FOUNDATIONS OF CODING
TEACHER'S GUIDE
K-3

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Who Are Botzees For?

Botzees are for children ages 4 and up. The construction blocks are designed to suit the developing fine motor skills of K-3 students. While Botzees will draw the interest of students who already demonstrate an interest in robotics and information technology, we designed Botzees and this curriculum to appeal to and engage students with a variety of interests. The creative and open-ended nature of the project-based lessons will accommodate various knowledge and skills levels; students with little knowledge of robotics and coding will learn the basics, while students who may already have a knowledge of coding will have the opportunity to design and code more complicated programs and will be challenged to operate within design constraints. Botzsees are also especially well suited to a variety of learning styles including visual, auditory, and kinesthetic.

How Are Botzees Used?

Use Botzees in your classroom to introduce your students to the foundations of coding. Students will learn sequencing, looping, and conditional coding. Botzees encourage and develop problem solving, creativity, hand-eye coordination, and teamwork, all while having fun!

Our curriculum is designed to be utilized in Kindergarten to 3rd-grade classrooms. Ideally, each classroom would have a classroom set of Botzees, a classroom set of smart devices (Apple or Android, phone or tablet) with students working together in pairs. (See more about student grouping, organization, compatible smart devices, and storage in the “Botzees in the Classroom” section below.) Over the course of 12 lessons, students will learn about coding fundamentals and become familiar with the various features and capabilities of the Botzees.

How Botzees Work

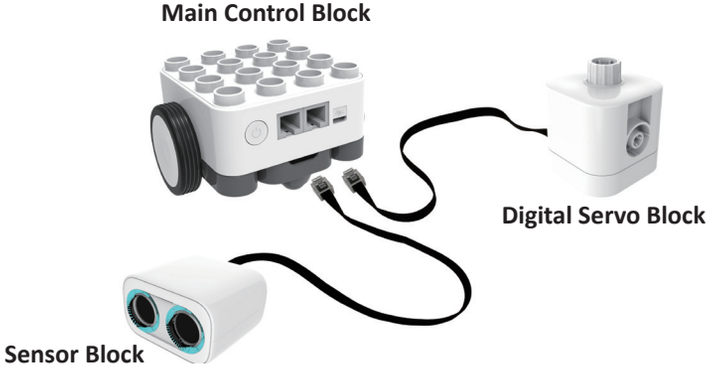
Botzee Coding Robotics Kits include components for building 6 different Botzees (Botzee Robot, Botzee Monkey, Botzee Explorer, Botzee Dog, Botzee Walrus, and Botzee Alligator) as well as any unique robot designed by the student.

Botzee Coding Robotics Kits include:

- 130 easy-to-grip construction blocks for building the Botzees
- 4 wheels to create traveling Botzees
- 3 robotics components that allow Botzees to move, sense, play music, and flash lights.

The robotics components comprise of:

- the main control block
- the sensor block
- and the digital servo block, which includes a second motor.



Botzees are operated with a free app (Botzees AR) available in Apple and Android app stores. The app is necessary for operating the Botzees and is essential to the lesson plans. It must be downloaded to a compatible smart phone or tablet for use in the lessons. This app enables control and coding of the Botzees and will provide your students with the instructions for building the 6 Botzees. (See the “Botzees in the Classroom” section below for more information on compatible devices, downloading the app, and pairing Botzees.)

Botzees in the Classroom

Compatible Devices

Botzees work in conjunction with compatible smart phones and tablets. The Botzee app (Botzees AR) must be downloaded to each device in a classroom set of compatible devices before the lessons can take place. Each Botzee will then get paired via Bluetooth to a particular device. Devices should be updated to the most recent operating system.

Compatible devices include:

iPHONE

- iPhone 11 Pro
- iPhone 11 Pro Max
- iPhone 11
- iPhone XS
- iPhone XS Max
- iPhone XR
- iPhone X
- iPhone 8
- iPhone 8 Plus
- iPhone 7
- iPhone 7 Plus
- iPhone 6s
- iPhone 6s Plus
- iPhone SE

iPAD

- iPad Pro (all models)
- iPad Air (3rd generation)
- iPad mini (5th generation)
- iPad (5th generation or later)

iPOD

- iPod touch (7th generation)

ANDROID

There is a multitude of compatible Android devices available from a diverse set of manufacturers. Consult the table available at this link to see if your Android device is compatible: https://developers.google.com/ar/discover/supported-devices#android_play

SCREEN MIRRORING

We highly recommend setting up screen mirroring on a large monitor in your classroom.For example, you can use AirPlay to demonstrate to students on a TV what you are doing on an iPad.

STORAGE

Classroom Botzee Packs include 10 Botzee Coding Robotics Kits and 6 port charging stations. We recommend packing up each Botzee and its accompanying kit into its original box at the end of each project. This will help maintain complete kits and will offer some protection to components between uses. Keep in mind that in between the first and second day of a project, the constructed Botzees will need to be stored separately. We recommend utilizing an out-of-the-way table top or shelf.

ORGANIZATION & LABELING

We highly recommend labeling each Botzee with a number that corresponds to a particular device. In the first lesson, or before, the main control block of each Botzee kit will get paired with a device so that a particular device will communicate with and control a unique Botzee. If your classroom set of compatible devices already has labels, then give the classroom set of Botzees matching labels. If not, then simply label the devices 1 through 10, and also label the Botzees 1 through 10. (It is only necessary to label the main control block because only the main control block is paired with a smart device.) When you pair your devices with the Botzees, either on your own before you begin the lessons or during the first lesson with your

students, pair each device with the Botzee having the corresponding label, for example device #1 with Botzee #1, device #2 with Botzee #2, and so on. (For more details on how to pair devices with Botzees, see the “Preparation” section below.) We also highly recommend labeling the outside of the kit box.

PROJECT-BASED LEARNING

Our curriculum follows a project-based learning model. We emphasize collaboration, inquiry, and performance assessments.

Grouping

We recommend that students work in pairs during the lessons, with each pair getting their own Botzee kit. This promotes collaboration while also allowing easy access to the robot and programming software. We also encourage teacher assignment of groups rather than letting students pick their groups so that students learn how to work with a variety of students and within a range of social dynamics. For this reason, we also encourage you to change group assignments between projects. Below is a model of a system you can use to develop 6 different pairings to utilize over the 12 lessons. You could also use popsicle sticks or pair students by birthdays or favorite animal. Whatever system you choose, we encourage you to make it transparent to the students so that they aren’t wondering or presuming why they got paired in a certain way.

Project 1 Pairs		Project 2 Pairs		Project 3 Pairs		Project 4 Pairs		Project 5 Pairs		Project 6 Pairs	
Student 1	Student 11	Student 1	Student 12	Student 1	Student 13	Student 1	Student 14	Student 1	Student 15	Student 1	Student 16
Student 2	Student 12	Student 2	Student 13	Student 2	Student 14	Student 2	Student 15	Student 2	Student 16	Student 2	Student 17
Student 3	Student 13	Student 3	Student 14	Student 3	Student 15	Student 3	Student 16	Student 3	Student 17	Student 3	Student 18
Student 4	Student 14	Student 4	Student 15	Student 4	Student 16	Student 4	Student 17	Student 4	Student 18	Student 4	Student 19
Student 5	Student 15	Student 5	Student 16	Student 5	Student 17	Student 5	Student 18	Student 5	Student 19	Student 5	Student 20
Student 6	Student 16	Student 6	Student 17	Student 6	Student 18	Student 6	Student 19	Student 6	Student 20	Student 6	Student 11
Student 7	Student 17	Student 7	Student 18	Student 7	Student 19	Student 7	Student 20	Student 7	Student 11	Student 7	Student 12
Student 8	Student 18	Student 8	Student 19	Student 8	Student 20	Student 8	Student 11	Student 8	Student 12	Student 8	Student 13
Student 9	Student 19	Student 9	Student 20	Student 9	Student 11	Student 9	Student 12	Student 9	Student 13	Student 9	Student 14
Student 10	Student 20	Student 10	Student 11	Student 10	Student 12	Student 10	Student 13	Student 10	Student 14	Student 10	Student 15

If you do have to modify groups for any classroom management considerations, make that decision transparent too and reference the

issue, turning it into an opportunity to coach students on effective collaboration.

Roles

Botzees offer a terrific opportunity to develop collaboration skills. Effective collaboration also ensures that students are able utilize a range of modalities, exercise their strengths, and develop targeted skills. Implementing process-oriented roles creates a structure in which collaboration can be explicitly taught, promoted, and assessed. We recommend utilizing the following process-oriented roles that develop collaboration while not limiting or dictating student access to tasks or resources.

Task Master: This student helps to ensure that progress is being made towards the goal. Questions they'll ask:

- What are we doing and is it on task?
- Are we making progress?
- Are we on track or are we behind?

Team Keeper: This student helps to ensure that the group is an effective team. Questions they'll ask:

- Are group members participating?
- Are we utilizing all of our strengths?
- Are we communicating effectively?

Asset Manager: (Optional—in the event you have a three person group) This student helps to ensure the group has the resources they need to work effectively. Questions they'll ask:

- Do we have the right equipment?
- Are we taking care of it?
- Do we have the information we need?

During the group-work portion of the lessons, turn to students to coach their group according to their role. Lesson plans will also engage these roles in particular ways. You may find it helpful to make a class set of name tags so that both teacher and students can easily identify student roles for the day. This will also make it easier to assign roles quickly during the lesson.

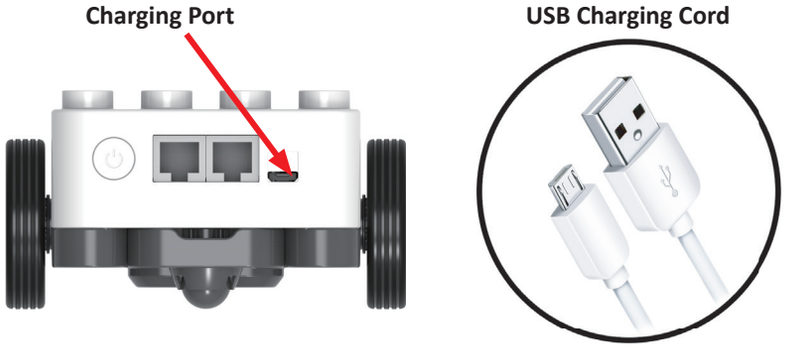
PREPARATION

Charging

The main control block is the robotics brain of all Botzee's creations and should be charged prior to first use. Each kit comes with a USB cord for charging, and Classroom Botzee Packs come with 6 port charging stations. You can plug-in 6 main control blocks at a time to start charging. Main control blocks will arrive already partially charged, so the initial charging should take about half an hour. Charging from a completely depleted battery will take up to 3 hours, and a fully charged battery provides about 3 hours of playtime.

NOTE: You can also use power adapter bricks to plug directly into an outlet to charge main control blocks. When the block is charging, a red light will show on the front of the main control block. Once it's fully

charged, the light will turn green.



Loading Apps

Botzees are operated with a free app (Botzees AR) available in the Apple App Store and Google Play. The app is necessary for operating the Botzees and is essential to the lesson plans. This app enables control and coding of the Botzees and will provide your students with the instructions for building the 6 Botzees. It must be downloaded to each device in a classroom set of compatible devices (e.g. to each iPad in a class set of iPads) before the lessons can take place. (See the section on “Compatible Devices” above for more information on which devices are currently compatible with Botzees.)

Pairing Botzees

Once you have downloaded the Botzees AR app to the classroom set of compatible devices, you can pair each device with its corresponding Botzee. (See the earlier section on “Organization & Labeling.”) You can do this before starting the lesson sequence, or you can do this with your students to teach about Bluetooth technology and communication between devices. To pair a compatible device with a Botzee, open the Botzees AR app on the device and click the Bluetooth icon. (For optimal experience, close all other apps before launching.) You will be prompted to power on the main control block. Turn on the main control block of the correspondingly labeled Botzee. Make sure to hold the device within 10 inches of the control block. The Botzees AR app will automatically connect to your Bluetooth device. You’ll hear a chime once Botzees and your device are paired.

Sound

You can have sounds emit from either the tablets or from the Botzees. We recommend having the sound emit from the Botzees, as this makes the Botzees come alive. It is especially important for lessons when the students might want to program their Botzee to play a sound. To do this, go to your device’s Bluetooth settings, and connect to the Botzees audio device listed as “Pai_Audio_######.” (Note: You should already see Pai_###### listed as a connected device. To have the Botzee emit sound, you must also connect to Pai_Audio_######.)

Prepping Building Blocks

Botzee Robotics Kits come with construction blocks for 6 different Botzees. For each lesson, only a portion of the blocks will be needed to build that particular Botzee. You may want to separate the required pieces for your students ahead of a lesson. We will list the pieces necessary for each lesson at the beginning of the lesson plan.

CARE & MAINTENANCE

Cleaning

To clean dirty components, wipe with a cloth. Do not use water. Dust can inhibit certain components from functioning properly. For example a build up of dust can prevent wheels from turning or get in the way at connection points and ports. We recommend wiping dust away periodically. You can also use a spray can duster for electronics.

Missing Parts

To replace missing parts, contact customer support at cs@pai.technology.

Sleep Mode

The Botzees will power down after 10 minutes of inactivity. To wake up the Botzee, simply turn it back on by pressing the power button.

OBJECTIVES, STANDARDS & RUBRICS

COURSE OBJECTIVES

- **Coding**

  Students will utilize blocks of code, including looping and conditional blocks, to program a robot to move, make sounds, and perform simple tasks.

- **Collaboration**

  Students will work effectively in pair and/or group settings to accomplish a
  common goal. They will demonstrate a range of skills including appropriately
  dividing labor, identifying and leveraging strengths of individuals within the group or pair, exhibiting appropriate body language, offering and receiving ideas, asking and responding to questions, explaining, justifying, providing and responding to feedback, demonstrating patience, offering encouragement, disagreeing and requesting respectfully, inviting participation, assuming positive intent, and remaining solutions focused.

- **Technical Literacy**

  Students understand and use the technical vocabulary presented in the lessons.

- **Hardware Proficiency**

  Students understand the function and nature of
  the various hardware components and treat them accordingly. They use this knowledge to troubleshoot issues as they arise.

- **Design Process**

  Students engage in a design process that meets requirements and adheres to
  constraints. Students are able to overcome challenges and persevere to complete their tasks. They engage in an iterative process, testing, debugging, and revising.

