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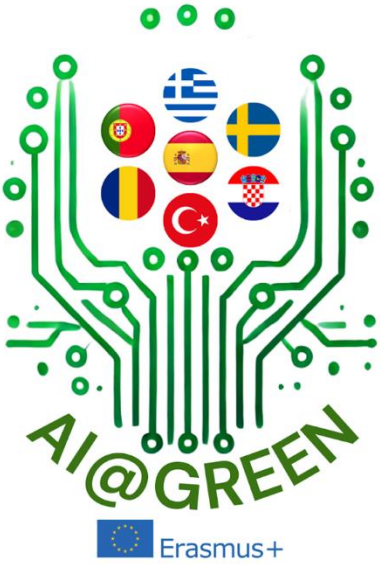

Ecological Agriculture 2025

9 E-modules

Each module will have an introduction about ecological agriculture, what was historically considered and done (conventional vs ecological agriculture), case studies, what needs to change and why, how can we realistically bring about these changes globally and how do we incorporate AI into all of these processes. We need to include visual tools.

We need to ensure there is a large focus on the use of AI - both by the teachers in creating teaching resources and by the students when engaging in their lessons, assignments and presentations.

Target Teachers: teachers across Europe from schools with varying degrees of digital competence and access. All tools need to be easily accessible, appropriate for GDPR and easy to implement.

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This e-module is designed to support teachers in integrating the topics of ecological agriculture into their lessons, environmental awareness and critical thinking among students. The following guidelines will help you maximize the module's potential:

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Tackling the eco-sustainability as theory and practice…

"Development that meets the needs of the present without compromising the ability of future generations to meet their own needs"

(World Commission on Environment and Development, 1987)

Introduction

Welcome to the e-module on "Ecological Agriculture." This course is designed to empower educators with the knowledge, resources, and strategies needed to address two of the most pressing global challenges: ecological agriculture.

This lesson plan introduces students to sustainable agricultural practices, fosters environmental awareness, and promotes hands-on learning. Through interactive presentations, group discussions, and practical activities, students will gain valuable insights into organic farming, renewable energy sources, and the importance of seed planting.

Throughout this module, you will explore engaging teaching methodologies, practical classroom activities, and real-world case studies to help your students better understand these topics. Together, we can inspire the next generation to take action for a more sustainable and equitable world.

Let’s begin this journey toward environmental awareness and impactful education!

Learning goals Vs learning objectives

Learning Goals

Introduce students to sustainable agricultural practices

Foster environmental awareness

Promote hands on learning

Understand the principles of organic farming

Identify renewable energy sources

Participate in a seed-planting activity

Learning Objectives

By the end of this e-module, teachers will be able to:

1. **Explain** the causes, effects, and global implications of ecological agriculture and the role of renewable energy in combating climate change.
2. **Identify** practical strategies to introduce ecological agriculture and renewable energy topics in engaging and age-appropriate ways for their students.
3. **Analyze** real-world case studies that connect ecological agriculture, energy production, and sustainability.
4. **Develop** lesson plans and classroom activities that encourage students to think critically about environmental issues.
5. **Facilitate** meaningful discussions and projects to inspire student-led solutions for a more sustainable future.

Teaching Sustainability: Ecological Agriculture in the Classroom

Pedagogical Guidelines:

This e-module is designed to support teachers in integrating the topics of deforestation and renewable energy into their lessons, fostering environmental awareness and critical thinking among students. The following guidelines will help you maximize the module's potential:

1. **Active Learning:** Engage students with interactive activities, group discussions, and problem-solving exercises to explore the causes and effects of deforestation and the role of renewable energy.
2. **Real-World Connections:** Use case studies and examples to link the topics to students' daily lives and global challenges, encouraging them to think critically about solutions.
3. **Interdisciplinary Approach:** Integrate these themes across subjects like science, geography, economics, and citizenship education, promoting a holistic understanding.
4. **Student-Centered Learning:** Facilitate projects that empower students to investigate, propose, and present actionable solutions for sustainability.
5. **Reflection and Assessment:** Include opportunities for reflection and assessment, such as journaling, debates, or presentations, to evaluate learning outcomes and foster deeper engagement.

6. Interactive presentation: A visually stimulating and engaging presentation will introduce key concepts and ideas.

7. Group discussion: students will participate in facilitated group discussions, fostering collaboration and critical thinking.

