CHILDREN'S CREATIVITY MUSEUM

Robot Coding Field Trip Teacher's Guide

In the Robot Coding field trip, students will be introduced to computer programming using Blockly, a drag-and-drop visual programming tool, and robots from Wonder Workshop. Students will collaborate in small groups to complete coding challenges such as charting and obstacle course and navigating through a maze. More experienced coders can program robots to respond to sensor input and use loops to avoid obstacles.

Before your visit:

- Talk to your students about what programming and code means.
    - Explain that **CODE IS SIMPLY A SET OF INSTRUCTIONS.**
        - **For Example:**
            - To turn on your TV, you press the power button:
                - You told the code to turn on the television screen
                    - The code is the television's set of instructions to turn on
                - IMAGINE: Would the tv still turn on if there wasn't any code?
- **PLUGGED PRE-ACTIVITY**
    - The Hour of Code
        - If you have the time in class, Code.org has a great 1-hour introduction to programming activity that is a great way to prepare your students for the Robot Coding Field Trip.
        - All of the exercises use a graphic, block-based programming language that makes writing code as easy as building with legos.
            - Although we will be using a slightly different program here at the museum, this activity provides the best introduction to the concepts.
            - Through a series of 20 engaging exercises, students will be introduced to some of the fundamental programming concepts that we'll use in our field trip together.
                - We recommend the Angry Bird and Frozen themes to best prepare your students
            - Every 5 lessons, a new concept is introduced by different people such as Mark Zuckerberg from Facebook, Chris Bosh from the NBA, or Bill Gates from Microsoft.

- **UNPLUGGED PRE-ACTIVITY**
    - Simon Says Un-Plugged
        - Prep: Grab some blue painter's tape and make simple mazes on the ground
        - Break students up into pairs: one will be the "robot" and the other is the "programmer"

        - The robot will be blindfolded while the programer will be the person providing commands (ex: move forward 4 steps, turn left 90 degrees, move backwards 2 steps, etc.)
    - The objective is for the programmer to coach their robot through the maze only using their commands
        - If the robot makes a mistake - that's okay - start all over and try again!

During your visit:

- **Check-in:** 10 minutes before the start of your trip, please check in at the front desk and put your bags on the provided cart or in the yellow cubbies.
- **Warm Up:** A museum educator will lead you to the Tech Lab, introduce the space, and lead the group in a creative warm-up.
- **Introduction:** Students will learn what it means to use code and what programming means.
- **Brainstorm:** After introducing the field trip, students will work in pairs to brainstorm an idea for a maze design that they will make.
- **Maze Challenge:** Based on the outcome of their maze design during the brainstorm, students will draw a maze on a dot-grid.
- **Coding:** Each student team learns how to code with Blockly on an iPad with Dash robots maneuver through for other pairs to run through.
- **Events:** Students will make 2 events within the maze for a robot to complete before finishing the maze.
- **Maze Trial :** Each group will rotate around the table trying to solve other groups' mazes.
- **Showcase:** Each table team will share their corner of the maze and maneuver through the maze.
- **Debrief:** A museum educator will end with a debrief on the field trip experience.

After your visit:

- **Be sure to fill out our post- field trip survey!** Your responses help us continue to provide the best possible experience for teachers and students. Click HERE to have a voice in our program development:
- **Share pictures of your field trip and a reflection of your field trip on the CCM website or blog**: E-mail education@creativity.org to submit your work.
- Ask follow up questions such as:
    - What was your favorite part of the field trip?
    - What was the most challenging part of the field trip?
    - How difficult was it making your maze??
    - Was there a maze in the class that was hard to program your robot through? What made it hard??

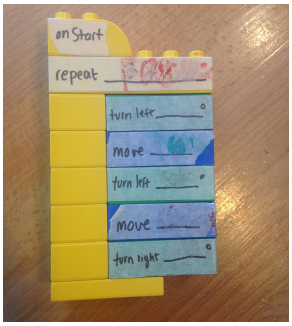
- What was an example of an event that your robot had to accomplish?
- Did you have to use a lot of code blocks to guide your robot through at first?
- Were you able to run your robot from the very start to the end of a maze without pausing?

- **PLUGGED POST ACTIVITY**
  - Wonder Workshop - Dot and Dash Robots
    - Do you want your very own Dot and Dash robot set for your classroom?
      - The Children's Creativity Museum wants to help your school with purchasing your very own Wonder Workshop set!
        - Click HERE to go to Wonder Workshop
          - Steps To Purchase:
            - Click on: BUY NOW
            - Select the item(s) you want to purchase
            - During the checkout process you can fill out the PROMO CODE
              - PROMO CODE: CCM2015

  - Scratch
    - This is a FREE online drag-and-drop coding program similar to Blockly (the program used by Children's Creativity Museum)
    - Creating an account is FREE!
      - Click on "Try It Out" icon with an orange cat
        - On the right hand side of the screen there is a tutorial that can help you teach your students

- **UN-PLUGGED POST ACTIVITY**
  - Robot Turtles: The Board Game for Little Programmers
    - An un-plugged programing board game that sneakily teaches kids(ages 3+) the fundamental concepts of coding.

  - D.I.Y. LEGO Code Cubes
    - If you do not have access to laptops or tablets, let's get your students comfortable with code by using a robot role play game with LEGOs!
      - Prep:
        - LEGOs with the following commands (see image to right):
          - onStart (this is the start block)
          - Turn left _____*
          - Turn right ____*
          - Move Forward ____
          - Move Backwards ____
        - Set up a "course" for the robots with a clear start and finish line
          - Examples:



        - Basketball court littered with cones, kids start on one side and program their “robots” to go through the mess to the finish line without touching a cone
        - Have items in a hula hoop and an empty hula hoop in a separate location, the goal would be to program the “robots” to grab items and transport them to the empty hula hoop
    - Set Up:
        - Pair up students together and assign one student the role of “robot” and the other the role of “programmer”
        - Remind the students: the “robot” needs to do exactly what the cubes say, even if it doesn’t work
            - Welcome mistakes and prompt kids to try it again!
    - Activity:
        - Have all the “robots” line up at the start line
        - Have the “programmer” set up the LEGOs in order to command the “robot”
            - Note: Do not forget to read the commands from the top to the bottom
        - Once all programmers are done, have them flip over the LEGOs (hiding the code) and hand to the “robot”
            - Remind the students not to peek
        - Have the students turn over the LEGOs and GO!
            - Try to challenge your students to have them complete the activity under a set time limit
                - This will help the game from getting too competitive

- Want to explore more with coding, but have limited access to technology? Check out these websites that help support teachers like you!
    - TinkerSmith
    - Computer Science UnPlugged
    - Stay connected with the Edtech Community:
        - edSurge

Do you have questions, concerns, or comments about your trip?
Please e-mail **melissa@creativity.org** or call **(415) 820-3516**