- **Presenting**

  Students present to the class utilizing effective body language, word choice,
  content choice, and voice.

RUBRICS

Rubrics that assess the above standards will be available in individual lessons. Use them to assess your students and to provide feedback to students. If appropriate for your classroom, feel free to introduce your students to the rubric at the beginning of the lesson.

COURSE STANDARDS

Botzees will foster the development of core computer science practices

in your early elementary classroom. Each Botzees lesson is designed to support Computer Science Teachers of America (CSTA) Standards and the International Society of Technology in Education (ISTE) Standards for Students.

COMPUTER SCIENCE TEACHERS ASSOCIATION (CSTA) K-2 COMPUTER SCIENCE STANDARDS

Algorithms and Programming

- Model daily processes by creating and following algorithms (sets of step-by-step instructions) to complete tasks. (1A-AP-08)
- Develop programs with sequences and simple loops, to express ideas or address a problem. (1A-AP-10)
- Decompose (break down) the steps needed to solve a problem into a precise sequence of instructions.(1A-AP-11)
- Debug (identify and fix) errors in an algorithm or program that includes sequences and simple loops. (1A-AP-14)
- Using correct terminology, describe steps taken and choices made during the iterative process of program development. (1A-AP-15)

Computing Systems

- Use appropriate terminology in identifying and describing the function of common physical components of computing systems (hardware). (1A-CS-02)

INTERNATIONAL SOCIETY OF TECHNOLOGY IN EDUCATION (ISTE) STANDARDS FOR STUDENTS

Be Empowered Learners

- Students use technology to seek feedback that informs and improves their practice and to demonstrate their learning in a variety of ways. (1c)
- Students understand the fundamental concepts of technology operations, demonstrate the ability to choose, use and troubleshoot current technologies and are able to transfer their knowledge to explore emerging technologies. (1d)

Be Knowledge Constructors

- Students build knowledge by actively exploring real-world issues and problems, developing ideas and theories and pursuing answers and solutions. (3d)

Be Innovative Designers

- Students know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts or solving authentic problems. (4a)
- Students select and use digital tools to plan and manage a design process that considers design constraints and calculated risks. (4b)
- Students develop, test and refine prototypes as part of a cyclical design process. (4c)

- Students exhibit a tolerance for ambiguity, perseverance and the capacity to work with open-ended problems. (4d)

Be Computational Thinkers

- Students break problems into component parts, extract key information, and develop descriptive models to understand complex systems or facilitate problemsolving. (5c)
- Students understand how automation works and use algorithmic thinking to develop a sequence of steps to create and test automated solutions. (5d)

Be Creative Communicators

- Students create original works or responsibly repurpose or remix digital resources into new creations.(6b)
- Students publish or present content that customizes the message and medium for their intended audiences. (6d)

Be Global Collaborators

- Students contribute constructively to project teams, assuming various roles and responsibilities to work effectively toward a common goal. (7c)

LESSON PLANS

PROJECT 1 - BOTZEE ROBOT + INTRODUCTION TO CODING

Learning Objectives

- Coding: Students understand that robots can be controlled by code.
- Collaboration: Students are able to communicate their ideas and make decisions as a pair using respectful language and appropriate body language.
- Hardware Proficiency: Students understand and carry out “Care for Hardware.”
- Hardware Proficiency: Students understand the role of “power” and are able to power on and off their robot.
- Design Process: Students come up with a trait and an accompanying movement to give their robot.
- Presenting: Students will introduce their robots to the class.

ISTE Standards

- Students know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts

or solving authentic problems. (4a)

- Students exhibit a tolerance for ambiguity, perseverance and the capacity to work with open-ended problems. (4d)
- Students understand how automation works and use algorithmic thinking to develop a sequence of steps to create and test automated solutions. (5d)
- Students create original works or responsibly repurpose or remix digital resources into new creations.(6b)
- Students publish or present content that customizes the message and medium for their intended audiences. (6d)
- Students contribute constructively to project teams, assuming various roles and responsibilities to work effectively toward a common goal. (7c)

CSTA Standards

- Develop programs with sequences and simple loops, to express ideas or address a problem. (1A-AP-10)
- Use appropriate terminology in identifying and describing the function of common physical components of computing systems (hardware). (1A-CS-02)

Assessments

Informal assessments:

- During group work, the teacher will observe whether:
  - » Students are able to brainstorm traits and movements for their robot. (Design)
  - » Students are able to select and place an appropriate block of code in the coding bar. (Coding)
  - » Students take care when interacting with key components such as connectors and cables. (Hardware)
  - » Students are able to power on and off their Botzees. (Hardware)
  - » Group members face each other and use respectful language to discuss their ideas. (Collaboration)

Formal assessments:

- During the presentation, the reacher will assess whether:
  - » Students present their Botzee to the class, articulating and demonstrating the trait they have given their Botzee. (Presenting, Design, and Coding)

Name_____ Date _____

PROJECT 1 RUBRIC - INTRODUCTION TO CODING

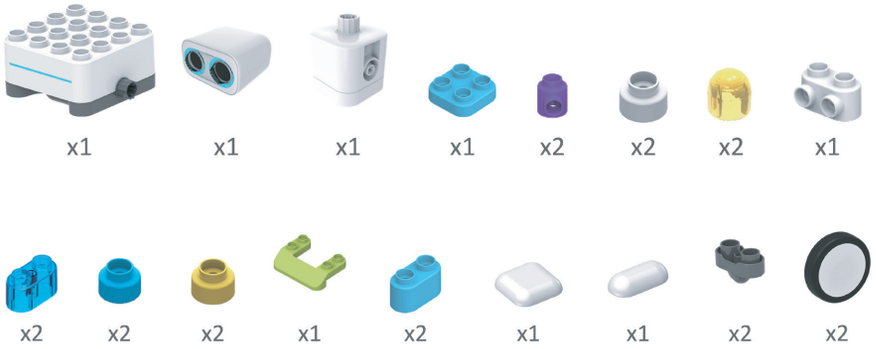
	Not Yet	Almost	Yes
Coding We used a coding block to program the robot.	☆	☆☆	☆☆☆
Collaboration We faced each other and used respectful language.	☆	☆☆	☆☆☆
Hardware We could power on and off our robot on our own.	☆	☆☆	☆☆☆
Hardware We showed care for hardware.	☆	☆☆	☆☆☆
Design We gave our robot a trait.	☆	☆☆	☆☆☆
Presenting We introduced our robot to the class.	☆	☆☆	☆☆☆

Vocabulary

- Power
- Charging
- Charging Port
- Main Control Block
- Digital Servo Block
- Sensor
- Cables
- Connection Points
- Hardware * the parts of a computer, tablet, or robot that you can see and touch
- Device Name, e.g. iPad
- Bluetooth
- Pairing
- Icon
- Trait * a quality that makes one thing different from another
- Program
- Code * a set of directions for a computer or a robot to follow in a language that computers and robots can understand
- Command
- Collaboration

* Recommended to display word and definition on a word wall during the lesson.

Pieces needed



Lesson Plans

DAY 1

I. Introduction (12 min total)

A. What is a robot? **(2 min)**

1. Ask students, “What is a robot?” Have students share their thoughts with a partner then share out.

B. Traits **(3 min)**

1. Explain to students that today we are going to build a robot. Not only are they going to build a robot, they’re going to design it. They’re going to decide on one trait their robot will have. What is a trait? Define trait as “a quality that makes one thing different from another.” Brainstorm a list of traits as a class such as shy, silly, confident, calm, brave, etc.

C. Pair work **(7 min)**

1. Pair up students and instruct them to decide on a name and a single trait for their robot with their partner. Explain that when everyone has built their robots, we will all introduce our robots to the class. (See our recommendations on grouping in the “Botzees in the Classroom” section of the teacher’s guide.)

2. As students discuss, call the class’ attention to a pair that is using respectful language, and to a pair that is facing each other. Explain how they are demonstrating good collaboration.

II. Care for Hardware (8 min total)

A. What is hardware? **(3 min)**

1. Explain to students that hardware is a compound word meaning is it made up of two words. Ask if anyone hears the two words that make up the word hardware? Once "hard" and "ware" have been identified, have students turn to a partner discuss what they think "hardware" means. Have students share out.

B. Care for Hardware **(3 min)**

1. Define for students that hardware is "the parts of a computer, tablet, or robot that you can see and touch." Ask students, "Can hardware break?" Yes! Explain then that we have to take care of it. We can call it **"Care for Hardware."** Have students repeat this phrase.

2. Hardware "blocks." Show them the three robotics components. Point out how they are the white blocks. (For now, we can skip over their names.) Explain how these are the "eyes" and "brains" of the robot, and need to be taken care of. Explain how they should be not thrown or dropped.

3. Cables. Show students the cables and explain how they send messages and power between the hardware blocks. Explain that they are important, and should be taken care of. They should not be pulled or tangled. Also point out the clear plastic connectors. Show how they are delicate.

4. Demonstration. Show students how to carefully connect the cables to the main control block. Ask a student to come up and demonstrate themselves, treating all hardware components with care. Ask the other students what the demonstrator student did well. Explain that everyone will have an opportunity to demonstrate "Care for Hardware" when they connect cables to their own robot.

C. Hardware needs power. **(2 min)**

1. Explain to students that hardware needs power. Explain that you charged them earlier, so that when they press the power button (show them the power button on the back of the main control block), there should be enough power for the control block to turn on.

III. Retrieving Kits (3 min)

A. Make sure students are in their pairs and have one student from each pair retrieve their Botzee kit and corresponding device (e.g. iPad). Look for examples of "Care for Hardware" and point them out.

IV. Bluetooth and paired devices (Optional. Factor in an additional 3 to 5 min.)

A. Depending on time, age, and preference, walk students through the Bluetooth pairing process. If devices and Botzees have already been paired, continue building the Botzee.

V. Build Botzee (17 min total)

A. Demo **(2 min)**

1. If possible, use screen mirroring to show students how to launch the app, click on “Build,” and select the “Robot.”

The “Build” feature of the Botzee app shows students how to build their Botzee, one step at a time. Show students how they can click the arrow on the right to move to the next step and click the arrow on the left to review the step again. Also show them how they can rotate the image of the Botzee to see it from different angles.

B. Build **(15 min)**

1. Allow students to build their Botzee in their pairs following the directions in the app. Encourage students to face each other and use respectful language— important elements of effective collaboration.

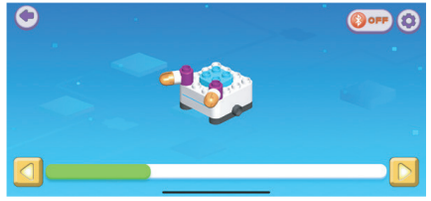
2. Point out good examples of “Care for Hardware,” especially during Step 15 when the cables are connected to the ports. The teacher may need to assist with this step. Some students may not finish today, in which case they can catch up on Day 2. For students who finish early, show them the control button and have them explore the capabilities of the Botzee.

1. Start with the first Botzee block.

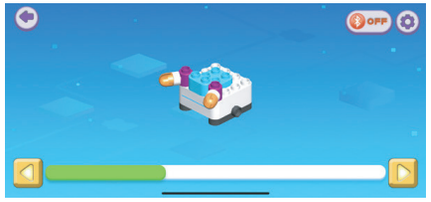
2. Add the 4 hole turquoise block.

3. Make sure children are adding the blocks to the front of the Botzee, where the light screen is located.

4. Attach your Botzee arm.



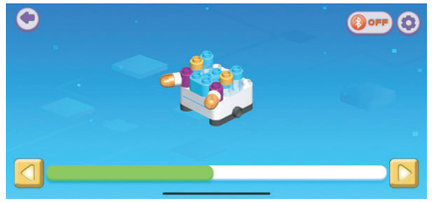
5. Repeat and make the second Botzee arm!



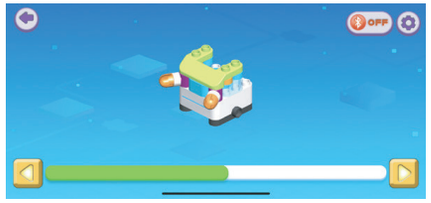
6. Add one turquoise block to the front.

7. Add two transparent blocks to each side.

8. Add two small turquoise circle blocks.



9. Add two small yellow circle blocks.

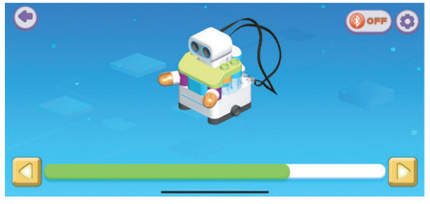


10. Cover your blocks with the green block.

11. Add the white programming block.

12. Add the white block & turquoise block to the back.

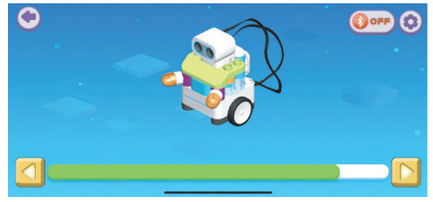
13. Cover the turquoise block with a smooth white block.



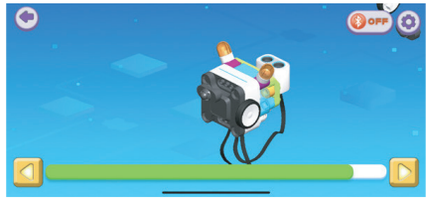
14. Add Botzee's eyes!

15. SUPERVISION - Plug in your Botzee and show "Care for Hardware"

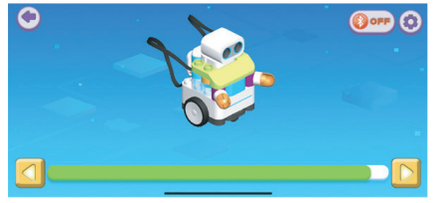
16. Add the smooth "backpack" block.



17. Add the right wheel.



18. Attach the small black roller wheel.



19. Add the left wheel.

20. Attach the second small black roller wheel.

For students who finish ahead of others, show them the "control" button on the app and let them move the Botzees around the classroom.

C. Clean-up (5 min)

1. Have students return all loose parts to their kit box. One partner can put away the pair's kit box, and the other partner can place their Botzee in the designated storage area. (We recommend an out-of-the-way table or shelf.)