8. Practical activities: A hands-on seed-planting activity will allow students to experience the process of growing food and connect the theory to real-word practices.

Required Technologies and Resources:

- **Technologies:**
  - Access to a computer, tablet, or interactive whiteboard with an internet connection.
  - Presentation software (e.g., PowerPoint, Google Slides) for creating and sharing lesson materials.
  - Online platforms or tools like Padlet, Kahoot, or Google Classroom for collaborative and interactive activities.
- **Resources:**
  - The e-module content (lesson plans, case studies, and activity guides).
  - Multimedia materials, including videos, articles, and infographics provided in the module.
  - Access to relevant online databases or websites for research and exploration.
  - Classroom materials, such as printed worksheets or hands-on activity kits, if applicable.

These tools and resources will help you deliver engaging and impactful lessons that empower students to act for a sustainable future.

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Lesson Plans/ E-modules

E-module 1: AI in ecological agriculture

Learning Objectives

- Students will be able to define artificial intelligence (AI) and its applications in agriculture.
- Students will be able to explain the benefits of using AI in ecological greenhouse farming.
- Students will be able to identify different types of AI technologies used in greenhouse farming.
- Students will be able to analyze the ethical considerations of using AI in agriculture.
- Students will be able to design and present their own AI-powered greenhouse farming solutions.

Materials

- Whiteboard or projector
- Markers or pens
- Handouts with information about AI and ecological greenhouse farming
- Computers or tablets with internet access
- Materials for building miniature greenhouses (optional)

Lesson Plan 1: Introduction to AI and its Applications in Agriculture

- **Activity 1:** Brainstorming
  - Ask students what they know about artificial intelligence.
  - Discuss examples of AI in everyday life (e.g., Siri, Alexa, self-driving cars).
  - Introduce the concept of AI in agriculture and its potential benefits.

    https://www.youtube.com/watch?v=8gdHSV6Y6ro

- **Activity 2:** Presentation and Discussion
  - Present information about AI and its applications in agriculture.
  - Discuss the benefits of using AI in ecological greenhouse farming (e.g., increased efficiency, reduced resource use, improved crop yields).
  - Show videos or images of AI-powered greenhouse farming systems.

    https://www.youtube.com/watch?v=DrI7GcDf-I0

- **Activity 3:** Vocabulary Review
  - Review key vocabulary terms related to AI and agriculture (e.g., artificial intelligence, machine learning, computer vision, precision agriculture).
  - Play a vocabulary game or quiz to reinforce learning.

(Kahoot about vocabulary)

Lesson Plan 2: AI Technologies Used in Greenhouse Farming

- **Activity 1:** Research and Presentation
  - Divide students into groups and assign each group a specific AI technology used in greenhouse farming (e.g., sensors, drones, robots, computer vision systems).
  - Have each group research their assigned technology and create a short presentation to share with the class.
- **Activity 2:** Guest Speaker
  - Invite a guest speaker who is an expert in AI or agriculture to talk to the class about their work.
  - Have students prepare questions for the guest speaker in advance.

*The speaker is from Alarcontrol company.

Lesson Plan 3: Ethical Considerations of Using AI in Agriculture

- **Activity 1:** Case Study Analysis
  - Present students with a case study about the ethical considerations of using AI in agriculture (e.g., job displacement, data privacy, environmental impact).
  - Have students discuss the case study in small groups and share their thoughts with the class.
- **Activity 2:** Debate
  - Hold a debate on the ethical implications of using AI in agriculture.
  - Assign students to different sides of the debate and have them prepare arguments to support their position.

Lesson Plan 4: Designing AI-Powered Greenhouse Farming Solutions

- **Activity 1:** Brainstorming
  - Have students brainstorm ideas for AI-powered solutions to challenges in ecological greenhouse farming (e.g., pest control, irrigation, climate control).
- **Activity 2:** Design and Prototyping
  - Have students work in groups to design and prototype their own AI-powered greenhouse farming solutions.

    https://www.youtube.com/watch?v=1NU2mE-f71E

  - Encourage students to use their creativity and problem-solving skills to develop innovative solutions.

