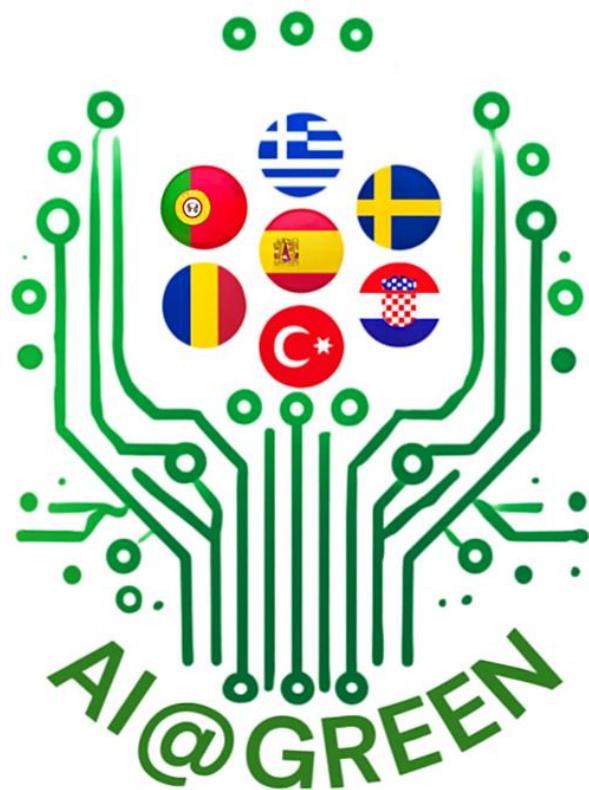


Module 7

ACTIVE STUDENT INVOLVEMENT THROUGH INTERACTIVE LEARNING



Module 7: Active Student Involvement Through Interactive Learning

About the module

Teachers will learn how to use interactive methods and AI tools to encourage students to actively participate in topics related to climate change and green skills.

1. Techniques for Encouraging Active Learning and Student Engagement

Description:

Active learning means that students are not passive recipients of information, but participate in the construction of knowledge through discussions, practical tasks, and collaboration.

Examples of activities:

- **Online quizzes:**

Teachers prepare quizzes about climate change using platforms such as Kahoot or Quizizz. Students answer in real time, and the system automatically provides results and motivates competition among them.

- **Digital posters/infographics:**

Students in small groups create a digital poster using tools such as Canva or Piktochart. The topic may be “How my community contributes to climate change” or “Our proposals for environmental preservation.” AI tools can help with design and ideas.

- **Virtual team challenges with AI support:**

Students in groups are given the task of designing a project to reduce the carbon footprint in the school or local community. They use an AI chatbot (e.g., ChatGPT) to generate ideas and a plan of activities. After brainstorming, each group presents their plan online or live. The teacher may use Google Jamboard or Miro for collaborative idea visualization.

- **Interactive digital survey and data analysis:**

Students create a survey about environmentally related habits (e.g. how often they use paper, drive a car, recycle). The survey can be created using Google Forms or Microsoft Forms. After collecting the data, they use simple AI tools (e.g. Excel with AI functions or Google Sheets Explore) to analyze and visualize the results. Together, they interpret the data and discuss possible measures.

- **AI-supported simulation tasks:**

Students work in pairs or small groups using online climate change simulators (e.g. NASA Climate Kids, PhET simulations). With the help of an AI assistant, they receive guidance and explanations for interpreting simulation results. Then, they create a report on the impact of different scenarios (e.g. CO₂ emissions reduction, afforestation).

- **Creative writing with AI support:**
Students write stories, diaries or letters from the perspective of a future generation living in a world affected by climate change. They use AI tools to help shape the text, expand ideas and correct grammar. Then, they exchange their work and comment on it in digital classrooms such as Microsoft Teams or Google Classroom.
- **Research task using digital sources and AI assistance:**
Task: Students research local climate changes and their impact on the community (e.g. changes in plants, weather conditions). Using AI (e.g. ChatGPT), they write a summary of their findings in Croatian. They present the results through videos or digital presentations that include interactive elements (QR codes, links).

Advantages:

- Increases motivation and retention of information.
- Develops critical thinking and creativity.
- Students collaborate and share ideas.

2. Project-Based and Inquiry-Based Learning

Description:

Students are encouraged to come to conclusions themselves through projects and research, using technology as a tool for data collection and analysis.

Examples of activities:

Mini-project with an AI tool

Students use a chatbot or AI assistant to ask questions about climate change, collect data or find solutions. For example, they use an app to track air quality or observe local weather patterns.

Air Quality Tracking Applications

AirVisual (IQAir AirVisual):

Displays current air quality (PM2.5, PM10, CO₂ and other indicators) in real time for the user's location or selected cities worldwide. Includes educational charts, data history, and forecasts. Available as a mobile app and web platform.

