

EcoTech Innovators: E-STEM & Digital Innovation

Integrating Science, Technology, Engineering & Mathematics to Promote
Environmental Stewardship and Green Technological Solutions

Transnational School Partnership Green & Digital Transition
Virtual Workshop



Co-funded by
the European Union





Erasmus+ Project Framework

Environmental Stewardship

Empowering European students to investigate critical ecological challenges—such as climate change, biodiversity loss, and resource depletion—through rigorous scientific inquiry and data-driven analysis.

Technological Innovation

Equipping classrooms with open-source digital tools, Internet of Things (IoT) microcontrollers, 3D modeling software, and GIS mapping to design sustainable technological solutions for real-world impact.

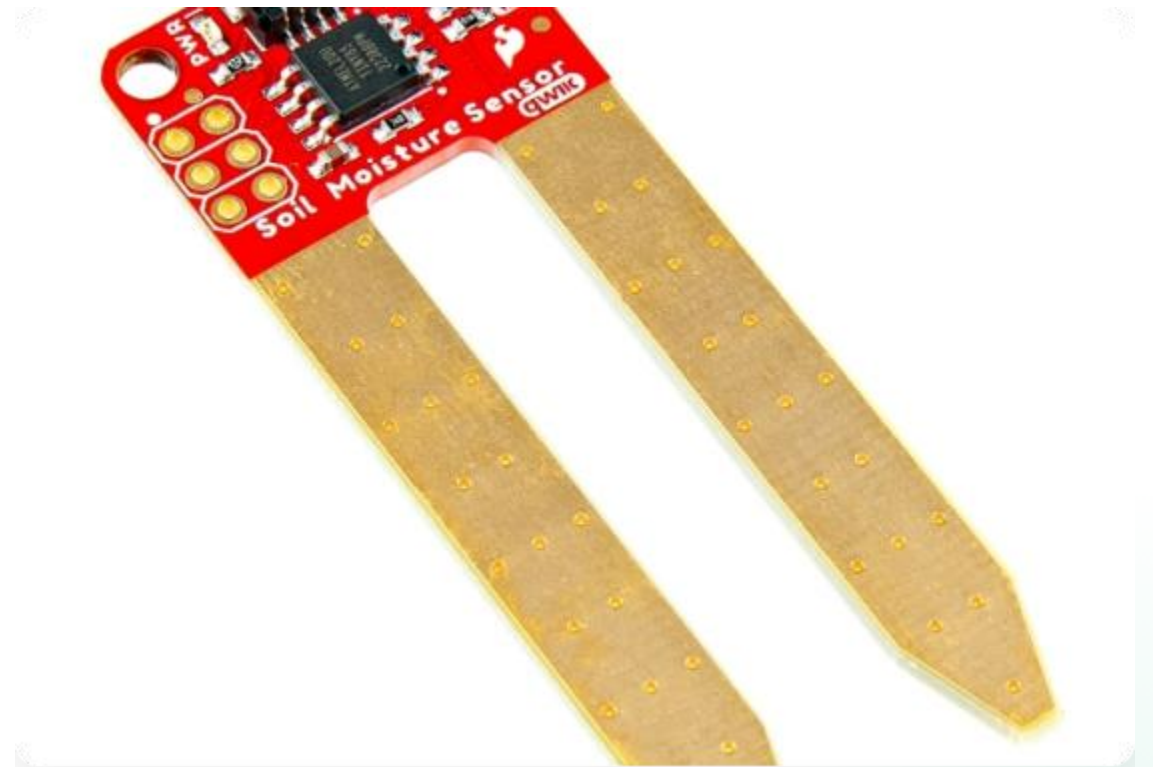




HANDS-ON STEM

IoT Environmental Sensors

- ✓ **Real-Time Monitoring:** Students assemble and program microcontrollers (Micro:bit / Arduino) with soil moisture, temperature, and atmospheric gas sensors.
- ✓ **Data-Driven Agriculture:** Automated irrigation systems reduce water consumption in school gardens by up to 40% through precise sensor triggers.
- ✓ **Coding & Engineering:** Hands-on block coding and circuit assembly transform theoretical electronics into active ecological solutions.





Pillars of E-STEM Learning



Science

Investigating ecosystems, bio-indicators, and climate mechanics through field measurements.



Technology

Leveraging open data, cloud platforms, and sensors to capture environmental metrics.



Engineering

Designing, 3D printing, and prototyping low-carbon eco-technological solutions.



