



## ***Save the World: Pollution, carbon footprint and recycling – VEGA Teaching Scenario***

**Topic:** To raise awareness about the greenhouse effect, working into environmental education, quantifying the impact of daily activities, pollution, climate change and its effects..

**Subject(s):** Natural Science, Social Science studies, History and Geography collateral influences

**Age / Grade:** 13+ / grade 2 Secondary school

### **Short description of the AR/VR game in this scenario:**

- [MOZAIK 3D \(AR/VR\)](#) The mozaik3D mobile application is a tool to explore more than 1200 educational 3D scenes and videos, interactive activities, games... with the help of a smartphone or tablet.

Interactive educational scenes that are related to history, technology, physics, mathematics, biology, chemistry, geography and visual arts make the learning experience an adventure. Most of our 3D scenes contain narration, built-in animations, as well as labels, fun animated activities, and other visual elements. Create a free user account and open 5 educational 3D scenes for free every week.



The 3D scenes are available in several languages, which also offers an excellent opportunity to learn and practice languages.

- [COSPACEEDU\(AR\)](#) CoSpaces Edu is a creation app widely used in schools around the world and lets kids easily create their own virtual content. Working simply as a website inside the browser but also as a mobile and tablet app, CoSpaces Edu enables students to build, code and explore their own creations in VR or AR, while demonstrating their learnings and developing essential digital skills.

Creating in CoSpaces Edu is a simple drag and drop process using a variety of creation features including 3D objects, building blocks, block-based coding and much more. CoSpaces Edu's visual coding language CoBlocks is ideal for young coders and a great introduction to computational thinking. Teachers are able to follow their students' work and even observe it in real-time online from their class in the "Students" section. Teachers automatically get access to their students' assignments as well as any CoSpaces created in Free Play.



## **Introduction to the scenario**

The carbon footprint allows us to quantify emissions of greenhouse effect gases that are released into the atmosphere as a result of a specific activity.

From the point of view of environmental education, this quantification will allow us to be aware of the impact that each activity generates on climate changes, thus making the carbon footprint and high quality awareness tool.

We will mix different AR/VR tools to create awareness about the environmental impact of our actions.

## **Learning outcomes:**

The students are able to:

- Have responsible environmental behaviour.
- exercise actions and behaviours that favour the environment both locally and globally.
- Students will understand climate change and its effects.
- Quantify the impact of daily activities
- Have a responsible environmental behaviour
- exercise actions and behaviours that favour the environment both locally and globally
- Understand Climate change and its effects

## **A selection of learning outcomes from the Spanish Curriculum**

The curricular contents that adhere to this scenario belong to block 3 of the subject Social Science, Geography and History entitled: Human space. The contents are:

- Current population policies in the face of problems such as population explosion, increasing resources and food production, the ageing of the population, or the intensification of migration.
- Pressure on the environment caused by the expansion of cities : the ecological footprint, environmental pollution and the generation of urban waste as limits to urban waste generation as limits to urban growth.
- Active contribution to the maintenance of the environment.

The evaluation criterion corresponding to this content is as follows:

- Debate on some current demographic problems and argue the validity of the demographic policies developed to solve these problems based on the analysis of their effects described in institutional reports adapted to the students' level.

This criterion is related to civic and social competences, the learning to learn competence and the competence of the sense of initiative and entrepreneurship.

The indicators of achievement related to these contents are as follows:

- Debate on some current demographic current demographic problems, such as the demographic explosion, the growing consumption of resources and food production, the ageing of the population, or the intensification of migrations and the pressure of population growth on the environment, using information from different sources population growth on the environment, using information from different geographic sources previously selected by the geographic sources previously selected by the teacher. teacher.
- Argues the validity of the demographic policies developed to solve some current demographic problems based on the analysis of their effects described in institutional reports adapted to the students' level.

### Students self-assessment rubric

This rubric is made to help understand what's important with games or any new media in general. An experienced teacher can run without, but this is to help new teachers to assess what's valuable.

The idea is that every ROW is just ONE variable (ex. recall, transfer. problem-solving etc.). You read the first column and give a 'grade'. The descriptions are just there to give a 'quality' if you need that.

