



Guide to Elementary Coding Activities

Grades 3+

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Should You Be Teaching Coding in Your Classroom?

You likely already know that coding is an increasingly important skill for students to learn, as programming jobs are one of the fastest-growing in today's job market. However, you may be concerned that you don't know enough about coding to teach it yourself.



Many people think they need to have an advanced degree in computer science if they want to introduce their students to coding in the classroom. While that may have held true decades ago, coding has become far more accessible to all ages, thanks to web-based coding programs that support all of the different levels of learners and the various coding languages.

Another common myth is that coding is exclusively in the realm of science or math classes. But coding is relevant across the curriculum and can be incorporated in ELA, art, social studies and other subjects. Coding is another tool that can be used to engage students in the content you are covering while exposing them to computer science and computational thinking outside the traditional computer class. By introducing your students to coding, you'll be helping them build a multitude of important skills that will help them in all areas of study as they get older.

Skills Students Learn With Coding

Critical Thinking

Coding requires students to take the time to think about every step of the process and look at problems from different angles. This is a skill that translates into many other subject areas as well.

Creativity

Students have nearly unlimited options to create through coding. Each student in a class can write different code to accomplish the same task, or come up with their own innovative ideas.

Math

Writing code and creating functions can offer opportunities to help reinforce core math concepts.

Problem-solving

Coding offers opportunities for students to solve complex problems. This often requires thinking out of the box and trying multiple solutions.

Determination and Courage to Try New Things

In coding, students often have to try several different approaches before they are successful. By discovering that it can take time and effort to solve a problem, students are learning that determination pays off. This is also a great way to encourage students to try new things.

Other Benefits of Coding in the Classroom

Incorporating STEAM Across the Curriculum

Coding is an excellent avenue for supporting STEAM across the curriculum. Including basic STEAM concepts in ELA or social studies classes will help students become stronger learners in all areas of study.

Self-paced Learning

Every student will have a different level of skill when it comes to coding. A big benefit is that the nature of coding allows students time to explore and work at their own pace.



Giving Students Choices

Coding offers students the opportunity to explore different coding languages and the types of problems they want to address with their code. This freedom to explore and choose will increase student engagement and help build an interest in coding and STEAM in general.

Becoming Part of the Coding Community

The coding community is filled with coders who are eager to support one another. GitHub is one of many different coding spaces on the Internet where users share code. This can be helpful not only for students but for teachers as well, as it can help you grow your skill set to support students. Kids age 13 and up can create their own accounts on GitHub.

Get Started With 10 Coding Lessons

Below you'll find 10 coding lessons to help you introduce students to the world of coding. It's important to note that you don't need to tackle all of these lessons to successfully bring coding to your classroom. One or two of the lessons for the school year would be a great introduction to coding. Remember that you are the expert in your class and you can modify the lessons and implement them in ways that are comfortable for you and make sense to your students. Doing too much before you are ready could be overwhelming for you and your students. Take coding one step at a time, and you and your students will discover success.

1. Cue Robot Art

Skills learned: Block coding, geometry, problem-solving, sequencing

Grade range: 3–5

Time: One 50-minute class period

Supplies: [Cue Robot](#), [Cue Robot Sketch Kit](#), large sheet of butcher paper or bulletin board paper, pictures of different shapes, iOS or Android device

Goal: Students will re-create geometric shapes by coding Cue and using the Sketch Kit.

Steps:

1. Break students into groups so each group has a Cue Robot with the Sketch Kit adapter attached, a connected device, and a large piece of butcher paper. (This lesson can easily be adjusted based on the number of Cue robots you have available and the number of students in class. The following example works for six students in a group.)
2. Give each group one picture of a shape. This can be the same shape for each group, or each can have a different shape.
3. Each group needs to code the Cue to draw the shape they were given on the piece of paper in front of them. The twist is that only one person can code one block at a time. This gives every student in a group an opportunity to code what the Cue needs to do next to create the shape. The students should try to code the drawing of the shape using the fewest blocks possible.
4. Give students 20–25 minutes to problem-solve the needed code for the shape and to experiment with their code. (More sheets of paper might be needed if students do a lot of experimenting with their code.)
5. Have students share their code with class and have the Cue draw out the shape for others to see.

Extensions: If students were all given the same shape to code, have students compare their code and see what is similar and what is different about their codes.

