Sphero Edu

TEACHER RESOURCE GUIDE K-12

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Introduction to Sphero Edu

Sphero Edu provides a toolset that is unbounded in its potential. Our program goes beyond code by incorporating robotics and technology with collaborative STEAM activities, nurturing students' imaginations in ways no other education program can. So, what can you do with Sphero in education? Although the possibilities are endless, below are some ideas of how you could integrate Sphero into your educational setting:

- Teach computational thinking by programming Sphero in three different ways designed for learner progression - draw, blocks, and Javascript. Coding comes to life with Sphero!
- Measure time, speed, distance and other metrics to complete real world experiments
- Perform specific functions such as motion and direction, color and light, and sensor-controlled reactions
- Direct the movement of the Sphero using an app or autonomously using code to navigate a maze or terrain
- Problem solve, collaborate, and iterate!

Sphero is adaptable to all ages, skill levels, and content areas. The Teacher Resource Guide is designed to give you everything you need to know to get the ball rolling with your learners.

Mission in Education

Sphero Edu provides a toolset that is unbounded in its potential. While coding and 21st century skills are necessary, our program also goes beyond code by incorporating robotics and technology with collaborative STEAM activities, nurturing students' imaginations in ways no other education program can.

How are Sphero Robots Being Used in Education?

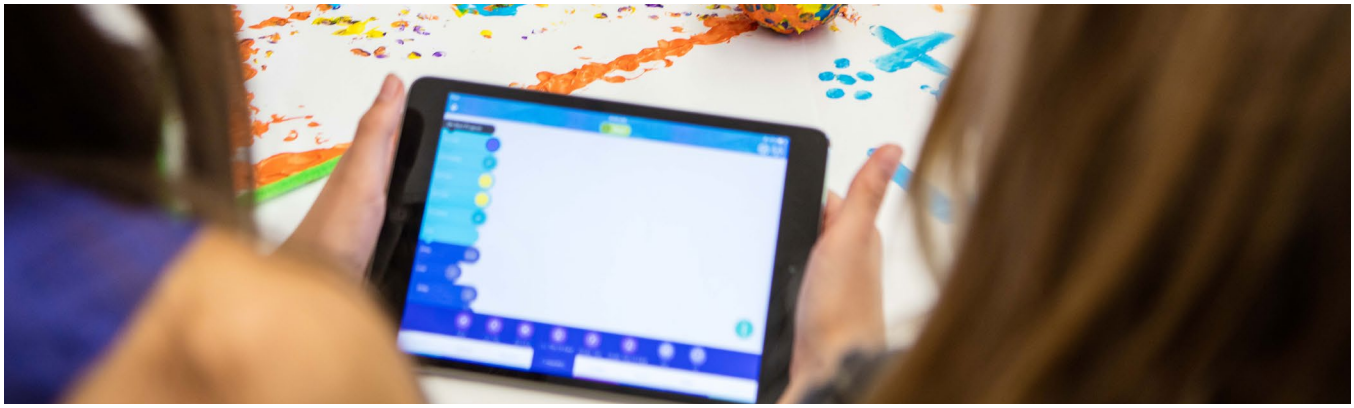
Sphero can be used in and out of the classroom in formal and informal learning environments. Below are some ways Sphero is being used in different learning environments:

Elementary, Middle, High School Classrooms and Homeschool

In classrooms and homeschool learning environments, Sphero is being used to teach computer science concepts and/or supplement content in any content area (math, ELA, science, art, music, health enhancement, and more). Sphero is incredibly versatile and easily integrated into a variety of learning initiatives such as personalized learning and project-based learning.

Sphero Edu offers three different coding "canvases" - Draw, Block, and Text - that move from beginner to advanced coding skills making it simple to use with learners of all grade and ability levels, from elementary to high school and special education. Students can work collaboratively or at their own pace thanks to the Sphero Edu app, and track their progress on individual or group work.

Introduction to Sphero Edu



Elementary

Elementary aged students are grasping early concepts of programming while fostering 21st century skills through activities such as replicating the solar system, programming characters in a story, or painting geometric shapes with the robot. Students are exposed to real world problems and the 4C's (collaboration, communication, creativity, and critical thinking).

Middle and High School

Middle and high school aged students explore advanced concepts of logic, design thinking, and computer science. Students use the more complex variables, sensors, and text programming of Sphero to take programming to the next level and learn the foundations of JavaScript.

Higher Education

In higher education and post-secondary learning environments, learners are using Sphero to provide a hands-on method to learn the programming language JavaScript and advanced coding skills. Sphero's built-in sensors are also used to measure forces and gather data, such as acceleration, velocity, and pitch, during scientific experiments.

Clubs

Sphero is being used in robotics, coding, and STEM clubs that may meet before/after school or during lunch. Clubs can be an effective way to attract students, especially underrepresented groups, to participate in STEAM-based learning activities and creative challenges.

