WP 4.2 Skeleton of lesson plans for Interdisciplinary Pedagogical Micro-Units (IPUs) in each area of study along with technological tools to be incorporated

Lesson Plan Template

Lesson Plan Components

Lesson Topic	***Climate Crisis*** This lesson develops students' ability to analyze greenhouse gas emissions data, interpret climate projection graphs, and explore how individuals and communities can take meaningful climate action. Students will work with real-world data to identify top greenhouse gas emitters, examine projected temperature changes under different scenarios, and discuss how personal and civic actions—such as those inspired by Greta Thunberg—can address climate challenges. The lesson also encourages clear communication of proposed school climate actions through a short written task.
Phenomenon	News reports and social media videos of record-breaking heatwaves, floods, wildfires, and melting glaciers are sparking global concern and debate about the climate crisis.
Grade Level	Middle school (13-15 years old)
Learning Objectives	Students will: 1. analyze greenhouse gas emissions data to identify gas types, emissions by geographical region, and key human activities causing emissions. 2. interpret current and projected consequences of climate change (i.e., the rise in global average temperature) [LK1] using real-world climate data. 3. evaluate civic and individual actions that can mitigate or adapt to climate change (e.g., recycling, energy-saving, activism) and consider how these can be applied in their school context. [LK1]For this objective, I think activity 2 talks only about temperature.
Learning Outcomes	By the end of the lesson, students will: 1. discuss the impact of major greenhouse gases (e.g., carbon dioxide, methanol) using data from emissions sources. 2. analyze a climate projection graph, describing differences between emission scenarios and identifying regions with higher warming. 3. develop a written call for action to communicate to their school and/or broader community
Subjects Integrated	Environmental Science, Geography, Civic Education, Language and Literacy, Digital Literacy

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Lesson Materials	• Projector, tablets/computers (one per student if the closing activity is written digitally), internet access, speakers • Activity 1: Worksheet 1 • Activity 2: Worksheet 2 • Activity 3: Discussion questions displayed on mentimeter.
Prerequisite Skills	• Reading simple graphs and maps • Writing simple paragraphs • Summarizing ideas from discussions into short texts • Basic typing or note-taking skills (if writing the paragraph digitally). • Working effectively in small groups
Seating Arrangements	A combination of group work (3–4 students), student pairs, whole-class discussions, and individual activities.
Lesson Time	80 minutes
Student Assessment	Summative

Teaching procedure

Introduction (8 Minutes)	The teacher shows the video which illustrates the interconnections between rising sea levels, forest fires, droughts, heat waves, typhoons, powerful storms, and flooding. (*https://education.nationalgeographic.org/resource/extreme-weather-interconnections-in-extreme-weather/*). A whole-class discussion follows: *"What kind of extreme weather conditions have you seen? What is the cause of these conditions?"* Possible student responses: glacier melting, sea level rise up, heat waves, drought, fires, flooding, storms, heavy winds. Possible causes include: human activities such as burning fossil fuels, release of greenhouse gas emissions, which trap the heat and lead to the temperature rise. Another possible cause is natural factors (e.g., El Niño and La Niña) can influence weather patterns around the globe. Teacher writes on the whiteboard key terms after student responses such as: burning fossil fuels, green house effect, gas emissions. If students are not clear about the greenhouse effect, teacher may show this video https://www.youtube.com/watch?v=SN5-DnOHQmE&t=2s *"Who might be affected by these changes and how?"* Possible student responses: living organisms on the planet (vulnerable humans, coastal communities, agricultural and water-dependent regions, etc.
Activity 1 (25 Minutes)Lesson objective 1	Tell students: *"Class, you are going on a mission to work with real-world data to see which gases humans release into the atmosphere, which ones are the strongest, and how emissions have changed over time."* Group students into teams of 3–4. Assign roles within each group: ·Writer – records the team's answers on the worksheet. ·Speaker – presents the team's findings to the class. ·Timekeeper – keeps track of time and helps the team stay focused. ·Question Leader – reads each question to the group and ensures everyone contributes (including graph interpretation).

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Ask students if they have any questions. If not, distribute the worksheet 1 to each team and tell them that they have 15 minutes to finish the task.

A whole class discussion is followed (5 minutes): Each team presents one or two key findings from their worksheet. Teacher facilitates discussion:
·Which countries are the largest emitters?
·Which gas has the highest emissions?
Which facts surprised students most?