Lesson Plan 5: Presentations and Wrap-up

- **Activity 1:** Presentations
  - Have each group present their AI-powered greenhouse farming solutions to the class.
  - Encourage students to explain their design choices and the potential benefits of their solutions.
- **Activity 2:** Wrap-up and Reflection
  - Review the key concepts learned throughout the week.
  - Have students reflect on their learning and share their thoughts on the future of AI in agriculture.

Assessment

- Participation in class discussions and activities

- Quality of research and presentations
- Creativity and innovation of AI-powered greenhouse farming solutions
- Understanding of ethical considerations of using AI in agriculture

Extension Activities

- Visit a local greenhouse or farm that uses AI technologies.
- Conduct a research project on a specific AI technology used in agriculture.
- Create a website or blog to share information about AI in agriculture.

E- module 2: Use of local resources for an ecological agriculture

Objectives

- Students will be able to identify local resources that can be used in an ecological greenhouse.
- Students will understand the benefits of using local resources for sustainability.
- Students will learn how AI can assist in optimizing resource use in a greenhouse.

Materials

- Whiteboard or projector
- Markers or pens
- Handouts with local resource examples (e.g., types of soil, compost, natural pest control)
- Internet access for AI tools
- Optional: samples of local resources

Lesson Plan 1: Introduction

- Begin with a class discussion: "What are some things plants need to grow?" (water, sunlight, nutrients, etc.)
- Introduce the concept of an ecological greenhouse: "A greenhouse where we try to use resources that are good for the environment and are found locally."

Lesson Plan 2: Brainstorming Local Resources

- Divide students into small groups.
- Ask each group to brainstorm local resources that could be used in a greenhouse.
- Have each group share their ideas with the class.
- Discuss the benefits of using local resources (reduces transportation costs, supports local economy, may be better suited to the environment).

Lesson Plan 3: AI-Powered Resource Analysis

- Introduce an AI tool (e.g., a chatbot or website) that can provide information on local resources.
- Have students use the AI tool to research specific local resources. For example:
- "What type of soil is best for growing tomatoes in our area?"
- "What are some natural ways to control pests in a greenhouse without using chemicals?"
- Discuss the information provided by the AI and how it can help make decisions about resource use.

Lesson Plan 4: Greenhouse Design Challenge

- Divide students into teams.
- Challenge each team to design a model greenhouse using only local resources.
- Have each team present their design and explain their resource choices.

Lesson Plan 5: Reflection and Wrap-up

- Review the key concepts of the lesson.
- Discuss how AI can be a valuable tool for sustainable agriculture.
- Ask students to reflect on what they learned about local resources and ecological greenhouses.

Assessment

- Observe student participation in discussions and activities.
- Review student research using the AI tool.
- Evaluate the greenhouse designs created by the teams.

Extension Activities

- Visit a local greenhouse.
- Start a class greenhouse using local resources.
- Research careers in sustainable agriculture and AI.

AI Tools

- Consider using Google's Bard or a similar AI chatbot that can provide information on local resources and answer student questions.
- Explore AI-powered greenhouse management systems that can optimize resource use based on real-time data.

E-module 3: intensive agriculture vs ecological agriculture

Learning Objectives

- Students will be able to define intensive and ecological agriculture.
- Students will identify the key differences between the two approaches.
- Students will analyze the environmental and social impacts of each method.
- Students will evaluate the sustainability of different agricultural practices.
- Students will propose solutions for feeding a growing population sustainably.

Materials

- Whiteboard or projector
- Markers or pens
- Handouts with definitions and comparison charts
- Internet access for research and AI tool use
- Optional: Art supplies for creating visuals

Lesson Plan 1: Introduction to Agriculture

Brainstorming: Start with a class discussion about where our food comes from. Ask students to list different types of farms and farming practices they know.

Definitions: Introduce the terms "intensive agriculture" and "ecological agriculture." Provide simple definitions and examples.

Visuals: Show images or videos of different farming methods. Discuss the visual cues that distinguish intensive from ecological farms.

https://www.youtube.com/watch?v=yCXWo-ex8h8

https://www.youtube.com/watch?v=Fo3FYAVvDcE

https://www.sistemashorticolasalmeria.com/blog/agricultura-intensiva/?gad_source=2&gclid=EAIaIQobChMIuuPZoY7XiwMVBz4GAB2p5wpZEAEYASAAEgJKG_D_BwE

Lesson Plan 2: Intensive Agriculture

Characteristics: Explore the key features of intensive agriculture, such as:

- High use of fertilizers and pesticides
- Monoculture (growing a single crop)
- Large-scale operations

- Use of technology and machinery

Pros and Cons: Discuss the advantages (high yields, efficiency) and disadvantages (environmental damage, potential health risks) of intensive agriculture.