Plume Labs: Air Report:

Shows real-time air quality. Also includes forecasts for the next few days, alerts, and tips on how to reduce exposure to pollution. Also available on mobile devices.

BreezoMeter:

Provides detailed data on air quality and allergens. Includes educational content and tips. Offers an API and integration with other platforms.

Applications for Monitoring Local Weather Patterns

Weather.com (The Weather Channel):

Detailed weather forecasts, radar, historical data, and analysis of weather conditions. Visually rich and easily accessible.

Windy:

Displays wind, rain, clouds, temperature, and other meteorological data on an interactive map. Ideal for detailed observation of weather patterns.

MeteoEarth:

Visualization of weather systems in real time. Uses graphics similar to TV weather forecasts, but with interactive options.

Ventusky:

Interactive map with weather data such as temperature, wind, rain, pressure, and more. Suitable for tracking weather patterns and changes.

How to Use Them in the Classroom?

- Students can monitor air quality at their school or home and compare the data with other cities or countries.
- They can create reports or charts on changes during the week.
- Using weather applications, they can track local weather conditions and predict environmental events (e.g., storms, droughts).
- A practical project can also be created – e.g., an air quality diary with notes on the influence of weather conditions.

Suggestions for Reducing CO₂

Students analyze their own and the school's habits by collecting data (e.g. energy consumption, plastic usage), and with the help of simulation software propose concrete measures to reduce their carbon footprint.

Simulation Software and Tools for Tracking/Reducing CO₂ Footprint

1. Carbon Footprint Calculator (WWF, EPA, Global Footprint Network...)

Description:

Online calculators that allow students to enter their data (transportation methods, energy use, dietary habits...) and receive a calculation of their personal carbon footprint.

Classroom use:

- Students individually or in groups enter data about their habits (school, home, food).

- They analyze the results and propose changes – e.g. switching to bicycles, using less plastic, eating locally produced food.

Online tools:

- WWF Footprint Calculator
- EPA Carbon Calculator
- Global Footprint Network

2. En-ROADS Climate Simulator (Climate Interactive + MIT Sloan)

Description:

An interactive simulator that shows how various global measures impact greenhouse gas emissions, temperature, health, and the economy.

Classroom use:

- Students can "experiment" with scenarios – reducing industrial emissions, increasing renewable energy use, changing citizens' behavior.
- **Discussion:** What measures have the greatest impact? What are the trade-offs?

Website: <https://en-roads.climateinteractive.org>

Suitable for:

Upper elementary and high school, interdisciplinary learning (physics, geography, civics).

3. Climate Simulation Game (World Climate Simulation)

Description:

Students play the role of UN delegates and use the En-ROADS software to agree on measures to save the planet.

Use:

- Simulation of UN climate negotiations.
- Students make decisions themselves and observe the effects of their policies.

Website: <https://www.climateinteractive.org/programs/world-climate/>

Additional: Includes guides and teacher materials.

4. PhET Simulations – “Greenhouse Effect”

Description:

A simple interactive simulation that shows how different gases in the atmosphere trap heat.

Use:

- Illustrates the basic scientific principles of climate change.

- Can be combined with experiments and analyses.

Website: <https://phet.colorado.edu/en/simulation/greenhouse>

5. Earth School / Google's "Your Plan, Your Planet"

Description:

Interactive educational tools for a basic understanding of personal impact on the environment (water, energy, plastic).

Website: *Your Plan, Your Planet*

Project Use:

After analysis and simulations, students can:

- Design a campaign to change habits at school.
- Present results and solutions using posters, videos, PowerPoint presentations, or infographics.
- Create a "Green Action Plan" for their school.

Advantages:

- Develops research and analytical skills.
- Allows practical application of knowledge.
- Connects lessons with real-world issues.

3. Technology in Interactive Learning

Description:

The use of technologies such as VR/AR and AI platforms provides students with experiences that are not possible in traditional teaching.

Examples of Activities:

Virtual Reality (VR)

Using VR goggles, students "visit" endangered ecosystems, observe the effects of climate change, or compare different scenarios (e.g., floods, droughts). These can be free applications or Google Expeditions.

VR Applications for Climate Change and Environment

1. Google Expeditions (archived, replaced by Google Arts & Culture VR)

Description:

With the help of VR goggles (or even just a mobile device), students could explore different places and phenomena – including climate change, glaciers, forests, coral reefs, and flooded areas.

Note: Although the app has been discontinued, content is available via the Google Arts & Culture platform, e.g., through 360° videos and virtual tours.