DAY 2

I. Designing, Coding, Collaborating

A. Define "Code" **(5 min)**

1. Remind students that each design team has decided on a name and trait of their robot, and that each team will introduce their robot to the class. Explain that they are going to program their robot with code, so that the robot can demonstrate that particular trait to the class. Ask students, "What do you think code is?" Have students talk to their partner first, then ask students to share out. Build on students' answers and connect them to the definition for today's lesson. Explain that "code" is a set of directions for a computer or a robot to follow. It is in a language that computers and robots can understand.

B. Demonstrate the Task **(5 min)**

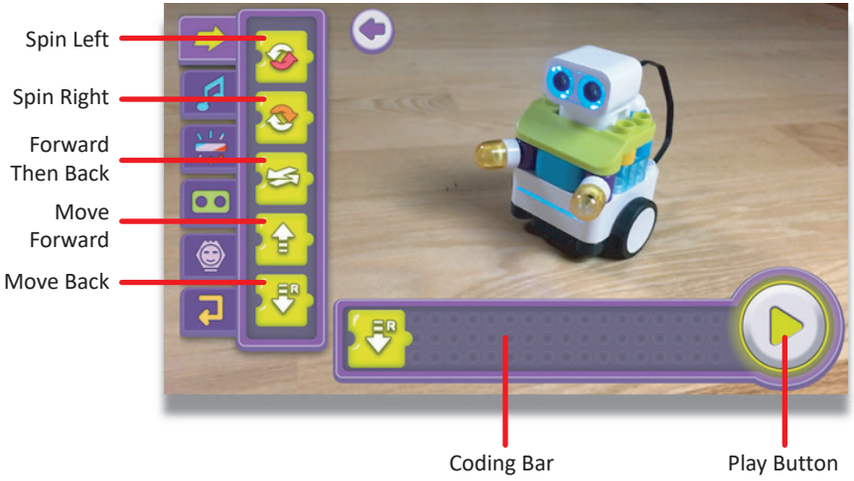
1. Design process. Model the design process for students. For example, explain to students that your robot is called Robo and he is "shy." Ask students, "How does a shy person act?" Follow up on their responses and engage students in the design process. For example, say, "So, if my robot is shy, when I introduce him, is he going to race forward? What might he do?" Build on student responses and model the decision about how to program the robot. For example, say, "So I want to program him to go backwards when I introduce him. How are we going to do that? We are going to do that with code—a language the robot can understand!"

2. Coding. Once you have decided on what the robot will do during the introduction, demonstrate how to code that. If possible, use a screen mirroring set-up.

a) Click on "Code."

b) Scan the play area and robot. (This is a step prompted by the app so that the Botzee's movement is limited to a particular area. The user sets the boundaries of the play area by dragging the purple and yellow border.)

c) Drag the code block you want to the coding bar.



d) Introduce the robot and execute the code by hitting the play button. Example: "This is Robo. He's shy."

C. Sentence Frames. Provide students with these sentence frames. **(2 min)**

1. Partner 1: "This is _____ "
2. Partner 2: He/She/It/They is _____"

D. Collaboration and Roles **(15 min)**

1. Have students find their partner. Once they are with their partners, tell them that today will involve even more "collaboration." Explain that good collaboration means you are on task and working as a team. So today, one partner will be the Task Master, and the other partner will be the Team Keeper. Have the Task Masters start the task by retrieving their constructed Botzees from the designated shelf or table. (If the pair has not finished building their Botzee, they will also have to retrieve their kit box.) Release students to code their introductions with their partner. Point out examples of "Care for Hardware." Encourage students to face each other and use respectful language—important elements of effective collaboration. Periodically ask for Team Keepers to check and share out if this is happening.

II. Robot Introductions. (8 min)

A. Have student pairs introduce their robots. Assess students using the rubric.

III. Reflect. Have students share out what they learned and what they did. Guide them to these possible outcomes. (5 min)

A. We learned about hardware and practiced “Care for Hardware.”

B. We engaged in the design process.

C. We coded our robots with traits.

D. We had good collaboration. We faced each other and used respectful language.

IV. Pack-up. Have students box up their Botzee kits and return them to the storage areas. Point out examples of “Care for Hardware.” (5 min)

PROJECT 2 - BOTZEE WALRUS + CONDITIONAL CODE & SEQUENCING

Learning Objectives

- Coding: Students understand that blocks of code can be sequenced to program a robot.
- Coding: Students understand what a conditional code is.
- Collaboration: Students are able to communicate their ideas and make decisions as a pair using respectful language and appropriate body language.
- Collaboration: Students are able to offer and receive ideas and provide encouragement to group members.
- Hardware Proficiency: Students understand that their device is paired via Bluetooth to their particular control block. They understand that their device communicates with the control block via Bluetooth.
- Hardware Proficiency: Students understand that the main control block has a motor that turns the axle.
- Design Process: Students create a dance - a piece of choreography for the Botzee.
- Design Process: Students engage in an iterative design process by exploring the capabilities of their Botzee and testing sequences.
- Presenting: Students will present their robot dance to the class using appropriate body language.

ISTE Standards

- Students know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts or solving authentic problems. (4a)
- Students exhibit a tolerance for ambiguity, perseverance and the capacity to work with open-ended problems. (4d)
- Students understand how automation works and use algorithmic thinking to develop a sequence of steps to create and test automated solutions. (5d)
- Students create original works or responsibly repurpose or remix digital resources into new creations.(6b)
- Students publish or present content that customizes the message and medium for their intended audiences. (6d)
- Students contribute constructively to project teams, assuming various roles and responsibilities to work effectively toward a common goal. (7c)

CSTA Standards

- Develop programs with sequences and simple loops, to express ideas or address a problem. (1A-AP-10)
- Use appropriate terminology in identifying and describing the function of common physical components of computing systems. (1A-CS-02)

Assessments

Informal assessments:

- During group work, the teacher will observe whether:
  - » Students are engaging in an iterative design process by exploring the capabilities of their robot and testing sequences. (Design)
  - » Students are able to select and place multiple blocks of code in a deliberate sequence in the coding bar. (Coding)
  - » Students make use of a conditional coding block. (Coding)
  - » Students take care when interacting with key components such as connectors, cables, and the main control block and its axle. (Hardware)
  - » Students can point to the main control block. (Hardware)
  - » Students can point to the axle that the motor powers. (Hardware)
  - » Students are able to power on and off their Botzees. (Hardware)
  - » Students are aware of needing to wait for their device to communicate with their Botzee. (Hardware)
  - » Group members face each other and use respectful language to discuss their ideas. (Collaboration)
  - » Group members offer and receive ideas and offer encouragement. (Collaboration)

Formal assessments:

- During the presentation, the teacher will assess whether:
  - » Students present their Botzee and choreography to the class using appropriate body language. (Presenting, Design, and Coding)

Name_____ Date _____

PROJECT 2 RUBRIC - CONDITIONAL CODE AND SEQUENCING

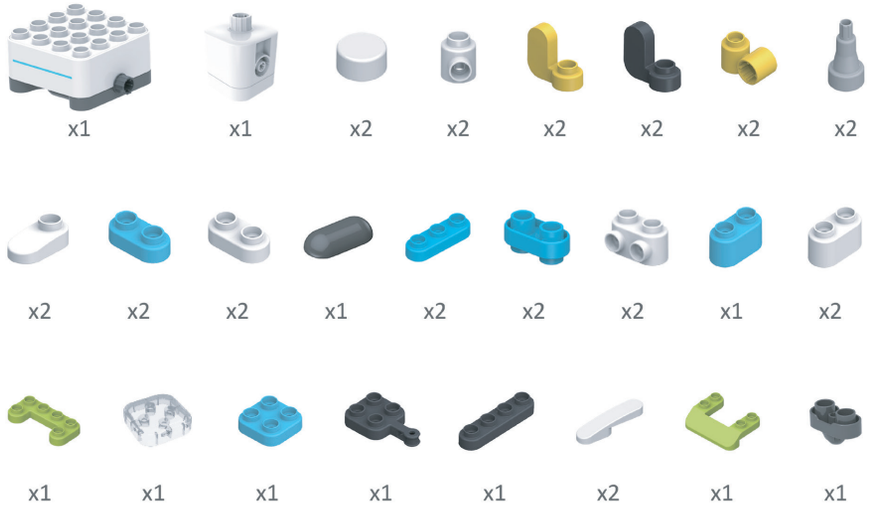
	Not Yet	Almost	Yes
Coding We created a sequence of blocks of code to program the robot.	☆	☆☆	☆☆☆
Collaboration We offered and received ideas and provided encouragement to each other.	☆	☆☆	☆☆☆
Hardware We could power on and off our robot on our own.	☆	☆☆	☆☆☆
Hardware We showed care for hardware, especially the main control block and axle.	☆	☆☆	☆☆☆
Design We created a dance for our Botzee.	☆	☆☆	☆☆☆
Design We used an iterative process: Try. Think. Adjust. Repeat!	☆	☆☆	☆☆☆
Presenting We presented our robot dance using appropriate body language.	☆	☆☆	☆☆☆

Vocabulary

- main control block * - the robotics brain on your Botzee
- motor * - a machine that helps something move
- axle * - a rod that passes through the center of something like a wheel.
- iterative process* - Try. Think. Adjust. Repeat.
- body language
- encouragement
- offer and receive ideas
- Bluetooth
- pair
- sequence * - steps in an order
- conditional * - “If _____ , then _____ .”

* Recommended to display word and definition on a word wall during the lesson

Pieces needed



DAY 3

I. Introduction (10 min)

A. What is a sequence?

1. Examples of a sequence

a) Ask students, “Who can tell me how to brush your teeth?” Call on a students to share out and explain how to brush your teeth. Draw attention to any “steps” that the student broke the task into, for example, putting toothpaste on a toothbrush. Tell students, “Now I want you to tell me how to make a sandwich. Turn to your partner and tell them how to make a sandwich, and make sure to include the different steps.” Call on students to share out how to make a sandwich, drawing attention to any steps they included.

2. Order of steps

a) Ask students, “Do the order of the steps matter? Think to yourself for 10 seconds. Do you think the order of the steps matter? (Wait 10 seconds.) Raise your hand if you think, yes, that the order of the steps matter. Raise your hand if you think, no, that the order of the steps do not matter. Now turn to your partner and tell them why you think the order does or does not matter.” After the partners share their thoughts with each other, call on students to explain their thinking, and elaborate on their responses, clarifying that sometimes, the order of steps do indeed matter.

b) Ask students, “What would happen if you brushed your teeth with the steps out of order?” Call on a few students. Then ask students, “What would happen if you made a sandwich with the steps out of order?” Call on a few students. Use their answers to emphasize that for certain tasks, the steps AND the order of the steps matter.

3. Define sequence

a) Put the word “sequence” on the word wall with its definition (“steps in an order”), and explain that steps in a particular order is a sequence.

B. Introduce project

1. Explain that today, they are going to program robots with a sequence of code. So instead of just one coding block, they are going to use multiple coding blocks in a particular order to create a sequence. Tell students that they are going to build a new Botzee for their second project, and they will program it with a sequence of code to make the robot dance.

II. Build Prep (8 min)

A. Demo

1. If possible, use screen mirroring to show students how to launch the app, click on “Build.” Swipe until you see the walrus.

2. Like in Project 1, the “Build” feature of the Botzee app shows students how to build their Botzee, one step at a time. Remind students how they can click the arrow on the right to move to the next step and click the arrow on the left to review the previous step. Also show them how they can rotate the image of the Botzee to see it from different angles.

B. Main Control Block

1. Every Botzee needs a main control blockDuring the second step of the build, ask students, “Did we use this large white piece last time?” Hopefully students will remember that yes, they did use that piece. If they don’t remember, you can quickly back out of the walrus build and bring up the Botzee robot build and point out the main control block at the base of the Botzee. Point out and remind them that that’s where they power on and off the Botzee. Explain that every Botzee will use this main control block. Explain that it’s the brain of the robot. Ask them, “Why do you think it’s called the main control block.” Emphasize student answers that point out its block shape (block), that it’s probably important (main) and that it controls the robot (control).

2. The main control block has a motor and axles

a) Explain that the main control block has a motor. Ask students, “What else has motors?” Explain that motors help things move. (You can point out the “mot-” part of the word “motor.”) Show how last time, wheels attached to the main control block. Ask students, “What did the wheels help the Botzee do?” Point out that the wheels attached to main control block through round, toothed, grey pieces. Explain that we call them “axles.” Have students repeat the word “axle.” Explain that axles are “rods that pass through the center of something like a wheel.” Ask students, “But do walruses have wheels?” Explain that this Botzee uses something other than wheels to move.

C. Care for Hardware

1. Remind students that they have to show “Care for Hardware.” Ask students, “What is hardware again?” Remind them that it is “parts of a computer, tablet, or robot that you can see and touch.” Ask them, “How do we show Care for Hardware?” Ask them specifically how they would show care for the main control block and axles. Guide them to describing how they shouldn’t drop the main control block or twist the axles without care. Ask them, “Why is care for these pieces particularly important?” Guide them towards

understanding that if they do not care for the main control block, the robot may lose its ability to power on and off or control the robot. Also guide them to understanding that if they were to damage the axles, the robots may not be able to move.

III. Collaboration Prep (7 min)

A. Assign Pairs

1. Assign pairs for Project 2 and have students sit with their partners. (See our recommendations on grouping in the "Botzees in the Classroom" section of the teacher's guide.)

B. Revisiting respectful language and appropriate body language

1. Remind them that they are collaborating, and that part of collaboration is using respectful language and appropriate body language. Ask students, "What are some examples of words I should hear when you are collaborating and using respectful language?" (For example, "please" and "thank you"). Ask students, "If you are collaborating with your partner, will you most likely be facing towards each other or away from each other?" Have all pairs of students then demonstrate appropriate collaborating body language by facing each other. Ask students, "Why is it helpful to face each other when collaborating?"

C. Offering encouragement

1. Explain that today's build might be a little harder than the last build. So as good collaborators, we can offer each other encouragement. Ask students for examples of encouragement. Ask students, "Why is it helpful to offer encouragement during collaboration? Turn to your partner and share your thoughts." After students have shared with their partner, ask a few students to share out. Explain that today, you will be looking out for examples of offering encouragement.

