SCIENCE NORTH SCIENCE NORD
SUDBURY, ONTARIO, CANADA

Coding Is Magnetic!	Kindergarten, Demonstrating Literacy and Mathematics Behaviours & Problem Solving and Innovating

Lesson Plan

Description

An introductory, unplugged coding activity that allows Kindergarten students to explore directionality, sequencing, critical thinking and problem solving. This will allow students to explore beginning coding concepts and use play-based learning concepts to experiment with coding.

Learning Outcomes

- Learners will describe the maze they built to get from the beginning of the maze to the end.
- Learners will plan and design a maze using the materials provided.
- Learners will explain directionality using proper coding terminology (e.g. “This arrow goes right,” “We need to go up,” and “Stop. There’s something in the way.”).
- Learners will use arrows to help them go from the beginning of the maze to the end of the maze.

Specific Expectations

1.4 sustain interactions in different contexts
1.6 use language (verbal and non-verbal communication) to communicate their thinking, to reflect, and to solve problems
1.7 use specialized vocabulary for a variety of purposes
4.1 use a variety of strategies to solve problems, including problems arising in social situations
13.1 state problems and pose questions in different contexts and for different reasons
13.2 make predictions and observations before and during investigations
13.4 communicate results and findings from individual and group investigations
17.2 communicate an understanding of basic spatial relationships in their conversations and play, in their predictions and visualizations, and during transitions and routines
20.6 use mathematical language in informal discussions to describe probability in familiar, everyday situations
24.2 state problems and pose questions
24.3 as part of the process of creating and designing make predictions and observations as part of the process of creating and designing

Introduction

Whole Group Lesson:

1. Make a large 4x4 grid on the floor (chalk, tape, etc.).
2. Explain to students that together, we will be trying to get from Point A to Point B using directions.
3. Ask a student to place the A in a square and the B in another square. Then, we ask students to hypothesize about how they could travel the grid from Point A to Point B.
4. Introduce coding language that everyone will be using to group: UP, DOWN, TURN, LEFT, RIGHT.
5. Choose a student to travel the grid from Point A to Point B, based on the recommendations of their peers.

This activity can be done several times to practice, by moving Point A and Point B, or by adding students as obstacles in the grid that they then have to work around.

Action

Set Up & Material: *Teacher sets up Coding Game using magnetic tiles, make a grid that is appropriate to the skills of the students (e.g. 4x4, 6x6, 8x8, etc.). Provide arrows (paper arrows, arrows drawn on post-its, etc.), objects that fit within the magnetic tiles (blocks, legos, toys, etc.).*

Inquiry Based Learning Invitation:

- Encourage student to experiment and plan their maze. Student put Point A and Point B within the grid, then places the arrows on top of a square to get from Point A to Point B. Each arrow takes up a whole square; arrows are put down in the direction that the Student wants them to travel to help them get from A to B. If students show readiness signals, encourage Student to put in obstacles within magnetic tiles to make it more challenging, so that they must use arrows to go around obstacles to get from Point A to Point B.
- While playing, Student and Educator discuss problem solving strategies using language learned during the Large-Group activity. Examples of possible language: “I need to move two blocks up,” “Turn left,” “Move three spaces down.”
- Once the Student reaches Point B, the Student and Educator discuss the process that the Student undertook to accomplish the task. Student can retell and explain their reasoning. The game can be reset and readjusted as needed.

Extension

This can also be a game played by two players — a programmer and a robot.

- The programmer gives instructions on the direction to go, while the robot follows the programmers instructions by putting arrows down the way that they are instructed. The game is played similarly to how it was played during the Whole Group Lesson, but on the magnetic tile grid.
- Once the student reaches Point B, the students that are playing can switch roles and reset the game.

Accommodations/Modifications

Magnetic tile grids can be adapted to be as big or small as needed for student learning. Obstacles within the grid can be as few or as many as the Student can handle.

Assessment

Anecdotal evidence based on discussions with students, listening to discussions between students, recording the observation of the game, etc.

Additional Resources

Materials Needed:

- Magnetic Tiles
- A collection of arrows (↑↰↱). Arrows can be printed on paper, drawn on post-its, wooden, etc.
- Objects (small toys, blocks, legos, etc.), Point A and Point B (paper, post-it, object, etc.)