Case Study: Examine a real-world example of intensive agriculture

(*Look for information on the Internet: students can use Chromebook or laptop to do the activity)

Lesson Plan 3: Ecological Agriculture

Characteristics: Explore the key features of ecological agriculture, such as:

- Crop rotation and diversification
- Use of natural fertilizers and pest control
- Emphasis on soil health and biodiversity
- Smaller-scale, local production

Pros and Cons: Discuss the advantages (environmental benefits, healthier food) and disadvantages (lower yields, higher costs) of ecological agriculture.

Case Study: Examine a real-world example of ecological agriculture.

(*Look for information on the Internet: students can use Chromebook or laptop to do the activity)

Lesson Plan 4: AI and Agriculture

Introduction to AI: Briefly explain what artificial intelligence is and how it can be used in different fields.

AI in Agriculture: Discuss how AI can be applied to both intensive and ecological agriculture, such as:

- Precision farming (optimizing resource use)
- Crop monitoring and disease detection
- Data analysis for sustainable practices

Ethical Considerations: Explore the ethical implications of using AI in agriculture, such as job displacement and data privacy.

https://www.youtube.com/watch?v=t9paRh-fb8Q

https://www.youtube.com/watch?v=ypabdICkuwg

Lesson Plan 5: Sustainable Solutions

Group Project: Divide students into small groups and assign each group a specific aspect of sustainable agriculture (e.g., reducing pesticide use, promoting local food systems, minimizing food waste).

Research and Presentation: Have each group research their assigned topic and create a presentation summarizing their findings and proposing solutions.

Class Discussion: Facilitate a class discussion about the different solutions presented and how they can contribute to a more sustainable food system.

https://azadaverde.org/practicas-agricolas-sostenibles

Assessment:

- Participation in class discussions
- Completion of handouts and research tasks
- Group project presentation

Differentiation:

- Provide additional support for students who need it, such as pre-filled graphic organizers or simplified reading materials.
- Offer extension activities for advanced students, such as researching specific AI applications in agriculture or writing a persuasive essay about sustainable food systems.

E- module 4: Ecological fight against plant pests and diseases

Objectives

- Students will be able to identify common plant pests and diseases.
- Students will learn about ecological methods for pest and disease control.
- Students will understand how artificial intelligence can be used in plant protection.
- Students will develop critical thinking and problem-solving skills.

Materials

- Whiteboard or projector

- Markers or pens
- Images of common plant pests and diseases
- Samples of natural pest control methods (e.g., ladybugs, neem oil)
- Computer or tablet with internet access
- AI-based plant identification app (e.g., Plantix, PictureThis)

Lesson Plan 1: Introduction

- Begin with a class discussion about the importance of plants and the challenges they face from pests and diseases.
- Show images of common plant pests and diseases, and ask students to identify them.
- Introduce the concept of ecological pest and disease control as a way to protect plants without harming the environment.

Lesson Plan 2: Ecological Methods

- Discuss various ecological methods for pest and disease control, such as:
  - Companion planting: Planting certain plants together to repel pests or attract beneficial insects.
  - Biological control: Using natural enemies of pests, such as ladybugs or parasitic wasps.
  - Neem oil: A natural pesticide extracted from the neem tree.
  - Crop rotation: Rotating different crops to prevent the buildup of pests and diseases.

Lesson Plan 3: Hands-on Activity: Natural Pest Control

- Divide students into small groups and provide each group with a sample of a natural pest control method (e.g., ladybugs, neem oil).
- Ask students to research their assigned method and create a presentation or poster to share with the class.

Lesson Plan 4: Introduction to AI in Plant Protection

- Explain how artificial intelligence can be used to identify plant pests and diseases more quickly and accurately than humans.
- Introduce an AI-based plant identification app (e.g., Plantix, PictureThis) and demonstrate how it works.

- Discuss the potential benefits and limitations of using AI in plant protection.

