SDG13 Climate Change Engage Game Design

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Lesson 3: The Cause of Current Climate Change

Subjects: Design, Environmental Science, Game Design, Geography, Science, Technology

Lesson Title and Summary: The Cause of Current Climate Change

In this lesson, learners are introduced to the current causes of climate change. Through an exploration of the process of energy transport (radiation), the relationship between greenhouse gases and how heat is trapped, learners will develop an awareness on the causes of global warming and how this contributes to contemporary climate change.

This lesson builds on lesson 2 providing concrete knowledge learners might integrating into their game design.

Vocabulary: Concentration; Greenhouse Gas; Infrared (heat) Radiation; Visible Light

In this lesson, the learner will:

- Understand the difference between radiation from the sun and radiation from the Earth's surface and objects surrounding us
- Understand that the atmosphere is transparent to visible light, but not to infrared radiation.
- Be able to explain the greenhouse gas effect
- Understand what can change the amount of energy in the climate system and thus change the climate

Materials

- Video: 'The Cause of Current Climate' Change
- Support: Lesson 2-4 Teachers' Guide
- Internet access
- Pens, pencils
- paper
- Blackboard / Whiteboard

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Activity Instructions

Activity 1 : Showing changes in solar radiation and infrared radiation (40 mins)

1. Divide the learners into groups of 3-4.
2. Play video: 'The Cause of Current Climate Change' up until 2:20 mins. Encourage learners to make notes on the key ideas. Ask groups to discuss the following questions:
   - What is changing solar radiation?
   - What is changing greenhouse gas concentrations that trap infrared radiation?
   - Ask learners to look up what ‘concentration’ means if they don’t know.

   Go over each question as a whole class. Refer to Lesson 2-4 Teacher's Notes for support.
3. Watch the rest of the video, making notes on key ideas.
4. Discuss the following questions in their groups:
   - What processes increase the energy in the climate system?
   - Could there also be processes that decrease this energy?
   - What would these be?

   Go over each question as a whole class. Refer to support: 'Lesson 2-4 Teachers’ Guide’
5. Watch the video again in full, explaining that each group is going to produce an illustrated diagram to show the changes in solar radiation and infrared radiation. Ask learners to make more notes while watching the video a second time to gain more information on the changes in solar and infrared radiation.
6. Allow 10-15 minutes for the groups to work on their draft diagrams.
7. Swap draft diagrams with another group to compare ideas. Return drafts and work on a final version.
8. Share final versions of diagrams as a whole class. Discuss what is good about each diagram and what it highlights well.

Activity 2 Connecting Climate to Game Design (10 mins)

1. In small groups, consider how they could use this new information in the diagram in their game design. Brainstorm ideas.
2. Mix up the pairs and share and compare ideas.

REFLECTIVE EXERCISE: 3-2-1 (10 mins)

- Three things they feel they have learnt from the tasks
- Two things they found most interesting and would like to explore more
- One opinion they have about the activities, what did they like or how they would improve them

Use Post-its or a mentimeter survey - www.mentimeter.com to gather reflections

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EXTENSION / REDUCTION ACTIVITIES

Reduction: for a shorter lesson, complete Activity 1 only.

Extension: for a longer lesson, complete Activity 1 and 2, then watch the video 'Understanding the Greenhouse Effect' (see Media Box). Conduct a simple Greenhouse Effect experiment - see Local Trip / Expertise / Additional Work and Assessments box.

Alternatively, the experiment can be conducted in the following lesson.

For an additional lesson play the Climate Negotiation Game:
https://www.metlink.org/resource/climate-change-negotiations-for-schools/

MEDIA BOX: (materials, online video links, extra resources, case studies etc)

The Cause of Current Climate Change (4:49min) https://youtu.be/4j5Qi1Sm0rw

Understanding the greenhouse effect (7:09mins)
https://www.museumoftheearth.org/changing-climate/greenhouse-effect

Article: Undertake a simple greenhouse experiment
https://www.familyeducation.com/school/global-warming/greenhouse-effect-experiments

The long and short of transmission and absorption (4:37 minutes): https://www.priweb.org/teach-climate-science-gallery/the-long-short-of-absorption-transmission

Local Trip / Expertise / Additional Work and Assessments

Undertake a simple greenhouse experiment - as a class or in pairs

- Line a large open bowl with dark cloth or paper.
- Place the bowl in the sun and put an inverted paper cup in the bowl. Lay a thermometer across the top of the cup so that you are measuring the air temperature in the bowl.
- Note the temperature.
- Cover the bowl with a sheet of clear plastic wrap over the top of everything. Note the new temperature reading. The increase in air temperature is due to the trapped heat.