Introduction to Sphero Edu

Competitions

The hands-on nature of Sphero makes it the perfect tool for competitions. Competitions are a great way to bring younger and older students together. Kids can complete engineering challenges, program robots, and compete against peers.
Think beyond formal competitions and organize a competition for your school such as Sphero Olympics, STEAM Night, or Evening of Code.

Makerspaces

Makerspaces are being implemented in schools everywhere, especially library programs, to encourage creativity, innovation, and hands-on learning. Sphero is the perfect addition to makerspaces, giving students an opportunity to learn by doing, tinker with robotics, and experiment with open-ended programming challenges. Refer to the Makerspace Guide for tips on bringing Sphero into a makerspace.

Why is Sphero Edu a Valuable Educational Tool?

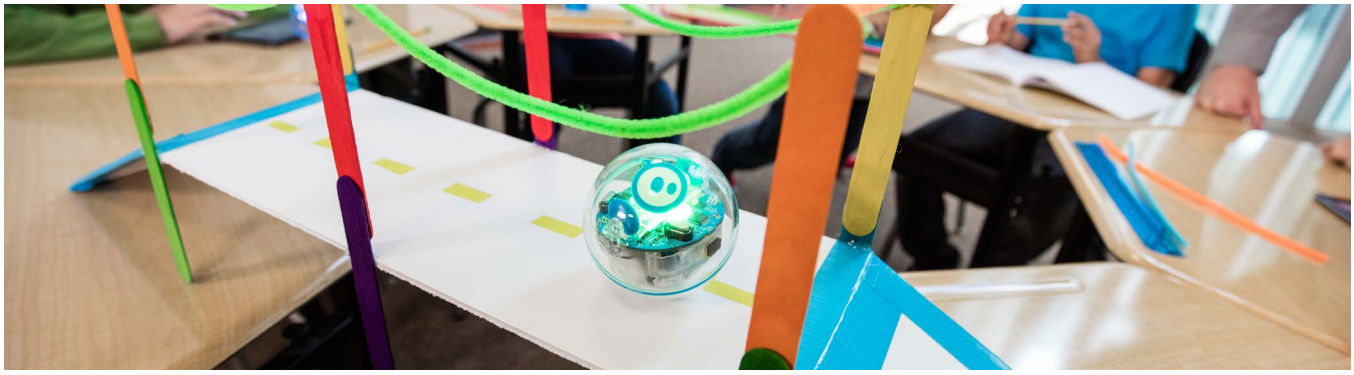
Sphero is an incredibly versatile educational tool making it an ideal fit for STEAM, project-based learning, personalized learning and more.

Educational Value and Alignment to Standards

Sphero can be used to teach computer science concepts and/or supplement content in any content area. Sphero provides extensive learning activities that are aligned to Common Core ELA and Math, Next Generation Science Standards, and ISTE standards for easy integration into curriculums.

Teachers don't have to be programming experts to integrate Sphero into their classroom instruction. Sphero Edu offers three different coding "canvases" - Draw, Block, and Text - that move from beginner to advanced coding skills. The three coding canvases make it easy for teachers to target learner abilities and even differentiate learning. These three coding options make it easy for teachers to use Sphero with students of all ages and abilities. Teachers do not need additional resources or activities to use these different canvases – the same Sphero used in a first grade classroom can also be used in a high school.

Why is Sphero Edu a Valuable Educational Tool?



STEAM Education

Sphero robots provide real life learning to science, technology, engineering, art, and math. A few examples of the STEAM integrations built into the Sphero Edu learning activities are:

- Build a bridge and drive Sphero across to test the structural integrity
- Create a long-exposure photograph
- Learn the math and science behind Olympic sports to maximize Sphero's long jump distance

In addition to the learning activities provided by Sphero, review the resources below for some ideas for integrating Sphero into STEAM education:

- Teaching Physics with Sphero Robots
- How to Use Sphero the Robot for Incredible STEM Lessons

Project Based Learning (PBL)

It is easy to expand your Sphero learning activities into PBL or include Sphero robots as a part of PBL. Are you new to PBL? Visit the Buck Institute for Education website to learn more and find a variety of resources including planning documents and rubrics:

- Buck Institute for Education
- Buck Institute for Education Essential Project Design Elements

Personalized Learning

Goals, content, method and pace can all vary in a personalized learning environment. The hands-on nature of Sphero makes it a perfect tool to tailor to the preferences, interests and pace of various learners. Review these resources to learn more about personalized learning:

- Personalized vs Differentiated vs Individualized Learning
- 3 Ways to Personalize the Learning Experience

Why is Sphero Edu a Valuable Educational Tool?

Computational Thinking

Sphero is the perfect platform to help students develop computational thinking skills and the mindsets that are necessary to compete in a global, technology-rich economy.

