

Learning Scenario title

“Left or Right?”

Educational level / Age group	Beginners / Pre-K - Grade 1
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Learning objectives / aspirations

The objectives of this lesson are related to left-right orientation and development of the first person-view when programming a MATATALAB robot. This lesson builds on some pre-programming activities that the children should already be familiar with - such as the game “Freeze” that is played on a grid marked out on a floor by a colourful tape. The aim is to develop a sense of looking at the coding blocks from the perspective of the robot, i.e. to gain a “relative” perspective in terms of moving forward, backwards and left and right, when planning a sequence of steps getting the robot from Point A to B.



Narrative overview

During this 45-minute lesson for children aged 6-7 consists of two main parts:

- In part 1, the children pretend to be robots themselves and follow instructions from the teacher on a grid marked out on the floor.
- Part 2 consists of programming the MATATALAB robot using the world map or any other suitable grid that is available.

The main objective is to help children internalise the orientation on the grid and experience the movement 'forward' and 'backward', as well as to help them memorize and use correctly the directions of 'left' and 'right'. For children of this age, it is very helpful to experience the robot movement with their full body so to speak, and to 'be' the robot, thus developing the ability to see the desired path through the robot's eyes.

The opportunity to first try the movement through their own body and then program the robot with the movement blocks should strengthen their understanding of the directional blocks.

***Freeze** is a game of rhythm and self-control. The group is moving around walking in accordance to a rhythm produced by the teacher simply on a drum, by wooden sticks or hand-clapping. When the teacher calls 'freeze!' Everyone should immediately stay still and quiet like a statue. There are many variations and extensions on this game.

***Grid movement** - is based on jumping or stepping along a grid with one jump/step representing one unit of movement. It is important to note from the very beginning that turning constitutes a step of its own without changing a square, thus turning right and moving forward require two separate steps not just one.



Approach to teaching and learning

<p>Approach to teaching and learning</p>	<p>The approach to teaching and learning is a combination of teacher-centred instruction, small group instruction and student-centred constructivist method. Group activity with movement on the grid requires a level of respect for other people’s personal space.</p> <p>The teacher should prepare the sets in advance. It is assumed that the children already have an experience with the MATATALAB robot and can switch everything on. They should also be able to understand how the programming tiles are placed on the control board.</p> <p>One set per two children is recommended but also one per three could be ok.</p>
<p>Approach to assessment</p>	<p>As part of the assessment the teacher should evaluate the level of self-control and coordination during the movement activity shown by children as well as their skills development by observing if they:</p> <ul style="list-style-type: none"> - Respect the personal space of others - Are able to follow the directional instructions correctly - Are adding their own ideas to programming the robot - Are expressing their ideas verbally and communicating with their partner appropriately



Roles

<p>Teachers</p>	<p>The teacher’s role is to lead the group activities on the grid marked out on the floor and then provide challenges for programming the robot as well as creating space for children to experiment by themselves.</p> <p>The teacher can be in a role of a guide for individual inquiries and lead the reflection at the end.</p>
<p>Learners</p>	<p>The learners’ role changes throughout the lesson: from role playing a robot and being physically active whilst moving on the grid at the beginning of the class to collaboration in pairs and problem solving whilst interacting with the MATATALAB sets.</p>



Learning environment

The learning environment should contain a space, such as a large carpet or a mat, that should have a grid marked out with at least 4x4 squares each of a size that can fit several children (e.g. 0.6m x 0.6m). Alternatively, the grid can be just marked out on a floor with sufficient dimensions.

The other necessary aspect of the learning environment is sufficient space for setting up the MATATALAB robot sets and mats. Ideally this could be arranged around the large grid on desks with sufficient space for children to sit around them. A classic desk arrangement would also be sufficient. As an alternative, due to a lack of space in the classroom, the part with movement on a large grid could be done outdoors or in a corridor/hall.



Learning activities

The learning scenario develops through the following sessions:

Activity 1 - (5min)

"Let's play a game! You are a robot moving on this grid. One step or jump forward means to move to the square immediately adjacent and in front of you."

- Children spread on the squares along one side of the grid facing the teacher. The teacher stands on the opposite side across the grid.
- The teacher shows the group a large arrow representing the movement block printed on a piece of cardboard (with a notch included so that children get used to seeing it facing down) and calls out a number of steps alternating forward/backward blocks.

Activity 2 - (5min)

"Let's try another game! I will show you a turn arrow, your role is to turn on the spot in accordance with the arrow."

- Children stand on one side of the grid as before, all facing the same direction towards the teacher.

- The teacher shows the group a large left or right arrow printed on a piece of cardboard and children should turn according to the direction shown.
- Two arrows can be also combined or an arrow with a forward/backward arrow.

Note: it is important that the teacher moves with the children and changes sides of the grid so that the children can face the arrows shown.

Activity 3 - (30min)

“We can now try the same with our MATATALAB robots”

- Children will use only the light green (motion) and blue (number) coding blocks.
- They will turn on their command tower and place it on the control board.
- They will then turn on the robots and place them on the map in the bottom left corner facing top left corner (a more appropriate instruction can be given based on the actual pictures on the map such as “Place your robot on the forest facing the volcano” (Coding Set).

Teacher leads the group exercises as follows:

- (a) if you place a forward arrow (the teacher can show the arrow used in the previous exercise on your control board, where will your robot end up? Encourages answers. Let’s try it!
- (b) if you place a turn right arrow and a forward arrow on your control board, where will your robot end up? Try.
- (c) if you place a forward arrow, turn left arrow and another forward arrow on your control board, where will your robot end up?
- (d) leave the previous program on the control board and let one of the partners place the robot on a different square, the other person should take a guess where the robot will end up. Try and confirm. Alternate for several times keeping the same program and placing the robot on a different starting square.
- “Now work in pairs for several minutes without my instructions. One person will create a program and let the other person take a guess where the robot will end up. Each turn you can add one extra movement block to your program. Check the answer together.”

Activity 4 - (5min)

Reflection - using the arrow up or down, children will rate how well they did in the lesson.

(Extension - add a number to the arrow). Teacher creates space for children to express what they succeeded in, what they enjoyed or perhaps what did not work so well for them.



Possible challenges

The active part on the large grid could present a challenge for class management and children's self-control. Involuntary and sometimes even intentional bumping into others could create a conflict situation.

Understanding the directional arrows could also be a challenge. Sometimes children assume that an arrow pointing up means also up and that movement forward is achieved by an arrow pointing to the right side. This should be addressed through the role-playing game. However, you may need some follow up when programming the robot.

A potential challenge while programming could arise in a situation when the robot leaves the mat. It may be a good idea to instruct the children not to execute programs that appear to end up outside the mat. These should be considered as invalid. It could also prevent a robot falling off the table and help outline the importance of staying within the work domain (in this case the grid).



Resources

MATATALAB Code Set and the map of various environments.
Masking (or electrical) tape to mark out the large grid within an open space.
Cardboard arrows with notches representing the Movement coding blocks, one for each direction.



Literature to support

MATATALAB Self-guided course (Course 2)



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