



NINTENDO LABO TEACHER GUIDE

Nintendo Switch system required. Additional systems and accessories may be required for multiplayer mode. Customization tools and materials not included. Adult supervision recommended.

Rated E (Everyone) — Mild Cartoon Violence

Nintendo Labo Educator Guide

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1. INTRODUCING NINTENDO LABO

a. What is Nintendo Labo?

Nintendo Labo™ kits provide the tools (software, cardboard, grommets, string, etc.) to make DIY creations called Toy-Con. The Nintendo Labo: Variety Kit, featured in this guide, includes materials to create a Fishing Rod, Motorbike, House, Piano, and two RC Cars. With these Toy-Con creations, kids can play games through a mix of physical and digital experiences, discover how Nintendo Switch™ technology brings it all to life, and even create and program original Toy-Con projects.

Nintendo Labo is comprised of three core experiences: Make, Play and Discover.

- **MAKE.** In the Make phase, students will collaborate to construct Toy-Con creations. During this phase, students work together and build key 21st-century skills, such as communication, collaboration, problem solving and engineering. The Make phase also encourages a great deal of tenacity in students. Nintendo Labo encourages students to keep trying, even as they face new challenges while working together to build their Toy-Con creations. And the beauty of Nintendo Labo is that you can always go back and fix mistakes.
- **PLAY.** During the Play phase, students enjoy playing with the Toy-Con creations they built! They can play games with their Toy-Con creations on the Nintendo Switch system and engage in challenges incorporating their Toy-Con creations (e.g., relay races or obstacle courses).
- **DISCOVER.** The Discover phase is where things really get interesting! In the Discover Phase, students can use a mode called Toy-Con Garage to interact with their Toy-Con creations in new ways and even design new creations! Toy-Con Garage offers students a simple drag-and-drop programming interface that uses a series of connected inputs and outputs to create different behaviors and interactions.

b. What is Nintendo Switch?

Nintendo Switch combines the power of a home console with the mobility of a handheld device, facilitating unique experiences that can be shared in a variety of settings. The technology inside the Nintendo Switch system and Joy-Con™ controllers—including gyroscopes, accelerometers, an infrared camera and more—powers the Nintendo Labo experience and encourages kids to explore, tinker, problem-solve and, in the process, get excited about design and technology.

c. How is Nintendo Labo used?

Nintendo Labo kits combine physical and digital play patterns that support the development of 21st-century skills such as creativity, collaboration, critical thinking and problem-solving. The kits provide a fun way for kids to explore basic STEAM topics together and be entertained while building a fundamental understanding of the technology behind them.

d. Who is Nintendo Labo designed for?

While grade-school kids are the primary demographic for Nintendo Labo, the kits are designed to have a very broad appeal. Ever since the first two Nintendo Labo kits debuted in April, people of all ages have become amateur inventors using a mode included in the software called Toy-Con Garage. Toy-Con Garage introduces basic principles of programming, allowing anyone to use the tools and

technology within each kit to develop their own imaginative creations, from fully realized musical instruments to analog clocks and much more.

2. WHY IS NINTENDO LABO VALUABLE FOR STUDENTS?

Nintendo Labo is a powerful learning tool that hits on the basics of the following important themes in education today: STEAM, the Maker Movement, project-based learning, personalized learning, and design thinking. Nintendo Labo also fosters key 21st-century skills such as communication, collaboration, creativity, critical thinking and problem solving.

a. Meeting Standards with Nintendo Labo

Lessons or activities that incorporate Nintendo Labo align well to current standards, such as the Next Generation Science Standards (NGSS) and Common Core State Standards (CCSS). The best standards alignment can be made to NGSS for Engineering, Technology, and Applications of Science (ETS).

Elementary school students who demonstrate understanding can:

- K-2-ETS1-1 - Ask questions, make observations, and gather information about a situation people want to change in order to define a simple problem that can be solved through the development of a new or improved object or tool.
- K-2-ETS1-2 - Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.
- 3-5-ETS1-1 - Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.
- 3-5-ETS1-2 - Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

3. BECOMING FAMILIAR WITH NINTENDO LABO

a. How Nintendo Labo Works

The features of the Nintendo Switch system and the Joy-Con controllers bring the Nintendo Labo experience to life. The controllers contain HD Rumble, an IR Motion Camera and gyro sensors and accelerometers that enable motion controls, and the Nintendo Switch screen includes a multi-touch capacitive touch screen.

The Nintendo Switch software included in every Nintendo Labo kit includes interactive instructions for building the various Toy-Con creations; games that kids can play using the Toy-Con creations they've built; tutorials that teach them how everything works; and a variety of digital tools that extend the experience even further. For example, kids can record original compositions with the Toy-Con Piano, create original tracks to race on using the Toy-Con Motorbike, and compete against a friend with two Toy-Con RC Cars. (additional Joy-Con controllers required)

b. Toy-Con Garage

Toy-Con Garage was briefly mentioned above, but there's so much to explore with this mode that we want to dive a little deeper! In this mode, kids can apply what they've learned during the Make, Play and Discover parts of the experience to invent new ways to play. Toy-Con Garage features a simple user interface, touchscreen controls, and handy tutorials designed to get players of all ages started with basic programming concepts. It empowers kids to experiment with their Toy-Con creations—changing their actions and adding new functionality—and even craft original creations

using common household/classroom items like cardboard, construction paper, markers and paper cups.

