Robotics

Lesson Plan

Season 2, Episode 2 (13:05–26:46)
bit.ly/steamcamp-s2-ep2

Learn what a robot is and then use computational thinking to "program" a grown-up or friend!

Next Generation Science Standards | Science and Engineering Practices:

Using Mathematics and Computational Thinking:

- Mathematical and computational thinking in K–2 builds on prior experience and progresses to recognizing that mathematics can be used to describe the natural and designed world(s).
- Mathematical and computational thinking in 3–5 builds on K–2 experiences and progresses to extending quantitative measurements to a variety of physical properties and using computation and mathematics to analyze data and compare alternative design solutions.

Materials

- A small object or toy to hide
- A piece of paper
- A pencil
- A grown up or friend

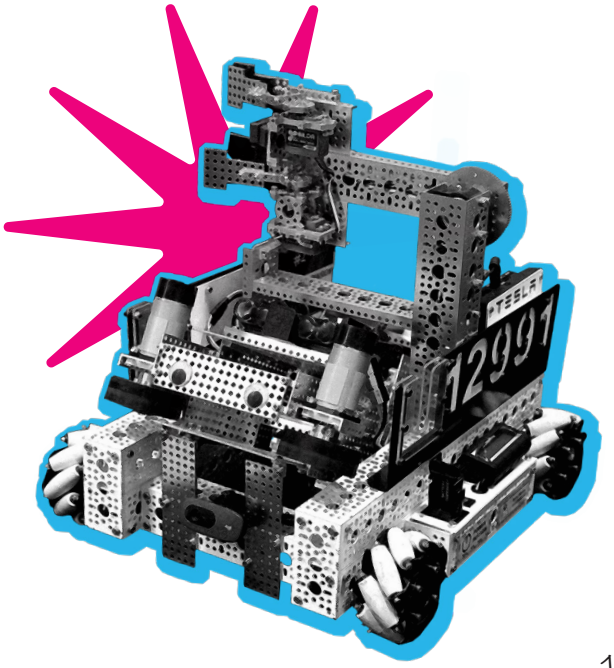
Engage:

Share the beginning of the program with students. After Royce asks, "What is a robot?," pause the program and ask your students the same question. Write this essential question down and have students draw a picture of what they think a robot is, to reveal students' current knowledge, connections to the topic, and further questions they have.

Explain:

Introduce the words: robot, sensor, processor, program.

- Have students guess their meaning and record their ideas.
- Ask students to listen for the words as they watch the video clip, featuring Dr. Louis Rubbo from FIRST Nevada and members of the FIRST Nevada robotics team, Awkward Silence.
- When they hear one of words, encourage students to make a gesture, such as wiggling their fingers.



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Explain, continued:

Pause the video at key spots to ask questions that strengthen comprehension and help children make connections.

- After Dr. Rubbo's introduction, pause the video and ask the following questions:
  - Why do humans build robots? (to repeat a task over and over)
  - What key things do all robots have? (sensor, brain)
  - Why do roboticists need to program a robot? (to teach robots how to make decisions)
  - What tool do roboticists use to program a robot? (computer)
  - Why is a thermostat a robot? (it repeats a task over and over/ senses, acts, computes)
- After Dylan and Jaxon share their robots, compare and contrast them. How are they the same? How are they different?
- Watch the "What did we learn?" segment to reinforce the concepts.

Reflect on the new knowledge students have acquired.

