

# Training AI: Science & Data

SMaLE Project

## Key Information

**Target Group:** 13 - 16 y.o.

**Duration:** 4-5 lessons (45 min each)

### Key Learning Goals:

- Scientific Reasoning:** Deepen understanding of classification concepts using AI.
- Critical Thinking:** Evaluate AI limitations and the role of human judgment.
- Digital Literacy:** Train models using Teachable Machine and analyze data quality.
- Ethical Awareness:** Reflect on the implications of AI in scientific contexts.

## Learning Outcomes

By the end of the project, students will be able to:

### KNOWLEDGE & UNDERSTANDING:

- Describe machine learning concepts (training, testing, datasets).
- Identify sources of error and bias in AI models.
- Recognize ethical considerations like trust and responsibility.

### SKILLS & ABILITIES:

- Collect and label datasets effectively.
- Use Teachable Machine to create predictive models.
- Collaborate in teams to design experiments and analyze results.

### ATTITUDES & VALUES:

- Appreciate the synergy between human insight and technology.
- Demonstrate openness to diverse perspectives in scientific discussions.

## European Dimension / Erasmus+ Connection

- Scientific Citizenship:** Engaging in real-world scientific inquiry and debate.
- Digital Responsibility:** Promoting ethical data practices.



**Co-funded by  
the European Union**



- **Collaboration:** Opportunities for sharing datasets with European peers.



## 1. Resources and Tools

- **Digital Tools:** Teachable Machine, eTwinning, Padlet.
- **Hardware:** Computers/Tablets with webcams.
- **Materials:** Physical objects for classification (rocks, leaves, etc.), Worksheets.

## Activity Overview

Activity	Time	Description
Intro	20 min	<b>AI in Science:</b> Discussion on how Machine Learning supports scientific research.
1	45 min	<b>The Human Algorithm:</b> Manual classification of objects to understand the human process.
2	45 min	<b>Collecting Data:</b> Fieldwork to capture and label diverse images for the dataset.
3	45 min	<b>Training the Model:</b> Using Teachable Machine to train and test the AI.
4	45 min	<b>Ethics &amp; Debate:</b> "Can AI replace lab scientists?" Critical analysis and reflection.

## 2. Introduction: AI in Science

**Goal:** Contextualize AI as a tool.

- **Discussion:** How does AI identify a star or a cell?
- **Concept:** It learns from examples provided by humans.

## 3. Activity 1: The Human Algorithm

**Goal:** Understand classification logic.

- **Task:** Students are given a set of objects (e.g., various rocks).
- **Action:** Create rules to classify them manually.
- **Reflection:** How did you decide? What features did you look for?

## 4. Activity 2: Collecting Data

**Goal:** Building a robust dataset.

- **Task:** Teams capture photos of their assigned category.
- **Focus:** Quality and diversity (lighting, background) to avoid bias.
- **Output:** A folder of labeled images.

## 5. Activity 3: Training the Model

**Goal:** Practical Machine Learning.

- **Tool:** Teachable Machine.
- **Process:** Upload data -> Train Model -> Test.
- **Analysis:** Present new objects. Does the AI recognize them? Identify false positives/negatives.



## 6. Activity 4: Ethics & Debate

**Goal:** Critical thinking.

- **Debate Topic:** "Can AI replace human lab scientists?"
- **Discussion:** Reliability, responsibility for errors, and the need for human oversight.
- **Evaluation:** Students reflect on their learning via Padlet and peer feedback forms.