With Toy-Con Garage, the possibilities of Nintendo Labo are almost limitless, but the core principles are very simple and based on connecting objects called “nodes” together to create different reactions. There are three types of nodes to program. The basic functions are programmed through input nodes (what a user does) and output nodes (what happens as a result). A kid could choose a certain button on one of the Joy-Con controllers as an input node, and a specific sound as the resulting output node. After selecting the input and output, they simply need to connect the two nodes by dragging their finger across the Nintendo Switch touch screen. Kids can take things a step further by adding additional parameters to their program, using a “middle node” (IF, NOT, AND). For example, if the input/output is to push the X Button on the right Joy-Con controller to play a cat sound, then students could add a middle node stating that the sound will only play if the button is pressed AND the controller is tilted downward. Students can use their imaginations to create anything from musical instruments to analog clocks—and even design their own simple games.

4. CLASSROOM MANAGEMENT WITH NINTENDO LABO

Using Nintendo Labo in the classroom gives students a unique opportunity to learn, practice and demonstrate their understanding of ideas in engaging ways. It is important, however, to pay close attention to the management of materials and students so that your experience is successful. There are several things to keep in mind—outlined in this section—that can help your students unlock the power of Nintendo Labo and glean the most from the experience.

We encourage teachers to see the time with Nintendo Labo as part of the critical learning that happens in classrooms every day, helping students apply what they know about your classroom behavior expectations to the Nintendo Labo experience. Be clear that you expect students to uphold classroom norms, even while they are at play.

a. Student Groupings and Roles

Great classroom experiences require everyone to participate. As the teacher, if you can create an atmosphere where all students feel like they are participating and being held accountable for their participation, you’ll decrease the potential for management issues.

It is recommended that students work with Nintendo Labo in pairs or small groups (3-4 students). The ideal number may vary slightly based on the Toy-Con creation (e.g., RC Car, Fishing Rod, or Motorbike) they’re building, and which part of the Session they’re in: Make, Play, or Discover. While you would not want more than four students building a Toy-Con creation together, two small groups could share the same Nintendo Switch system as they build separate sets of the same Toy-Con creation.

Larger groups can be challenging, and students may become frustrated if they’re unable to see the Nintendo Switch screen or contribute to the building process. As with other classroom activities, make sure to mindfully group students and consider setting up the experience as part of a station activity, so all students are set up to optimize focus and success.

In order to ensure higher levels of collaboration, it is important to assign student roles in each group. Roles that have worked well are:

- **Nintendo Switch Driver:** The student(s) who holds and navigates the interactive Nintendo Labo instructions on the Nintendo Switch system.
- **The Builder:** The student(s) who manipulates the cardboard to build the Toy-Con creation.
- **Project Manager:** The student who makes sure that other students in the group stay on task and focused on their roles.
- **Fun Patrol:** The student who makes sure the group is smiling and having fun while learning.

All students should have the opportunity to perform each role, so it is important to alternate throughout the building process—approximately every 7-10 minutes, depending on the complexity of the Toy-Con project.

It is always great to leverage student experts in the room as well. If there are students who have played with Nintendo Labo in the past, you might consider putting them in different groups, so each group has an “expert” or “mentor.”

b. Materials and Organization

There are many—often small but important—pieces needed to build a Nintendo Labo creation, and in the more advanced creations, numerous sheets of cardboard. When multiple groups in a classroom are building a Toy-Con creation, it is very easy to lose, mix-up, or misplace pieces, so storage becomes very important especially if building happens over several sessions.

From the beginning of building, every group should have a small storage bin or paper bag labeled with their group number for storing cardboard sheets and individual pieces needed for the Make process. They should have a separate bag set aside for recycling scraps that are no longer needed. This way, a group can very easily keep track of their parts and pick up where they left off last time.

c. Student Problem Solving

In working with Nintendo Labo, it is important to establish norms and procedures for what students should do when they’re feeling stuck. Students can easily support each other in solving many common challenges, allowing for higher levels of peer support and collaboration. Some educators have employed an “Ask Three Before Me” rule, in which students must ask three peers for help before asking the teacher.

Using the Nintendo Switch touch screen to navigate the interactive instructions, students can hold the rewind or forward buttons to quickly re-watch (or preview) an instruction. The instructions can also be manipulated 360 degrees and zoomed in/out, allowing students to see different perspectives and troubleshoot any potentially tricky steps.

5. GETTING STARTED WITH NINTENDO LABO IN THE CLASSROOM

There are three sections within the Nintendo Labo experience: Make, Play and Discover. All three types of interaction offer distinct benefits and learning opportunities for students. When using Nintendo Labo in the classroom, we suggest offering students experiences from each type of interaction. Below, you will find mini-lessons that will introduce your students to the Nintendo Labo experience.