Activity 2
(20 Minutes)Lesson objective 2

The teacher asks students to analyze climate projections from a particular graph.
The teacher shows the graph and helps students to understand core elements of it. A description of the graph is also included in Worksheet 2.

-The teacher introduces **one scenario** (e.g., A2 = high emissions) using the graph.
-The teacher models how to "read" the graph step by step:

- Identify row (scenario).
- Identify column (time period).
- Interpret colors (temperature change).

-The teacher asks guiding questions to ensure all students understand before moving on.

Rows = Scenarios (B1 = low emissions, A1B = medium emissions, A2 = high emissions).
Columns = Time periods (2011–2030, 2046–2065, 2080–2099).
Colors = Temperature change (°C). Darker = hotter.

If teacher needs more information for those scenarios, he/she can navigate the full report from IPCC and pages 3-5: https://www.ipcc.ch/report/emissions-scenarios/

-Students are placed in pairs. Each pair receives Worksheet 2 with two remaining scenarios (B1 = low emissions, A1B = medium emissions).

-Pairs analyze the rest of the scenarios from the Worksheet and answer the three questions.
Teams answer the questions and then read their answers to the class, followed by a whole-class discussion where the teacher summarizes the students' ideas and draws key conclusions.

Some key points are:
-Different scenarios=different futures (*B1 (low emissions*) → much smaller rise in temperatures, *A1B (medium emissions*) → moderate rise, *A2 (high emissions*) → largest and most dangerous rise).

-Time matters: The further into the future we go (2080–2099), the greater the differences between scenarios. Early years (2011–2030) show smaller changes, but impacts grow over time.

-Human choices drive outcomes: missions are not "fixed" — they depend on energy use, policies, technology, and behavior.

-Temperature changes affect everyone: Even a few degrees of warming has big consequences (e.g., extreme weather, sea-level rise, agriculture impacts).

-Main message: *What we do now will decide whether we live in a low-, medium-, or high-emissions future.*

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Activity 3 (17 Minutes)Lesson objective 3

Tell students:
"Class, in this activity, you will learn how individuals, like Greta Thunberg, can inspire action against climate change. You will work in teams to discuss ideas for climate action at your school and agree on one action to propose to the school community."

The teacher projects one video related to Greta Thunberg: https://www.youtube.com/watch?v=rhQVustYV24

After watching the video, students are divided into teams of 3–4.

Suggested roles for teams:
Facilitator: keeps the group focused on the question. Ensures everyone gets to share their opinion. Manges time.
Recorder: Writes down the group's ideas and submits answers to Mentimeter.
Reporter: Shares the group's main points in the whole class discussion.
Fact-checker: Makes sure the group's ideas connect back to what was shown in the Greta video.

The teacher displays one question at a time on the projector (via Mentimeter).
After each question is displayed, students, discuss for 2-3 minutes and submit their group's response in Mentimeter. (https://www.mentimeter.com/app/presentation/al27hoy34ie33w26h4xti4juve653q2i/edit?source=share-modal).

1. What motivated Greta Thunberg to act? Why did she feel she needed to speak out about climate change? (Suggested responses: enormous impact of aviation on the climate, urgency of the crisis, future generations, frustration with inaction by leaders).
2. What civic or individual actions were mentioned in the video? (People need to be informed about the consequences of climate change, people should raise their voices and take action as responsible democratic citizens).
3. Do you think one person can make a difference? Why or why not? (Suggested responses: yes, because one person can inspire millions; no, because systemic change is also needed — but individuals can spark it).

A whole-class discussion follows, during which the teacher summarizes the teams' answers. The teacher takes notes of the proposed actions, and, at the end, the class decides which action will be suggested to their school community.

Closing (10 minutes) Assessment

As a final task, each student will write one paragraph introducing a call for climate action.

The paragraph should:

- Explain the problem with climate crisis using terms such as gas emissions, greenhouse effect, temperature data, human activities, etc.
- Explain the importance of taking action now
- Invite school community on an a climate action (e.g., recycling program, energy-saving campaign, planting trees, awareness campaign).
- Suggest how school members can get involved.
- Include a title that grabs attention.

The paragraph can be written on paper or on a computer with a word limit of 300-350 words.

The teacher will assess students' work based on:

- How clearly and accurately the student described the action.
- How well the student explained its importance and involvement strategies.
- Structure and clarity of the paragraph.