If students were given different shapes, have the students combine their codes to create cool geometric art on a fresh piece of paper.

Challenge students to create more complex shapes with eight or more slides.



2. Cue Story Time

Skills learned: Block coding, storytelling, writing, sequencing

Grade range: 3–8

Time: Three 50-minute class periods

Supplies: [Cue Robot](#), iOS or Android device, pencil and paper

Goal: Students will write a story and code Cue to tell the story to the class.

Steps:

Day 1:

1. Spend time with the students sharing the different parts that can make up a story. Emphasize a beginning, a middle and an end. Using stories shared in class is a good way to model the format for the students.
2. Have students number a piece of paper with 1, 2 and 3, making sure to leave space to write between the numbers.
3. Have students write a story that Cue might tell to class. This could include jokes or just everyday things Cue might do during class. The story does not need to be very complex. It should have 2–3 sentences for each part.
4. Next, students should write notes on what types of things the Cue robots should do while telling the story. Will it pace back and forth while it tells the story? Maybe it will interact with other objects placed around it. Writing the story and planning the movements should take the entire first class period.

Day 2:

1. Each student should open the Cue app and begin to record the audio for their story. There are 10 slots to record audio. Each sound file can only be 10 seconds long.
2. Students should test their stories with Cue as they build their story.
3. Students should gather any props they might need for their story.

Day 3:

1. Students will use Cue to share their stories with class.

Extensions: Have students write code to allow for multiple Cues to tell a story together.



3. Dash Dance Contest

Skills learned: Block coding, sequencing

Grade range: Grades 3–4

Time: One 50-minute class period

Supplies: [Dash Robot](#), radio or other music-playing device, iOS or Android device

Goal: Students will create an original dance for a Dash Dance Party.

Steps:

1. Discuss with students the way that a sequence works in code.
2. Show students an example of simple turns and movements.
3. Have students work in groups of 2–4 to create their own dance moves. Each Dash should dance for around 45–60 seconds.
4. Have students work as a team to code their dance moves into the app.
5. Dance Party! Have all students begin their dance party at the start of the music. (And be sure to show students some of your own dance moves!)

Extensions: Have students work together to choreograph a dance featuring multiple Dash bots.



4. Dash Fashion Show

Skills learned: Design, listening, measuring, block coding, sequencing

Grade range: 3–6

Time: Three 50-minute class periods

Supplies: [Dash Robot](#), iOS or Android device, assorted fabric and crafting materials, painter's tape, pillowcases or other like-size fabric

Goal: Interview other students and design a costume for Dash. Code Dash to walk the runway and showcase the outfit.

Steps:

Day 1:

1. Show students an example of a runway fashion show. Point out how the models walk down the runway, stop, spin and walk back to where they came from.
2. Break students into groups of 3–4 with one Dash per group. It is important to have an even number of groups.
3. Pair up groups so each group has a partner group. Each group will be designing the outfit for its partner group's Dash.
4. The two groups should interview each other on the types of things they would like to see designed for their Dash. Students should take notes on what the other group wants designed for their Dash.
5. Students should break off into their own groups and start to design the outfit for their partner group's Dash.

Day 2:

1. Using painter's tape, mark out the runway. Hallways are a perfect long space to do this. It is important to show the runway to the students because they will need to take measurements and figure out how long each action needs to be to get their Dash to walk the runway.
2. Students will work to bring their design to life using the crafting supplies. Make sure students do not use hot glue or other adhesives that might damage Dash.
3. Students should program their Dash to be able to walk the runway. They can add whatever extra moves they want, but Dash needs to walk to the end of the runway, pause, turn 360 degrees, pause, turn 180 degrees and walk back.

Day 3:

1. Last looks! Groups should be given five minutes for any last minute touch-ups on their Dash's outfit. Once they are complete, students should cover their Dash with a pillowcase or fabric to keep the design secret.
2. Choose some music and let the fashion show begin!

Extensions: Instead of having students design clothes for other groups, connect with another class or grade and have students interview those students. Hold a fashion show for those students.



5. Sphero® Bridge Construction Company

Skills learned: Designing, measuring, block coding, sequencing

Grade range: 5–12

Time: Four 50-minute class periods

Supplies needed: Sphero, iOS or Android device, assorted light building materials (Popsicle sticks, straws, spaghetti noodles, etc.), glue sticks, scale, painter's tape

Goal: Students will create the lightest bridge possible to allow Sphero to get safely across the river.