MAKE

Mini-Lesson: Making with Nintendo Labo

Constructing the RC Cars

A great way to introduce students to building with Nintendo Labo is by having them build an RC Car. This is the simplest Toy-Con creation, allowing students to experience success quickly while familiarizing themselves with many key concepts of Nintendo Labo. Building the RC Car will teach students how to navigate the Nintendo Labo software interface on the Nintendo Switch system and serve as a model for future Toy-Con construction. Below is a sample lesson plan for building the RC Car.

Title: RC Car Construction

Time: 15-20 minutes

Materials: Nintendo Switch, Nintendo Labo: Variety Kit software, RC Car sheet, decorating materials (optional; not included in kit) such as stickers, pipe cleaners, markers and colored tape

Objectives

- Students will understand how to use the Nintendo Switch system
- Students will be able to build and customize Nintendo Labo Toy-Con creations

Steps:

1. Form groups of 2-4. Assign every student in the group to be an A or a B (you might have up to 2 As and 2 Bs in each group).
2. Introduce Nintendo Labo and explain that we will be building the simplest Toy-Con creation, the RC Car. Explain that we will have lots of fun today, but to be successful we will all need to work well as a team!
3. Explain the Nintendo Labo group roles:
 - a. **Nintendo Switch Driver:** The student(s) who navigates on the Nintendo Switch screen
 - b. **The Builder:** The student(s) who creases and folds the cardboard to build the Toy-Con creations.

Explain that we will be switching roles and every student will get to be both the *Driver* and the *Builder*.

4. Hand out 1 RC Car sheet and 1 Nintendo Switch to each group. Pairs of students will work together to build ONE RC Car. NOTE: There are 2 RC Cars on each sheet, so in a group of 4, students can make 2 RC Cars, while sharing the Nintendo Switch system to follow steps as they troubleshoot and build together.

As you (or student volunteers) hand out the cardboard and Nintendo Switch systems make sure to tell students not to touch the materials (or punch out cardboard pieces) or use the Nintendo Switch system until everyone has what they need and they're instructed to begin.

5. Once students have materials, you should give a brief introduction to the controls and navigating the instructions, and then students can begin building.

Remind them of the roles. As will start as the Nintendo Switch Driver while Bs build. Make sure to prompt the students to switch roles every 5-7 minutes throughout the building process.

Encourage students to only punch out the cardboard pieces highlighted in the instructions on the

Nintendo Switch screen.

As students build, they can either lay the Nintendo Switch system flat on a surface or use the kickstand (on the back of the system), with the goal of positioning it so that all students can see the screen clearly.

6. Tell students to pause once they reach the step asking them to insert the Joy-Con controllers into their RC Car. Groups that finish early can begin customizing their vehicles—making sure not to cover the slots on the sides—until all groups are ready to complete the final step and begin the Play experience.
7. Debrief – Bring students back together to discuss their experience. Possible debrief questions: What did it take to be a good builder? What helped you do it well? What challenges did you experience? How did you collaborate? What do you imagine will be important as we build more complex Toy-Con creations?

PLAY

Mini-Lesson: Playing with Nintendo Labo

Playing and Designing with the RC Cars

There are many fun things students can do in the Play phase after building RC Cars! First and foremost, students should learn more about how the Nintendo Switch system works and how it is able to bring Toy-Con creations to life. Then they can play with their RC Cars and explore how to control them using the Nintendo Switch system. They can race, they can joust, they can design obstacle courses to navigate their RC Cars through...the fun is endless! Below is a lesson plan for a relay race.

Title: RC Car Play

Time: 20-30 minutes

Materials: Nintendo Switch, RC Car, Tape, Reflective Stickers

Objectives

- Students will know that the Nintendo Switch system has wireless Joy-Con controllers, which vibrate and that the right Joy-Con has an IR Motion Camera
- Students will understand that the Nintendo Switch system causes the Joy-Con controllers to vibrate, which makes the RC Car move
- Students will be able to use the Nintendo Switch system to control the RC Car

Steps:

Prior to the lesson: Please note that RC Cars function most effectively on even, smooth surfaces (i.e. not shaggy carpet!). Make sure to test your flooring with RC Car prior to the lesson. RC Cars should not be used on desks or counters.

1. Demonstrate how to use the Nintendo Switch system to control the RC Car
 - a. Come back together as a group and sit in a circle to demo the RC Car controls.
 - b. Give a mini-lesson on Nintendo Switch. Introduce the console and the Joy-Con controllers and show how the controllers detach from the console and work wirelessly.