Sphero serves as both a coding platform and self-contained robotics system that can be used by any teacher or student, without any background in computer science. In addition, Sphero has a sophisticated set of sensors (called an inertial measurement unit or IMU) used for measuring forces and gathering data during scientific experiments.

Here are some examples of how Sphero activities help build a computational thinking mindset, with or without writing code.

Computational Thinking Fundamentals	What This Means	Examples in Sphero Activities
Decomposition	Does the activity encourage the student to break a larger problem into smaller problems to come up with a solution?	Students solve complex problems through smaller, more manageable tasks.
Pattern Recognition	Does the activity encourage the student to identify common patterns?	Students identify common patterns like movement, speed, light, time, or direction of the Sphero.
Pattern Generalization and Abstraction	Does the activity encourage the student to make connection about common patterns?	Students connect concepts, such as speed & direction to how far Sphero traveled.
Algorithm Design	Does the activity encourage the student to create logical steps that can be automated based on those patterns and connections?	Students create programs to control the Sphero. These often require using patterns like loops, which can be used to automate repeated behavior.

Why is Sphero Edu a Valuable Educational Tool?

Explore the following computational thinking resources for more ideas:

- ISTE's Computational Thinking Toolkit
- Hour of Code Activities - Use Sphero robots to make hour of code activities come to life!

21st Century Skills

Sphero is the perfect platform to help students develop the mindsets that are necessary to compete in a global, technology-rich 21st century economy. Integrating Sphero into learning activities provides an opportunity to enhance 21st century skills such as creativity, collaboration, critical-thinking, and communication. The Sphero Edu App allows collaboration with other users around the globe to innovate the world of education and empower anyone to program. Refer to the Framework for 21st Century Learning for more information and definitions of 21st century skills.

Get to Know Your Robot

Inside the Robot

Sphero robots are approachable and simple to use, yet are packed with incredibly complex tech. Here's the gist of the magic inside your ball:

- **Circuit board** - The printed circuit board (or PCB) is what houses all of the electronics in your Sphero that process commands into actions. A Bluetooth chip within that board connects to your device, receives your commands, and sends them to the IMU, or Sphero's brain, to process. Also built into the circuit board are the gyroscope and accelerometer, which detect your Sphero's movements, acceleration, and turning, helping to keep it oriented and driving where you tell it to drive.
- **Electric motor** - An electric motor turns the wheels that move your Sphero while the pressure from a stabilizer on top allow the wheels to move your robot, keeping it from going in circles inside the ball.
- **Charger** - To keep Sphero's tech sealed inside its shell, it uses inductive charging rather than wiring to the batteries inside. Place it on the base and it'll charge right through the polycarbonate.

Get to Know Your Robot

Compatible Devices

Spheros must have an accompanying device to operate the robots. Here are some tips regarding these devices:

- A list of compatible devices for each robot type may be found at https://www.sphero.com/devices.
- Chromebooks can be used with Sphero Edu thanks to the free Chrome Extension.
- The larger the screen, the better.
- If you are in need of mobile devices to run your Spheros, retired smartphones work great.
- Consider asking for old smartphone donations from your community.
- Remember to keep the mobile devices updated.
- Remember to keep the Sphero Edu and other Sphero-related apps you may be using on the mobile devices updated.

