into your classroom. Apps offer an excellent way to gently move into robotics learning without feeling as if you're in over your head.*

excellent way to gently move into robotics learning without feeling as if you're in over your head.

We've gathered a handful of K-12 robotics apps you can explore and use in your classroom. Test them out, and let us know if you have a favorite app you use in your classroom.

**CoderZ:** CoderZ is an online educational environment that improves student's 21st century skills, while they

programming or robotics.

**Robot School:** Learn to Code is a programming game suitable for children aged 7 and above. R-obbie the Robot crashed his spaceship in a far away galaxy. R-obbie needs a lot of energy to get back to his planet. Drag and drop programming instructions to help him reach the fuel he needs to return home safely. Robot School offers a child-friendly way to learn proce-

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China  
86-0553-5841830

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[Kinderlabrobotics.com](http://Kinderlabrobotics.com)

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**littleBits Electronics, Inc.**

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**Micro:bit Educational Foundation**

12 New Fetter Lane  
London EC4A 1JP UK

**Microduino**

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**Robo3 (Shenzhen) Science and Technology Co., Ltd.**

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RobotLAB is the leading educational robotics integrator on the market, serving educational institutes for over a decade. The team here at RobotLAB provides you with a vast experience in deploying educational robotics programs, for any budget, age group, and any subject. Every purchase comes with training and our commitment to make your program successful!

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**Skriware**

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**SmithSystem**

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**Softbank Robotics** (Formerly Aldebaran Robotics)

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**Sony KOOV: Coding and Robotics Kit**

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Sphero inspires the creators of tomorrow by teaching kids to code through play. Based in Boulder, CO, Sphero is the #1 app-enabled, programmable robot in education, available in 40,000+ institutions globally. Sphero recently acquired littleBits to become the EdTech market leader and accelerate play-based learning for kids worldwide.

[sphero.com](http://sphero.com)

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**UC Davis C-STEM Center**

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**Wonder Workshop**

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San Mateo, CA 94404  
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# About eSchool News

## History

**eSchool News** covers education technology in all its aspects—from legislation and litigation, to best practices, to lessons learned and new products. First published in March of 1998, **eSchool News** is a monthly print and digital newspaper providing the news and information necessary to help K-20 decision-makers successfully use technology and the internet to transform North America's schools and colleges and achieve their educational goals. The newspaper is read by more than 300,000 school leaders, and a companion web site—**eSchool News Online**—is visited by more than 500,000 unique visitors each month, including over 280,000 registered members.

**eSchool News** is a marketing solutions company serving the education technology industry. Throughout our 25-year history, we have created the most comprehensive portfolio of products and services in the industry. We offer access to the broadest reach and deepest range of education technology professionals worldwide across the entire technology spectrum: the creators, sellers, and buyers of technology around the world.

Every day, our editorial, sales, and marketing professionals share their content expertise to help our customers grow their businesses. We leverage the immediacy of online, the networking of face-to-face opportunities, the expert interaction of web seminars, and the breadth and depth of print to create compelling, focused media that delivers measurable results.

## Mission

**eSchool News** — helping educators succeed by:

- Providing the latest news, resources and reports on the applications of technology to improve learning
- Providing resources and tools to evaluate the funding, purchasing and the evaluation of technology in the education systems
- Assisting educators in forming collaborative alliances and providing a valuable resource bank for the exchange of information, ideas and best practices.

In order to fulfill our mission, we pledge the following:

- We will treat each member as though the success of our organization depends on that individual alone
- We will continue to increase the value and benefits of our services, programs and products
- We will deliver what we promise
- We will conduct our business in a manner which commands the respect of the public for our industry and for the goals toward which we strive

### 2019-2020 MONTHLY GUIDE EDITORIAL CALENDAR

November 2019	Digital & Mobile Learning
December 2019	School Safety
January 2020	Multimedia Presentation Systems
February 2020	STEM, STEAM, & Makerspaces
March 2020	IT Solutions: Hardware & Management
April 2020	Online and Personal/Blended Learning
May 2020	Curriculum, SEL and Instructional Tools
June 2020	Library & Media Technology
July 2020	Wireless Products
August 2020	Data Management & Storage
September 2020	Communication Technology

## eSCHOOL MEDIA INC.

**eSchool News** covers the intersection of technology and innovation in education. We focus on how technology can help educators improve learning and deliver instruction more effectively, enhance the student experience, and transform their schools.

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