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Unit 2. CLIMATE CHANGE AND THE THREAT OF SPECIES EXTINCTION



BIOS4YOU
AR 2.0

BIO-INSPIRED STEM TOPICS FOR ENGAGING YOUNG GENERATIONS
THANKS TO THE USE OF AUGMENTED REALITY

Project Number: 2023-1-DE03-KA220-SCH-000126516

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General information

Name of the exercise:	Climate Guardians AR Mission
Description of the exercises:	Climate Guardians AR Mission is an interactive AR quiz created in Delightex (CoSpaces Edu) using the Multi Diorama format. Students explore four short AR scenes (stations) connected to the topic “Climate change and the threat of species extinction.” At each station, learners: ● read a short info panel (student-friendly text), ● tap a question board / object, ● choose one correct answer from four options (A–D), ● receive immediate feedback: “Correct!” or “Try again!” After a correct answer, students see an instruction such as “Go to the next station/scene” and continue to the next diorama. After the 4th station, a final message appears: “Mission completed / Well done!” (reflection prompt included). The four stations address the following topics: 1. Coral reefs – ocean warming and coral bleaching 2. Arctic ecosystems – melting ice and disrupted food chains 3. Forests – carbon sinks, forest fires, and climate regulation 4. Freshwater ecosystems (river/lake) – invasive non-native species
Participants:	Individual work on a device (phone/tablet) Optional pair/group discussion after each station
Participants’ age range:	14–18 years.
STEM subject and specific topic:	Biology / Environmental Science Topic: Climate change and the threat of species extinction (ecosystems, food chains, invasive species, carbon sinks, conservation actions)
Gamification process:	● Students complete 4 AR stations (one station = one ecosystem scene). ● Each station contains 1 multiple-choice question (A–C). ● Students get instant feedback (“Correct / Try again”).

Written or graphic description of Augmented info: External (or extra) tools required Links (video, images, text online and so on).	● The activity is completed when students answer all 4 questions correctly and reach the final “Mission completed” screen. <i>(No scoring system, no tokens, no clue/code unlocking — because the real Delightex world does not include these elements.)</i> Format: Multi Diorama world with 4 scenes Each scene includes: ● a short info panel about the ecosystem / climate impact ● a question board with a multiple-choice question ● four answer options (A–D) as clickable texts/buttons ● feedback texts: “Correct!” and “Try again!” Navigation: after “Correct!” the student is instructed to move to the next scene (next station). Only Delightex (CoSpaces Edu) is required for the quest. Optional extensions: ● Google Arts & Culture (visual inspiration) ● Seek by iNaturalist (local observation homework) Delightex (CoSpaces Edu): https://edu.delightex.com/ Google Arts & Culture (AR/3D content): https://artsandculture.google.com/project/expeditions Seek by iNaturalist: https://www.inaturalist.org/pages/seek_app IUCN Red List: https://www.iucnredlist.org/ NASA Climate: https://climate.nasa.gov/ WWF: https://wwf.panda.org
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Pedagogical specifications

How can this augmented information be used to address a STEAM topic in a more interesting way for students?

AR turns climate change and biodiversity loss into an interactive mission. Instead of only reading, students explore ecosystems, interact with species models, and solve problems step by step. The quest format increases attention and curiosity because learners must collect clues and unlock the final object. Students also practise scientific thinking by connecting cause → effect (warming → habitat loss → extinction risk).

Which pedagogical objectives are addressed through this scenario?

Students will be able to: explain how climate change increases extinction risk; identify key threats (habitat loss, food chain disruption, invasive species, fires); describe the role of carbon sinks and feedback loops; propose realistic conservation actions (mitigation + adaptation); use environmental vocabulary in context (B1–B2 level); collaborate and discuss evidence from AR exploration.

Which results are expected to be reached with its use?

By the end of the quest, students are expected to: complete 4 stations and correctly answer most questions; combine clues and unlock the final message; give at least one clear example of how climate change affects species; suggest one conservation action at school/community level.

higher engagement and motivation (quest format);
better understanding of “invisible” or distant processes (reef bleaching, Arctic changes);
improved retention due to interaction + immediate feedback;
stronger emotional connection (seeing endangered ecosystems);
.

Which benefits are expected to be reached with its use?