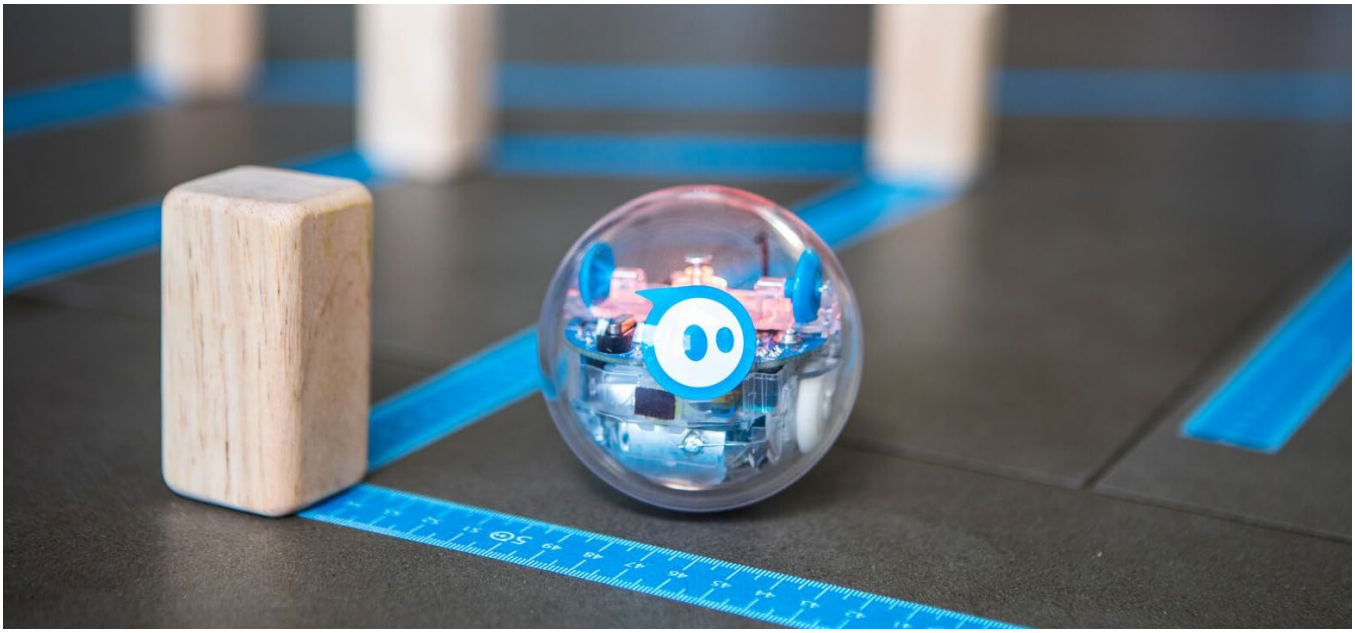
Charging

Follow these tips to get the longest battery life out of your Sphero!

- How to charge your Sphero:
    - Sphero robots charge via Micro-USB cables and dedicated AC wall plugs. Computers can be used to charge Spheros as well but typically this will increase charging time due to the typically lower voltage output of a computer USB port.
    - Place Sphero on the charging cradle heavy side down. Spheros will not charge if they are not placed heavy side down in the charger. Ensure students know how to place Spheros in the charger.
    - Plug power cord into a wall outlet. The blinking blue charger lights indicate Sphero is charging.
        - If students are placing Sphero's in the chargers, check at the end of class for the blue blinking light.
    - Charge for 3 hours or until the blue charger light stops blinking. It is OK to keep Sphero on the charger for longer. Remove Spheros from the cradle to get the party started.
- Make sure to charge your Sphero robots and mobile devices the night before use.
- Battery life slightly varies depending upon the specific robot - SPRK+, Ollie, Mini, etc. Keep in mind battery life when planning Sphero use in your learning setting. For example, if you plan to use Spheros in back to back classes.
- It is best to fully drain Sphero robots by using until the battery is low, and then fully charging for about 3 hours or until the blue charging indicator light stops blinking. If you repeatedly charge and play with partial charges it will decrease the battery life.
- Keeping Sphero robots on the charger for long periods of time will not decrease battery life.

Get to Know Your Robot

- If you are going to store your Sphero for longer than a week, we recommend putting the robot to deep sleep by following the simple steps below:
    - Place on its plugged in charging base
    - Press and hold the button on the side of the charging base while simultaneously lifting the robot off of the base
    - While the robot is off the base, unplug the charger from the power source
    - Your robot is now in deep sleep!
    - To wake, simply place the robot on the charging base and plug it in
- Before connecting to Sphero Edu, ensure your robot is fully charged and not in deep sleep
- Do not store Sphero below 50 degrees F or above 80 degrees F (Doing so can lessen battery life).



Storing & Labeling

Here are some tips for storing your Sphero robots:

- Number your Sphero robots with a label maker or permanent marker. Also consider numbering the Sphero chargers and/or case to make for easy matching during clean-up.
    - If you have designated mobile devices for Sphero use, number the mobile devices and always pair the same number mobile device with the same number Sphero (for example, mobile device 1 is always paired with sphero 1).