- c. Demonstrate how to use the Nintendo Switch touchscreen and how to control the RC Car using the onscreen controls.
 - d. Discuss how the vibration and vibration frequency affects the speed of the RC Car.
 - e. Explore the IR Motion Camera features and other functionality of the Joy-Con controllers. Put your hand in front of the right Joy-Con controller and show students the camera picture on the RC Car controls on the Nintendo Switch console. Introduce what an infrared camera is and explain that the camera can see basic shapes and movement of objects directly in front of it.
 - f. Ask for two student volunteers to take a turn, each controlling an RC Car. Give each student a turn, tackling some challenges together. For example, try moving toward a specific goal, race a partner, place the RC Car under a cardboard box and use the “night vision” camera to find a hidden object.
 - g. Model how the reflective stickers (included in the Nintendo Labo kit) work to affect the path of the RC Car. Put a reflective sticker on one of the street signs included on the cardboard sheet with the RC Cars. Switch the RC Car controls into auto mode, and show how the car will follow the sign.
2. Students come together to participate in a relay race
 - a. Tell the students that they’re going to compete in a relay race with the goal of being the first RC Car to get to the finish line.
 - b. Mark a starting line and a finish line on the floor with tape, around 3-4 feet apart.
 - c. Each team should place their RC Car on the starting line and stand in a line behind their RC Car. Each student will have 10 seconds to be the Driver on the Nintendo Switch system and control their RC Car. When 10 seconds are up, the first Driver passes the Nintendo Switch to the next student in line and runs to the back of the line. They continue changing drivers every 10 seconds. First team to the line wins!
 - d. Make sure to remind students to hold the Nintendo Switch system with BOTH hands when passing between their teammates.

Other fun Play activities to do with the RC Car:

- **Jousting Match**
 - Create a “Ring” by marking off around a square-foot with tape on the floor. Two RC Cars battle each other to knock the other RC Car out of the designated ring. With students, brainstorm what makes an ideal jousting body for the RC Car, thinking about weight, size, and accessories of the vehicle. Give students some time to create the “Perfect Jousting RC Car.”
- **Obstacle Course**
 - Students create obstacle courses for another to navigate their RC Cars through.

DISCOVER

Below is a lesson plan for how to introduce Toy-Con Garage and for giving students some basic challenges in Toy-Con Garage.

Mini-Lesson: Discovering with Nintendo Labo

Title: Intro to Toy-Con Garage!

Time: 30-40 minutes

Materials: Nintendo Switch

Objectives

- Students will understand what inputs and outputs are
- Students will understand what they can do with Toy-Con Garage

Steps:

1. Come together as a group and sit in a circle to explore what Toy-Con Garage can do. Begin by asking students: Who knows what it means to program or code? Has anyone played with robotics or done any other basic programming? Explain that you're going to do some basic programming with Nintendo Labo in a cool "secret lab" in the software called Toy-Con Garage, which allows you to create basic new behaviors for your Toy-Con creations.
2. Show 1-2 examples of creations that people have made to provide context/inspiration. This is a great resource for finding cool examples: <https://labo.nintendo.com/share/>.
3. Introduce what an input and output is and how to connect these nodes to create interactions. Introduce possible inputs and outputs in the software and experiment together to see how it works. For instance, discuss how hitting a light switch is an example of an input with an output of a light going on. Ask students if they can think of other inputs and outputs that they see every day. Introduce possible inputs and outputs in the software and experiment together to see how it works.
4. Have students complete scaffolded challenges in Toy-Con Garage.

Challenge 1: Tell students to create an input of touch. They'll press input and then select "If Touched." Give students 5-8 minutes to play around with outputs to create a simple touch interaction (for example: light up when touched). Ask groups to share what they created.

Challenge 2: Now students have a basic understanding of how to select inputs and outputs to create basic interactions. Their next challenge is to turn one Joy-Con controller into a musical instrument! Tell them the input they'll be using is "If a Button Is Pressed." Show them how to click settings on the *If a Button Is Pressed* input to select which button they're programming. When opened, the settings for *If a Button Is Pressed* defaults to all buttons on the Joy-Con controller they've selected, so they'll have to deselect all buttons but the one they wish to program.

6. NINTENDO LABO LESSONS

Now that you've done some mini-challenges with your students, you're ready to dive in and explore more! Below are some sample lessons that you can do with your students after they've built and experimented with the RC Car. We recommend building either the Fishing Rod or the Motorbike. They each take around 2 hours to build in a classroom context. Once students have built the Fishing Rod or Motorbike, they'll be very familiar with Nintendo Labo, and they'll be able to let their imaginations run wild and make their own Toy-Con creations using Toy-Con Garage!

Title: Fishing Rod

Time: 3-4 hours

Materials: Nintendo Switch, Fishing Rod cardboard sheets

Objectives

- Students will be able to build the Toy-Con Fishing Rod

- Students will be able to play with the Toy-Con Fishing Rod

Steps:

