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WRITTEN LESSON PLAN

ECO HEROES

Waste Sorting and Training an AI Model

SCHOOL & TEACHER | LESSON DETAILS

Subject: Computer Science · Grade: 7th / 8th grade of primary school

Teaching Unit: Artificial Intelligence and Machine Learning | Lesson Topic: Eco Heroes – Waste Sorting and Training an AI Model

Cross-curricular links: Nature / Civic Education – Sustainable Development / Computer Science / History | Type of lesson: Introduction and application (project/problem-based approach) · Duration: 2 class periods (90 minutes)

Educational Outcomes

The student will:

- analyses a written historical source
- distinguishes cause and consequence of a historical event
- explains the social, political and environmental consequences of a nuclear disaster
- develops critical thinking about the relationship between technology and responsibility
- trains a simple machine learning model
- applies principles of responsible environmental behaviour

Key Concepts

artificial intelligence, machine learning, training, testing, recycling

Teaching Methods

problem-based learning • project-based learning • collaborative learning • discussion method • demonstration method • inquiry-based learning

Forms of Work

frontal teaching • group work • individual work

Teaching Materials and Tools

3D printed bins from the Eco Heroes game, waste cards, computers with internet access, projector,

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Teachable Machine tool.

LESSON FLOW

1. INTRODUCTION (10–15 min)

Motivation

1. INTRO (5–7 min)

THE TEACHER ASKS:

- Can technological progress become a threat to humanity?
- What are the positive consequences of AI technology?
- What are the negative consequences of AI technology?
- Do you know an example of irresponsible use of technology?

ACTIVITY 1

We will explore one of the greatest ecological disasters of the 20th century — Chernobyl disaster.

A) Working with a Written Source (15 min)

Students receive a written source:

https://www.zzjzdnz.hr/zdravlje/okolis-i-zdravlje/cernobilska-nuklearna-nesreca-i-njezin-utjecaj-na-zdravlje

TASKS FOR STUDENTS:

1. Determine the place and time of the event.
2. Identify the cause of the disaster.
3. List the short-term consequences.
4. List the long-term consequences.
5. Assess the responsibility of the authorities.

B) Analysis of Causes and Consequences (10 min)

A table is created on the board.

CAUSES	CONSEQUENCES
Human error	Deaths and illnesses
Technical flaws	Soil contamination

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Lack of safety measures | Evacuation of the population

Covering up information | Distrust toward authorities

GUIDED DISCUSSION

- Can we prevent ecological disasters today?
- Are disasters always the result of one major mistake, or also long-term irresponsible behaviour?
- How do our everyday decisions affect the environment?

Students conclude:

Technology can be useful, but without responsible human behaviour it can become dangerous. · Prevention begins with small everyday actions.

To prevent ecological disasters, each of us must take responsibility. One of the simplest but important steps is proper waste sorting.

ACTIVITY 2

Game "Eco Heroes" (application of knowledge)

Now we will play the game Eco Heroes.

Your task is to show that you understand how proper waste sorting contributes to environmental protection and prevents larger ecological problems.

Reflection after the game

STUDENTS ANSWER:

- Is proper waste sorting simple?
- What happens if we make a mistake?
- How could mistakes in a real system affect the environment?
- Can AI help us sort waste correctly?

ACTIVITY 3

TRAINING AN AI MODEL

Platform: https://teachablemachine.withgoogle.com/

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TECHNICAL STEPS

1. Opening the platform

Students open: https://teachablemachine.withgoogle.com/

Select: Image Project

2. Setting categories

Students add 3 main categories (depending on waste type):

- Paper
- Plastic
- Bio waste
- Each category represents an output in the model.

3. Data collection / capturing images

Students use the camera to record samples for each category.

Recommended:

- at least 50–100 samples per category
- record samples from different angles and lighting conditions
- use real objects (e.g., newspapers, plastic bottles, fruit)

Recording the data

Students click “Webcam” and record images.

Examples:

- Paper: old newspapers, books, notes
- Plastic: plastic bottles, packaging
- Bio waste: fruit peels, food leftovers

4. Training the model

After all samples are added → click “Train Model”.

The model is automatically trained based on the collected data.

5. Testing the model

After training students show new objects to the camera and observe:

- the computer’s interpretation
- which category is selected
- the accuracy of recognition

IF THE MODEL MAKES A MISTAKE, THE TEACHER ASKS:

- Why do you think it made a mistake?
- Did we capture the samples well enough?

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- Do we need additional examples?

6. Improving the model

Example of a trained model:

https://teachablemachine.withgoogle.com/models/cS0qBoxT-/

The model improves by adding new examples.

FINAL PART

What was the ecological disaster in Chernobyl supposed to teach us?

Possible answer: The consequences of irresponsible use of technology.

What did we learn through the Eco Heroes game?

Possible answer: The importance of personal responsibility in everyday life.

What did you learn while training AI?

Possible answer: AI can also make mistakes — everything depends on the data we give it.

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