EARLY Teaching Scenario

Topic: Mathematics and IT (programming) with Lego WeDo.

Measuring, units of measurement, conversion, speed, comparison, filling and reading the table.

Learning outcome: Students learn how to:

- Discuss the circumstances and conditions that affect the speed and the distance of a vehicle (shape, gradient, size of the wheels, mass etc).
- use robots as real-life learning tools
- measure the distance and speed
- fill and read the table
- predict the expected outcome on the basis of existing data and knowledge
- compare the outcomes and make the conclusions.

Applying the 7 key competences

Knowledge and skills pupils develop during the scenario: connect to curriculum →

Estonian National Curriculum for the 2nd-grade students in mathematics states that by the end of 3rd class students should be able to:

- read and follow different instructions;
- uses appropriate measuring tools and units;
- solves age-appropriate real-life problems;
- converts different units;
- analyses different exercises and their solutions and their relevance in the real world situation.

Estonian model of digital competences based on The Digital Competence Framework 2.0 of EU (https://ec.europa.eu/jrc/en/digcomp/digital-competence-framework) states that 2nd class students should be able to:

- cooperate with each other in solving simpler digital problems;
- creates digital outcomes with the help of the teacher;
- creates simpler programmes with the visual programming language that include variables, cycles, conditional sentences and procedures;
- uses digital technology sustainably and with care;

The course components that are trained in the project are as follows:

- critical thinking
- measures
- metric units
- information literacy
- problem solving
- technology literacy
- self evaluation

Target group: beginners level, pupils in primary school

Age of students: Ca 7-8 years

Number of pupils: 24 (Large group, but possible with many adults in the classroom)

Duration (estimated time/number of lessons): 3x45 minutes

Prerequisites (necessary materials and online resources):

- Ipads with Lego Education app
- 12 Lego WeDo sets (one for two pupils)
- 12 tape measures
- Good space on the floor
- Starting line on the floor
- Finish line on the floor
- Table with the names of the students and three columns of trials
- Stopwatch or stopwatch app.

Introduction to the scenario *(incl. possible applications, alternatives and risks)***:**

- Solving different problems with hands-on method helps the students to understand the topic better and create deeper knowledge on the topic.
- there can be some emotions connected to the good/bad results of the test. So the regulation of emotions can also be developed during this project.

 Video: https://www.youtube.com/watch?v=Gz0Z_rojO1I&feature=youtu.be

**Before the program begins (preparatory work for teacher):**

- prepare for the project and integrate the robotics activities carefully into the school curriculum;
- prepare the table;
- check and prepare the iPads and the robots

The main part of the scenario:

Step 1 ca 15 minutes - discussion about the factors that can influence the speed and distance of a vehicle.

Step 2 ca 10 min build the racing car. Instructions can be found in Lego WeDo app
https://education.lego.com/en-us/lessons/wedo-2-science/speed#Planitem2
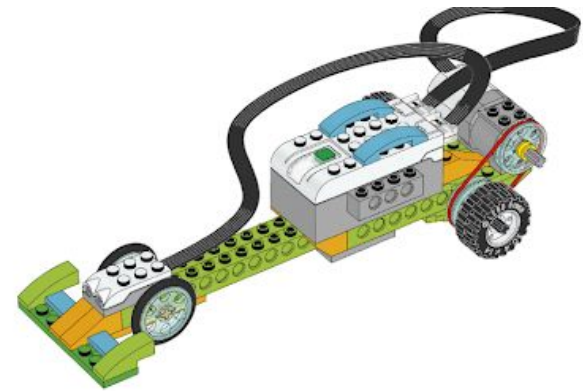
Step 3 ca 15 min program the race car to calculate the time.

Step 4 ca 15 min. When the first version of the car is ready to carry out first test races. Measure the time and distance. Fill the first column of the table.

Step 5 ca 10 min. Discussion about the factors that influenced the outcome.

Step 6 ca 10 min. Change the elements of the racing cars construction and programme.

Step 7 ca 15 min. Carry out the second racing test, measure the time and distance and fill the table.

Step 8 ca 10 min. Change the elements of the racing cars construction and programme once more.

Step 9 ca 15 min. Carry out the final tests, measure the time and distance and fill the table.

Step 10 ca 15 min. Make a photo of the final table and share it with the students. The students will examine the table and form three conclusions about speed and distance.

Step 11 ca 15. Final discussion. Here the teacher can also include the topic of traffic safety.

Summary (knowledge, skills, understanding):

Students understand:

- How changing parameters of the construction or program of the vehicle influence the speed and distance of the vehicle.
- Can expand their knowledge into other fields of engineering and science.

Students can:

- read and follow the instructions from Lego WeDo app
- present hypothesis on the factors that influence speed and distance of vehicles.
- measure distance and time
- fill and read the table
- compare the results
- program a race car with a visual programming language

Students learn:

- length and time measurement units
- factors that influence the speed
- change the parameters of the construction and program of the car according to the hypothesis