2. Roles

a) Assign students to be "Task Masters," "Team Keepers," and, if there are groups of three, "Asset Managers." (See our recommendations on roles in the "Botzees in the Classroom" section of the teacher's guide.) Explain that the Task Masters will retrieve kits and make sure that the group is on task (the task of building the walrus), and that the Team Keepers will make sure group members are facing each other, using respectful language, and offering encouragement. If there are Asset Managers in a group of three, they will be looking for examples of "Care for Hardware."

IV. Build (15 min)

A. Retrieve

1. Have the Task Masters retrieve Botzee kits and the Team Keepers retrieve the tablets.

B. Build

1. Allow students to build their Botzee in their pairs following the directions in the app.

C. Collaboration

1. Encourage students to face each other, use respectful language, and offer
encouragement. Utilize Team Keepers in assisting with this. For example, if a team isn't facing each other, bring this to the attention of the Team Keeper so that they can direct their group to face each other.

2. If students are off task, bring this to the attention of the Task Masters so that they can direct their group to re-focus on the build.

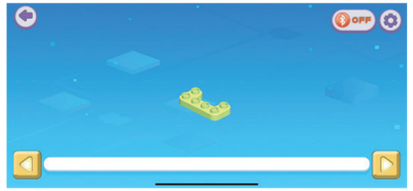
D. Care for Hardware

1. Point out good examples of "Care for Hardware." Utilize Asset Managers if there are Asset Managers. For example, if a team isn't being careful with their cables, bring this to the attention of the Asset Managers so that they can direct their group to be more careful.

E. NOTES

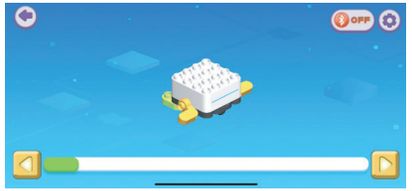
1. During Step 9, the app does not display the cable in the image. As students
approach this step, draw the class' attention to this fact, and show them that they can go ahead and connect the cable to the connection port. In Step 25, the green piece can be placed over the cable, which will tuck the cable neatly out of the way, which will be particularly helpful for the dance portion of the project in Day 4.

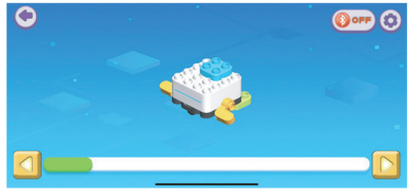
2. Some students may not finish today, in which case they can catch up on Day 2. For students who finish early, show them the control button and have them explore the capabilities of the Botzee.


Step 1


Step 2


Step 3


Step 4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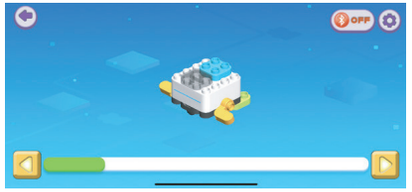
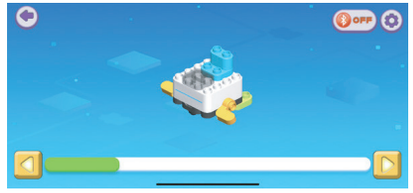

Step 6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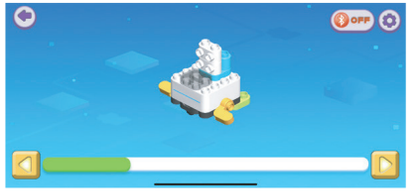
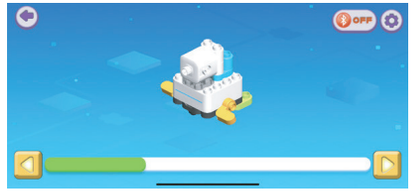
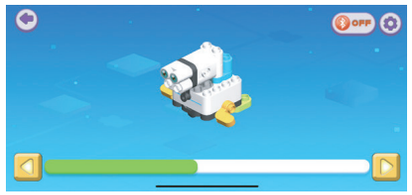

Step 8


Step 9


Step 10

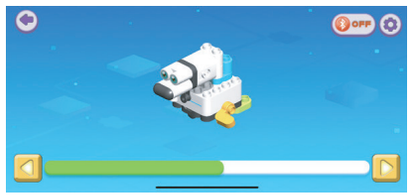
Step 11

Step 12



Step 13

Step 14



Step 15

Step 16

Step 17

Step 18

Step 19

Step 20

Step 21

Step 22

Step 23

Step 24

Step 25

Step 26

V. Clean up (5 min)

A. Have students return all loose parts to their kit box, reminding them to show “Care for Hardware.” One partner can put away the pair’s kit box, and the other partner can place their Botzee in the designated storage area (we recommend an out-of-the-way table or shelf).

DAY 4

I. What is a condition? (5 min)

A. Have students fill in the blanks.

- If I stand in the rain, then _____ .
- If my cat is hungry, then he will _____ .
- If I call my dog, then she will _____ .
- If I _____ , then my little brother will laugh.

B. Ask students, “What did these sentences have in common?” Have students turn to their partner and share their thoughts. Then call on a few students to share their answers with the class. Elaborate on student answers to explain how these sentences follow a pattern where they start with “If” and follow up with “then.” You can also explain that one event leads to another event.

C. Explain that these sentences are conditional. Conditional sentences follow the pattern, “If _____ , then _____ .” Post this on the word wall. Explain that people who code computers, phones, apps, websites, and robots also use conditional codes. Ask them to fill in these blanks.

- If I click on an app on the tablet, then _____.
- If I click on a link when using the internet, then _____ .
- If I press the power button on the main control block, then _____ .

D. Explain that these things do not happen magically, but that programmers had to program the tablet or computer or main control block to do that. Explain that today, they are going to program their Botzees with conditional codes too.

II. Demo (10 min)

1. Coding.

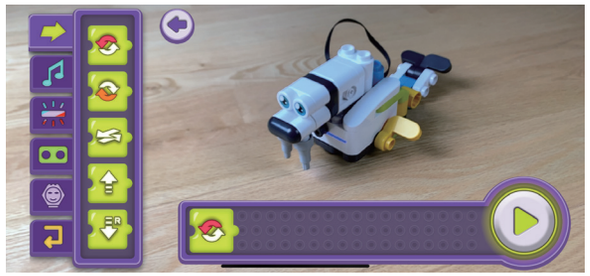
a) Demonstrate to the students how to code their dance with a sequence of code and a conditional code. If possible, use a screen mirroring set-up. Click on “Code.”

b) Scan the play area and robot. Set the boundaries of the play area by dragging the purple and yellow boarder.)

B. Show them how the app has to connect to the Botzee. Explain that each tablet is paired with a particular Botzee. Point out how the labels on the main control block and their tablets match. (See our recommendations on labels in the “Botzees in the Classroom” section of the teacher’s guide.) Explain that each tablet communicates with only one Botzee because they have been “paired,” just like the students have been paired. Then explain how the tablets and main control blocks communicate, or talk, using a technology called Bluetooth. That is a way that computers, phones, tablets and other devices send messages to each other through the air. Explain how Bluetooth sends messages over short distances, so the students have to be close to their Botzees when programming them. Tell them that if it seems like their tablet isn’t sending messages to the Botzee, then it may be a problem with Bluetooth. Also point out that whenever they go to code the Botzee, they will have to wait as the tablet establishes communication with the Botzee via Bluetooth.

C. Coding a sequence using an iterative process

1. Play the song to which the students will program their Botzee to dance. Tell them that they have to program their Botzee with a sequence of code to dance to a portion of the song. Explain that first you want to see what the different coding blocks will do, so you’re going to try out a block. React to what you see. Then add another block. Then model an iterative design process with a think-aloud. For example, “Huh. I feel like it would be cool if the walrus moved forward twice, then backward twice. Let me see what that would look like.” Program the Botzee according to your think-aloud, then press play. Continue with modeling an iterative process with a think-alound. For example, “I like it! But I wonder what it would look like if I added a turn somewhere instead. Should I try it? Totally! But instead, I want you guys to get started. You are going to do what I did, and more. You are going to try out a block, see what it looks like and think if you like it, then make some adjustments, they try it again. This is called an iterative process.” Have them repeat the phrase “iterative process.” “That’s when you do what I did. Try. Think. Adjust. Repeat.” Put the definition of “iterative process” on the word wall. (Try. Think. Adjust. Repeat.)

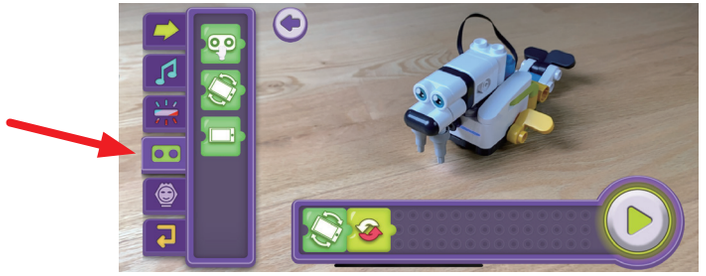


D. Collaboration - Offering and Receiving Ideas.

1. Explain that during an iterative process, a pair or group will need to collaborate by offering and receiving ideas. Ask for two volunteers. Have one student hold the tablet you are using to model, then have another student stand next to him/her/them. Ask the class, “How can (insert name) offer an idea?” Guide students to suggestions like, “What if we….” or “I think it would be cool if….” Then ask your students, “How can (insert name) receive an idea.” Guide students to language like, “Let’s try it!” Have your two volunteers carry out coding by utilizing the language suggested by the students. Then ask students, “Why is it helpful to offer and receive ideas when collaborating.” Have students share with their partners, then have a few students share out, emphasizing that it helps to bring out ideas, and it helps group members feel comfortable and heard. Tell them you expect to hear lots of offering and receiving ideas today during their group work. Thanks and dismiss your volunteers.

E. Conditional Codes

1. “Now, to start the dance, I want you to use a conditional code. What pattern does a conditional code follow?” Guide students to “If _____, then _____.” “To add a conditional code, I need to click on this green box.” Bring up the conditional codes and examine the coding blocks available. “I see this one has a picture of a tablet shaking, and this one has a picture of a tablet rotating. This is a picture of a piece we didn’t use, so that coding block won’t do anything for this robot. But let’s see what these blocks will do.” Create a sequence that starts with either the Shake to Trigger block or Rotate to Trigger block, followed by a short sequence of movement coding blocks. Press play. Nothing will happen. React to that, then ask the students, “Huh. What’s going on? It’s not moving, even though I’ve coded it to move. What do you think I need to do?” If students are stuck, point out details of the icon of the conditional block (like the arrows), guiding the students to determine we should try shaking or rotating the tablet. Then shake or rotate the tablet, depending on the coding block you used. “Ah, so if I shake (or rotate) the tablet, then the rest of the code will follow.” Explain to the students that they must include a conditional code to start their dance.



F. Roles

1. Explain that today:
   a) Task Masters will be asking, “Are we iterating? Have we used a sequence of blocks and a conditional block?”

b) Team Keepers will be asking, “Are we using respectful language and appropriate body language? Are we offering and receiving ideas?”

c) Asset Managers (if there are any), will ask, “Are we showing Care for Hardware?”

III. Code (15 min)

A. Have the Task Masters or Asset Managers retrieve their Botzee from the designated shelf or table.

B. Show students how to remove the pieces of the Walrus Botzee that block the power and power on the Botzee.

C. Release students to code their dance.

1. During group work, note if groups are making progress and iterating successfully. If not, draw this to the attention of the Task Masters so they can direct their group.

2. Also note if students are offering and receiving ideas. There is a risk that one student will dominate the process. If that is the case, draw this to the attention of the Team Keepers. Intervene if appropriate, and suggest handing off the tablet to another group member to see if that facilitates offering and receiving ideas.

3. Point out good examples of “Care for Hardware.”

IV. Presentations (8 min)

A. Organizing presentations

1. Once most students seem ready to present a dance, gather students for presentations. Tell them one group member will introduce the group, and the other group member will introduce the dance. Tell them they need a name for their dance, like “The Silly Side-Step.” Give students a moment to decide on a name for their dance and to determine who will say what.

B. Appropriate body language

1. Have two volunteers come up to demonstrate appropriate body language for presenting. While their robot is dancing, students should face toward the audience and robot, their feet planted on the floor. Tell students they should try not to fidget while their robot is dancing. That’s distracting! Point out how it may be harder than it looks.

C. Have students present. Assess using the rubric.

V. Pack-up (5 min)

A. Have students take apart their Botzee, box up their kits, and return them to the storage areas.

VI. Reflect (2 min)

A. Have students share out what they learned and what they did. Guide them to these possible outcomes

1. We learned about the Main Control Block and how it communicates with our tablet through Bluetooth.

2. We learned that the Main Control Block has a motor with an axle that makes movement possible
3. We coded our robots with sequences of code and conditional code.
4. We collaborated by offering and receiving ideas and offering encouragement.
5. We used an iterative design process.
6. We presented using appropriate body language.

PROJECT 3 - BOTZEE MONKEY + LOOPING & MAKING MUSIC

Learning Objectives

- Coding: Students will understand that blocks of code can be looped to program a robot.
- Coding: Students will use sequences of code to program a robot.
- Coding: Students will use a conditional code block to program a robot.
- Collaboration: Students will invite participation.
- Collaboration: Students will learn to disagree and request respectfully.
- Hardware Proficiency: Students will learn that the sensor block senses motion.
- Design Process: Students will engage in an iterative design process by exploring the capabilities of their Botzee and testing sequences and loops.
- Presenting: Students will present with appropriate body language.
- Presenting: Students will include content in their presentation that effectively explains their design choices.