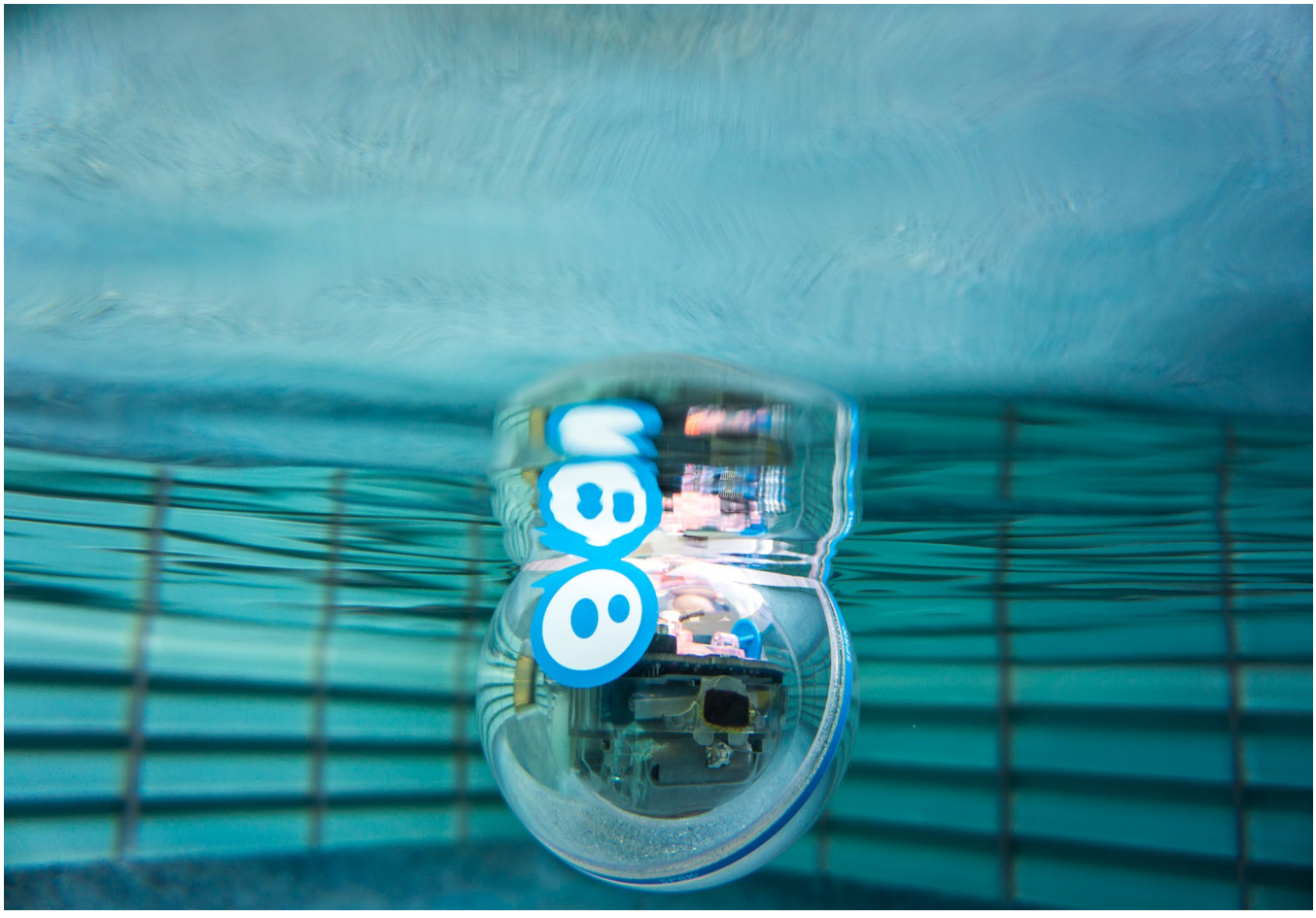
Get to Know Your Robot

- The SPRK+ Power Pack™ lets you charge, store, and carry SPRK+ robots by the dozen. Built with an integrated cooling system, your robots can charge safely all from one place. If you don't have a SPRK+ Power Pack™ carts and powerstrips may help with storage, charging, and organization.
- Assign each learner or group a Sphero number. This helps with set-up, clean-up and accountability for taking care of the robots.

Care and Maintenance

Here are some tips for storing your Sphero robots:

- Sphero robots are waterproof; to clean simply wipe your robot with warm soapy water and dry it with a towel.
- Sphero robots are also shockproof. Pop it, lock it, drop it. Your ball can handle it. That being said, we don't recommend testing this theory from the top of a tall building.



The Sphero Edu App

Sphero Edu is the Sphero app for programming Sphero robots. It is your hub to create, contribute, and go beyond code with Sphero. Sphero Edu makes it easy for educators, learners and parents to be involved. Learners may build programs and complete activities, educators manage classes and take learning beyond code, and parents may even create accounts for their kids.

What you can do with the Sphero app:

- Drive your robot and change colors.
- Create programs for your robot using three canvas types: Draw, Block, and Text.
- Connect your robots to run programs you have created or search for a host of programs created by the Sphero team and community.
- Set up a classroom with student logins, assign activities and track them in real-time.
- Create an activity and assign it to your class, or share it publicly with the community.
- Find learning activities for different skill levels and content areas aligned to Common Core and Next Generation Science Standards.
- Collaborate with other users around the globe.
- Save your work by creating an account and jump between the apps or website.
- Find models of the Sphero robot to learn about the inner workings.
- Read the JavaScript Wiki to expand your coding knowledge!

Where to Get the App

The Sphero Edu app is available for free in the Google Play store and the iTunes store. The Chrome Extension is available in the Chrome Web Store. After you've downloaded the app, create an account so you can save your Programs and Activities in the cloud.

Connecting with Bluetooth

When you are ready to connect your robot, open the Sphero Edu app on a compatible mobile device and sign in to your account.