🔗 Explore here: <https://artsandculture.google.com/>

► Search: *climate change, polar regions, oceans, deforestation...*

2. Within VR – “This is Climate Change”

Description:

A series of VR films (4 episodes) that show real consequences of climate change: wildfires, hunger, ice melting, deforestation.

Realistic 360° documentaries, very emotional and educational.

Requirements: VR headset (e.g., Oculus, or even Google Cardboard).

Available at: <https://www.with.in>

3. Stanford Ocean Acidification Experience (SOAE VR)

Description:

A VR experience that shows how increased CO₂ in the atmosphere changes ocean chemistry and destroys marine life.

Free on Oculus and YouTube VR.

4. Tree VR – The Rainforest Experience

Description:

The user becomes a tree in the Amazon rainforest and experiences growth, life, and eventually – deforestation.

Available on: Oculus, HTC Vive, Samsung Gear VR.

5. EcoVR / Climate Change VR Simulations

(YouTube 360°, VeeR VR, Oculus TV...)

Description:

There are many 360° videos showing:

- flooded cities
- drought and famine
- species extinction

- climate migration

Recommended search platforms:

- YouTube VR (search: *climate change VR, 360 environment*)
- VeeR VR
- Oculus TV / Quest Store

How to Use It in Schools?

- **VR goggles:** Google Cardboard + smartphones can be used.

Activities:

- Students watch VR content and then write impressions, solutions, or their own “stories from the future.”
- Workshops: “*Virtual Visit to Planet Earth 2100*” – what does the Earth look like after the climate crisis?
- Comparing two scenarios: no action vs. sustainable development.

AI Platforms for Personalization

AI systems analyze student responses and offer customized materials or tasks.

Example: A student struggling with understanding basic climate concepts receives additional materials, while an advanced student gets more challenging tasks.

Advantages:

- Increases engagement and understanding through experiential learning.
- Adapts lessons to individual student needs.

AI Platforms for Personalized Learning

1. Khan Academy + Khanmigo (AI tutor)

Description:

A free educational platform now using the AI assistant Khanmigo, developed in collaboration with OpenAI.

Personalization features:

- An AI tutor that answers questions and encourages critical thinking.

- Tracks student progress and suggests tasks based on achievements.

🔗 <https://www.khanacademy.org>

2. Century Tech – not free

Description:

An AI platform that combines neuroscience, educational theory, and AI for adaptive learning.

Features:

- Detects where the student is struggling and automatically adjusts the content.
- Teachers see individual reports.

Intended for: Primary and secondary schools.

🔗 <https://www.century.tech>

3. Socrative + AI tools

Description:

Although not a pure AI tool, Socrative can be used with AI assistants for automatic assessment and task adjustment.

Combination with AI allows teachers to quickly analyze errors and provide personalized tasks.

4. Squirrel AI (China)

Description:

An advanced AI platform for personalized learning that uses micro-analysis of student knowledge.

Functionality:

- Maps student knowledge down to the level of "micro-skills."
- Adjusts lessons in real time.

5. Knewton Alta

Description:

An AI tool for personalized learning in higher education (math, science...).

Features:

- Tracks performance in real time and adjusts content accordingly.
- Includes metacognitive strategies.

🔗 <https://www.knewton.com>

6. Smart Sparrow (Adaptive Learning)

Description:

Allows teachers to create interactive lessons that adapt to each student.

Features:

- AI analyzes responses and adjusts the learning path.

How to Use in Schools?

AI platforms can be used for:

- Learning at home or as a supplement to lessons.
- Insight into student needs – who is falling behind, who needs a challenge.
- Student digital learning maps – AI suggests the next step.

4. Activities for Teachers

a) Collaborative Project – Practical Workshop

Objective: Teachers collaboratively design a project that enables students to explore and solve real climate issues using AI and interactive tools.

Steps:

- Selecting a topic (e.g., reducing waste in school, monitoring air quality).
- Choosing tools (e.g., environmental tracking apps, AI chatbots, data visualization tools).
- Creating a project plan with clear student roles and expected outcomes.
- Exchanging ideas and suggestions among teachers to improve the plan.

Outcome: Teachers receive a ready-to-implement project plan for their schools.

b) Peer Review of Lesson Plans

Objective: To enhance interactive teaching techniques and the use of AI tools through mutual review and feedback.

Steps:

- Each teacher prepares a lesson or workshop that includes elements of interactive learning and AI.
- In small groups, teachers share their plans and provide constructive feedback.
- Discussion of challenges and successful approaches.
- Joint collection of ideas for further improvement.

Outcome: Better-designed teaching materials and increased teacher readiness to use new technologies.

Conclusion

Through this module, teachers gain not only theoretical knowledge but also practical skills they can immediately apply. AI and interactive tools enable a deeper understanding of climate change and encourage students to actively participate in environmental protection.