VR COURSE

PRIMARY EDUCATION

Design Your Sustainable 3D Schoolyard!

Introduction

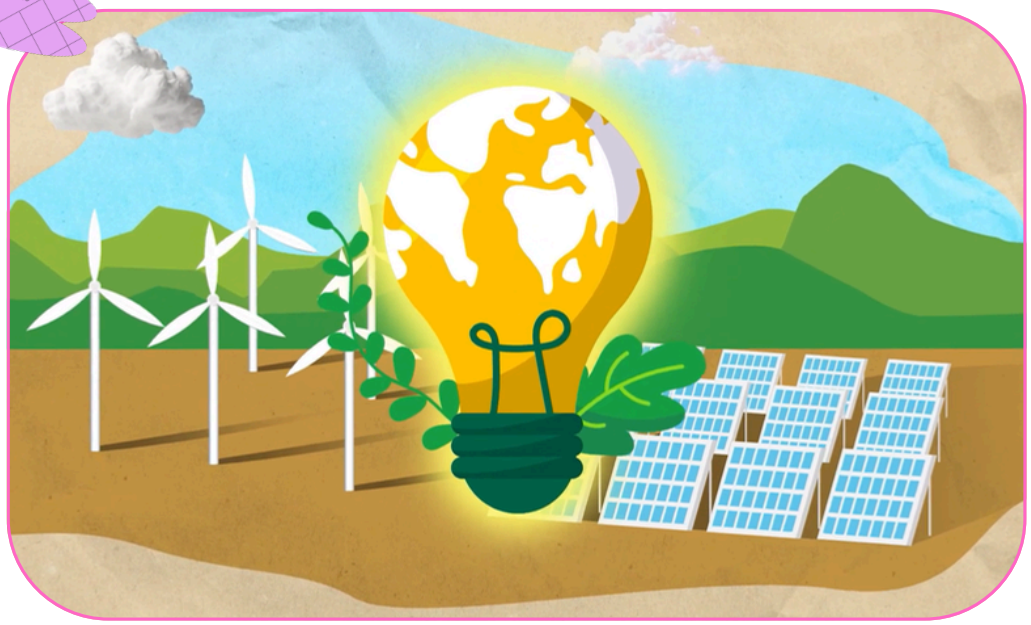
Students take on the role of an Engineer as they make a model of their sustainable school yard. They take on the work of a civil engineer as they plan the infrastructure (drainage, walkways, accessibility etc.) They get to know the work of landscape architects, focusing on aesthetics, usability, and environmental sustainability. They will propose sustainable solutions like rainwater management, eco-friendly materials and safe soil/air quality like environmental engineers do. Along the way, they will create 3d sustainable elements to be added to the proposed design of their school yard, which will be experienced in Virtual Reality.

Materials and Preparation

- E-book for Tinkercad
- E-book “Building 3d Worlds in Delightex”
- Videos
- Pencil
- Ruler
- Protractor
- Eraser
- Student worksheets
- PCs or tablets
- Tinkercad account (optional)
- Delightex account (optional)
- MetaQuest 2 VR Headset (Optional)

Design CHALLENGE

Create sustainable elements that could be added in your school playground. Take into account climate change and the challenges your area is facing due to it. Make sure that you minimize your carbon footprint along the way. Create a replica of your school yard inside Virtual Reality making it climate disasters' resilient and adding sustainable elements to it.



Course INSTRUCTIONS

STEP 1

Watch the videos
https://www.youtube.com/@VR4Clima

STEP 2

Play the VR4Clima Game either using a VR Headset or at your PC

STEP 3

You are a civil or environmental Engineer. You will update the design of your school yard, adding sustainable elements and making it more resilient to climate change and disasters it might bring. You will use Tinkercad in order to create elements for your school yard which are sustainable (wind mills, solar panels etc.), depending on the climate of your area. In order to be prepared for the design task, you need to learn about climate change and ways to protect our environment. For this reason your teacher will present some animations. Discuss with your peers the elements that you will use

STEP 4

Create in Tinkercad 1-2 sustainable elements that you believe that should be included in your school playground. Export them

STEP 5

Using pen and paper, sketch a design of your current playground and then another one containing the changes/additions that you propose in order to make it sustainable and climate change resilient

STEP 6

Create your proposed school playground in Delightex. Import the elements that you created in Tinkercad previously

STEP 7

Invite your peers inside your virtual world and guide them around

STEP 8

Discuss about your implementation / proposed improvements

TIME MANAGEMENT

The VR course can last as little as 1 class period without including the 3D Game. However, to help students from feeling rushed and to ensure student success, it is recommended that the course is split into two periods, allowing students more time to brainstorm, test ideas and finalize their design.