Mathematics

Modeling environmental datasets, statistical trends, and resource conservation ratios.





Satellite Remote Sensing

Monitoring Urban Microclimates

Transnational student teams access open-source satellite data from Sentinel Hub and European Earth Observation databases to analyze regional urban heat islands and vegetation loss.

By mapping multispectral satellite imagery, learners identify high-density concrete zones and propose targeted micro-reforestation initiatives across partner European cities.





QUANTITATIVE IMPACT



Eco-Audit Key Metrics

35%

Energy Waste Reduced

Achieved in participating school buildings using smart digital sensors

120+

IoT Sensor Nodes

Deployed across 4 partner European schools for environmental tracking

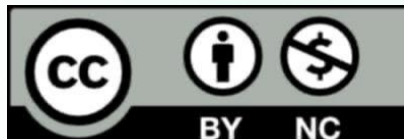
100%

Open Source Tech

All code repositories and 3D print models made freely accessible



Co-funded by
the European Union





Energy & Carbon Reduction

Partner School A (Germany)

88% Eco-Efficiency

Partner School B (Spain)

76% Eco-Efficiency

Partner School C (Italy)

82% Eco-Efficiency

Partner School D (Poland)

70% Eco-Efficiency

Integrated E-STEM audits allowed partner schools to benchmark digital energy tracking, identifying an average 79% performance improvement in facility resource management.





PROJECT LIFECYCLE



Project Mobility Timeline

1

Phase 1: Setup

Virtual icebreakers, tool selection (Miro, Tinkercad), and baseline environmental audits.

2

Phase 2: Sensor Lab

Coding microcontrollers and building physical environmental sensing stations.

3

Phase 3: Hackathon

Transnational student teams design digital eco-prototypes during a 3-day challenge.

4

Phase 4: Expo

Virtual 3D exhibition, peer assessment, and publishing open-access STEM toolkits.

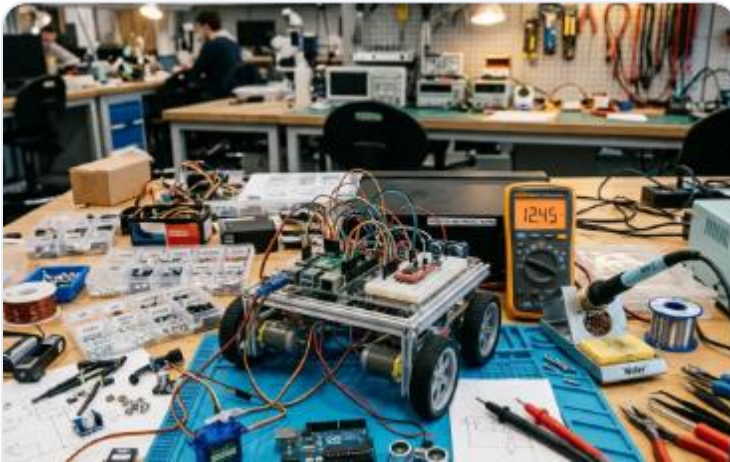


Co-funded by
the European Union





Student Eco-Tech Prototypes



Smart Robotics & Sensors

Programming autonomous water-quality testers for local river ecosystems.



Aerial Conservation

Utilizing drone imaging to quantify tree canopy density in urban parks.



Rapid Prototyping

3D printing custom solar panel mounts from recycled filament.



Join the Green Digital Movement!

Thank you for partnering in our Erasmus+ journey towards sustainable STEM education and technological innovation.



Co-funded by
the European Union



Image Sources



<https://www.sparkfun.com/media/catalog/product/cache/f3020b7489dcfc4d1d147cf4dad07b7f/S/E/SEN-24409-Soil-Moisture-Sensor-Qwiic-Feature.jpg>

Source: www.sparkfun.com



<https://gee-community-catalog.org/images/c3slc.png>

Source: gee-community-catalog.org



https://cdn.shopify.com/s/files/1/0552/3269/2430/files/Robotics_for_Beginner_How_Kids_Get_Started_Building_Real_Robots.webp?v=1781091284

Source: circuitmess.com



<https://www.zenadrone.com/wp-content/uploads/2025/04/Forest-Preservation-Drone-1.webp>

Source: www.zenadrone.com



http://www.pitsco.com/cdn/shop/files/94060_featured_01.jpg?v=1779473901

Source: www.pitsco.com