Connect your SPRK+ to Sphero Edu by opening the Sphero Edu app and holding your robot next to your device; wait a moment for it to connect over Bluetooth.

If you have a Sphero 2.0 or Sphero SPRK, you need to double-tap it, then pair it in Bluetooth settings before opening the app.

The Sphero Edu App

How to Get Started

To get started, charge your Sphero robot. Once your robot is sufficiently charged, open the Sphero Edu app, and connect your robot using Bluetooth. Then, use the Drive functionality to make your Sphero roll forward.

App Features

The Sphero Edu app includes many features, including:

- **HOME**
  - Feed - Overview of user activity in the Sphero community
  - 3D Models - Learn the inner workings of your robot
- **ACTIVITIES**
  - All Activities - Learning activities and lessons designed for Sphero, consisting of varying skill levels and content areas, that are all aligned to Common Core and Next Generation Science Standards.
  - My Activities - Learning activities created by you.
  - Workbook - Activities you have previously opened.
  - +Create - Create your own learning activities.
- **PROGRAMS**
  - All Programs - Pre-created programs for Sphero. Connect your robot and run!
  - My Programs - Programs you have created. Programs may be created in three different ways designed for learner progression:
    - **Draw:** Beginners can give robots commands by drawing a path that represents code for their robot to follow.
    - **Block:** Intermediate programmers can use code blocks to learn more advanced logic.
    - **Text:** Advanced programmers can use text programming and write their own JavaScript.
  - JavaScript Wiki - Expand your knowledge of JavaScript coding.
  - +Create - Create your own programs for Sphero.
- **CLASSES**
  - Learners - Add and manage your class list and class rosters.
  - Assignments - Assign activities to your classes. Review assignment progress.
  - Moderate - Find the status of activities and programs you have submitted to the Sphero Edu community.
- **DRIVE**
  - Connect, drive and change the colors of your robot. *Note the compatibility guide below for platforms that support this feature.

Sphero Edu Activities

Introductory Activities

Are you wondering where to start with Sphero in your educational setting? The best way is to jump right in and learn by experimentation and play! The Sphero Edu team has developed a series of activities designed to introduce you and your learners to Sphero.

First, we recommend choosing a canvas to learn. The app interface in which you will control the Sphero is called a canvas– and to support a wide range of skills and abilities, we've developed three canvases: Draw, Block, and Text. All three canvases are available in the Sphero Edu app.

Not sure which one to start with? Here is more information about each canvas:

- **Draw** - Uses a drawing interface. Best suited for grades K-5 and all class types.
- **Block** - Uses a drag-and-drop block interface and teaches the logical structure of code. Best suited for grades 3-12 and all class types.
- **Text** - Uses the programming language JavaScript. Best suited for grades 8-12 and classes that focus on computer science and programming.

The Sphero Edu team has developed a series of activities designed to introduce you and your learners to Sphero.

Getting Started with Draw

Draw 1: Shapes: This lesson introduces learners to Sphero by challenging them to draw shapes that represent code and execute that code through the Draw canvas.

Getting Started with Blocks

Blocks 1: Intro and Loops: This lesson introduces learners to Sphero through an overview of the app, how to create programs using block coding, and how to use loops and operators.

Getting Started with Text

Text 1: Hello World: This lesson introduces learners to Sphero through an overview of the text canvas, how to use loops and operators, and tips for getting started with their first lines of JavaScript code.

Sphero Edu Activities

Classroom Management

To create a class in the Sphero Edu app, click on **Classes > Learners** and follow the directions to create a class and add your learners.

- To speed up the process, choose the "Add from Roster" option and upload a CSV file with the names of your learners.
- If you are a Google or a Clever user, you can automatically sync your classes. View more information here: https://edu.sphero.com/about.

If you need assistance visit the Sphero support website: https://support.sphero.com/support/home.

Sphero Edu Activities

If you would like to create your own activities in the Sphero Edu app, click on **Activities > Create** . Once created, you can find your activities under **Activities > My Activities**. To assign an activity to your class, navigate to the activity and click **Assign.**

Sphero Edu has a collection of learning activities found at https://edu.sphero.com/cwists/category. All Sphero Edu Activities follow this framework:

- **Exploration:** Activate learner prior knowledge related to the challenge. Consider starting Sphero activities "unplugged," meaning learners begin the activity by planning and brainstorming without the Sphero robots.
- **Skill-building:** Follow with learners completing a guided activity with Sphero to learn the skills needed for the challenge. Make sure to build in time for students to play, learn, and discover.
- **Challenge:** Learners use their new knowledge and skills to solve a problem utilizing Sphero.

Whether creating your own activities or using the Sphero Edu learning activities, consider having additional supplies available for your Sphero learning activities. Example supplies could include cardboard, tape, scissors, paint, and other crafting supplies.

