Cofinanciado por la Unión Europea

E- module 6: Promotion of biodiversity outside and inside greenhouses (5º Primaria)

(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)

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(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.



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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) (5º Primaria)

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

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- 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

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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: AI in ecological agriculture (6º Primaria)

Learning Objectives

- Students will be able to define artificial intelligence (AI) and its applications in

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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

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- 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.

Empresa Alarcontrol. Se pueden preparar preguntas para hacer ese día sobre el tema 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

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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 9: intensive agriculture vs ecological agriculture (6º

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Primaria)

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=EAIaIQobChMIuuPZoY7XiwMVBz4GAB2p5wpZE AEYASAAEgJKG_D_BwE

Lesson Plan 2: Intensive Agriculture

Characteristics: Explore the key features of intensive agriculture, such

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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

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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.

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