Make

1. Explain that you will now be leveling up your Nintendo Labo building skills. You're going to build something much more complicated than the RC Car – the Fishing Rod. We'll need to collaborate and work together as a team. Ask students:
 - What did we learn from building the RC Car?
 - What should we keep in mind as we begin building the Fishing Rod?
 - What strategies should we remember that helped us in working well as a team?
2. Organize students into groups of 3-4.
3. Hand out materials for the Toy-Con Fishing Rod and one Nintendo Switch system to each small group. Students will work in their small group to build one Fishing Rod together.
4. As you (or student volunteers) hand out the cardboard and Nintendo Switch systems, tell students not to touch the materials or Nintendo Switch until everyone has what they need and are instructed to begin.
5. Assign each student in the group to be an A, B, C or D. The As will start as the Nintendo Switch Drivers, Bs are Builders, Cs are Project Managers, and Ds are Fun Patrol. Change roles every 8-10 minutes.
6. Once students have materials, they can begin building. Encourage students to only punch out the cardboard pieces highlighted in the instructions on the Nintendo Switch screen.
7. As students build, they can either lay the Nintendo Switch system flat on a surface or use the kickstand (on the back of the system), with the goal of positioning it so that all students can see the screen clearly.
8. Tell students to pause once they reach the step asking them to insert the Joy-Con controllers into their Fishing Rod. Groups that finish early can begin customizing their Fishing Rods—making sure not to add any decorations that interfere with the string, block the Joy-Con controller slots in the reel/handle, or prevent the reel from rotating/the pole from extending—until all groups are ready to complete the final step and begin the Play experience.

Play

1. When students complete their Fishing Rods, they're very eager to test them out! In the Play mode of Nintendo Labo, select Fishing. Introduce the fishing game and how to control the Fishing Rod. Put the Nintendo Switch in the base unit (called the "Ocean") of the Toy-Con creation as instructed on screen, and insert the Joy-Con controllers into the appropriate parts of the Fishing Rod.
2. Ask for a student volunteer to fish with their group's Fishing Rod. Ensure the base of the Fishing Rod that holds the Nintendo Switch system—called the "Ocean"—is set on the floor when playing, as noted in the instructions. Give a few students a turn. If you have more than one Fishing Rod built,

you can have 2 small groups playing, each with a Nintendo Switch. Make sure each student gets a turn to play.

3. Using a similar format to the RC Car relay race, teams race to be the first team to catch 5 fish!

Each team places the Ocean on the floor and stands in a line behind their rods. Each student will have 30 seconds to fish. When 30 seconds are up, the first fisher passes their Fishing Rod to the next student in line and runs to the back of the line. They continue rotating every 30 seconds, and the first team to catch 5 fish completes the challenge!

Remind students to hold the Fishing Rod with BOTH hands when passing between their teammates.

Discover

1. Introduce the Toy-Con Garage design challenge: Create an instrument!

Design Challenge: *In groups of 3-4, design and program a new musical instrument! You can turn the Fishing Rod itself into an instrument, or you can program the Nintendo Switch console and Joy-Con controllers into 3 separate instruments. The Design Challenge will culminate with a concert, in which your team will play a song on your instrument(s)!*

Title: Motorbike

Time: 3-4 hours

Materials: Nintendo Switch, Motorbike cardboard sheets

Objectives

- Students will be able to build the Toy-Con Motorbike
- Students will be able to play with the Toy-Con Motorbike

Steps:

Make

1. Explain that you will now be leveling up your Nintendo Labo building skills. You're going to build something much more complicated than the RC Car – the Motorbike. We'll need to collaborate and work together as a team. Ask students:
 - What did we learn from building the RC Car?
 - What should we keep in mind as we begin building the Motorbike?
 - What strategies should we remember that helped us in working well as a team?
2. Organize students into groups of 3-4.
3. Hand out materials for the Toy-Con Motorbike and one Nintendo Switch to each small group. Students will work in their small group to build one Motorbike together.
4. As you (or student volunteers) hand out the cardboard and Nintendo Switch systems, tell students not to touch the materials or the Nintendo Switch until everyone has what they need and are instructed to begin.
5. Assign each student in the group to be an A, B, C or D. The As will start as the Nintendo Switch

Drivers, Bs are Builders, Cs are Project Managers, and Ds are Fun Patrol. Change roles every 8-10 minutes.

6. Once students have materials, they can begin building. Encourage students to only punch out the cardboard pieces highlighted in the instructions on the Nintendo Switch screen.
7. As students build, they can either lay the Nintendo Switch system flat on a surface or use the kickstand (on the back of the system), with the goal of positioning it so that all students can see the screen clearly.
8. Tell students to pause once they reach the step asking them to insert the Joy-Con controllers into their Motorbike. Groups that finish early can begin customizing their Motorbikes—making sure not to add any decorations that interfere with the movement of the handles/base or block the Joy-Con controller slots in the handles—until all groups are ready to complete the final step and begin the Play experience.

Play

1. When students complete their Motorbikes, they're very eager to test them out! In the Play mode of Nintendo Labo, select Circuit. Note that the system should be inserted into the Toy-Con creation during play, as shown in the instructions on screen. Introduce the racing game and how to control the Motorbike.
2. Ask for a student volunteer to race with their group's Motorbike. Give a few students a turn. If you have more than one Motorbike built, you can have 2 small groups playing, each with a Nintendo Switch system. Make sure each student gets a turn to play.
3. Students can now design new tracks to race on. To begin, we recommend reviewing the Racetrack Design and Advanced Racetrack Design tutorials in the Motorbike area of Discover with your students. Next, in their small groups, have students map out new tracks on a sheet of paper. Remind them that for a racetrack to work, the start and end must meet. Once their new tracks are drawn on paper, groups can take turns creating and testing the new tracks on Nintendo Switch. To create a track:
 - Select Circuit in Play
 - Tap one of the three symbols in the Make your own track! area (each symbol is a save spot for one track)
 - Insert the Joy-Con into the Motorbike as shown on the screen, and follow the instructions there to start making your track by driving along the path you want the track to follow.
 - Note: if the Minibike has been built (its Make instructions are just under and slightly to the right of Motorbike), the Minibike can also be used to make tracks.