Technical specification

AR INFORMATION

Technology

Delightex (CoSpaces Edu) — main quest environment (AR mode)

<https://edu.delightex.com/XUG-UMH>

Optional (not required):

Google Arts & Culture – Expeditions (visual exploration)

Seek by iNaturalist (local biodiversity observation)

If it's needed a marker, description of the marker



Hardware

and software needed:

Teacher: PC / laptop with browser access to Delightex

Students: smartphone/tablet with camera (iOS/Android), internet for loading

Optional: classroom projector for teacher demo

Type of Augmented data

Text: short information panels, questions, answer options, feedback messages

Written description
of the AR data

3D objects: ecosystem elements and visual objects related to climate change

Interactive elements: clickable boards/buttons for answering questions

Optional audio: background ambience (e.g. wind, ocean sounds)

Google Arts & Culture – Expeditions (Global exploration)

Students open the “Coral Reef” or “Endangered Species” expedition.

On their screens, realistic 3D models of coral reefs, fish, and marine environments appear, placed directly in the classroom space through AR.

They can walk around the scene, zoom in, and observe phenomena such as:

- coral bleaching (reefs turning white),
- the presence of invasive species,
- migration of fish.

Students use an observation worksheet provided by the teacher to note what they see (e.g., “Corals are bleached – caused by warming water”).

This phase connects global biodiversity issues with visual, immersive evidence.

Seek by iNaturalist (Local biodiversity observation)

Students go outside (schoolyard, park, or nearby nature area) with their mobile devices.

They point their camera at local plants, insects, or animals.

AR overlays appear on screen, displaying:

- the common and scientific name of the species,
- taxonomic group,
- protection status (where available).

Each successful identification automatically gives the student points (recorded manually in the class table).

This phase connects classroom concepts to the students' immediate environment, making the problem of climate change more personal and tangible.

CoSpaces Edu – AR Ocean Quiz (Knowledge check in gamified form)

The AR activity is designed as a Multi Diorama world with four stations. Each station represents an ecosystem affected by climate change and species extinction.

At each AR station, students:

- *read a short information panel explaining a climate-related threat;*
- *interact with 3D objects placed in the AR scene;*
- *open one multiple-choice question (A–D) by tapping a question board;*
- *receive immediate feedback (“Correct!” or “Try again!”).*

After a correct answer, students are instructed to move to the next station by rotating the diorama. The activity continues until all four stations are completed.

After the final (fourth) station, a final information panel appears with the message:

“Well done! You completed the Climate Guardians mission.”

A short reflection prompt encourages students to think about biodiversity protection and conservation actions.

Feedback and Reflection

The teacher leads a reflection discussion:

- *What did you observe in the global AR (Expeditions)?*
- *Which local species did you find with Seek?*
- *Which quiz question was hardest in CoSpaces?*
- *What action can we take to protect biodiversity?*

If Image

Screenshots from the Delightex AR scenes showing the Multi Diorama, information panels, question boards, and feedback messages.

If Text

Intro text (AR welcome panel):

Welcome to Climate Guardians!

Explore each AR station, read the information, and answer the questions to learn how climate change

threatens species and ecosystems.

Station 1 – Coral Reef (Ocean warming)

Question:

Why are coral reefs at risk from climate change?

- A. Ocean warming and coral bleaching ✓
- B. Overfishing only
- C. Plastic pollution only
- D. Increased rainfall

Station 2 – Arctic Ecosystem (Food chains)

Question:

How does climate change affect Arctic food chains?

- A. It increases krill populations
- B. It disrupts food chains by melting sea ice ✓
- C. It creates new forests
- D. It has no effect on animals

Station 3 – Forest Ecosystem (Carbon sinks)

Question:

Why are forests important in the fight against climate change?

- A. They store carbon dioxide from the atmosphere ✓
- B. They increase global temperatures
- C. They block sunlight

D. They reduce biodiversity

Station 4 – Freshwater Ecosystem (Invasive species)

Question:

Why are invasive non-native species dangerous for ecosystems?

A. They look different from native species

B. They disrupt ecosystems and food chains ✓

C. They reduce rainfall

D. They slow down climate change

Feedback messages (used in all stations):

Correct!

Try again!

Final message (last AR panel):

Well done!

You completed the Climate Guardians AR Mission.

Think:

What action can people take to protect biodiversity?

If video

Optional: teacher may show short video clips from WWF / NASA about coral reefs and climate change before AR exploration.

If audio

Optional: ocean sounds or voice-over in CoSpaces to increase immersion.

If 3D model

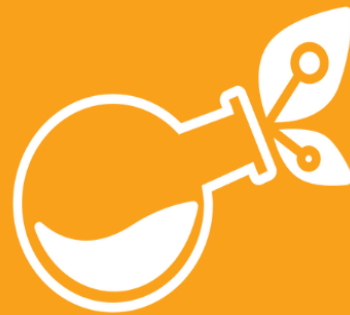
3D models used:

- Ocean animals (whale, fish, crab, dolphin, shark),
- Treasure chest,
- Coral reef background (if included).

Formats: *.obj*, *.stl*, provided by CoSpaces library.



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