Written feedback can be given in the following lesson.

Teacher Tips

Emphasize facts: Provide clear evidence from reliable sources to show that climate change is happening
Support whole-class discussions: Provide sentence starters (e.g., "I agree because…", "Another perspective is…") to help students express ideas.
Follow-up project: Suggest a follow-up project, such as a "Climate Action Day" where students write letters to local officials about an environmental concern.

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Appendix

The appendix contains the student worksheets and supporting materials for the lesson activities.

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Appendix

Worksheet 1

Student Names: _____Date: _____

Using the information from this website (https://ourworldindata.org/greenhouse-gas-emissions), work with your team to answer the following questions.

1. **What do the total greenhouse gas emissions graphs show?**
   Look at the chart "Total greenhouse gas emissions" and answer the following questions.

   - Which regions and counties produce the most emissions today? (list the first five countries) Why do you think they have the highest gas emissions?

   - Have emissions increased or decreased over time?

2. **Apart from CO_2 (carbon dioxide), what other types of greenhouse gases did you identify?**

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3. **Which of the gases you identified has the highest greenhouse gas emissions worldwide?**
   See the graph ‘’Greenhouse gas emissions by gas, World, 1950 to 2023.”

4. **What are the main human activities (write two activities) that release greenhouse gas emissions into the atmosphere based on the article?**

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Worksheet 2

Student Names: _____Date: _____

Based on the graph below, work with your team to choose and answer two of the following questions.

The graph shows projected global surface temperature changes compared to the late 20th century, under three different climate scenarios (B1, A1B, and A2) for three future time periods (2011–2030, 2046–2065, and 2080–2099).

- B1 scenario: assumes strong action to reduce greenhouse gas emissions.
- A1B scenario: assumes moderate emissions and balanced energy sources.
- A2 scenario: assumes high population growth and high emissions.

Colors show how much the average surface temperature is projected to increase (in °C), with yellow representing small increases (around 1–2°C) and dark red/purple representing larger increases (over 6°C).

1. Which scenario shows the smallest temperature increase by 2080–2099?

2. Which scenario shows the largest increase in temperature?

3. How does Europe's temperature change between 2011–2030 and 2080–2099 (A2 scenario)?

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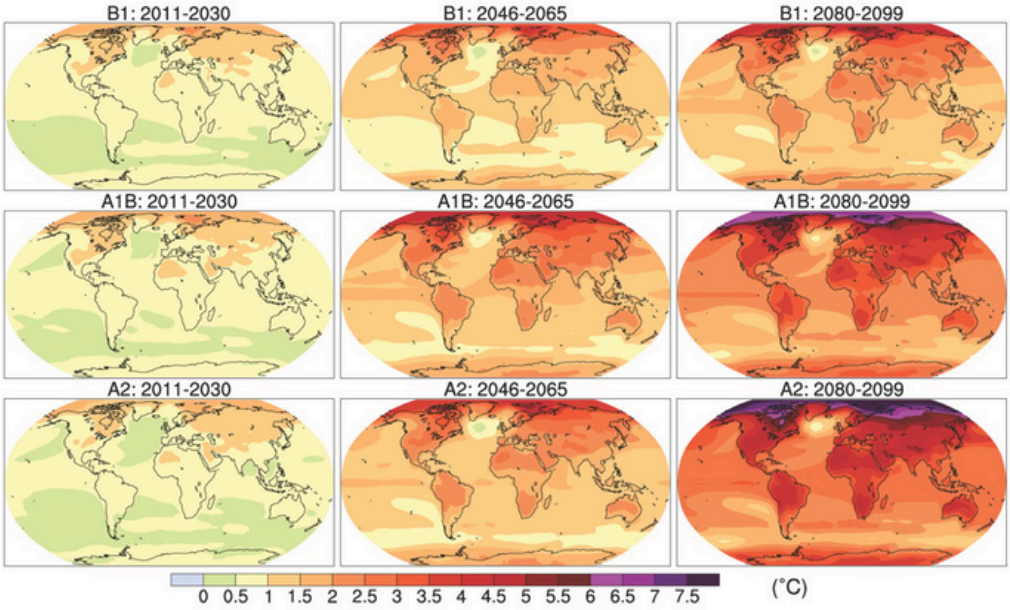

Graph source: IPCC, “Global Climate Projections” (https://www.ipcc.ch/report/ar4/wg1/global-climate-projections/).

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