

Didactic scenario

1. Title

Avoiding obstacles

2. Keywords

Robotics, Automation, Visual Programming, Wedo 2.0, Scratch 3.0

3. Basic information

STEAM : Engineering (Science, Technology, Math, Art)

Typical time of interaction with the educational scenario in the teaching hours for in-school work: 3 teaching hours

General description of the scenario:

Phases	Stage	Time
Robot presentation	warm up	30'
Robot construction	Implementation stage (part A')	40'
Robot programming	Implementation stage (part B')	40'
Obstacle Avoiding Robot	Evaluation stage	25'

Age group: 11-12 years old, grades 5th or 6th

Estimated level of difficulty :

Easy	Very Easy	Moderate	Challenging	Very challenging
		X		

Teaching resources

Material: The Lego pack Education Wedo 2.0

School infrastructure : The Computer laboratory (computers with internet , computers with Bluetooth connectivity , video projector)

Additional material from external sources/online tools:

- Hyperlink to video presentation of the construction
<https://youtu.be/-ac6Cvu4hPs>
- Robot Build Steps Activity
https://drive.google.com/file/d/1oAn8DFFIEf76vF_F4oU3HY9IYGLN2MFm/view?usp=sharing
- Robot programming activity in the Scratch programming environment
<https://scratch.mit.edu/projects/931838393/editor/>
- Evaluation with Google Forms:
https://docs.google.com/forms/d/e/1FAIpQLSfy2PdHqQQOZs0IMQnl-SGtfmkA7w7dlnX_gv1EVhGs5GCo_g/viewform

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4. Educational Problem

Students in the class know the existence of robots and their categorization into robots with direct human control (remote controlled robots) and autonomous robots controlled by a programmed computer. The second category is also the one that they should study and provide solutions to complete the scenario. The teams first create a construction from guided slides and after completing it they program the robot to avoid obstacles in front of it. Students will study and experiment both in the virtual (through the Scratch program) and in the real world (robot built with WeDo 2.0 "bricks").

Students should have basic computer skills, know the building blocks of the Lego package WeDo 2.0, have built simple robotic constructions and know basic commands from the Scratch programming environment.

5. Learning objectives

1. To make legos WeDo 2.0 robot.
2. To understand that the behavior of a robot interacts with the physical environment depending on the corresponding programming.
3. To program objects as well as the package engine in relation to the distance sensor in the Scratch programming environment.
4. To improve cooperation and communication skills.

6. Phases of the Scenario

Phase 1

Title: Robot presentation

Indoor	Outdoor	Mixed
X		

Phase duration in minutes: 30'

Detailed description of the scenario phase:

Students are divided into groups (ideally 3-4 people per WeDo 2.0 package) with each group using a computer.

First, a demonstration of the final solution (a final image and/or a short video of the robot's capabilities) is done with the help of the video projector. Here are some questions and actions that the students must implement:

- What kinds of robots do they know and what category does the one they watched belong to?
- Which automation does this particular robot use?
- To use the Scratch programming environment to discover a ready-made or design a similar robot.
- What title would you give for this particular robot? (write the dominant idea on the board)

Activity sheets: Questions to be answered orally. Link to the video.

Phase 2

Title: Robot Construction

Indoor	Outdoor	Mixed
X		

Phase duration in minutes: 40'

Detailed description of the scenario phase:

Students are given a link with the steps to build the robot. After determining roles and the order

in which each student will act, the group implements the construction. Upon completion of the construction, the teacher asks the students to describe the possible mode of operation of the robot.

Activity sheets: Link to the instructions for building the robot and questions to be answered orally.

Phase 3		
Title: Robot Programming		
Indoor	Outdoor	Mixed
X		
Phase duration in minutes: 40'		
Detailed description of the scenario phase: Students follow the teacher's instructions to connect the robot to the computer to program it. Then two different blocks of commands from the Scratch programming environment are given , one completed and one not. Students should choose which belongs to the robot programming and which belongs to the Scratch . For the unfilled command block, the students will be asked to describe the operation of the robot and after hearing some sentences, the students will have to join the corresponding command blocks and execute the commands. Each team checks if it was planned correctly or if changes are needed.		
Activity sheets: Link to the robot programming instructions and questions to be answered orally.		

Phase 4		
Title: Robot which avoids obstacles		
Indoor	Outdoor	Mixed
X		
Phase duration in minutes: 25'		
Detailed description of the scenario phase: After ensuring the correct operation of the robot, the students check whether there is a relative		

matching of movements in both the virtual and the real robot and, after consultation, present their result to the plenary.

Activity sheets: Presentation of each team's robot in plenary, scenario evaluation questionnaire

7. Evaluation Methodology

Initial : It takes place through guided discovery and question-and-answer discussion. (Which categories of robots do you know?)

Formative : It takes place continuously in all phases, with questions at various points to further students' understanding and learning.

Final : Implementation activities (assembling a robot with legoWeDo 2.0 "bricks") and programming (Scratch programming environment) of construction.

The evaluation of the scenario was carried out with a questionnaire in Google Forms.

8. Additional resources for the teacher

Folder: Avoiding obstacles_ Additional resources for the teacher