Lesson Plan 5: AI Challenge: Plant Diagnosis

- Have students use the AI-based plant identification app to diagnose a plant with a pest or disease.
- Ask students to research the recommended treatment for the diagnosed problem and present their findings to the class.

Assessment

- Observe students' participation in class discussions and activities.
- Evaluate students' presentations or posters on natural pest control methods.
- Assess students' ability to use the AI-based plant identification app to diagnose plant problems.

Extension Activities

- Visit a local garden or farm to learn about their pest and disease control practices.
- Conduct a class experiment to compare the effectiveness of different ecological pest control methods.
- Research and present on other applications of artificial intelligence in agriculture.

E-module 5: saving and quality of water used in greenhouses

Learning Objectives:

- Students will understand the importance of water conservation in greenhouses.
- Students will learn about factors affecting water quality in greenhouse systems.
- Students will explore how artificial intelligence (AI) can be used to optimize water usage and maintain water quality in greenhouses.
- Students will develop critical thinking and problem-solving skills related to water resource management.

Materials:

- Whiteboard or projector
- Markers or pens
- Handouts with activity instructions and questions
- Access to computers or tablets with internet connection

- Optional: materials for building mini-greenhouses (plastic bottles, soil, seeds)

Lesson Plan 1: Introduction to Water Conservation in Greenhouses

- Engage**:** Begin with a class discussion about the importance of water for plant growth and the challenges of water scarcity.
- Explore: Introduce the concept of greenhouses and their role in agriculture. Discuss the specific water needs of greenhouse systems.
- Explain**:** Explain the importance of water conservation in greenhouses to reduce water waste and minimize environmental impact.
- Elaborate**:** Show examples of different water-saving techniques used in greenhouses, such as drip irrigation and rainwater harvesting. (https://www.youtube.com/watch?v=2ExVLHs--Iw)
- Evaluate: Have students brainstorm and present their own ideas for water conservation in greenhouses.

Lesson Plan 2: Factors Affecting Water Quality in Greenhouses

- Engage: Start with a review of the water cycle and its relevance to greenhouse systems.
- Explore**:** Discuss the potential sources of water contamination in greenhouses, such as fertilizers, pesticides, and pathogens.
- Explain: Explain the importance of maintaining water quality for plant health and human safety.
- Elaborate: Introduce methods for testing and monitoring water quality in greenhouses, such as using pH meters and water testing kits.
- Evaluate: Conduct a class experiment to test the pH levels of different water samples.

Lesson Plan 3: Introduction to Artificial Intelligence

- Engage: Begin with a fun activity where students try to teach a computer to recognize objects or solve a simple puzzle.
- Explore: Introduce the concept of artificial intelligence (AI) and its applications in various fields.
- Explain: Explain how AI can be used to analyze data, make predictions, and automate tasks. (Infogr.am, ArcGis Online, Piktochart, Flourish,Tableau Public…)
- Elaborate: Discuss the potential benefits of using AI in agriculture, such as optimizing crop yields and reducing resource consumption.(https://www.youtube.com/watch?v=HpL1CCQt5Bg)
- Evaluate: Have students brainstorm and present their own ideas for how AI could

be used in agriculture.

Lesson Plan 4: AI for Water Management in Greenhouses

- Engage**:** Review the concepts of water conservation and water quality from the previous days.
- Explore**:** Introduce the concept of using AI to monitor and control water usage in greenhouses.
- Explain: Explain how AI-powered systems can analyze data from sensors to optimize irrigation schedules and nutrient delivery.
- Elaborate: Discuss the potential benefits of using AI for water management in greenhouses, such as reducing water waste and improving crop yields. (https://www.youtube.com/watch?v=RU53ordm-nc)
- Evaluate: Have students research and present examples of AI-powered water management systems used in greenhouses.

Lesson Plan 5: Project: Designing an AI-Powered Greenhouse

- Engage**:** Review the key concepts learned throughout the week.
- Explore: Divide students into groups and challenge them to design their own AI-powered greenhouse.
- Explain: Provide students with guidelines and resources for their projects, including information on sensors, AI algorithms, and greenhouse design. (https://invernaderounicaescri.wordpress.com/desarrollo-del-proyecto/)

  (https://www.youtube.com/watch?v=odD9rxIVZns)

  (Alarcontrol company: speaker from this company)

- Elaborate: Have students work in groups to develop their designs, considering factors such as water conservation, water quality, and AI integration.
- Evaluate**:** Have each group present their project to the class, explaining their design choices and the potential benefits of their AI-powered greenhouse.