Background

CONCEPTS

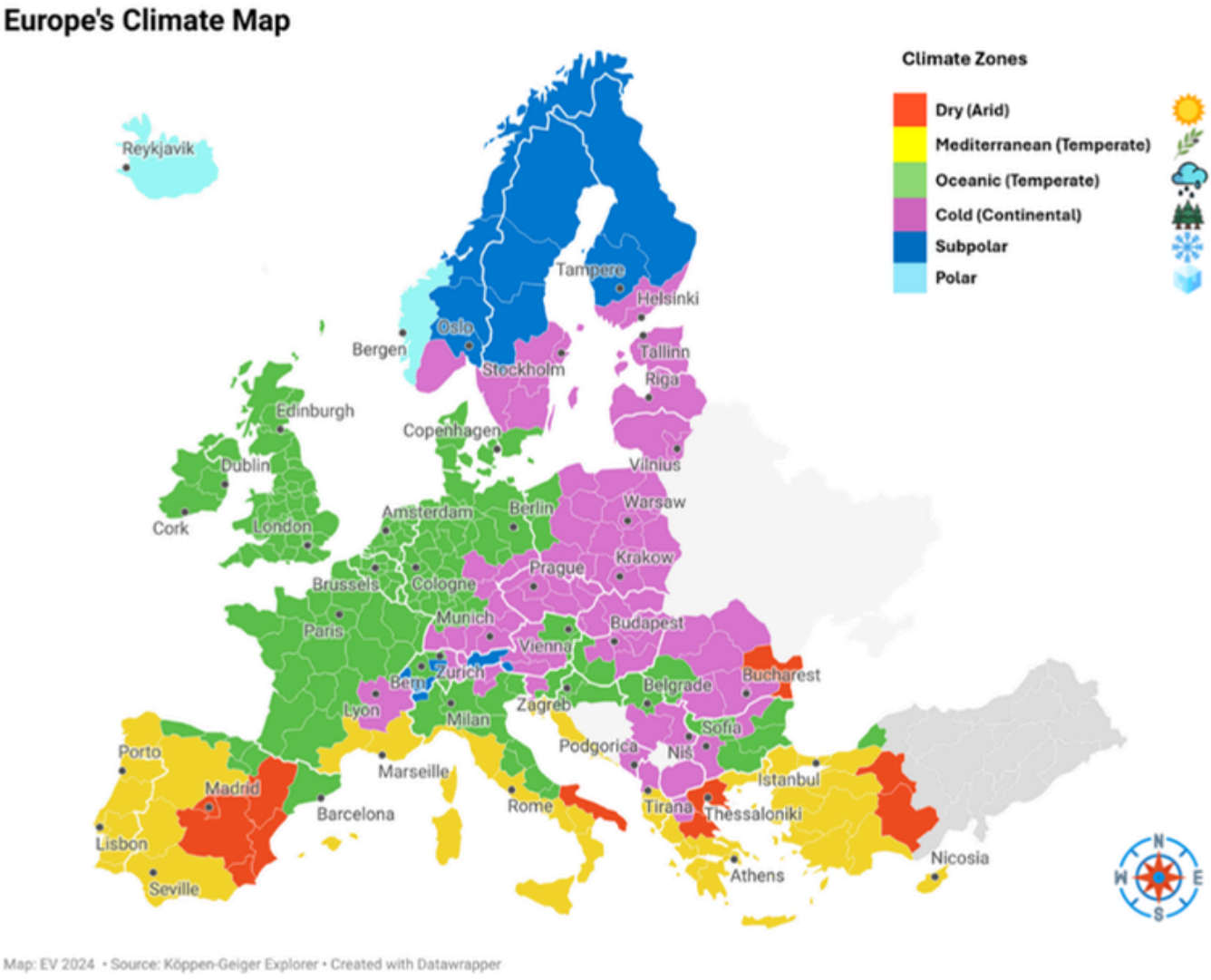
Sustainable choices are determined by the climate of each area. A choice which is sustainable in a region with a specific climate can be non-sustainable in a region with a different climate. Climate is determined by the temperature, precipitation, humidity and wind speed in a region. These characteristics are influenced by topography and natural factors as latitude, proximity (water access/ distance from the sea), altitude.