ISTE Standards

- Students know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts or solving authentic problems. (4a)

- Students exhibit a tolerance for ambiguity, perseverance and the capacity to work with open-ended problems. (4d)
- Students understand how automation works and use algorithmic thinking to develop a sequence of steps to create and test automated solutions. (5d)
- Students create original works or responsibly repurpose or remix digital resources into new creations.(6b)
- Students publish or present content that customizes the message and medium for their intended audiences. (6d)
- Students contribute constructively to project teams, assuming various roles and

responsibilities to work effectively toward a common goal. (7c)

CSTA Standards

- Develop programs with sequences and simple loops, to express ideas or address a problem. (1A-AP-10)

- Use appropriate terminology in identifying and describing the function of common physical components of computing systems. (1A-CS-02)

Assessments

Informal assessments:

- During group work, the teacher will observe whether:
  - » Students are engaging in an iterative design process by exploring the capabilities of their robot and testing sequences and loops. (Design)
  - » Students are able to select and place multiple blocks of code in a deliberate sequence in the coding bar. (Coding)
  - » Students make use of a conditional coding block. (Coding)
  - » Students make use of a loop coding block. (Coding)
  - » Students take care when interacting with key components such as connectors, cables, the main control block and its axle, and the sensor block. (Hardware)
  - » Students can point to the main control block. (Hardware)
  - » Students can point to the axle that the motor powers. (Hardware)
  - » Students can point to the sensor block. (Hardware)
  - » Students are able to power on and off their Botzees. (Hardware)
  - » Students are aware of needing to wait for their device to communicate with their Botzee. (Hardware)
  - » Group members face each other and use respectful language to discuss their ideas. (Collaboration)
  - » Group members offer and receive ideas and offer encouragement. (Collaboration)
  - » Group members invite participation. (Collaboration)
  - » Group members disagree and request respectfully. (Collaboration)

Formal assessments:

- During the presentation, the teacher will assess whether:
  - » Students present their Botzee and song to the class, their code utilizing loops, sequences, and conditional coding blocks. (Coding)

» Students use appropriate body language. (Presenting)

» Students articulate the tone they wanted to achieve and describe their design process. (Presenting)

Name_____ Date _____

PROJECT 3 RUBRIC - LOOPING & MAKING MUSIC

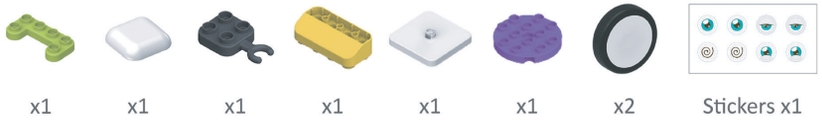
	Not Yet	Almost	Yes
Coding We used a looping block to program the robot.	☆	☆☆	☆☆☆
Collaboration We invited participation and disagreed and requested respectfully.	☆	☆☆	☆☆☆
Hardware We made use of the sensor block.	☆	☆☆	☆☆☆
Hardware We showed care for hardware.	☆	☆☆	☆☆☆
Design We create a song.	☆	☆☆	☆☆☆
Design We used an iterative process: Try. Think. Adjust. Repeat!	☆	☆☆	☆☆☆
Presenting We presented our song using appropriate body language and content choice.	☆	☆☆	☆☆☆

Vocabulary

- sensor block * - senses motion
- cables
- connection port
- loop * - a repeating sequence of code
- sequence
- conditional
- iterative process
- tone * - expression of attitude or feeling

* Recommended to display word and definition on a word wall during the lesson

Pieces needed



DAY 5

I. Introduction (12 min)

A. What is a loop?

1. Ask students, “What is a loop?” Have them share with the person next to them, then ask a few students to share out.
2. Explain that we can also have loops in code where a sequence of code is repeated. Place the definition of loop on the word wall.
3. Tell students that they are going to make a song by coding their Botzee. To do that, they will create a sequence that loops.

B. Project brief

1. Tell students that their Botzee song will need to have a tone, and that all songs have tones. What is a tone? Define tone as the expression of attitude or feeling, and display the definition on the word wall. As a class, come up with a list of examples of tones, e.g. sad, happy, wacky, energetic, silly. Play some examples of songs and ask students to describe the tone. Explain that for this project, after they build the Botzee, they are going to decide on a tone with their team and program their Botzee to play a song with that tone.

II. Sensor Block (3 min)

A. Explain that to start the song, they will use a conditional block of code that triggers the sensor block. Have students repeat, “sensor block.” Show students the sensor block, and explain that the sensor block senses motion. Display this definition on the word wall. Explain to students that they need to show care for the sensor block.

III. Building the monkey (25 min)

A. Demo

1. If possible, use screen mirroring to show students how to launch the app and click on “Build.”

Swipe until you see the monkey. Demo the first few screens of the monkey build. Point out the sensor block. Also, have students name the main control block and the axle. Based on the picture, ask them what they think the axle will power. Wheels like the first Botzee? Flippers like the walrus? We’ll see!

B. Collaboration

1. Inviting Participation

a) Remind them about respectful language, appropriate body language, providing encouragement, and offering and receiving ideas. Explain that today, we are going to practice inviting people to participate. Ask them, “Why is it important to invite people to participate? How do we benefit as a team when we do that?” Have students share their thoughts with the person next to them, then have students share out. Ask for examples of inviting participation. For example, “Would you like to build this part?” “Would you like to hold the tablet?” Explain how this will be the longest build yet, so group members will also benefit from offering encouragement, and if you hit a snag, remember to offer and receive ideas.

2. Roles

a) Pair students for Project 3 and assign roles. Ask the Task Masters to raise their hands. They need to keep track of whether the team is making progress on their build. Ask the Team Keepers to raise their hands. They need

to assess if the team is inviting participation. If there are Asset Managers, they will need to make sure the sensor block, main control block, and cables are being cared for.

C. Dismiss students to build.

Step 1

Step 2

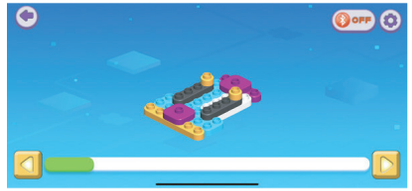
Step 3

Step 4

Step 5

Step 6

Step 7



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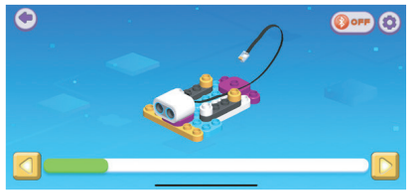

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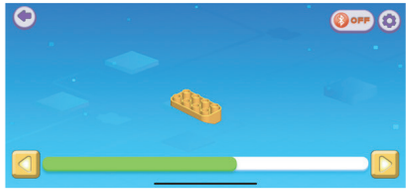
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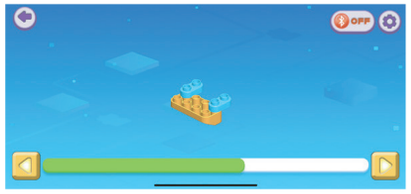
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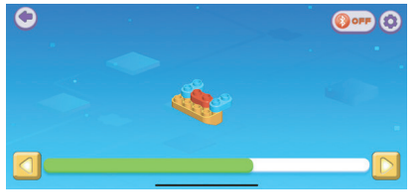
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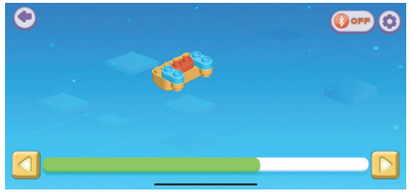
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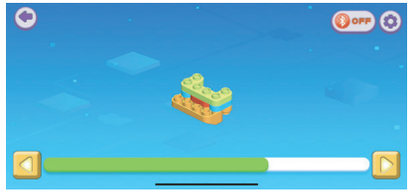
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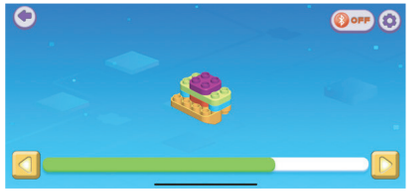
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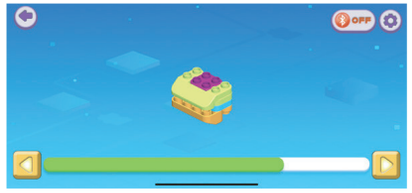
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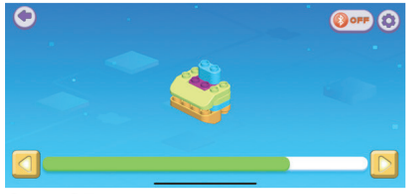
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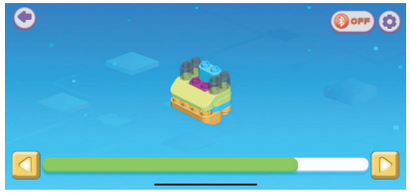
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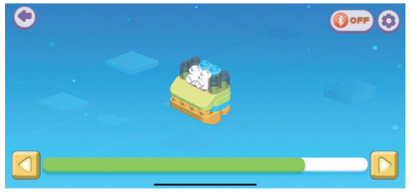
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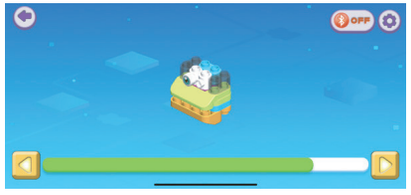
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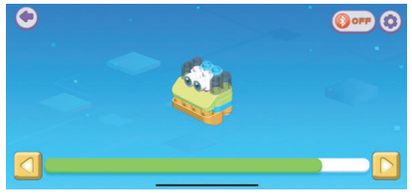

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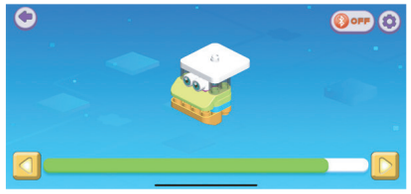

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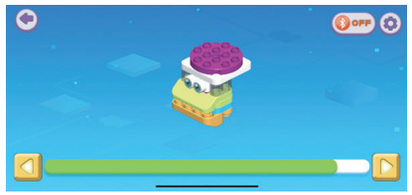

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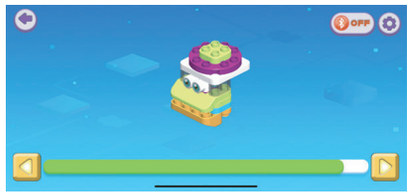

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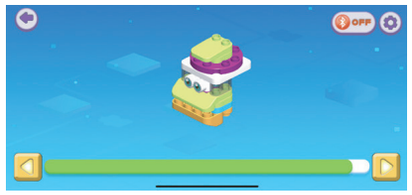

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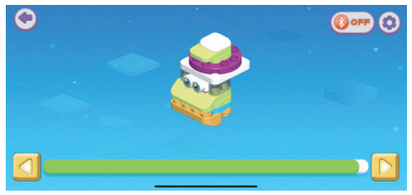


Step 44

Step 45

IV. Clean-up (5 min)

A. Have students return all loose parts to their kit box, reminding them to show “Care for Hardware.” One partner can put away the pair’s kit box, and the other partner can place their Botzee in the designated storage area (we recommend an out-of-the-way table or shelf).

DAY 6

I. Introduction (5 min)

A. Reminds students that today they are going to program their Botzee to play a song that conveys a certain tone. Remind them that tone is the expression of attitude or feeling. Also remind them of the examples they came up with in the previous lesson, e.g. sad, happy, wacky, energetic, silly.

B. Have students get into their pairs and have them decide on a tone for their song.

Have students share out.

II. Demo (5 min)

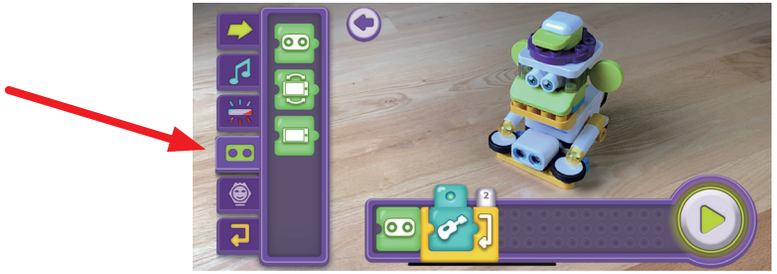
A. Remind students that we are going to code our Botzees to play a song. If possible, use screen mirroring to show students how to begin.

B. Scan the play area and robot. Set the boundaries of the play area by dragging the purple and yellow border.purple and yellow border.

C. Show students where the music code blocks are and explain that they will use an iterative process where they try different blocks.

D. Remind students that we are going to use loops in our song. Demonstrate this.

E. Also explain that they must make use of the sensor block with the conditional coding block. Demonstrate to students how to do that.



III. Collaboration (7 min)

A. Iterative process

1. Explain that partners will collaborate on the song. They will engage in an iterative design process. Ask them to recall what this means. (Try. Think. Adjust. Repeat.) Refer to the word wall if necessary.

B. Disagree Respectfully

1. Explain that as team members during an iterative process, they will offer and receive ideas. Ask them, “But will we always agree?” Guide them to understand that often team members will not agree. Then ask them, “How do we disagree respectfully?” Ask for students to give an example of disagreeing respectfully, e.g. “I think a different block would match our tone more.” Ask for a volunteer to demonstrate disagreeing respectfully with you. Explain that you are going to try something, and that (name) will disagree respectfully. After the demonstration, ask students why it’s helpful to disagree respectfully.

C. Request Respectfully

1. Ask students, “What if you want to try something? Your team member might invite participation by saying, ‘Would you like

to code?' But you can also make a request. How do we make requests respectfully?" Ask for examples of making a request respectfully, e.g. "Can we see what it sounds like if we add a pause?" Ask for a student volunteer to come up and make a request of you. Demonstrate complying with the request.

D. Roles

1. Assign roles.

2. Explain that it's extra important for the Task Masters to make sure they are making progress on their song and that the song is matching their chosen tone. Explain that the team will spend time exploring the codes, but at some point the team needs to make decisions about their song and code, and that the Task Masters can coach their team to do that. Team Keepers need to make sure the team is working together by offering and receiving ideas, disagreeing and requesting respectfully, and everything else they've been practicing. If there are Asset Managers, they need to make sure the team is showing "Care for Hardware," especially the sensor block.

IV. Code (15 min)

A. Have students retrieve their Botzees and begin to code.

V. Present (8 min)

A. As students finish up, explain that they will present their song. Before they play it, they will explain the tone and why they picked the coding blocks they did. Give
students time to plan and practice their presentations.

B. Have students present, and remind them to use appropriate body language. Assess students using the rubric.

VI. Pack-up (5 min)

A. Have students take apart their Botzee and box up their kits and return them to the storage areas.

VII. Reflect

A. If there is time, have students reflect on what they learned and what they did. Guide them to these possible outcomes.

- We learned about loops.
- We used the sensor block.
- We disagreed and requested respectfully.
- We programmed our Botzees to play a song that matched a tone.
- We used an iterative design process.
- We presented using appropriate body language.
- We explained our design process.

PROJECT 4 - BOTZEE ALLIGATOR + WAIT CODE BLOCK

Learning Objectives

- Coding: Students will code their Botzees to mimic a conversation using the “wait” coding block.
- Collaboration: Students are able to offer and receive ideas and provide encouragement to group members.
- Collaboration: Students will invite participation.
- Collaboration: Students will learn to disagree and request respectfully.
- Design Process: Students will engage in an iterative design process (testing and revising) in order to code their robots to mimic a conversation.
- Design Process: Students will create a dialogue.
- Presenting: Students will present their dialogue to the class using appropriate body language and voice.