Discover

Introduce the Toy-Con Garage design challenge: Create an instrument!

Design Challenge: *In groups of 3-4, design and program a new musical instrument! You can turn the Motorbike itself into an instrument, or you can program the Nintendo Switch console and Joy-Con*

controllers into 3 separate instruments. The Design Challenge will culminate with a concert, in which your team will play a song on your instrument(s)!

Once students have built the RC Car and Fishing Rod or Motorbike, they can begin exploring Toy-Con Garage further and can even create their own Toy-Con creations. Below are some ideas about how you might incorporate Nintendo Labo into projects in your classroom.

- Enhance Your RC Car
 - Have students personalize/decorate their RC Cars, designing a unique and creative style for their RC Car.
 - Use Toy-Con Garage to create a new version of the controls for the RC Car. Perhaps they program a different way to trigger the vibrations that move the RC Car or add a third input node on the screen for a horn.
- Game Design Challenges: There are many different game design challenges that you can give your students, some of which include existing Toy-Con Creations, while others require programming with Toy-Con Garage.
 - Students can brainstorm, design and test games/challenges that other students can play using their Toy-Con creations (e.g. obstacle courses, races or jousting tournaments).
 - Students create games modeled on physical games (e.g. soccer, bowling, or dodgeball) that can be played with the RC Car and Nintendo Switch. Students might bring in other materials such as small balls, blocks, or cardboard.
 - Students design and program simple games on the Nintendo Switch system using Toy-Con Garage.
- Animal Design Challenge
 - Students design and construct an “animal” that moves using prototyping materials and Toy-Con Garage.
- Musical Instrument Challenge
 - Students design and construct musical instruments of various kinds (guitars, drums, pianos, etc.) and perform with them (solo or in a band).
 - Advanced music students can apply music theory to create specialized instruments that include chords, progressions, etc.
- Interactive Toy Invention
 - Students choose an audience then design and construct a toy (e.g. spaceship, doll, tool) for that audience using prototyping materials. They add interactivity using Toy-Con Garage to sell the “fantasy” of that toy, such as triggering sound effects when interacted with in a certain way.
- Computer Science techniques (applicable to any project)
 - Students apply computational thinking by using advanced Toy-Con Garage settings, such as the Counter, AND, and NOT nodes.
- Tech Analysis
 - Students explore, investigate, and list different technologies (i.e., each node and its different settings) that the Nintendo Switch, Toy-Con Creations, and Toy-Con Garage can offer, and build interactive demos that prove what they learned.
- Diorama/Installation Art
 - Students use construction paper and other materials to build a scene that uses the Nintendo Switch system as a backdrop and uses the “Light Up Screen” output to illuminate the scene through cut-out shapes in the paper. Advanced students might create interactive ways to make different parts light up or even animate.

- Mini challenges
 - Students receive a list of mini-challenges that utilize various features of the Nintendo Switch system and Toy-Con Garage mode and build their familiarity with how to use them. Challenges could include things like “Use an AND node to create an output that requires two different inputs at the same time,” or “Create a sound effect that changes its pitch when you tilt the Joy-Con controller.” Different challenges could be worth points, and groups of students can compete to get the most points within a period of time.
- Invention
 - Students design and prototype a device that helps solve an everyday problem or make life easier and more convenient in some way (e.g., an alarm clock that requires a special interaction to turn it off or a pet-food dispenser that is activated by certain movements).

7. LESSON-PLAN DESIGN

You’re now a Nintendo Labo expert and can begin brainstorming and designing new ways to incorporate Nintendo Labo into your curriculum! We encourage you to think about where you might bring in Nintendo Labo as an assessment tool for students to show what they know, similar to how you might have students write an essay, create a slideshow or video, or create a physical art piece or model. Encourage interesting, organic uses of Nintendo Labo across curricular areas in your classroom to activate learning that is both personalized and student-driven.

As you begin designing your own projects using Nintendo Labo, you may find it helpful to think through and use the following project-planning framework, especially as students are getting started with Nintendo Labo. Remember to include elements from Make, Play and Discover to get them comfortable!

Setting the Stage:

Start by setting the stage for your students and give students an opportunity to familiarize themselves with the content/topic, what they will be doing, what the challenge will be or what they will be designing, etc. This may include brainstorming, discussion, and defining the lesson objective.

Questions to consider:

- What prior knowledge might help students with this lesson, and how can you activate this knowledge?
- How can you help students begin to generate questions to engage them in the project and their designs?

Making Connections:

Help your students see relevance to the real world and their everyday learning by drawing upon actual objects, events, experiences and situations. By making connections between the project they are doing and real-life experiences, it allows students to experience or practice different concepts and skills.

