Otto and the Scaled City

Learning Objectives

1. Recognize and apply scales to reduce and enlarge distances.

2. Relate fractions to real-life problems.

3. Program the Otto robot to complete trajectories adapted to different scales.

Didactic Tasks

1. Calculate real distances from a map with defined scales.

2. Program Otto to move following the adjusted scales.

3. Solve interactive challenges with scaled-up or scaled-down distances.

Interdisciplinary Connections

Related Subjects:

- Programming: Use of basic logic and algorithms to program Otto.

- Social Sciences: Application of scales in maps and urban layouts.

Practical Applications

Interpretation and use of scales in everyday contexts such as design, architecture, and navigation.

Resources and Materials Needed

Physical Resources:

- Otto robot and its programming software.

- A 'city' map with streets, buildings, and marked distances.

- Challenge cards with scale instructions.

- Rulers and measuring tapes.

- Stickers or small objects to represent packages or delivery points.

Digital Resources:

- Computer or tablet to program Otto.

Session Structure

Introduction:

1. Explanation of the concept of scales with visual examples:

- Scale 1:1: 1 cm on the map equals 1 cm in real life.

- Scale 1:2: 1 cm on the map equals 2 cm in real life.

- Scale 2:1: 2 cm on the map equals 1 cm in real life.

2. Activity presentation: Otto will make deliveries in a city and must adapt to different scales.

Development:

1. Challenge resolution:

- Students select a challenge card that includes a route and a scale. For example:

'Travel from the store to the park (4 real meters) at a 1:2 scale.'

- They calculate the map distance according to the scale. In this case, 4 real meters would be 2 cm on the map (4 ÷ 2).

- Program Otto to move the calculated distance.

2. Otto Programming:

- Use movement blocks in Otto Blockly to adjust the steps according to calculations.

3. Simulation:

- Otto performs the programmed route.

- If it reaches the destination correctly, the team earns points.

Closing:

1. Review the calculations and programming performed.

2. Reflect on the usefulness of scales in real maps and plans.

3. Reward the most accurate team.

Expected Results

Key Learnings:

1. Interpret and apply scales to solve practical problems.

2. Improve mathematical logic and programming skills.

3. Collaborate in teams to achieve common goals.

Final Products:

- Programming codes created by students.

- Correct solutions to the proposed challenges.

- Reflections on the use of scales in real-world contexts.

Additional Notes

Suggestions:

- Adjust the difficulty of the challenges according to students' age and level.

- Supervise Otto's use to ensure equal participation by all.

Possible Extensions:

- Introduce more complex scales, such as improper fractions and mixed numbers.

- Relate the activity to real maps of the local city.