ISTE Standards

- Students know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts or solving authentic problems. (4a)
- Students exhibit a tolerance for ambiguity, perseverance and the capacity to work with open-ended problems. (4d)
- Students understand how automation works and use algorithmic thinking to develop a sequence of steps to create and test automated solutions. (5d)
- Students create original works or responsibly repurpose or remix digital resources into new creations.(6b)
- Students publish or present content that customizes the message and medium for their intended audiences. (6d)
- Students contribute constructively to project teams, assuming various roles and responsibilities to work effectively toward a common goal. (7c)

CSTA Standards

- Develop programs with sequences and simple loops, to express ideas or address a problem. (1A-AP-10)
- Decompose (break down) the steps needed to solve a problem into a precise sequence of instructions.(1A-AP-11)
- Debug (identify and fix) errors in an algorithm or program that includes sequences and simple loops. (1A-AP-14)

Assessments

Informal assessments:

- During group work, the teacher will observe whether:
  - » Students are able to select and place the appropriate coding blocks (a sequence of “forward and back” blocks and “wait blocks) to mimic conversation. (Coding)
  - » Team members offer and receive ideas and offer encouragement. (Collaboration)
  - » Team members invite participation. (Collaboration)
  - » Team members disagree and request respectfully. (Collaboration)

- » Students engage in an iterative design process by exploring the capabilities of the their robot and testing sequences. (Design)
- » Students are able to create a dialogue. (Design)

Formal assessments:

- During the presentation, the teacher will assess whether:
  - » Students were able to code their Botzee to mimic conversation. (Design)
  - » Students were able to create a dialogue. (Design)
  - » Students presented with appropriate body language and voice.

Name_____ Date _____

PROJECT 4 RUBRIC - CONVERSATION WITH AN ALLIGATOR

	Not Yet	Almost	Yes
Coding We used sequences and/or loops to program the robot to knock down the "wall."	☆	☆☆	☆☆☆
Collaboration We remained solutions oriented. Let's fix it!	☆	☆☆	☆☆☆
Collaboration We explain our ideas to our team.	☆	☆☆	☆☆☆
Technical Literacy We correctly described and explained our code.	☆	☆☆	☆☆☆
Hardware We showed care for hardware.	☆	☆☆	☆☆☆
Design We used an iterative process: Try. Think. Adjust. Repeat!	☆	☆☆	☆☆☆
Design We worked within our time constraint.	☆	☆☆	☆☆☆
Presenting We explained our code using appropriate body language.	☆	☆☆	☆☆☆

Vocabulary

- iterative
- conversation * - two or more people talking
- conflict * - problem
- character

* Recommended to display word and definition on a word wall during the lesson

Pieces Needed

Prep

Build the alligator ahead of time to demo the assignment.

DAY 7

I. Introduction (5 min)

A. Ask students, “What is a conversation?” Guide students to the understanding that a conversation is two or more people talking. Put this definition on the word wall.

B. Ask for two students to come up and demo a conversation. After a few exchanges, stop the volunteers and ask the class, “What is (name) doing while (name) is talking?” Emphasize that they have to wait. Explain that we can program robots to wait and that this is often an important part of a sequence of code.

II. Brief (15 min)

A. Explain to students that for this project, students will create a short conversation and present it to the class, and that they will code their Botzee to look like they are participating in the conversation. (The conversation should have only a few lines of dialogue. See the example in Part C below.)

B. Pattern: Tell students that their conversation should tell a mini story, and that the

mini story needs to have a mini conflict or problem. Put this definition of conflict on the word wall. Tell the students that their conversation should:

1. Introduce the character

2. Introduce the conflict

3. End

C. Demo: Give the students a demonstration of assignment, where you "talk" to the alligator and the alligator responds with an opening and closing of the mouth (Snap!) (Below is the code you can use for the demo.)

Teacher: Hello Mrs. Alligator.

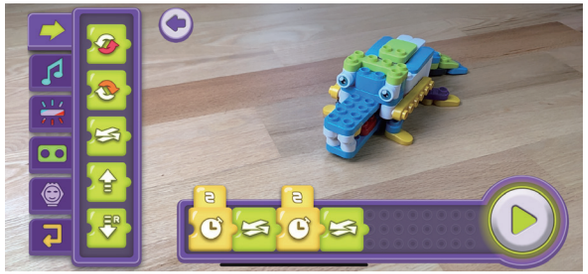
Alligator: Snap

Teacher: Are you hungry?

Alligator: Snap.

Teacher: Well, too bad!

Point out that your conversation introduced the character.



(Ask the class, what was the alligator's name?) Ask students that they problem was. (The alligator was hungry.) Ask students how it ended. (The alligator didn't eat.)

D. Say to the students, "So let's brainstorm some other problems your alligators could have. What problems could this alligator have?" Ask students to share their ideas with a partner, then have students share out, creating a list. In the demo, the alligator was hungry. Other possible problems would be that it's going to rain, that the alligator needs shoes, that he or she is sick, etc. Brainstorm problems with the class.

E. As a class pick a conflict and together come up with a dialogue that would introduce the character, introduce the conflict, then end. For example, if the class selects the conflict of needing shoes, the dialogue could be as follows:

Student: Hello Mr. Tooth.

Alligator: Snap!

Student: Did you lose your shoes?

Alligator: Snap!

Student: Well you can have mine!

Have a student run this second demo.

III. Build (20 min)

A. If possible, use screen mirroring to show students how to launch the app and click on "Build." Swipe until you see the alligator. Demo the first few screens of the build.

B. Roles and Collaboration

1. Assign teams and roles.
2. Explain that today's build is a little tricky, so it will be a good ideas to offer encouragement. Explain that Team Keepers can help with this. Ask students, "How can Team Keepers do that?" Guide students to the idea that Team Keepers can set the example and offer encouragement, for example, "I think you almost had it. Try again! Nice!"
3. Remind Task Masters to make sure they are making progress on their build. Ask students, "How can Task Masters do that?" Sample answer: "They can say, 'Let's get back to building.'"
4. If there are Asset Managers, remind them to monitor "Care for Hardware."

C. Retrieve kits

1. Have the Task Masters retrieve the Botzee kits and the Team Keepers or Asset Managers retrieve the tablets.

D. Build

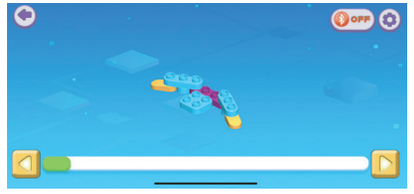
1. NOTE: The instructions don't show the cable on the digital servo block. It's not necessary for it to plug into the main control block, so students can leave it loose, although they should take care it does not get pulled.

Step 1

Step 2

Step 3

Step 4



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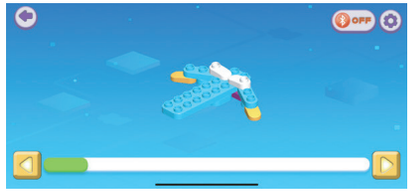

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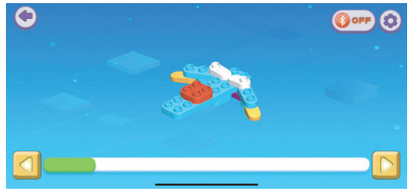

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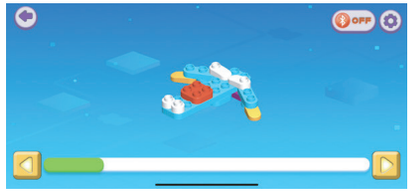

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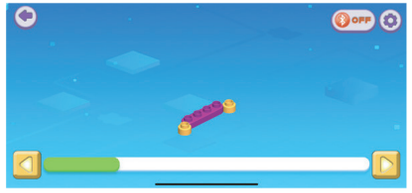

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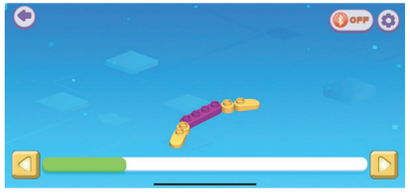

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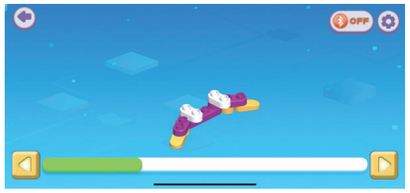

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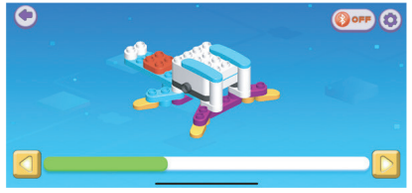

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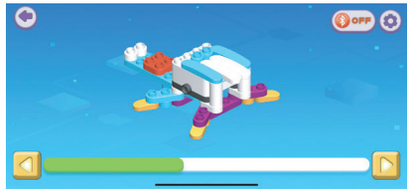

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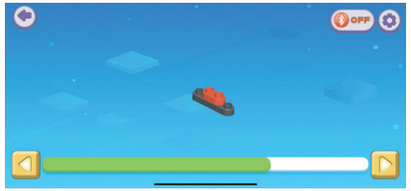

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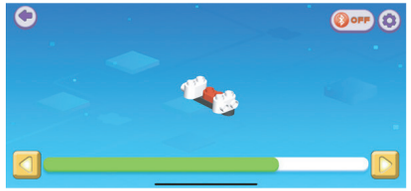

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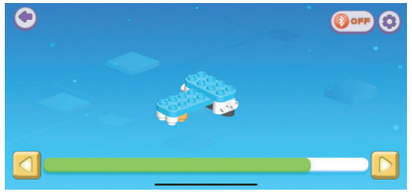

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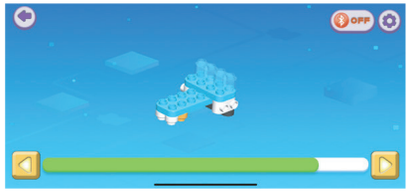

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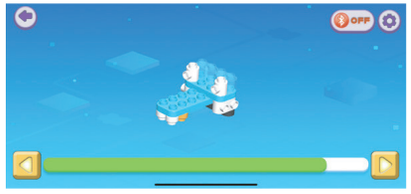

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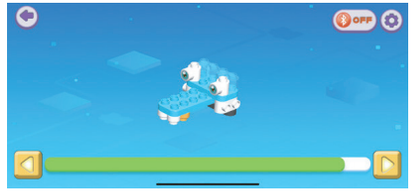

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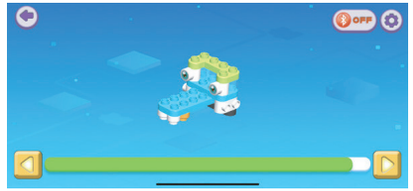

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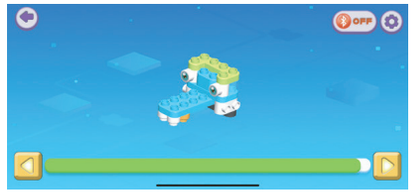

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IV. Clean-up (5 min)

A. Have students return the kit boxes, tablets, and constructed Botzees to their designated storage areas.

DAY 8

I. Brief (5 min)

A. Remind students that they are going to code a conversation.

B. Demo.

1. If possible, use screen mirroring to show students how to begin. Click on “Code.”

2. Scan the play area.

3. Show students where the “wait” code is and how they can code the Botzee to wait for a count of 1, 2, 5, and so forth. Encourage students to explore the codes to see if they can figure out how the make the alligator “snap.”

II. Collaboration. (3 min)

A. Remind them that they also have to collaborate with their team to create and present a conversation. Remind them to offer and receive ideas, invite participation, and disagree/request respectfully. Remind Team Keepers to coach their team on this. Ask students, “How can Team Keepers do this?” and have a few students offer examples. Sample answer: “Let’s listen to their idea,” or “Let’s try to disagree respectfully.”

B. Remind Task Masters to make sure their team is on task and making progress. Ask students, “How can Task Masters do this?” and have a few students offer examples. Sample answer: “Let’s work on the conversation.”

C. If there are Asset Managers remind them to coach and monitor “Care for Hardware.” Ask students, “How can Asset Managers do this?” and have a few students offer examples. Sample answer: “Watch out for the cable.”

III. Code (20 min)

A. Retrieve kits.

1. Have the Task Masters retrieve the alligator Botzees and the Team Keepers or Asset Managers retrieve the tablets.

B. Code and Conversation

1. Give teams time to code.

2. At some point grab the class' attention and remind them that they also have to create a conversation.
Review the list of conflicts from the previous lesson. Remind students that their conversation should introduce the character, the conflict, and end. Utilize Task Masters if you notice a team is not making adequate progress.

IV. Presentation Preparation (7 min)

A. Title

1. Bring the class together. Tell students that all team members should be part of the presentation. Students can either participate in the conversation, introduce the conversation, or both. To introduce the conversation, they can tell the class a title, like Hungry Alligator. Give teams a few minutes to come up with a title and practice their presentation.

B. Voice

1. Tell them that when they present their conversation, they will need to use
appropriate body language and voice and that they must be loud enough for the class to hear the conversation.

2. Tell them that facing the audience, standing up straight, and lifting their head up will help.

3. Have a student model appropriate voice and body language. They can practice their introduction.

V. Presentations (7 min)

A. Have teams present their conversation. Assess students using the rubric.

VI. Clean-up (3 min)

A. Have students pack up their Botzee kits and return kits and tablets to their storage areas.

VII.Reflection

A. If there is time, have students reflect on what they did and learned during this project.

1. We learned about and used the "wait" coding block.

2. We coded our alligator to look like it was talking.

3. We created a conversation that told a mini story with a character and a conflict.

4. We presented with appropriate voice and body language.

5. We were good collaborators, offering and receiving ideas, inviting participation, disagreeing and requesting respectfully, and offering encouragement.

6. We used an iterative design process. (Try. Think. Adjust. Repeat!)

7. We showed "Care for Hardware."

PROJECT 5 - BOTZEE TRUCK + TASK

Learning Objectives

- Coding: Students will utilize their understanding of coding to in order to code their robot to perform a simple task.
- Coding: Students will use sequences of code and/or loops to program a robot.
- Collaboration: Students will remain solutions oriented.
- Collaboration: Students will explain their ideas to team members.
- Technical Literacy: Students will explain the types of coding (sequence, loops, or conditional) they utilized to accomplish the task.
- Design Process: Students will engage in an iterative design process by testing sequences and loops in order to accomplish the task.
- Presenting: Students will present with appropriate body language.