Assessment:

- Observe student participation in class discussions and activities.
- Review student responses on handouts and worksheets.
- Evaluate student project presentations and designs.

Extension Activities:

- Visit a local greenhouse or farm that uses AI technology.
- Invite a guest speaker from the field of agriculture or AI.
- Have students research and write reports on different AI applications in agriculture.

E- module 6: Promotion of biodiversity outside and inside greenhouses (https://www.aenverde.es/biodiversidad-en-el-invernadero-hacia-un-agrosistema-sostenible/)

Learning Objectives:

- Students will understand the importance of biodiversity in both indoor and outdoor greenhouse environments.
- Students will explore how AI can be used to monitor, analyze, and promote biodiversity in greenhouses.
- Students will develop critical thinking skills by evaluating the benefits and challenges of using AI in ecological contexts.

Materials:

- Whiteboard or projector
- Markers or pens
- Images and videos of diverse greenhouse ecosystems
- AI-powered plant identification apps (e.g., PlantNet, iNaturalist)
- Data sheets or notebooks for recording observations
- Optional: Small greenhouse models or access to a real greenhouse

Lesson Plan 1: Introduction: "Why Does Biodiversity Matter?"

- Begin with a captivating question: "What do a rainforest, a desert, and a greenhouse have in common?"
- Facilitate a class discussion about the concept of biodiversity and its significance for ecosystem health.
- Show visuals of diverse plant and animal life in various ecosystems, including greenhouses.

  (**https://www.aenverde.es/biodiversidad-en-el-invernadero-hacia-un-agrosistema-sostenible/**)

  (https://www.youtube.com/watch?v=yOMsTJNVZq)

(LOS ECOSISTEMAS ARTIFICIALES: Sus Tipos, Características, Flora y Fauna del minuto 7:30 al 9:00)

Agricultura biodinámica en un invernadero de Sorbas - YouTube

Lesson Plan 2: Exploring Greenhouse Biodiversity

- Divide students into small groups.
- Assign each group either an indoor or outdoor greenhouse environment to focus on.
- Have students brainstorm the types of plants, animals, and microorganisms they might find in their assigned environment.
- Encourage them to consider the interactions between these organisms.

Lesson Plan 3: Introduction to AI in Greenhouses

- Introduce the concept of artificial intelligence and its applications in various fields.
- Explain how AI can be used in greenhouses to:
    - Monitor plant growth and health
    - Identify and classify species
    - Analyze environmental data (temperature, humidity, etc.)
    - Control automated systems (irrigation, lighting)
- Demonstrate AI-powered plant identification apps and discuss their potential for biodiversity research.

  (App: **PlantNet,** PlantSnap, **PictureThis,**Flora Incognita, **NatureID,LeafSnap)**

Lesson Plan 4: Hands-on Activity: "AI Biodiversity Challenge"

- If possible, take students to a real greenhouse or use miniature models.
- Challenge each group to use AI apps to identify and record as many different species as possible within a set time limit.
- Have students create data sheets or use notebooks to document their findings, including photos and descriptions of each species.

Lesson Plan 5: Discussion and Reflection: "The Future of Greenhouses"

- Bring the class back together for a final discussion.
- Share and compare the data collected by each group.
- Discuss the potential benefits and challenges of using AI to promote biodiversity

in greenhouses.
- Encourage students to think critically about the ethical implications of AI in ecological contexts.

Assessment:

- Evaluate student participation in class discussions and group activities.
- Assess the accuracy and completeness of their species identification and data recording.
- Encourage students to reflect on their learning through a short written assignment or presentation.

Extension Activities:

- Research and present on specific examples of AI being used in greenhouse or agricultural settings.
- Design and conduct a simple experiment to test the effects of different environmental factors on plant growth in a greenhouse.
- Create a class blog or website to share their findings and reflections on greenhouse biodiversity and AI.

E-module 7: Rejection of the use of chemical products (chemical fertilizers, pesticides, fungicides, etc)

Learning Objectives

- Understand the negative impacts of chemical use in greenhouses.
- Explore how AI can help reduce chemical reliance.
- Develop critical thinking skills about technology's role in agriculture.