Student evaluation rubric				
Knowledge content	1	2	3	4
Information recall	Student can't recall information covered in game	Student can recall some information covered in game	Student can recall most information covered in game	Student can recall all the information from the game well
Transfer	Student can't connect the information in game to information on books or in other medias	Student can transfer some information from the game to other medias	Student can transfer majority of information from the game to other medias	Student can connect the information in game very well to contents in other medias

Skills	1	2	3	4
Problem-solving	Student did not try to solve problems in game / during activity	Student was somewhat active in solving problems during the activity	Student worked rather actively on solving problems during class.	Student worked very actively on solving problems during class
Collaboration	Student was not able / willing to collaborate with others.	Student participated, but was not particularly active in collaboration.	Student was actively collaborating while working.	Student was very actively collaborating while working.
Creativity	Student did not actively consider / provide creative solutions to tasks or challenges	Student provided some creative ideas and solutions during the activity	Student actively considered / provided creative solutions to tasks or challenges	Student very actively considered/provided creative solutions to tasks or challenges
	1	2	3	4
Exercise completion	Student was not able to complete the tasks in the game	Student was able to complete some of the tasks in the game	Student was able to complete most of the tasks in the game	Student was able to complete all (or nearly all) tasks in the game
Engagement	Student was not engaged during the class	Student was slightly engaged during the class	Student was engaged during the class	Student was very engaged during the class

## Formative assessment

**Number of students: Duration (estimated time/number of lessons):**

- 20 students (4 students/group)
- 4 lessons á 45 min

**The main part of the scenario (number of lessons):**

**Part one (one lesson 1 x 45 min)**

### **Lesson 1 – Carbon footprint**

**Prerequisites (necessary materials and online resources):**

- Computers with internet connection
- Check that the internet is working
- Information about the topic to mediate to the students (videos, pictures, Educational tools etc.)
- Google Cardboards
- Oculus quest with Youtube app
- Cospaces Edu
- Paint3D
- Mixamo account

**Before the program begins (preparatory work for teacher):**

- Search and collect information and material about the topic
- Prepare and collect all things needed for the scenario
- Learn how basic functions work and how you use the controllers (make a manual for the controllers if the students haven't used them before)
- Create an assignment in Google classroom with project description and goals (the same task for three lessons)  
All material the students need is included in the assignment
- Divide students into groups of maximum four students per group

**Description:****Preparations:**

Calculator: Emissions can be measured using Tool called GHG Emission Calculator, which quantifies what schools, companies or individuals emit through their activities. You can measure the carbon footprint for a specific event or activity, for a project or service, or an entire entity.

Students can investigate and find many calculators for the carbon footprint.

<https://www.carbonfootprint.com/calculator.aspx>

Discussion about CarbonFootprint as a concept (referred to the amount of Greenhouse Gas (GHG) emissions we produce in the different activities that we carry out, directly and indirectly. Example (using lights in the night, using WhatsApp, travelling by car, ...

Uses google Card board / oculus quest 2 / mobile and tablets to visualise this 360° Youtube Videos:

Plastic Sea

<https://www.youtube.com/watch?v=URVGXu7ujL4>

VR Impacts of Plastic Waste on Our Environment 3D animation

<https://www.youtube.com/watch?v=a7IROxe9qCs>

Stop Waste in the World

<https://www.youtube.com/watch?v=3vAkEsH3lqk>

Teams should discuss VR/3D videos and make an Infographic about cause / effect and statement of intent.

Each Team can compare his or her family's footprint and compare it with students from other countries

Each Team proposes a specific activity and calculates footprint (free-play time at school, school bus, computer class,...) and they should expose it to the rest.

## **Part two (one lesson 1 x 45 min)**

### **Lesson 1 – 3D AR model about carbon footprint**

#### **Prerequisites (necessary materials and online resources):**

- Augmented Class /EcoSpacesCo Free accounts
- Mobile and tablets
- Cardboard
- Understanding how Augmented Class /EcoSpacesCo works
- Creating in CoSpaces Edu - Beginner tutorial  
<https://www.youtube.com/watch?v=2WWCnNjeMzM>
- CoBlocks - The Basics for beginners  
[https://www.youtube.com/watch?v=15Vlqe22\\_x0](https://www.youtube.com/watch?v=15Vlqe22_x0)
- Understanding how Mixamo works  
<https://www.youtube.com/watch?v=RbqyYorjUIs>
- understanding how Paint3D works  
<https://www.youtube.com/watch?v=Bd42BurRo5Q>
- Computers with internet connection
- Check that the internet is working
- Information about the topic to mediate to the students (videos, pictures, Educational tools etc.)