In addition, rubrics are a valuable tool for assessing learning when using Sphero robots. A Creativity and Innovation Rubric supplements Sphero well. Below are links to Common Core State Standards aligned Creativity and Innovations Rubrics for different grade levels from the Buck Institute for Education:

- K-2 Creativity and Innovation Rubric
- 3-5 Creativity and Innovation Rubric
- 6-12 Creativity and Innovation Rubric

Sphero Edu Activities

Grades k-2 & 3-5

The activities below require knowledge of the Draw or Blocks canvas. Many of these lessons have a slight focus on different curriculum areas as indicated. You can find more lessons designed for grades K-2 or 3-5 on the Sphero Edu app or website. All activities are easily searchable by title, subject area, grade level, standard or key word.

- Draw 1 - 3 (Introductory Activities)
- Blocks 1 - 4 (Introductory Activities)
- What a Character (ELA)
- The Heart (Science)
- Area of Rectangles (Math)
- Maze Mayhem (General)
- Perimeter (Math)
- Light Painting (Art)

Grades 6-8

Most of the activities below require knowledge of the Blocks canvas. Many of these lessons have a slight focus on different curriculum areas as indicated. You can find more lessons designed for grades 6-8 on the Sphero Edu app or website.

- Blocks 1 - 4 (Introductory Activities)
- What a Character (ELA)
- The Heart (Science)
- Secret Message (Social Studies)
- Planetary Motion (Science)
- Helmets for the Win! (Science)
- Avoid the Minotaur (General)

Grades 9-12

Most of the activities below require knowledge of the Blocks or Text canvases. Many of these lessons have a slight focus on different curriculum areas as indicated. You can find more lessons designed for grades 9-12 on the Sphero Edu app or website.

- Blocks 1 - 4 (Introductory Activities)
- Text 1 - 4 (Introductory Activities)
- The Heart - High School (Science)
- Atom Tracks - High School (Science)
- Fortune Teller - High School (Math)
- Morse Code - Data Structures (Computer Science)

Sphero Edu Activities

Engineering and Robotics Activities

Are you teaching engineering or robotics? The activities below encourage teamwork, collaboration, and creativity. Many of them employ open challenges that require students to practice engineering design principles and make use of room, time, or material constraints.

Activities to explore:

- Avoid the Minotaur
- Bridge Challenge
- Chariot Challenge
- Maze Mayhem
- Sphero City
- Tractor Pull
- Swim Meet
- Jousting Tournament
- Build a Sphero Run

Coding Sequence

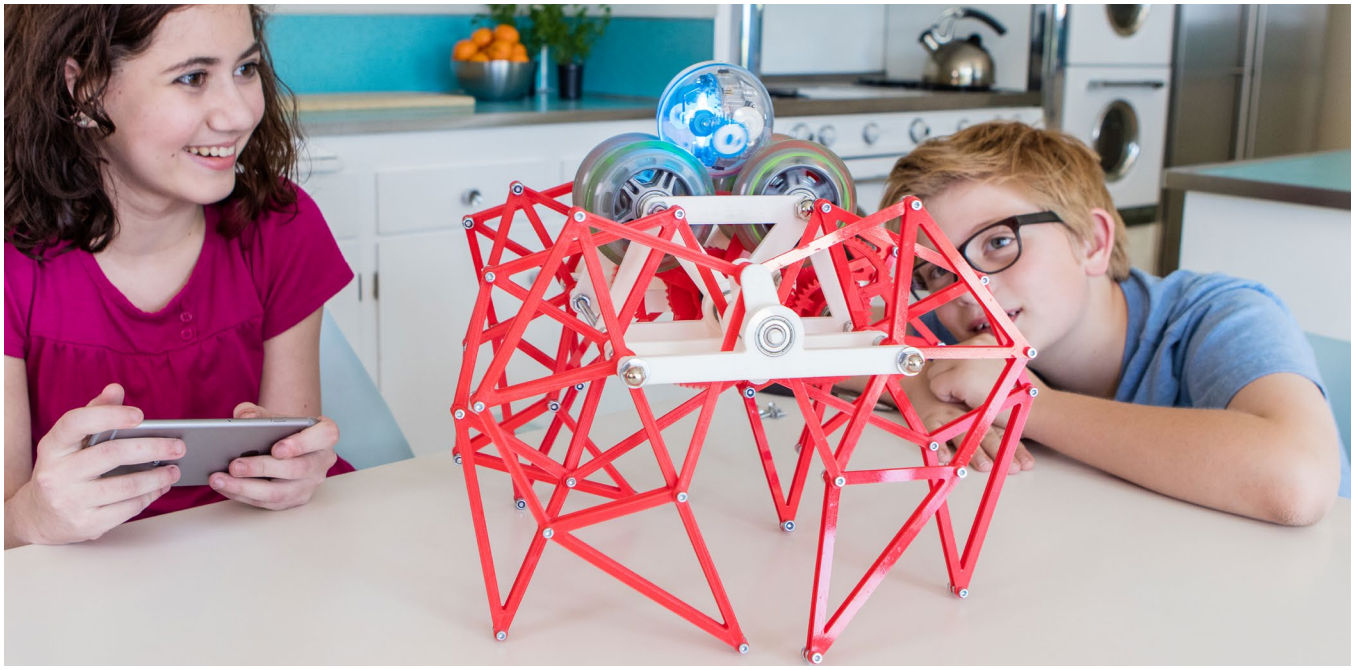
Are you teaching your learners to code? Follow the sequence below to introduce your learners to computer science fundamentals, JavaScript syntax, and industry standards like pseudocoding, debugging, and refactoring.