In the table below, the student-friendly climate classification is presented, detailing each climate zone alongside its corresponding color:

A/A	Class Name	Köppen-Geiger Code	Colour		Symbol	
1	Dry (Arid)	BSk, BSh	Red			Sun
2	Mediterranean (Temperate)	Csa, Csb	Yellow			Olive Branch
3	Oceanic (Temperate)	Cfa, Cfb, Cfc	Green			Rain Cloud
4	Cold (Continental)	Dfa, Dfb	Purple (Magenta)			Pine Trees
5	Subpolar	Dfc, Dfd	Blue			Snowflake
6	Polar	ET	Light Blue (Cyan)			Ice Cube

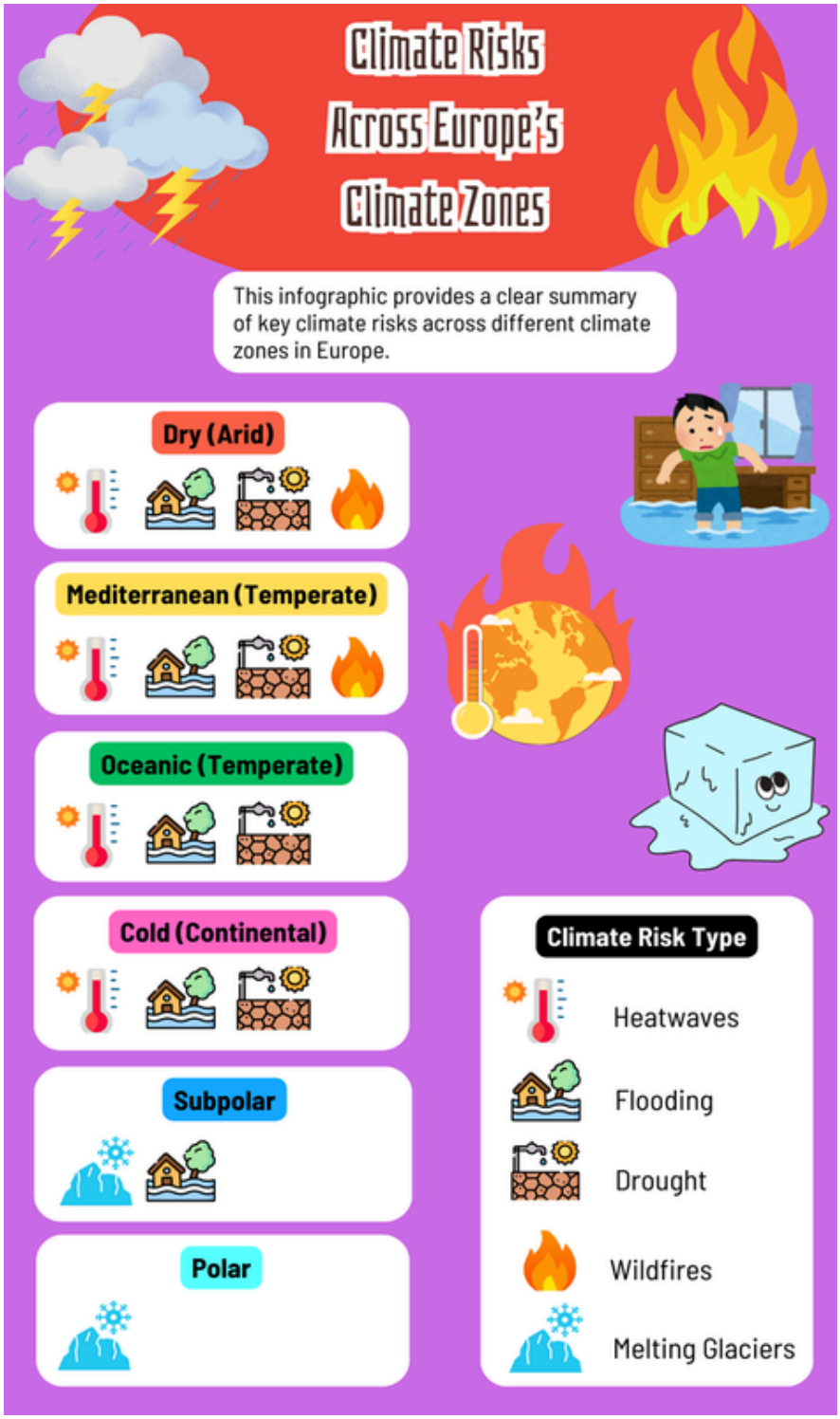
Europe’s Climate Map for Students

The Europe’s climate map for students will help students classify the climate of their region and therefore make sustainable choices depending on the climate.



Climate Risks

It is important that in the design phase they take into account the climate risks across Europe's Climate Zones



What is Climate Change?