### **Before the program begins (preparatory work for teacher):**

- Check links:

How to download animations from Mixamo

<https://www.youtube.com/watch?v=gLEzRW1vtFMGameplay>

How to use Paint3D

<https://www.youtube.com/watch?v=U3aZigT14vk>

Finding external 3D models in CoSpaces Edu

<https://www.youtube.com/watch?v=b10h-4NIIXE>

Import 3D Models into CoSpaces

<https://www.youtube.com/watch?v=nx6ZXkpyHyc>

### **Description:**

Knowing this software for AR, Teachers will ask students to prepare an AR model related to carbon footprint. Using repositories like (Thinkiverse or TurboSquid, Free3D,...) finding a 3D Model.

Students create "Dress" for this 3D model, recycling pics found by the internet can be used. Composition can be carbon footprint, recycling, greenhouse gases,... Use Augmented Class to visualise 3D models. Voting about what is the Best 3D Model.

Use MIXAMO to create animation on 3D MODEL (Human models) and trying to find animations to show what happen to our 3Dmodel when CO2 emissions affecting him (illness, headache,...)

Using CoEspaces Edu (AR) students can design their home or schools that reduces carbon emissions. Students' creations can be visualised in AR /VR (cardboard) and Voting about what is Best 3D Model.

### **Part three (one lesson 1 x 45 min)**

#### **Lesson 1 – Mozaik3D**

##### **Number of students: Duration (estimated time/number of lessons):**

- 24 students (2 students/group)
- One lesson : 1 lesson day x 45 min

##### **Prerequisites (necessary materials and online resources):**

- At least 15 mobile or tablets (depending the number of students or groups)
- Install and download MOZAIK3D
- Create free accounts for MOZAIK3D
- APP TRAILER  
<https://www.youtube.com/watch?v=VoaWX6-WFcU>
- HOW TO USE AND INSTALL MOZAIK3D  
<https://www.youtube.com/watch?v=U93cA9V10kg>

##### **Before the program begins (preparatory work for teacher):**

- Teacher will Introduce ancient civilisations in class. Dedicate a class to the introduction of the contents with audiovisual materials such as animation videos, documentaries, interactive games, etc.

Sample:

AIR POLLUTION

<https://www.youtube.com/watch?v=yRdtoPPbqDE>

- Learn how basic functions work and how you use the controllers (make a manual for the controllers if the students haven't used them before)
- Create an assignment in Google classroom with project description and goals (the same task for three lessons)

All material the students need is included in the assignment

- Divide students into groups of maximum two student / computer

### Description:

In class the students visualise the content of the following videos:

Using mobile and tablets with Cardboard, downloading MOZAIK3D, students are divided in teams to cover all topics. One device by each team:

MOZAIK3D group guide (cardboard) on this topics:

- POLLUTION, AIR POLLUTION, WATER POLLUTION



#### Pollution

Pollution is the detrimental effect of human activity on the natural environment.



#### Air pollution

This animation demonstrates the main sources of air pollution: agriculture, industry and urban settlements.



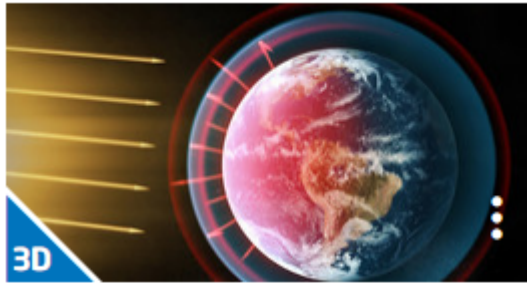
#### Water pollution

The main sources of water pollution are industry, agriculture and urban areas.

- SOIL POLLUTION

[https://www.mozaweb.com/en/Extra-3D\\_scenes-Soil\\_pollution-146877](https://www.mozaweb.com/en/Extra-3D_scenes-Soil_pollution-146877)

## GREENHOUSE EFFECT



### Greenhouse effect

Human activity increases the greenhouse effect and leads to global warming.

## HOUSE WITHOUT CARBON-DIOXIDE EMISSION



### House without carbon-dioxide emission

The design and structure of modern houses play an important role in environmental protection.

### **Debrief with students in the end of the first lesson**

- What did you learn that you didn't know before?
- Select a topic to develop in deep with your team: SOIL, WATER, AIR POLLUTION, GREENHOUSE EFFECT, HOUSE WITHOUT CARBON-DIOXIDE EMISSION
- Search and collect information and material about the topic
- Prepare 1 infographic about a topic developed.
- How does the cooperation in your group work?

