Lesson Plan: REDUCE POLLUTION

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Subject: NATURAL SCIENCE

Title : Lesson	**Time : 2 PERIODS OF 55 MINUTES EACH**
Subject *: NATURAL SCIENCE*	
Aim: Students aged 12-14 will apply principles of computational thinking to analyze various factors contributing to pollution in urban environments, and propose strategies to reduce pollution overall.	
Key CS elements: decomposition, pattern recognition, abstraction, algorithm design	
Age group : 1st-2nd level; 12-14 year-old students	
Learning situations: classrooms	**Activity type : lesson**
Resources : Internet access Writing materials Checklist template Map of the local area	

Learning development:

1. Introduction to Computational Thinking (10 minutes):

Discuss computational thinking in simple terms:
- breaking down complex problems,
- identifying patterns,
- creating abstractions, and
- designing algorithms to solve problems.

Relate computational thinking to everyday scenarios; in this case: how to reduce pollution.

2. Decomposition (15 minutes):

Introduce the problem: "What factors contribute to pollution in our city/town?"
Brainstorm with students various sources of pollution, such as
- transportation,
- industrial activities,
- deforestation, and
- waste management.

Divide students into small groups and assign each group a specific aspect of pollution to investigate (e.g., air pollution, water pollution, noise pollution).

3. Pattern Recognition (15 minutes):

Instruct each group to research and identify patterns in the data related to their assigned aspect of pollution.
Provide simple online resources or handouts for students to gather information.
Encourage students to identify common factors contributing to pollution in their assigned category.

Additional Information on Pattern Recognition

In the Pattern Recognition section of the lesson plan, the emerging patterns would relate to the factors contributing to pollution in the various categories investigated by the student groups. Here's how the patterns might emerge:

Air Pollution Patterns:

Common sources of air pollution may include vehicle emissions, industrial activities, and the burning of fossil fuels for energy.

Patterns could emerge in areas with heavy traffic congestion or industrial zones, indicating higher levels of air pollution.

Seasonal variations, such as increased pollution during colder months due to heating, may also be identified.

Water Pollution Patterns:

Sources of water pollution might include industrial discharge, agricultural runoff containing pesticides and fertilizers, and improper waste disposal.

Patterns could emerge near industrial areas, agricultural regions, or bodies of water with high human activity (e.g., rivers, lakes).

Students might observe higher levels of pollution downstream from urban areas or agricultural lands.

Noise Pollution Patterns:

Sources of noise pollution could include traffic, construction activities, industrial machinery, and human activities such as loud gatherings or events.

Patterns might emerge in areas with high vehicular traffic, construction sites, or near entertainment venues.

Students may notice higher noise levels during certain times of the day, such as rush hours or weekends.

Overall Pollution Patterns:

Cross-referencing data from different categories may reveal common contributing factors across various types of pollution.

For example, areas with heavy industrial activity might show high levels of air and water pollution. Urban areas with dense population and traffic congestion may exhibit higher levels of noise pollution in addition to air and water pollution.

4. Abstraction (15 minutes):

Provide students with a checklist template.
Instruct students to use the checklist to conduct a simple survey of their local area, focusing on factors that contribute to pollution (e.g., types of transportation, presence of green spaces).
Guide students in identifying commonalities among areas with high levels of pollution in different categories.

5. Algorithm Design (20 minutes):

Step 1: Bring the class back together and discuss the findings from the survey.
Step 2: Guide students in designing a simple plan to reduce pollution based on their analysis.
Step 3: Encourage students to consider actions that are feasible and impactful for their age group (e.g., reducing use of single-use plastics, promoting recycling, planting trees).
Step 4: Have students create a step-by-step algorithm for implementing their plan, considering factors such as ease of adoption and potential benefits.

6. Reflection and Extension (10 minutes):

Facilitate a brief discussion on the importance of taking action to reduce pollution in their community. Ask students to reflect on how computational thinking principles helped them approach the problem of understanding and reducing pollution. Optional: Assign a follow-up activity where students create posters or presentations to share their pollution reduction plans with the school community.
Assessment: Participation in group discussions and activities Completeness and accuracy of checklist survey Quality of algorithm design and reflection on computational thinking principles.
Expected results: The students will learn not only about the effects of pollution but also about the consequences of bad-practices and how to solve them.
Notes:
Conclusion: By applying computational thinking principles, students aged 12-14 develop critical thinking skills and innovative solutions to understand various factors contributing to pollution in their communities. They are empowered to propose strategies to reduce pollution overall, promoting environmental sustainability and responsible citizenship.

CHECKLIST FOR STUDENTS TO MARK WHEN THEY ARE IN GRANADA.

Pollution Abstraction Checklist:

Type of Pollution:

	Air Pollution
	Water Pollution
	Noise Pollution

Common Factors Contributing to Pollution:

Industrial Activities
Vehicle Emissions
Agricultural Practices
Improper Waste Disposal
Deforestation
Construction Activities
Others (Specify): _____

Patterns of Pollution Distribution:

Industrial Zones
Transportation Hubs
Residential Areas
Recreational Areas
Bodies of Water (Lakes, Rivers, etc.)
Urban Centers
Rural Areas
Others (Specify): _____

Interconnections between Pollution Categories:

Air Pollution contributing to Water Pollution
Noise Pollution resulting from Industrial Activities
Water Pollution impacting Air Quality
Others (Specify): _____

Key Characteristics of Pollution Hotspots:

High Population Density
Heavy Industrial Activity
Inadequate Waste Management Infrastructure
Proximity to Highways or Major Roads

Presence of Manufacturing Facilities
Others (Specify): _____

Simplified Models or Representations:

Diagrams illustrating Pollution Pathways
Flowcharts depicting Pollution Sources and Impacts
Concept Maps showing Interconnections between Pollution Categories
Others (Specify): _____

Target Areas for Intervention:

Areas with High Pollution Levels
Environmental Justice Communities
Vulnerable Populations (Children, Elderly, etc.)
Areas with Limited Access to Green Spaces
Others (Specify): _____

Additional Observations or Notes:

_____
_____
_____