Materials

- Whiteboard or projector
- Markers or pens
- Handouts with activity instructions
- Internet access for research and AI tool demos

Lesson Plan 1: Introduction: The Chemical Challenge

    - Begin with a class discussion:

- What are the benefits of greenhouses?
- What are some potential problems with using chemicals in them?

- Guide students to consider environmental and health impacts.

Lesson Plan 2: AI to the Rescue

- Introduce the concept of Artificial Intelligence (AI).
- Explain how AI can be used in greenhouses:
  - Monitoring: AI sensors track temperature, humidity, etc., to optimize conditions naturally.
  - Pest Control: AI can identify pests early, allowing for targeted, minimal-chemical interventions.
  - Precision Agriculture: AI helps deliver water and nutrients precisely where needed, reducing waste and runoff.

La inteligencia artificial irrumpe en los invernaderos en la lucha por acabar con las plagas

Lesson Plan 3: Design a Smart Greenhouse

- Divide students into small groups.
- Each group designs a greenhouse that minimizes chemical use by incorporating AI solutions.
- Groups present their designs, explaining their AI choices and how they address specific problems

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Lesson Plan 4: AI Tool Exploration

- If possible, demonstrate a simple AI tool related to agriculture (e.g., a plant identification app).
- Discuss how such tools could be used in a greenhouse setting.

Lesson Plan 5: Wrap-up: The Future of Farming

- Class discussion:

        - What are the potential benefits of AI in agriculture?
        - What are the ethical considerations or challenges?
    - Encourage students to think critically about the future of food production.

Assessment

- Participation in discussions
- Quality and creativity of greenhouse designs
- Understanding of AI concepts demonstrated in presentations

Extension Activities

- Research different types of AI sensors used in agriculture.
- Investigate companies developing AI solutions for greenhouses.
- Create a presentation or infographic about the benefits of reducing chemical use in farming.

E-module 8: Recycling of plastic containers for ecological products.

Objectives

- Knowledge:
    - Understand the importance of recycling plastic containers.
    - Learn about eco-friendly products made in greenhouses.
    - Discover how artificial intelligence (AI) can help with recycling.
- Skills:
    - Sort and classify different types of plastic.
    - Analyze the life cycle of plastic products.
    - Brainstorm creative ways to reuse plastic containers.
    - Use AI tools to identify and sort recyclable materials.
- Attitudes:
    - Develop a sense of responsibility towards the environment.
    - Appreciate the role of technology in solving environmental problems.
    - Foster creativity and innovation in finding sustainable solutions.

Materials

- Assorted plastic containers (clean and labeled)
- Markers, crayons, colored pencils
- Worksheets with recycling symbols and facts

- Access to computers or tablets with internet
- AI-powered recycling apps or websites (if available)
- Materials for creating recycled crafts (scissors, glue, etc.)

Lesson Plan 1: Introduction

- Begin with a brief discussion about the importance of recycling and its impact on the environment.
- Show examples of eco-friendly products made in greenhouses and discuss their benefits. (https://www.youtube.com/watch?v=2FGdCh9F6Ho)
- Introduce the concept of artificial intelligence and how it can be used in recycling.

Lesson Plan 2: Sorting and Classifying Plastics

- Divide students into groups and provide each group with a set of plastic containers.
- Have students sort the containers based on their type (e.g., PET, HDPE, PVC).
- Discuss the different properties of each type of plastic and their recyclability.

Lesson Plan 3: The Life Cycle of Plastic

- Use a visual aid or video to explain the life cycle of a plastic product, from production to disposal. (https://www.youtube.com/watch?v=MMPDkorbbCQ)
- Discuss the environmental impact of plastic waste and the importance of reducing, reusing, and recycling.

Lesson Plan 4: AI and Recycling

- Introduce AI-powered recycling apps or websites that can identify and sort recyclable materials. (Descarga A.I.R-E Asistente Inteligente de Reciclaje para Android, Descarga A.I.R-E Asistente Inteligente de Reciclaje para iOS, Descarga Cleanspot para Android, Descarga Cleanspot para iOS, Descarga Recicla y suma para Android, Descarga

Recicla y suma para iOS, iRecycle, Gimme 5, RecycleNation, RecycleSmart, Recycle Right, Brisbane Bin and Recycling, Grow Recycling, Recycle!)