Steps:

Day 1:

1. Show students examples of different types of bridges from around the world.
2. Break students into groups of 2–3 with one Sphero per group.
3. Mark off a “river” in your room. The width of the river will determine the difficulty of the lesson. Wider rivers will require students to build different types of bridges.
4. Students should see all of the materials that are available to them to construct their bridge and ramp.
5. Students should research different bridge designs, take the needed measurements and start to create their own bridge.

Day 2:

1. Students should start construction of their ramp and bridge.
2. Students should begin to write the code to move the Sphero across the bridge.

Day 3:

1. Each bridge should be weighed using the scale.
2. Students will set up their bridges and ramps and run the code to get their Sphero across the bridge.
3. The group that created the lightest bridge that allowed Sphero to cross without collapsing is the winner.

Extensions: Make some changes to the parameters of the contest (e.g., require height minimums for the bridge).



6. Sphero Labyrinth

Skills learned: Designing, block coding, sequencing

Grade range: 3–8

Time: Two 50-minute class periods

Supplies needed: Sphero, iOS or Android device, pencil and paper, painter's tape

Goal: Students will code their Sphero to navigate an obstacle course created by other students.

Steps:

Day 1:

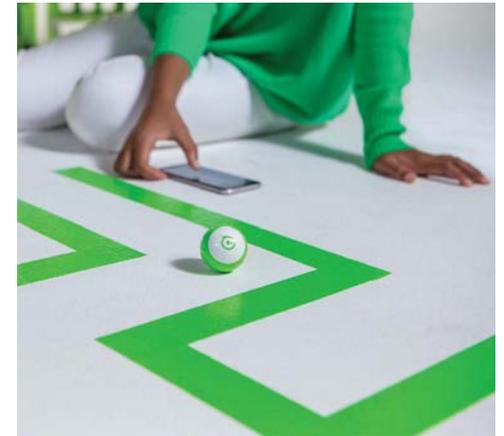
1. Show students an example of a marble maze labyrinth. Examples can be found on YouTube.
2. Break students into groups of 2–3 with one Sphero per group.
3. Students should sketch the first draft of their labyrinth on paper.
4. Students will study their draft and make any necessary changes.
5. Once students have finalized their labyrinth, they should use the painter's tape to re-create it on the floor. (If more space is needed, consider using the gym or use chalk and head to the parking lot.)
6. Once the labyrinth is created, rotate the groups so that each group is with another's labyrinth.

Day 2:

1. Give students a set amount of time to code Sphero to navigate the labyrinth. (This can be adjusted based on the time you want to give the students to accomplish the task.)
2. Once the set time has expired, each group should take a turn having their Sphero navigate the labyrinth.

Extensions: Connect with another class and have each class design their own labyrinths for the other class to create.

Create a giant labyrinth that has multiple entrances, with the goal for the Sphero to get to the center. Have students compete to get their Sphero to the center first.



7. Sphero Delivery Service

Skills learned: Designing, block coding, sequencing

Grade range: 3–8

Time: Three 50-minute class periods

Supplies needed: [Sphero](#); iOS or Android device; pencil and paper; scale; crafting supplies (Legos, wheels, Popsicle sticks, straws, tape, cardboard, etc.); miscellaneous action figures, pens, pencils, Lego figures, etc.

Goal: Students will create a device that allows the Sphero to deliver items to a predetermined location. The group that moves the most total weight in the set amount of time wins.

Steps:

Day 1:

1. Show students examples of [Sphero Chariot Races](#) on YouTube. Explain that the principle is the same, but that the students need to develop a model that allows them to transport items from the room.
2. Break students into groups of 2–3 with one Sphero per group.
3. Show students the starting and end point of the delivery and give them a time limit to make all of the deliveries (2–3 minutes is a good start time). You can choose to mark the path using painter's tape or allow the students to figure out the best path for delivery. Note: Students are allowed to place and remove the package once it has reached the start and end point.
4. Students should decide what items they want to deliver, start to design their delivery devices, and plan the code for delivery.

Day 2:

1. Students should prototype their devices and test their codes.

Day 3:

1. Allow students 10 minutes for final practice runs with their prototypes.
2. Bring the groups together and allow each group to make their deliveries during the set time.
3. After each group's turn, weigh the delivered packages. The group that delivered the most weight wins.