Climate change means that the Earth is getting warmer than it should because of too much pollution in the air. When we burn coal, oil, or gas (for cars, factories, or electricity), they create gases (eg. carbon dioxide) that act like a blanket around the Earth. This blanket keeps in too much heat from the Sun. As a result, the Earth's weather is changing: summers can get hotter, winters may be stranger or shorter and we experience more floods, fires, and storms.

How does it affect our lives?

Climate change affects our lives because the Earth is getting warmer, and that changes the weather: Sometimes it rains too much, causing floods. Other times it rains too little, so plants and trees don't get enough water. Summers can get very hot, which makes it harder for people, animals, and plants. We can have strong storms and wildfires more often.

This matters because farmers may have trouble growing food, animals may lose their homes and people may have to work harder to stay safe from heat, floods or storms

What is a Natural Disaster?

A natural disaster is when nature causes something very strong and dangerous that can hurt people, animals, or places. Here's the more common natural disasters:

- Floods – when too much rain or water covers the land
- Storms or hurricanes – when very strong winds blow things away
- Volcano eruptions – when hot lava and smoke come out of a mountain
- Earthquakes – when the ground shakes
- Wildfires – when big fires spread through forests.

Natural disasters can be scary, but people learn how to stay safe and help each other when they happen. And many helpers, like firefighters, doctors, and rescue teams, are always ready to protect us.

Sustainable choices

Sustainable choices are the decisions we make that are good for us, good for other people and good for the Earth — not just today, but also for the future. Here are some simple sustainable choices most of us can make:

- Walking or biking instead of always using the car. This creates less pollution
- Turning off the lights when you leave a room. This can save energy
- Recycling paper, plastic, and cans, thus give old things a new life
- Planting trees and caring for nature in order to keep the Earth healthy
- Not wasting food so that there's enough for everyone.

Vocabulary

Arid	very dry, with little or no rainfall
Carbon footprint	the total amount of carbon dioxide and other greenhouse gases a person, activity, or product produces
Climate	the usual weather conditions in a place over a long time
Climate resilient	able to cope with and recover from the effects of climate change
Cold	having a low temperature or lacking warmth
Continental	related to a large landmass or continent
Drought	a long period with little or no rain
Dry	having little or no water or moisture
Flooding	when too much water covers land that is usually dry
Heat waves	long periods of very hot weather
Mediterranean	related to the region around the Mediterranean Sea
Oceanic	related to the ocean or large seas
Polar	related to the North or South Pole, or very cold regions
Solar panel	a device that turns sunlight into electricity
Sub polar	the region just outside the polar areas, with cold but not extreme temperatures
Sustainability	using resources in a way that does not harm the environment and can last long-term
Temperate	having mild temperatures, not too hot or too cold
Wild fires	large, uncontrolled fires that spread quickly in forests or grasslands
Windmill	a structure that uses wind to produce energy or pump water

Alignment to CURRICULUM

There is no single, unified EU school's curriculum framework for Primary Education; instead, primary education is defined at the national level by each EU member state, with a focus on fundamental skills in literacy and numeracy, and personal/social development. Here we present the alignment to the Greek Schools' curriculum. The changes in other EU member states are minor

Subject Area / Course	Activity	Objectives / Alignment with the Curriculum
Environmental Studies (1-4 Grades)	Introduction to climate change and natural disasters	Understanding natural phenomena and their causes, connection with human activity. Development of environmental sensitivity.
Natural Sciences (5-6 Grades)	Creating models for the water cycle or natural disasters (earthquakes, floods)	Cultivation of skills in observation, experimentation and explanation of natural phenomena. Introduction to the use of technology as a tool for scientific representation.
ICT / Digital Literacy	3D design in Tinkercad and creation of a virtual world in Delightex	Development of computational thinking, creativity and basic knowledge of digital modeling, programming and virtual reality.
Civic Education	Discussion on sustainability and human responsibility in environmental protection	Development of environmental awareness, cultivation of a responsible attitude to life and active citizenship.
Language	Poster creation, texts or presentation on protection from natural disasters	Cultivation of oral and written language, use of argumentation, synthesis of information and communication of ideas.
Visual Arts / Technology	Artistic depiction of sustainable cities or natural phenomena through digital tools	Connecting art and technology, expression through creative design and innovation.
Skills Workshops – Thematic Circles	Integrated work plan: from information search to digital creation	Thematic Circles: "I take care of the environment", "I create and innovate", "Social empathy and responsibility". Development of 4K skills (Critical thinking, Collaboration, Communication, Creativity).