ISTE Standards

- Students use technology to seek feedback that informs and improves their practice and to demonstrate their learning in a variety of ways. (1c)
- Students understand the fundamental concepts of technology operations, demonstrate the ability to choose, use and troubleshoot current technologies and are able to transfer their knowledge to explore emerging technologies. (1d)
- Students build knowledge by actively exploring real-world issues and problems, developing ideas and theories and pursuing answers and solutions. (3d)
- Students know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts or solving authentic problems. (4a)
- Students exhibit a tolerance for ambiguity, perseverance and the capacity to work with open-ended problems. (4d)
- Students understand how automation works and use algorithmic thinking to develop a sequence of steps to create and test automated solutions. (5d)
- Students create original works or responsibly repurpose or remix digital resources into new creations.(6b)
- Students publish or present content that customizes the message and medium for their intended audiences. (6d)
- Students contribute constructively to project teams, assuming various roles and responsibilities to work effectively toward a common goal. (7c)

CSTA Standards

- Develop programs with sequences and simple loops, to express ideas or address a problem. (1A-AP-10)
- Decompose (break down) the steps needed to solve a problem into a precise sequence of instructions.(1A-AP-11)
- Debug (identify and fix) errors in an algorithm or program that includes sequences and simple loops. (1A-AP-14)
- Using correct terminology, describe steps taken and choices

made during the iterative process of program development. (1A-AP-15)

- Use appropriate terminology in identifying and describing the function of common physical components of computing systems. (1A-CS-02)

Assessments

Informal assessments:

- During group work, the teacher will observe whether:
  - » Students engage in an iterative design process by exploring the capabilities of their robot and testing sequences and loops. (Design)
  - » Students remain solutions oriented. (Collaboration)
  - » Students use sequences of code and/or loops. (Coding)
  - » Students explain their ideas to team members. (Collaboration)
  - » Students show “Care for Hardware.” (Hardware)

Formal assessments:

- During the presentation, the teacher will assess whether:
  - » Students were able to program their Botzee to knock down the “wall” within the time constraint. (Coding)
  - » Students were able to correctly describe and explain their code. (Technical Literacy)
  - » Students present with appropriate body language. (Presenting)

Name_____ Date _____

PROJECT 5 RUBRIC - ACCOMPLISHING A TASK

	Not Yet	Almost	Yes
Coding We used sequences, conditional codes, and/or loops to program our robot.	☆	☆☆	☆☆☆
Collaboration We offered and received ideas. “Yes, and…!”	☆	☆☆	☆☆☆
Collaboration We used our strengths.	☆	☆☆	☆☆☆
Technical Literacy We can talk about our hardware and code.	☆	☆☆	☆☆☆
Hardware We know and care for hardware.	☆	☆☆	☆☆☆
Design We used an iterative process: Try. Think. Adjust. Repeat!	☆	☆☆	☆☆☆
Presenting We presented with appropriate voice and content choice.	☆	☆☆	☆☆☆

Vocabulary

- constraints * - limitations
- solutions oriented * - Let's fix it!
- loop
- sequence
- iterative process

* Recommended to display word and definition on a word wall during the lesson

Pieces Needed

Other Materials Needed

- Cereal boxes (or a similar item) for each team. These boxes will model as walls to be knocked down. Tissues boxes, plastic storage bins, or crayon boxes could also work. Whatever is used, each team's "wall" should be the same dimensions and weight as the other teams'.

DAY 9

I. Introduction (8 min total)

A. How are robots useful? **(2 min)**

1. Ask students, "Are robots useful to humans? Raise your hand if you think robots are useful." Explain to students that, yes, some robots are very useful. Ask students, "How might robots be useful?" Have students share their thoughts with a partner then share out. Guide them towards the idea that robots can help humans perform tasks. They can assemble a car, then can lift heavy things, that can go places and perform a task someplace that might be dangerous for humans.

B. Brief **(1 min)**

1. Explain to students that for this project, they are going to program their robot truck to perform a particular task—their robot truck is going to have to knock down a wall. Explain that for this task, the wall will be modeled by a cereal box (or any other similar object that can be easily procured for the teams, as long as it is the same for all teams. Tissue boxes or plastic storage boxes could also work.) Ask them who thinks

they can program their Botzee to knock down the wall. (Get them excited!)

C. Constraints **(5 min)**

1. Explain, that like many designers, engineers, and computer programmers, they will face "constraints." Have students repeat the word "constraints." Tell them that constraints are "limitations." Post this definition on the word wall.

2. Share with students an example of a constraint from your own life. For example, describe to them how you were making sandwiches for you and your friend, but you only had two pieces of bread. That was a constraint. You couldn't make the sandwiches you wanted because you didn't have enough bread, so instead you made each of you a half sandwich. Ask students to think about a time that they wanted to do something, but faced constraints. Ask them to share their experience with a partner, then have a few students share out.

3. Explain to students that when they program their Botzee to knock down the "wall," they are only able to code with the coding blocks available, and they will only be able to use up to six coding blocks. Also explain that they will only have this class to build their robot, and part of the next class to code their robot. Explain that time limits are a very common constraints that designers and coders have to face.

II. Collaboration (10 min)

A. Explain to students that constraints can be a challenge for designers and programmers. That's why collaboration can be so beneficial. By working together and offering and receiving ideas, there is a much greater chance that tasks will get accomplished even though there are constraints. However, this requires good and effective collaboration. We've already been practicing that. Sometimes teams can only see the constraints, rather than how to overcome them. That can sometimes lead to teams getting stuck. That's why it's good for a team to be "solutions oriented." Have students repeat "solutions oriented."

1. Ask students, "What is a solution?" Guide students to the understanding that solutions fix a problem.

2. Ask students, "What do you think it means to be solutions oriented?" Have students share their thoughts with a partner, then ask a few students to share out. Guide students to the understanding that being solutions oriented means focusing on how to fix a problem rather than getting stuck on the problem itself. Define this on the word wall as, "Let's fix it!"

3. Ask students, "What do you think would happen if your team wasn't solutions oriented, and just focused on the problem instead?" Have students share their thoughts with a partner, then ask a few students to share out.

4. So tomorrow, when you are trying to program the Botzee to knock down the tower, identify any problems you're facing, but then try to remain focused on how you are going to overcome them.

B. Also explain to students that as they work together to accomplish their task, they may have to explain their ideas to their

team. This helps get everyone on board and allows other team members to build off of the idea. It also means team members won't feel left out, which can make effective collaboration difficult.

III. Build Botzee (20 min total)

A. Demo **(2 min)**

1. If possible, use screen mirroring to show students how to launch the app, click on "Build," and select the truck. Show the first few steps. Ask students to name the main control block and axles, reminding them to show "Care for Hardware."

B. Collaboration and Pairing **(2 min)**

1. Assign pairs for Project 4 and designate Task Masters, Team Keepers, and, if
necessary, Asset Managers. Remind them that they will practice good collaboration. Explain that Task Masters will retrieve the kits and make sure the team is on task, the task of building their truck within the time constraint (today's class). Explain that Team Keepers will make sure team members are remaining solutions oriented and explaining ideas when helpful. They should also monitor that students are facing each other, using respectful language, providing encouragement, and offering/receiving ideas. If there are Asset Managers, they will make sure team members are showing "Care for Hardware."

C. Retrieve Kits **(1 min)**

1. Dismiss the Task Masters to retrieve the kits. Point out good examples of "Care for Hardware."

D. Build **(15 min)**

1. Roles
   a) During the build, point out examples of being solutions oriented and explaining ideas. Also point out other aspects of good collaboration discussed in previous lessons: facing each other, using respectful language, providing encouragement, offering/receiving ideas, inviting participation, and disagreeing/requesting respectfully. Encourage Team Keepers to coach their group.
   b) Point out groups that are on task and on track to meet their time constraint. Encourage Task Masters to coach their group.
   c) Point out good examples of "Care for Hardware." Encourage Asset Managers to coach their group.
2. If students finish early, allow them to explore the movement of the truck by utilizing the "Control" function of the app.

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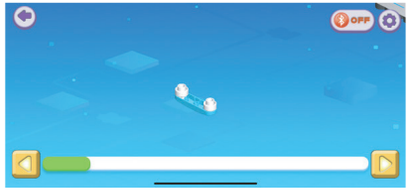

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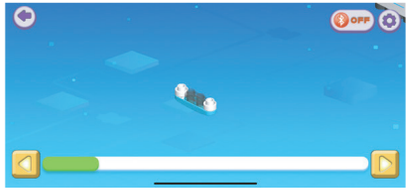

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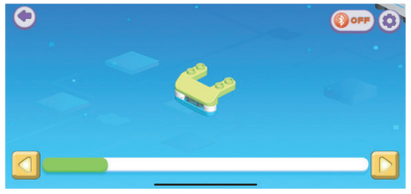

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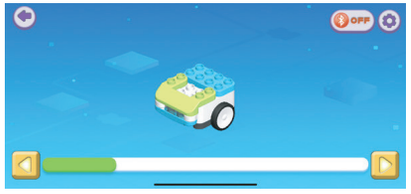

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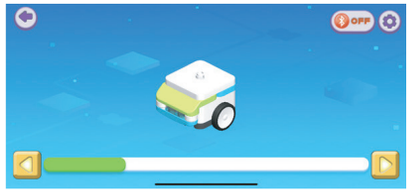

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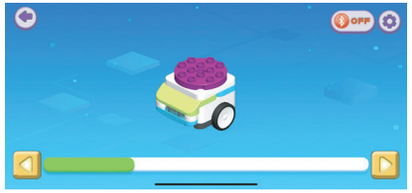

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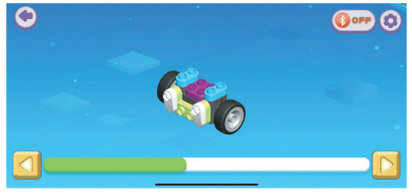

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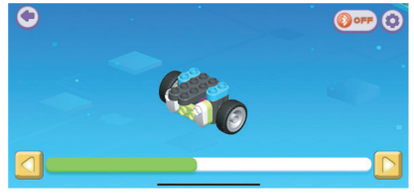

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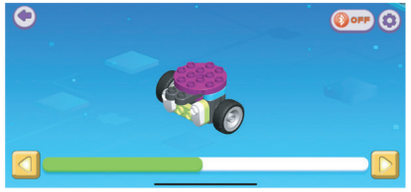
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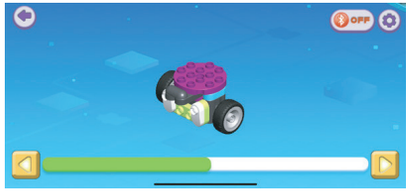
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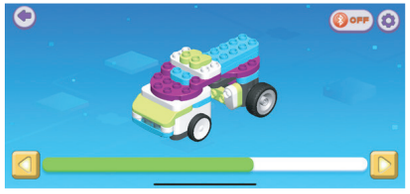
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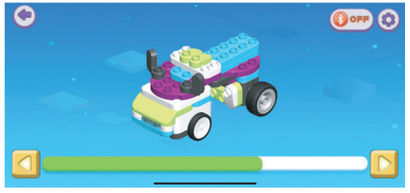
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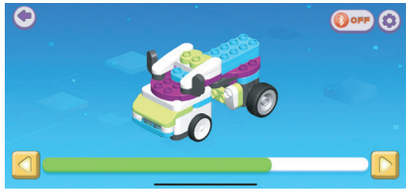
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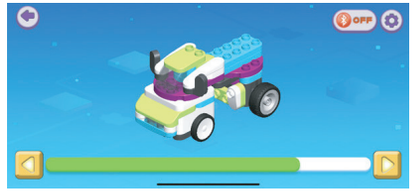
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IV. Clean-up (5 min)

A. Have students return loose parts to their kit box. Have one student from each group return kit boxes and the other student place their Botzee in the designated area, reminding them to show “Care for Hardware.”

DAY 10

I. Brief (5 min)

A. Explain to students that they are going to try to program their robot to accomplish a task. Their robot will need to knock down a “wall.” Explain that there are two different options. In Option 1, the truck starts 1 ft away from the “wall.” In Option 2, the truck starts 3 ft away from the “wall.” Show them the set-up of the two options.

B. NOTE: We encourage you to do a test run before class so that it’s clear the challenges that teams may face. If the boxes are light or top heavy, or if the floor is slick, the boxes may not be easily knocked over by the truck, in which case a piece of tape anchoring the back of the box to the floor should make the task doable. In general, Option 1 should be fairly straight forward.

Depending on the nature of the floor and the idiosyncrasies of the Botzee, Option 2 should pose a few challenges for the teams to try to overcome. If on carpet, the teams may need to make use of the loop coding block. In addition, the Botzees tend to list, and this makes the task difficult over a distance like 3 ft. Students could potentially augment their Botzee so that it moves in a straighter line, or they could compensate for the tendency of the Botzee to pull right or left by starting the Botzee pointed in the opposite direction. In any case, encourage students to embrace the challenge and the contraints and remain solutions focused. Emphasize that “failures” are very useful in an engineering design process.

1. Possible solution for Option 1.

2. Possible solution for Option 2. Notice that the Botzee is pointed to the right of the “wall” to compensate for a tendency of this Botzee to pull to the left.

II. Collaboration (2 min)

A. Remind students that today it's especially important that they remain solutions oriented. Ask students, "How can the Team Keeper help with that?" Example answer: The Team Keeper can say, "Let's focus on a solution."

B. Remind students that it is often helpful to explain your ideas to your team. Ask students, "How can the Team Keeper help with that?" Example answer: The Team Keeper can say, "Can you explain what your idea is to me and the team?"

C. Remind them of their constraints and that they will engage in an iterative process. Ask students, "How can the Task Masters help with that?" Example answer: Task Masters can say, "We have 10 minutes left," or "Well let's go ahead and try out that idea and see if it works."

III. Code (15 min)

A. Dismiss students to code.

B. Utilize Task Masters and Team Keepers to keep their teams on task and collaborating effectively. Point out examples of an iterative process and remaining solutions oriented as well as offering encouragement, offering/receiving ideas, inviting participation, disagreeing/requesting respectfully, and showing "Care for Hardware."