Extensions: Have students code the Sphero and create a device that picks up and drops off the package instead of placing it themselves.

Have students deliver a package to the office or another classroom to create a more complex coding problem.



8. Ozobot® Math

Skills learned: Varied math skills, problem-solving, sequencing

Grade range: Grades 3–4

Time: One 50-minute class period

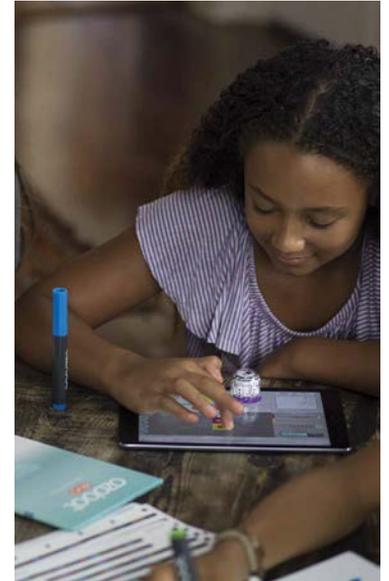
Supplies needed: [Ozobot Bit](#) or [Ozobot Evo](#), [Ozobot Washable Color Code Markers](#), white paper, [Ozobot Color Code Tips](#), [Ozobot Color Codes Reference Sheet](#), devices with Internet access

Goal: Students will solve math problems in class and have Ozobot trace their answers using the Ozobot color codes.

Steps:

1. Break students into groups of 3–4 and give each one an Ozobot and a set of markers.
2. Give the students a math problem to solve.
3. Students will work in their groups using scratch paper to solve the problem.
4. Once the students solve the puzzle, they will use a clean sheet of white computer paper and use the Ozobot color codes to write their answer with the provided markers and chart. They will then have the Ozobot follow the lines of the number they created.

Extensions: Give students a word problem and have them create the equation with the answer using Ozobot to follow their answer.



9. Identifying Similar Objects With Ozobot

Skills learned: Object identification, sequencing

Grade range: K-1

Time: One 50-minute class period

Supplies needed: [Ozobot Bit](#) or [Ozobot Evo](#), [Ozobot Washable Color Code Markers](#), white paper, [Ozobot Color Code Tips](#), [Ozobot Color Codes Reference Sheet](#)

Goal: The students will be able to identify objects that share common traits and use Ozobot color codes to move the Ozobot to each item.

Steps:

1. Beforehand, create a sheet that lists things in a certain category (e.g., animals or items you take to the beach). Leave ample space between the words. Then, make a copy of the sheet for each student.
2. Give each student an Ozobot and a set of markers.
3. Give the students a sheet you have created that has different objects that share similarities and differences.
4. Students must use the Ozobot color codes to have the Ozobot move to each item that has a specified common trait (e.g., have students move their Ozobots to every animal that has fur).

Extensions: Have students create their own sheet to share with the class.



10. Travel the World With Ozobot

Skills learned: Geography, sequencing

Grade range: 3-5

Time: One 50-minute class period

Supplies needed: [Ozobot Bit](#) or [Ozobot Evo](#), [Ozobot Washable Color Code Markers](#), different maps depending on the geography being covered in class (e.g., a map of the US or the entire world), [Ozobot Color Code Tips](#), [Ozobot Color Codes Reference Sheet](#), device with Internet access

Goal: The students will be able to locate places on a map and code Ozobot to travel to each place.

Steps:

1. Beforehand, create a sheet with a series of destinations that students can find on a map (e.g., if using a map of the United States, your list might include the Statue of Liberty, Disney World, the St. Louis Arch, the Grand Canyon and the Golden Gate Bridge).
2. Give each student or group of 2-3 students an Ozobot and a map.
3. Give each student a destination sheet. They will look up the locations of each destination and code Ozobot to travel to them. For example, for the Golden Gate Bridge, students would have their bot travel to central California.
4. Have students record their Ozobot's road trip on a separate sheet of paper detailing each place Ozobot visited.

Extensions: Create the code yourself, upload it to each Ozobot, and create a digital scavenger hunt based on the different stops you created for the Ozobot.

Have students use a mobile device to record their Ozobot's road trip and provide narration.





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