## Summative assessment:

Grades 5-10	5	6	7	8	9	10
Content application	<p>They add little information and do not apply their previous knowledge to the infographic.</p> <p>They do not respect game times</p> <p>They use the game irresponsibly.</p> <p>They do not seek information through audiovisual materials such as videos, images, websites, etc.</p>	<p>They add a lot of information and apply some prior knowledge to the infographic.</p> <p>They respect game times.</p> <p>They do not use the game responsibly.</p> <p>They do not look for information in audiovisual materials such as videos, images, websites, etc.</p>	<p>They add a lot of information and apply most of their previous knowledge to the infographic.</p> <p>They respect game times.</p> <p>They make responsible use of the game.</p> <p>They look for information in audiovisual materials such as videos, images, websites, etc.</p>	<p>They add a lot of information and apply their previous knowledge to the infographic.</p> <p>They respect the playing times.</p> <p>They make responsible use of the game.</p> <p>They look for information in audiovisual materials such as videos, images, websites, etc.</p>	<p>They use all the previous knowledge and curiosities of the game to create the infographic.</p> <p>They look for information using audiovisual materials such as videos, images, websites, etc.</p> <p>They respect the playing time and motivate each other in the team.</p> <p>They use the game responsibly.</p>	<p>They use all the previous knowledge and curiosities of the game to create the infographic.</p> <p>They look for information using audiovisual materials such as videos, images, websites, etc.</p> <p>They respect the playing time and motivate each other in the team.</p> <p>They use the game responsibly.</p>
Activity and engagement	<p>The student has had challenges to get the task finished. The student hasn't shown signs of engagement</p>	<p>The student has only occasionally shown interest in the work and has had difficulty finding motivation.</p>	<p>The student has mostly shown interest in the work both at home and at school.</p>	<p>The student has shown interest and commitment to the work both at home and at school.</p>	<p>The student has shown great interest and commitment both in lessons and at home.</p>	<p>The student has shown great interest, responsibility and commitment both in lessons and at home.</p>

	neither at school nor at home.					
Exercise resolutions	They produce an infographic with a design that does not match the content and a diffuse structure including most of the information but without audiovisual supports such as images, videos, etc.	They produce an infographic with an inadequate design and a coherent structure, including most of the information but without audiovisual supports such as images, videos, etc.	They produce an infographic with a suitable design and a coherent structure, including all the information and adding some audiovisual support such as images, videos, etc. They also include 1 additional fact or curiosity.	They produce an infographic with an appropriate design and a coherent structure including all the information and adding some audiovisual support such as images, videos, etc. As well as including some additional curiosities.	They produce an infographic with an appropriate design and a coherent structure including all the information and adding audiovisual supports such as images, videos, etc. They include additional information such as examples or data.	They produce an infographic with an appropriate design and a coherent structure including all the information and adding audiovisual supports such as images, videos, etc. They include additional information such as examples or data.
The overall picture of the work when completed.	The student misses several parts of his work and several points are not checked in the list.	The student lacks several parts of the checklist in his work.	The student lacks certain parts of the checklist, but it is largely complete.	The student has done all the parts on the checklist.	The student has done all the parts on the checklist and you can see that the student has made an effort to include all the parts.	The student has done every single part on the checklist and it can be seen that the student has processed the content.
Images and captions	The student lacks pictures.	The student has few pictures and no captions.	The student has pictures but no captions.	The student has pictures with accompanying text.	The student has several pictures and descriptive captions.	The student has versatile pictures and descriptive and explanatory text.

Showing responsibility for the completion of the work. Cooperation and peer response	The student had difficulty cooperating with his group and did not listen to his classmates. The student did not give a peer response and did not take into account what the group gave in response.	The student had some difficulties in cooperating with his group and listening to his classmates. The student gave peer feedback without following the instructions. The student did not take into account the response given by the group.	The student mostly cooperated well with his group. The student received and gave feedback from his group almost always according to the instructions. The response was mostly constructive.	The student showed responsibility and mostly a good ability for cooperation. The student received and gave feedback from his group. The response was constructive.	The student showed evidence of good responsibility and a good ability for cooperation. The student gave a versatile response and took the response he / she received from his / her group into account.	The student showed evidence of excellent responsibility and an excellent ability for cooperation. The student made an effort to formulate himself in a constructive and valuable way for the task in order to help his group further in his work. The student received a response from his group and took it into account in his own work.
Skills	No attitude towards the activity.  Distorts group activity.	Has a resolute attitude.  Work on an individual basis.  Does not show motivation in the activity.	Has a resolute and assertive attitude.  Develops his/her role in the group.  Work cooperatively.	Shows motivation in the activity.  Has a resolute and assertive attitude.  Develops his/her role in the group.  Work cooperatively.	Shows motivation in the activity.  Has a resolute and assertive attitude.  Develops his/her role in the group.  Works creatively.	The student shows evidence of an excellent understanding and fully masters the content.