C. If some teams are ready for the test ahead of others, instruct those teams to tackle another option.

IV. Performance Test (15 min)

A. Have students raise their hands if they want to go for for Option 1. Have students go one team at a time. Follow with Option 2. Decide if you want to allow teams to participate in more than one category.

B. Before teams conduct their performance test, ask them to describe and explain to the class what code they used to try to accomplish the task. In order to assess each student's technical literacy, have one team member list the types of code they used (sequences of code and/or looping), then have the other team member explain how that type of code shows up in their test. Also ask teams to describe any challenges they faced and how they tried to overcome them. If there are any "failures," encourage teams and the class to identify what we can learn from these "failures."

V. Clean-up (5 min)

A. Have students dismantle their Botzees and pack up their kits, returning them to the storage area.

VI. Reflect (3 min)

A. Have students share out what they learned and what they did during this project.

Guide them to these possible outcomes:

1. We coded (or attempted to code) our robots to accomplish a task.
2. We used an iterative design process.
3. We were solutions oriented.

4. We explained our ideas to our team.
5. We tackled constraints.
6. We learned from our “failures.”

PROJECT 6 - DESIGN YOUR OWN BOTZEE

Learning Objectives

- Coding: Students make use of sequences of code, conditional codes, and/or a looping block to program their robot to move, make sounds, and/or light up.
- Collaboration: Students will offer and receive ideas.
- Collaboration: Groups will identify and utilize strengths within their group.
- Technical Literacy: Students will describe how they utilized various hardware components in their Botzee (main control block, sensor block, axles.)
- Technical Literacy: Students will explain the types of coding (sequence, loops, or conditional) they utilized in their presentation of their Botzee.
- Hardware Proficiency: Students will design their own Botzee utilizing their knowledge of hardware, i.e. the role of the main control block, sensor block, and axles.
- Design Process: Students will engage in an iterative design process to design their own Botzee.
- Presenting: Students will present to the class using effective content choice.
- Presenting: Students will use their voices effectively during their presentations.

ISTE Standards

- Students know and use a deliberate design process for

generating ideas, testing theories, creating innovative artifacts or solving authentic problems. (4a)

- Students develop, test and refine prototypes as part of a cyclical design process. (4c)
- Students exhibit a tolerance for ambiguity, perseverance and the capacity to work with open-ended problems. (4d)
- Students understand how automation works and use algorithmic thinking to develop a sequence of steps to create and test automated solutions. (5d)
- Students create original works or responsibly repurpose or remix digital resources into new creations.(6b)
- Students publish or present content that customizes the message and medium for their intended audiences. (6d)
- Students contribute constructively to project teams, assuming various roles and responsibilities to work effectively toward a common goal. (7c)

CSTA Standards

- Develop programs with sequences and simple loops, to express ideas or address a problem. (1A-AP-10)
- Debug (identify and fix) errors in an algorithm or program that includes sequences and simple loops. (1A-AP-14)
- Using correct terminology, describe steps taken and choices made during the iterative process of program development. (1A-AP-15)
- Use appropriate terminology in identifying and describing the function of common physical components of computing systems (hardware). (1A-CS-02)

Assessments

Informal assessments:

- During group work, the teacher will observe whether:
  - » Students are making use of sequences of code, conditional codes, and/or a looping block to program their Botzee. (Coding)
  - » Students are offering and receiving ideas, possibly using “Yes, and…” (Collaboration)
  - » Students are identifying and utilizing strengths within their group. (Collaboration)
  - » Students are able to utilize their knowledge of hardware (the main control block, the sensor block, axles, and cables) to design their own Botzee. (Hardware Proficiency)
  - » Students are engaging in an iterative design process by exploring the capabilities and possibilities of kit components and coding blocks. (Design)

Formal assessments:

- During the presentation, the teacher will assess whether:
  - » Students make use of sequences of code, conditional codes, and/or a looping block to program their Botzee. (Coding)
  - » Students are able to describe how they utilized various hardware components (main control block, sensor block, axles). (Technical Literacy)

- » Students are able to explain the types of code they utilized (sequences, conditional codes, or loops). (Technical Literacy)
- » Students are able to design and build their Botzee utilizing essential hardware. At the very least, this would include use of the main control block. (Hardware Proficiency)
- » Students present their Botzee with effective voice and content choice. (Presenting)

Name_____ Date _____

PROJECT 6 RUBRIC - DESIGN YOUR OWN BOTZEE

	Not Yet	Almost	Yes
Coding We used sequences, conditional codes, and/or loops to program our robot.	☆	☆☆	☆☆☆
Collaboration We offered and received ideas. "Yes, and...!"	☆	☆☆	☆☆☆
Collaboration We used our strengths.	☆	☆☆	☆☆☆
Technical Literacy We could talk about our hardware and code.	☆	☆☆	☆☆☆
Hardware We used our knowledge about hardware to design and build our robot.	☆	☆☆	☆☆☆
Design We used an iterative process: Try. Think. Adjust. Repeat!	☆	☆☆	☆☆☆
Presenting We presented with appropriate voice and content choice.	☆	☆☆	☆☆☆

Vocabulary

- sequence
- loop
- conditional
- iterative process
- main control block
- sensor block
- inspiration * - where ideas come from
- brainstorm * - all the ideas
- reverse engineer * - How does it do that?

* Recommended to display word and definition on a word wall during the lesson

DAY 11

I. Inspiration (4 min)

A. What is inspiration?

1. Have students raise their hands if they know what inspiration is. Have a students share out if they know this word, guiding them to the understanding that inspiration offers us ideas. Put this definition on the word wall. Give an example of something that inspires you, for example maybe a person inspired you to become a teacher, or to rescue a a dog, or to run a marathon. Ask students to think about a time they were inspired to do something. Have students share with a partner, then ask a few students to share out with the class.

B. Botzee Inspiration

1. Explain to students that for this project, they will create your own Botzee and program it in some way. They will need some inspiration, something to give them ideas. They can use the Botzees as inspiration, and they can also bring in inspiration from the world around them, like animals, other machines or vehicles, or a character from their favorite book.

II. Collaboration and Brainstorming Intro (6 min)

A. Brief

1. Explain to students that this is a very open-ended project, so teams this week will need to be extra good collaborators. Explain that today they will brainstorm with their team some ideas for their Botzee. In their teams they will decide what their inspiration will be, how they think their Botzee will move, and a few other features of their Botzee.

B. What is a brainstorm?

1. Ask students, “What’s a brainstorm?” Call on a few students, guiding themtowards the idea that during a brainstorm, they want to get all the ideas out of their brain. Put the definition on the word wall.

C. Yes, and…

1. Explain to students that during a brainstorm, all ideas are good ideas, and that they can narrow ideas down later, especially when they come to build their Botzee and realize what works and what doesn’t. But for now, they want to offer

and receive a lot of ideas. Explain to students that one way to make sure this happens easily, is to say, “Yes, and…” Have students repeat, “Yes, and…” Ask for a student volunteer and have them say “Yes, and…” to every idea you offer as you and the volunteer describe an ice cream sundae with toppings you will make. For example:

“Let’s make an ice cream sundae with chocolate ice cream.”

“Yes, and let’s add strawberry ice cream.”

“Yes, and let’s top it with chocolate sauce!”

“Yes, and let’s add peanuts!!”

“Yes, and let’s add whip cream!!!”

“Yes, and let’s add pepperoni!!!!”

“Yes, and let’s add mashed potatoes!!!!!”

“Yes, and let’s add sprinkles!!!!!!”

D. Reflect

1. Afterwards, ask students, “What was helpful about saying, “Yes, and…” all the time. Sample answers: “It makes it fun,” “It makes the other person feel good about their idea,” “It makes it easier to come up with ideas,” etc. Encourage students to use “Yes, and…” as much as they can during their brainstorm, so that it facilitates offering and receiving ideas.

III. Brainstorming and Planning (20 min)

A. Assign Teams

1. Assign teams for Project 5. Assign Task Masters, Team Keepers, and (if necessary) Asset Managers.

B. Graphic Organizer

1. Review the graphic organizer titled “Our Botzee Design” with students. Explain that as a team, they’ll take time to decide on their inspiration for how their Botzee will appear, how their Botzee will move, what types of hardware they will need, and what types of color they want to use. Explain that some of this will change as they actually go to build their robot, but that brainstorming and planning will help their build go a lot more smoothly. Model how to fill it out. (In general, they should circle one option for “Looks,” one option for “Movement,” as many hardware pieces as they think are necessary, and as many colors as they want. They should all circle the main control block.) Tell the students that each team will report out.

C. Roles

1. Encourage Team Keepers to coach their group in good collaboration. Ask the class, “How can Team Keepers do that?” Example answer: “Team Keepers can say, ‘Let’s use “Yes, and…”’” Encourage Task Masters to make sure that their team’s sheet is getting filled out and that the team is addressing the topics on the sheet. Ask the class, “How can Task Masters do that?” Example answer: “Task Masters can say, ‘Let’s think about how the Botzee will move.’”

D. Team Time

1. Give students time to meet with their teams for brainstorming and planning. Look for and point out students using “Yes, and…” to offer andreceive ideas. Also point out

other, relevant aspects of good collaboration discussed in previous lessons: facing each other, using respectful language, providing encouragement, inviting participation, disagreeing/requesting respectfully, and explaining of ideas. Encourage Team Keepers to coach their group in good collaboration.

E. Report Out

1. Have each team share their inspiration for looks and movement as well as the hardware and colors they intend to use. Encourage all team members to participate in the report.

IV. Build (Part A) (10 min)

A. Reverse Engineering

1. Tell students that now that they have decided which Botzee is going to inspire their movement, they are going to figure out, "How does it do that!?" Explain that this is called "reverse engineering." Have students repeat "reverse engineering" and put the definition on the word wall. Ask students if they know what engineers do. Guide them towards the understanding that engineers build things. So reverse engineering un-builds things in order to figure out, "How does it do that?!" Explain to students that you want them to build the Botzee that they have chosen to inspire their movement, and to see if they figure out, "How does it do that?!" Ask a few students to venture a guess: "Who thinks they know how the Botzee robot moves?" Sample answer: "Wheels are connected to axles on the main control block."

B. Retrieve kits

1. Have Task Masters or Asset Managers retrieve kits.

C. Team Time

1. Prompt teams to select the build for the Botzee that their team is using to inspire their movement and have them start building. (We'll call this Botzee the "Inspiration Botzee.") Students may not finish, and they can continue in the next lesson. It's also not necessary for them to completely finish the build. They just need to get far enough along to identify how the "Inspiration Botzee" moves.

V. Clean-up (5 min)

A. Have students return loose parts to their kit box. Have one student from each group return kit boxes to the storage area and another student place their "Inspiration Botzee," which may only be partially constructed, in the designated area, reminding them to show "Care for Hardware."

DAY 12

I. Report Out (8 min)

A. Have teams retrieve their "Inspiration Botzees." (They may only be partially completed.)

B. Remind students that today they will move onto building their own, original Botzee, and that they will present their original Botzee to the class. Explain that during the presentation, students

must explain their inspiration and design process, and that their Botzee must be coded.

C. Have teams report out what they learned about how their "Inspiration Botzee" moves. If they don't know yet, that's fine. They can report that they don't know yet how it moves, but prompt them to describe at least the basic idea, whether it uses wheels or will mimic arms. (This is an opportunity to identify teams that may need help.)

II. Collaboration (5 min)

A. Explain that today's build and code requires a lot of different skills. Ask students to list all the things they'll be doing today. Have them share with a partner then ask a few students to share out. For example, they will have to find pieces, connect pieces, imagine how something will look or move, figure out how to make it look or move a certain way, try out ideas, make changes, pick out nice colors, etc. Explain that different people have different strengths, and that for a project like this, you want to use all of your team's strengths.

B. Ask students, "What would happen if we didn't use our team's strengths." Guide students towards the understanding that the team would lose out in some way.

C. Ask students what they think their strengths are. Have students share with a partner, then ask a few students to share out.

D. Tell students that today, you want to see the teams using your strengths. Tell them that the Team Keepers should be helping their team do that. Ask students, "How can Team Keepers do that?" Sample answer: "Team Keepers can say, "Let's make sure we're using our strengths. What is everyone good at?"

III. Build (Part B) (20 min)

A. Retrieve Kits

1. Have Task Masters or Asset Managers retrieve kits as teams will need access to the rest of the pieces in the kit.

B. Build Time

1. Give teams time to build their unique Botzee, using their "Inspiration Botzee" to guide them.

2. Encourage Task Masters to make sure their team is on task and making progress. Encourage Team Keepers to promote good collaboration. Encourage Asset Managers to monitor "Care for Hardware."

3. Point out examples of an iterative process and showing "Care for Hardware." Point out examples of groups utilizing strengths. Also point out other, relevant aspects of good collaboration discussed in previous lessons: facing each other, using respectful language, providing encouragement, inviting participation, disagreeing/requesting respectfully, and explaining ideas.

4. At some point, grab the class' attention that remind them that they will need to code their Botzees. Monitor groups and make sure they are moving on from building to coding. Encourage Task Masters to coach their group on this. Task Masters can say things like, "Let's think about how we'll code the robot," or "Let's try out some code and see what

happens."

IV. Present (7 min)

A. Bring the class together for presentations. Tell them that during team presentations, the teams must explain their inspiration and their design process. Tell them that you want them to use appropriate body language and voice. Ask for a student volunteer to demonstrate appropriate voice, guiding students to the understanding that everyone should be able to hear them. Remind them that facing the audience, standing up straight, and lifting their head up will help.

B. Have teams present their Botzees to the class. Assess using the rubric.

V. Clean-up (5 min)

A. Have students pack up their Botzee kits and return them to the storage area. Point out examples of "Care for Hardware."

Our Botzee Design

Looks	Movement	Hardware	Color
Robot 	Robot 	Main Control Block 	Purple
Truck 	Truck 	Sensor Block 	Yellow
Monkey 	Monkey 	Wheels 	Turquoise
Alligator 	Alligator 	Casters 	White
Walrus 	Walrus 		Black
Other Animal			Red
Other Machine or Vehicle			Green
Character			

TIPS & FAQS

(Q) Why isn’t the Botzee responding to the waving in front of the sensor block?
(A) Wave your hand up and down quickly. Try waving it closer to the sensor block.