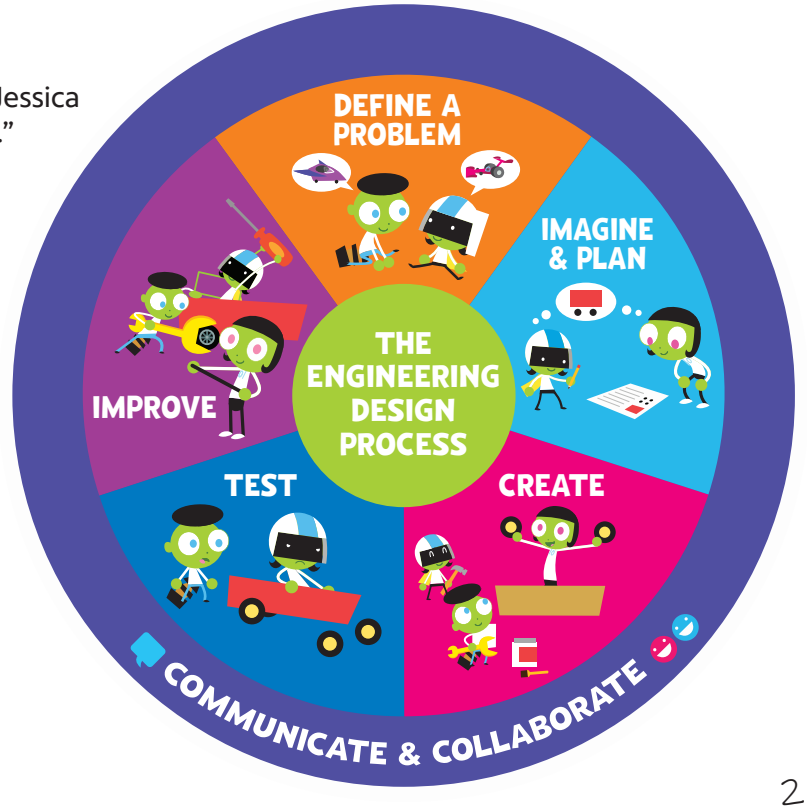
- Revisit the essential question and have children answer it by incorporating the vocabulary words; ask children to share any new information they acquired or additional questions they have.
- Ask students to draw a new picture of a robot, using what they learned from the segment. How is this robot the same and/or different than their original drawing?

Explore:

Share the at-home activity segment in which Jessica outlines directions for coding a human "robot." Have students follow the engineering design process to work through the activity:

Define the Problem: Program a grown-up or friend to find a small object you have hidden in your house or classroom, by writing a specific set of instructions that tells the robot what to do.

Imagine and Plan: First, have students hide an object somewhere inside the house or classroom. Then, identify a location where the robot's treasure hunt will begin. Will the robot move left or right? How many steps do students want their robot to take in one direction before it stops? How will they write their code so the robot avoids obstacles?



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Explore, continued:

Create: The next step is to write detailed, step-by-step instructions their robot will have to follow to find the treasure. Their instructions are just like programming code. The robot will have to follow the instructions, exactly as written, to find the hidden object.

Test: When students have finished their code, test it out! Have them read the instructions out loud to their robot, one at a time, while their robot does exactly what it is told to do.

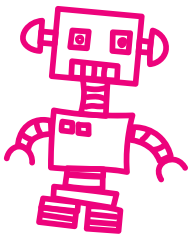
Improve: Did the robot find the treasure? If the students' program didn't work out the first time, have them improve their code and try again. In programming, this is called debugging. If the robot found the object, hide it again in a more challenging location and repeat the activity.

Communicate and Collaborate: Have students share their experience with the group. Did they have to debug their code? If so, how? Help students make connections between anything they learned in the video and this activity. What new questions do students have? Encourage students to share photos and videos of their at-home challenges with Vegas PBS at bit.ly/steamcamp-share.

Extend:

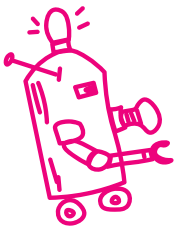
View the book talk with Marisa, a local Young People's Librarian.
If possible, check out the books Marisa shared with students:

- **Robotics!: With 25 Science Projects for Kids** by Carmella Van Vleet
- **Rox's Secret Code** by Mara Lecocq and Nathan Archambault



Encourage students to continue exploring robotics and coding by accessing the following PBS KIDS resources:

- PBS KIDS ScratchJr: bit.ly/pbskids-scratchjr
- SciGirls: Robots to the Rescue!: bit.ly/scigirls-robots



Share:

Visit vegaspbs.org/steamcamp to upload photos or videos of student projects, or share them with us on social media by tagging @vegaspbs.

Keep in mind, if you are submitting a video, make sure we can see what students are doing and hear what they are saying! Also, please keep videos to one minute or less.