CODINGVILLE.CA

LESSON:

PROGRAMMING PUZZLES

GRADE(S): K-6 **TIME:** 1 class (45 min)

LESSON SUMMARY:

In this activity, students will be introduced to computational thinking concepts. Students will learn how to talk to a computer, without even using one!

This activity was adapted from Cross-Curricular Activities to Foster Computational Thinking and Engineering Design, from the Journal Early Childhood Education, Vol 45, No 1, 2018 written by Stephanie Hladik, Laleh Behjat and Anders Nygren

LESSON OBJECTIVES:

Students will be able to:

- Communicate a procedure in clear, concise steps
- Model computational thinking

TOPIC(S):

Technology & Education

Technology & Innovation

Coding

KEYWORDS:

Computational thinking

Coding

Sequences

LESSON MATERIALS:

- Post-it notes of varying colour
- Paper
- Pencil
- Small animal figurines (optional)
- MF video Computational thinking: Direct instruction- Putting on winter clothes https://youtu.be/LquWGTgRS7U

COMPETENCIES:

- Problem Solving
- Creativity and Innovation
- Communication
- Collaboration

LEARNING OUTCOMES

This activity can be adapted to be applied across any subject area.

Coding outcome: Sequences

5 E's	Lesson Instructions & Times	Special Teacher Notes
ENGAGE Hook	**10 min** 1. Show the students the MF video - Computational thinking- Direct instruction- Putting on winter clothes. https://youtu.be/LquWGTgRS7U 2. Ask students the question, "what is important when giving directions?" Provide an example to frame the question around - when giving someone directions to the main office, when giving directions to make a peanut butter and jelly sandwich, etc.	Possible student answers: - To be clear - To be specific - For the directions to be in the right order - For the directions to be easily understood/not confusing

5 E's	Lesson Instructions & Times	Special Teacher Notes
EXPLORE Hands on activities Group work	**30 min** 3. Put students into pairs. Give each pair of students a set of small coloured squares (1 green, 1 red, multiple white, and a few blue) and a small animal figurine. 4. Ask students to arrange the coloured squares in a maze pattern that starts on green and ends on red, with white and blue squares connecting them. The blue squares can be placed anywhere in the maze, and represent the animal figurine making their correlating animal sound when on the square. The animal performs no action on the white squares. 5. Inform students that their animal figurine represents a "robot", and that they will need to write "code" in order to help their robot animal move from the beginning to the end of the maze. In writing their "code" (instructions), students may only use the words: forward, backward, right, left, "animal sound". Have each pair write their code on a piece of paper. 6. Once the pair has their maze and instructions complete, have them scramble their maze. Then, have another pair of students use only the written instructions (code) to recreate the original maze.	

5 E's	Lesson Instructions & Times	Special Teacher Notes
EXPLAIN & ELABORATE Class discussion	**5 min** 7. Ask students to share responses to the following questions: a) What was the most challenging part of writing the code for your maze? b) What was the most challenging part of reading another groups code to recreate the maze? c) How is this activity related to the way computers work?	Possible student answers a) "Keeping track of when to include the animal sound" b) "Knowing how many blocks there are in the maze based on the instructions" c) "Humans give computers instructions to follow" "If the wrong instructions are given to the computer, it will make a mistake" "It's important for humans to be very clear in their instructions to a computer" "A computer or robot cannot think like a human, it cannot guess or make predictions like humans can"
EVALUATE Student sharing	See image below for an example:  Correctly written code for this maze: Forward, right, roar, right, forward, forward, roar, left, left	

POSSIBLE EXTENSION

- Ask students to shorten their instructions/code (writing efficient code), and identify any loops, or parts of code that repeat themselves.
- Instead of using figurines and post-it notes, have students be the robots to incorporate movement into your lesson
- For higher grades, instead provide each student with a piece of graph paper and pencil. Have them create their own maze. Then, ask students to write specific instructions for completing their maze. Have students swap their maze with a partner and follow the instructions to complete the maze. Students may realize that their instructions were not specific enough and will have to make modifications to them.