- Have students use these tools to test their knowledge of plastic types and recyclability.
- Discuss the potential of AI to improve recycling efficiency and reduce contamination.
- Workshop about recycling with a local company

Lesson Plan 5: Creative Reuse

- Brainstorm creative ways to reuse plastic containers instead of throwing them away.
- Have students design and create their own recycled crafts using the plastic containers.
- Share and discuss the different creations, highlighting their functionality and aesthetic appeal.

Assessment

- Observe students' participation in discussions and activities.
- Evaluate their ability to sort and classify plastics correctly.
- Assess their understanding of the life cycle of plastic and its environmental impact.
- Review their creative reuse projects, considering their originality and functionality.

Extension Activities

- Research different types of AI technologies used in recycling.
- Visit a local recycling facility to see how plastics are processed. (visita empresa local)
- Organize a school-wide recycling campaign to raise awareness about plastic waste.
- Create a presentation or video to share what they learned with other students and the community.

E-module 9: Native plants (plantas autóctonas)

Lesson Plan 1:

-Debate sobre qué conocen de las plantas, tipos de plantas, partes de las plantas, si tienen plantas en casa, etc…

-Explicación de plantas autóctonas y muestra de fotos de romero, tomillo y lavanda.

En el área de inglés: nombre de estas plantas en inglés: lavender, thyme, Rosemary)

Lesson Plan 2:

- Partes de la planta (raíz, tallo, hoja, flor y fruto) /¿qué necesitan las plantas para vivir? Nombrar elementos: aire, agua, tierra y luz del sol.

-Vídeos de youtube

https://www.youtube.com/watch?v=GXEoDTf2lLE

https://www.youtube.com/watch?v=G6cz3CQopWw

En el área de inglés vocabulario de las partes de la planta en inglés y lo que necesitan para vivir.

Lesson Plan 3:

-Debate de cómo cuidar las plantas tanto en casa como en la naturaleza

https://www.youtube.com/watch?v=T7VWViFswiA

- Hacer listado o nombrar los usos de estas plantas (lavanda, romero, tomillo)

Lavanda: https://mejorconsalud.as.com/10-usos-de-la-lavanda-en-el-hogar-la-cosmetica-y-la-medicina/

Romero: https://www.elmundo.es/yodona/vida-saludable/2023/11/03/653fc38cfdddffc1048b45ad.html

Tomillo: https://www.herbazest.com/es/hierbas/tomillo

Lesson Plan 4:

-Ccoloreado de las plantas (fichas adjuntas)

3 años y TEA: Lavanda

4 años: romero

5 años: tomillo

Lesson Plan 5:

-Actividad complementaria (plantación en el patio de lavanda 3 años y TEA, romero 4 años y tomillo 5 años con ayuda del AMPA)

*Seguimiento: El alumnado de 5 años puede hacer un seguimiento del crecimiento de las plantas mediante un diario, lista de cotejo…


Erasmus+

Multimedia Materials

- **Videos:** Engaging content that visually explains ecological agriculture and the benefits of renewable energy.
    - *Ecological agriculture Video*
    - *Energy 101 Video Series*

      energy.gov

- **Articles and Infographics:** In-depth insights and data to support classroom learning.
    - *Ecological agriculture:* A thought-provoking poster with comprehension questions to understand deforestation.

      Teach Starter

    - *Latest Infographics on Renewable, Bioenergy & Wind Energy:* Visual insights into key green energy industry trends and data.

      greenenergy.report

Online Databases and Websites

- **Research Resources:** Access to curated online databases, research articles, and educational websites to enhance students' understanding and research skills.
    - *European Commission's Educational Videos and Quiz:* A series of animated videos introducing topics such as energy efficiency and renewable energy.

      Energy

    - *Revisiting Education for Sustainable Development:* An article discussing methods to inspire school students toward renewable energy. mdpi.com

- *Biodiversity outside and inside greenhouses* (**https://www.aenverde.es/biodiversidad-en-el-invernadero-hacia-un-agrosistema-sostenible/**)

Classroom Materials

- **Printable Worksheets and Templates:** Support for individual and group activities.
- **Hands-On Activity Kits:** Encouragement for experiential learning and collaboration, where applicable.

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