Questions to consider:

- How will you make connections between this project and past experiences?
- What materials could they engage with to help build necessary knowledge and understanding? For example, you may want to have students watch video clips, read something or interview people. Perhaps they will need to go on a field trip to see real-world examples or explore inspiring examples online of what others have done with Nintendo Labo.

- What mini-lessons and challenges have prepared the students or are needed to prepare the students for this larger challenge?

Brainstorm Ideas and Plan:

Once you have helped your students understand how the project they will work on fits into their broader learning and their world, they are ready to start to think about how to bring their ideas to life using Nintendo Labo. Give students time to brainstorm what their project will look like and what their final project will be able to do. Introduce them to different brainstorming tools such as capture/cluster, a brainstorming tool in which students write ideas on sticky notes and then cluster the notes into buckets or common themes, and mind-mapping. Help them create a project plan by thinking through the steps they will need to complete to get the project done.

Questions to consider:

- What kind of rubric can I give students to help them understand and plan to meet project expectations?
- Will students be working in groups or individually?
- How will students show their work?
- What choices will students have?

You might consider providing students with a Planning Tool, as they embark on this project. See example on the next page:

STUDENT PLANNING TOOL

Project Name:

Project Team:

PROJECT BRIEF

Describe (write or draw) your project idea:

How will you know if your project is a success?

TASKS:

What tasks will you need to complete to reach your goal, and who will be responsible for each step?

TASK

TEAM MEMBER(S)

1.

2.

3.

4.

5.

6.

7.

TOOLS

Equipment:

Materials:

Resources:

Project Design and Prototyping:

Now that students have a project plan, they're ready to embark on their project design and creation. During this time, students will conceptualize and verbalize their thinking and demonstrate their learning through the development of prototypes. They'll need time to prototype their Toy-Con creations as well as the Toy-Con Garage inputs and outputs.

Questions to consider:

- How will you structure the prototyping process for your students? Will you create a scaffolded process for students? Are there specific steps they must follow?
- What specific programming and domain-specific concepts would be useful for students to understand in order to be successful with this stage of the process?
- What concepts can students discover through experimentation with Toy-Con Garage, and what concepts are best taught through explicit instruction?
- What steps would help students refine and improve their design?
- What questions can you ask to further guide students' thinking and focus them on the goals of the challenge?
- How can you encourage student iteration?
- How and from whom will your students get feedback on their design?

Sharing and Reflecting:

Now is the time for students to share their work with the class or a larger audience and reflect on the success of their projects. Think about how you will structure the sharing process. You might consider organizing an information night where you invite parents and allow students to describe their projects and engage in self-reflection.

Questions to Consider:

- How will students share and document their work?
- How will students know and judge if their design was successful?
- How will you determine if students have met the lesson objectives?

Use the Teacher Planning tool below to support you in designing Nintendo Labo lessons for your classroom.

STEP	WHAT ARE STUDENTS DOING?
Setting the Stage	<i>What prior knowledge might help students with this lesson, and how can you activate this knowledge?</i> <i>How can you help students begin to generate questions to engage them in the project and their designs?</i>
Making Connections	<i>How will you make connections between this project and past experiences?</i> <i>What materials could they engage with to help build necessary knowledge</i>

	<p><i>and understanding?</i></p> <p><i>What mini lessons and challenges have prepared the students or are needed to prepare the students for this larger challenge?</i></p> <p><i>What specific programming and domain-specific concepts would be useful for students to understand in order to be successful?</i></p> <p><i>What concepts can students discover through experimentation with Toy-Con Garage, and what concepts are best taught through explicit instruction?</i></p>
<p>Brainstorm and Plan</p>	<p><i>What kind of rubric can I give students to help them understand and plan to meet project expectations?</i></p> <p><i>Will students be working in groups or individually?</i></p> <p><i>How will students show their work?</i></p> <p><i>What choices will students have?</i></p>
<p>Project Design and Prototyping</p>	<p><i>How will you structure the prototyping process for your students?</i></p> <p><i>What steps would help students refine and improve their design?</i></p> <p><i>What questions can you ask to further guide students' thinking and focus them on the goals of the challenge?</i></p>

	<p><i>How can you encourage student iteration?</i></p> <p><i>How and from whom will your students get feedback on their design?</i></p>
Sharing and Reflecting	<p><i>How will students share and document their work?</i></p> <p><i>How will students know and judge if their design was successful?</i></p> <p><i>How will you determine if students have met the lesson objectives?</i></p>

8. NINTENDO LABO TIPS & TRICKS

Share the following tips & tricks with your students to empower them to repair and troubleshoot any issues with their creations, decorate them, and more.

a. Solving Common Problems

Minor Cardboard Repairs

- Accidents happen, but have no fear! One of the great things about cardboard is that it's very easy to repair. For small rips and tears, a small piece of tape is often all you need.
- If you don't want a repair to be obvious, consider using colored tape and making that part of your decorations—a couple of stripes of colored tape can look very flashy and sporty, and no one has to know there's a little rip under there somewhere.