Note: These activities are considered advanced and are primarily geared for students in grades 9-12. While you do not have to complete these in the order below, many of them build upon the skills gained in previous activities.

Activities to explore:

1. Text 1: Hello World
2. Text 2 - Conditionals
3. Text 3 - Loops & Variables
4. Text 4 - Functions & TDD
5. Morse Code - Data Structures
6. Fun, Fun, Functions
7. Recursion & Ocean Colors

Supplemental Resources



Sphero Created Activities

All Sphero Edu activities can be found at https://edu.sphero.com/cwists/category. Find an activity that meets your learning objectives and continue learning with Sphero!

Thursday Learn Day

On Thursdays, the Sphero Edu team posts new programs that you can try with your learners! You can find these programs here: https://edu.sphero.com/remixes.

Troubleshooting Website

You can find support for most Sphero issues on our support website: https://support.sphero.com/support/home.

If you are having connection troubles, try the following strategies:

- If the robot does not connect to Sphero Edu, place your robot on the charger for 15 seconds to ensure it's not in deep sleep, then try again.
- If your robot is disconnecting often and you are in a room with a lot of users, try turning off wifi and bluetooth on the devices that are not being used with a robot. Limiting a room to about 20 robots and programming devices or less is a good rule of thumb.

Supplemental Resources

Javascript Wiki

The Sphero Edu documentation is located here: https://sphero.docsapp.io/docs/get-started. This wiki is a guide for students and teachers to learn how to program Sphero robots with JavaScript, the most common web programming language in the world.

Research / Case Studies

Programming with Sphero Edu's app-enabled robots fosters skills that lead to a wide variety of careers. However, when it comes to mainstream coding instruction, demand still outweighs supply. We're here to close the gap and help bring the future into classrooms today.

STEM and STEAM curriculum are a critical part of K-12 education, and superlative approaches to sharpening 21st-century skills will hinge on better coding instruction. The best solutions include coding that is interactive and fun, but also strategies that go beyond code by incorporating robotics and technology with collaborative STEAM activities, nurturing students' imaginations in new and exciting ways. These types of solutions appear to be moving the needle for school districts looking to improve coding instruction. According to the CDE survey, respondents who use Sphero solutions were more likely to say that coding instruction was meeting students' needs.

Instead of looking at coding as a requirement to fulfill, K-12 schools and school districts should consider it an open-ended form of art. Better coding instruction sparks divergent thinking and creativity; these concepts, coupled with the real-world benefits of learning how to program, will change the playing field for every student in America over the next five years and beyond. Read more about coding and STEM/STEAM skills in our schools by reading Cracking the Code: Six keys to better coding instruction in K-12 education, a case study with Sphero in the K-12 classroom.

Marketing Resources

The brand assets for Sphero Edu are located at: https://brandfolder.com/spheroedu. This Brandfolder is for educators and community members seeking logos, images and general up to date information about Sphero Edu.

Administrator Guide

Share the Administrator Guide with principals, curriculum directors, instructional technologist and any other administrators at your school that want to learn more about Sphero Edu.

Supplemental Resources

Makerspace Guide

Review the Makerspace Guide for specific ideas for integrating Sphero robots into maker learning.

Social Media

Connect with Sphero Edu online for ideas, tips, and resources:

- Facebook: https://www.facebook.com/GoSphero/
- Twitter: https://twitter.com/spheroedu
- Instagram: https://www.instagram.com/sphero/
- Pinterest: https://www.pinterest.com/sphero/

Sphero Blog

Visit our education blog for updates, tips, and suggestions: https://medium.com/@SPRK.

Support

- Support Home
  - Knowledge Base
  - Community Forum
  - Manuals
- Contact Us

Secuity & Privacy

We are dedicated to ensuring Sphero Edu is safe and secure to use. Some of our efforts include third party testing, annual audits, and a bug bounty program.

We are COPPA compliant, have signed the Student Privacy Pledge, and publish all of our privacy practice agreements online. Visit https://www.sphero.com/privacy for more information.