Major Cardboard Repairs

- If a truly catastrophic accident befalls a creation, there's still hope. Don't give up!
- If the part that has been destroyed is part of an official Toy-Con creation, like the RC Car, you can use the original sheet that the part came from as a template to create a replacement part. (Pro tip: Save those sheets!) Simply take the original sheet, place it on top of a piece of new piece of cardboard that is of similar thickness, trace the inside edges of the hole left by the part you need, and then cut it out of the new piece of cardboard. If this new part then needs to be folded, a ruler can make folding in straight lines easier.
- If the part that has been destroyed is not part of an official Toy-Con creation, take the damaged part, place it on top of a piece of cardboard that is of similar thickness, trace the outer edges of the part, and then cut it out of the new piece of cardboard. If this new part then needs to be folded, a ruler can make folding in straight lines easier.
- When creating a replacement part, be sure to cut out any holes or slots that were present on the original part and include all tabs that were present on the original part as well.

Mysterious Malfunctions

- If a creation suddenly stops working as intended, please refer to this list, which can help identify common issues:
 - Are the Joy-Con controllers properly inserted in the creation?
 - Do the Joy-Con controllers still have a charge? (When in doubt, check for lights on the edge that touches the Nintendo Switch system when they are docked. If no lights are visible, attach them to the Nintendo Switch console to recharge.)
 - Are any reflective stickers coming loose or covered by decorations?
 - Did any important parts fall off?
 - Are any decorations greatly increasing the creation's weight or throwing it off balance?
 - If your creation makes use of rubber bands, did any of them snap?
 - Are any decorations blocking the IR Motion Camera or its field of view?
 - Is too much light hitting the IR Motion Camera's field of view?
 - Revisit the interactive instructions to ensure everything is folded correctly and the appropriate reflective stickers are attached (if needed).

b. Decorating Your Creations

Common Crafting Materials

- Another great thing about cardboard is that it's so easy to decorate. Everyday crafting materials like colored pens and pencils, construction paper, stickers, felt, feathers, stamps, and pipe cleaners can all be used to personalize a creation and make it unique. The supplies you use to stick things to a creation can be decorative too, if you use something like colorful tape or glittery glue.
- When decorating, please keep in mind that certain parts of a creation shouldn't be altered—an RC Car won't be able to attach properly to a pair of Joy-Con controllers, for example, if the slots on its sides are covered up. Similarly, please be mindful of how much weight you are adding to a creation when you decorate it. Since the RC Car relies on vibrations to move, making it too heavy (for example, by decorating it with lots of clay) might throw it off balance or make it too heavy to move.
- When in doubt, test it out! We recommend attaching decorations you think might affect a creation's performance lightly (for example, with a very small piece of tape) and then trying the creation out to see if everything still works nicely before using more tape or glue to fully attach those decorations to the cardboard.

Painting Tips

- Paints can add a nice pop of color to a creation, but please be mindful of the fact that water and cardboard don't always mix—if cardboard gets too wet, it may warp or more easily tear. For this reason, we recommend using paints that don't require added water—like tempera paints, poster paints, and acrylic paints—when decorating a creation.
- If you really want to use watercolor paints or other paints that require added water, we recommend starting with a very small amount of water in the paint, and we also recommend testing the mixture on a piece of scrap cardboard first.

Adding Accessories

- Spare cardboard can be used to decorate a creation with accessories. (After all, what RC Car wouldn't look cute with a pair of cat ears and a tail, or perhaps a fancy hat?) If you want to have spare cardboard on hand to make accessories, consider collecting a few common household items such as toilet-paper rolls, tissue boxes, or cereal boxes.
- When cutting out cardboard to make accessories, please keep in mind that colored pens and pencils might not show up as well on the printed side of a box as they will on the unprinted side. For this reason, it's often helpful to plan on having the unprinted side facing out when deciding how to cut a piece of cardboard.

Decorating and the IR Motion Camera

- The IR Motion Camera at the base of every right Joy-Con controller is a powerful tool that can make Nintendo Labo creations do amazing things—but only if that “eye” can see what's going on!
- If you are decorating a creation that makes use of the IR Motion Camera, please be sure that your decorations don't cover the IR Motion Camera or its field of view, and that your decorations don't cover any reflective stickers that your creation needs the IR Motion Camera to “see” in order to work.
- In addition, please keep in mind that the IR Motion Camera works best when it isn't surrounded by too much extra light—in an overly bright space, it can be hard for the IR Motion Camera to distinguish details such as the location of specific reflective stickers. For this reason, if your creation is working the way you want it to and uses the IR Motion Camera, be cautious about altering your creation in a way that suddenly exposes that device to more light (for example, by cutting big windows into the sides of your creation).

c. Support Resources

There are many additional tutorials, gameplay tips, new project ideas and troubleshooting guides available in the Discover section of the Nintendo Labo software.

9. NINTENDO LABO COMMUNITY

a. Share Your Ideas

Take your creations to the next level with customization, or even invent new ways to play via the Toy-Con Garage mode. Get inspired by cool creations or share your own here:

<https://labo.nintendo.com/share/>.

b. Contact Us

Please don't hesitate to reach out! Email us at: labo@instituteofplay.org.