

GUIDELINES FOR THE PILOT IMPLEMENTATION



CLIMATOPIA



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TABLE OF CONTENTS

Introduction	4
Aims and Objectives	6
Ethics Documentation	7
Informed Consent.....	7
Assent.....	7
Protection of Confidentiality	7
Minimization of harm	8
Balancing Risks and Benefits	8
Minimization of Harm	8
Voluntary Participation	8
Copyright and License to Use the Project Results.....	8
Guidelines for Teachers	9
Roles in the Pilots	11
The First Steps of the Teacher Coordinators	12
Responsibilities of the Teacher Coordinators	13
Responsibilities of the Pilot Teachers	14
Pilots Deployment Plan.....	15
First Phase of the Pilots.....	16
STEM Activities Deployment Plan	17
Second Phase of the Pilots	18
References	20
Annex I.....	21

Introduction

"We can create transformational action that will safeguard the living conditions for future generations."

– Greta Thunberg

Climate change and environmental degradation are an existential threat to Europe and the world. To overcome these challenges, Europe needs a new growth strategy that will transform the Union into a modern, resource-efficient and competitive economy, where

- there are no net emissions of greenhouse gases by 2050
- economic growth is decoupled from resource use
- no person and no place is left behind (EC, A European Green Deal).

Environment and climate action are key priorities for the EU now and in the future. [The European Green Deal Communication](#) is the European new growth strategy and recognises the key role of schools, training institutions and universities to engage with pupils, parents, and the wider community on the changes needed for a successful transition to become climate neutral by 2050.

According to UNESCO (2020), "education is critical in helping populations understand and address the impacts of climate change, and in encouraging the changes in attitudes and behaviour needed to help them address the causes of climate change, adopt more sustainable lifestyles and develop skills that support different modules of economies, as well as to adapt to the impact of climate change".

UNESCO promotes climate change education (ECC) as part of its [Global Action Programme on Education for Sustainable Development](#) (ESD).

Education for sustainable development is a component of the fourth sustainable development goal on education. Goal number 13 on climate action targets the improvement of education on climate change. Indeed, education is about teaching young generations to understand and reflect on the physical and social world surrounding us so that they become citizens able to think critically, participate in decision-making and take action. Climate change education is therefore also citizenship education.

Since September 2020, UNESCO focuses on key issues related to the new global framework ESD for 2030 and the relevance of ESD during and beyond the Covid-19 pandemic to 'build back better'. Around the big questions such as 'what world do we want to live in beyond Covid-19?', 'what is necessary to rebuild and recover in a more sustainable and equitable way and not fall back into unsustainable habits and

structures?’ and ‘what role does education and particularly ESD play and how does it contribute to the transformation needed?’.

Education on climate change is grounded in science – but it is also about behaviour and action. It is about the environment and economy, but also about equality and social organisation. It promotes future citizenship that is environmentally and socially responsible on a global scale ([Eurydice, 2019](#)). To address this challenging priority, Climatopia builds on the expertise of two European Universities with pedagogical expertise, one network with expertise in human needs, the Hellenic National Centre for Scientific Research “Demokritos” and one technology expert to support pupils to provide answers to the above questions.



Figure 1. Rawpixel.com/Shutterstock.com.

Aims and Objectives

The Climatopia project aims at developing educational materials and teaching methods to be included in school settings, initial and ongoing teacher training settings and will also be communicated and discussed widely in the communities.

The concrete objectives of Climatopia are to:

LEARNING TO KNOW

Develop the pupils' scientific knowledge and green skills on climate change using comics and a - serious game.

LEARNING TO DO

Effectively apply the knowledge acquired in the context of a simulation, decision-making game.

LEARNING TO BE

Provide 'designed experiences' where players can learn through doing and being, rather than absorbing information from readings and traditional lecture formats.

LEARNING TO LIVE TOGETHER

Design highly engaging learning experiences that allow players to build empathy by taking on various roles and perspectives
Envision oneself in the future and seeing consequences of actions at different points in time.

Ethics Documentation

Research involving children requires special considerations to ensure that it is conducted ethically and in accordance with legal and ethical standards. The Climatopia project meets the following conditions when conducting research involving children in the pilot phases:

Informed consent

Informed consent must be obtained from the parent or guardian of the child, as well as from the child if they are capable of understanding the research and giving their consent.

A model of informed parental consent can be found in **Annex I** which teachers should translate into the working language of their school and adapt as necessary according to the national legislation of their country.



Figure 2. Parental Consent by Nick. Youngson CC BY-SA 3.0 Alpha Stock Images

Assent

Researchers should obtain the child's assent to participate in the study. This means that the child should be informed about the research in a developmentally appropriate manner and asked if they would like to participate.

In the Climatopia project, the researchers do not communicate with the children. Pre and post tests will be conducted by the teachers of the classes participating in the project as part of the evaluation of the project's learning activities that have been integrated into the official curriculum.

Protection of Confidentiality

The privacy and confidentiality of the child's data will be protected. All data must be anonymous. But to compare results Climatopia researchers need to be able to connect pre and post-tests. A code will be given by the pilot teachers to each of their pupils that will follow them for all project activities that require data collection.

The codes for each school will be provided by the University of the Aegean in an excel file and the class teacher will fill in the two-digit number corresponding to each pupil. The teacher will securely store this file and remind pupils of the codes when they are required to complete the pre and post-tests. Only the class teacher will be able to associate the code with a pupil. Project researchers processing pre and post test

data will only see codes without knowing which pupil they correspond to.

Minimization of Harm

Class teachers must take steps to minimize any harm or discomfort that may be caused to the child. This may include using non-invasive methods or adapting procedures to make them more child-friendly.

Balancing Risks and Benefits

There is minimal risk to children in taking part in this research project. All adults (except parents) in contact with children during this project are teachers Garda vetted. The Climatopia project follows the [General Data Protection Regulation](#) (GDPR) guidelines in terms of ethics procedures, confidentiality, data protection and anonymity.

Voluntary Participation

Participation in research involving children should be voluntary, and parents/guardians should be informed that they can withdraw their child from the study at any time without penalty or consequence.

The activities of the Climatopia project are integrated into the official curriculum of the schools, therefore they are governed by the “Internal Regulation” of the schools participating in the project.



Figure 3. Marco Verch. (2019). “Change the system, not the climate! - sign at Fridays For Future”.

Copyright and License to Use the Project Results

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All Climatopia educational materials are under Creative Common License,



Figure 3: Creative Commons>Licenses, Retrieved from <https://creativecommons.org/licenses/by-nc-sa/4.0/>

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Guidelines for Teachers

The pilots the Climatopia project will take place in the four participating countries of the project: Austria, Greece, Latvia and Spain.

Climatopia aims to engage at least two schools in each participating country, with two Teacher Coordinators in each country and two Pilot Teachers in each school. The age range of the pupils targeted by the project is 8-15 years old.

Roles in the Pilots

There are different roles in the project pilot to guide and support the implementation, collect data for project evaluation, write reports and share and disseminate project results and good practices.

Contact Person

There is a Contact Person in each partner organisation who remains available to each participant in the pilot to support them at every level.

Table 1

Contact information

AUSTRIA	GREECE	LATVIA	SPAIN
Contact Persons			
Dr Klaus Linde-Leimer Blickpunkt Identität email: office@blickpunkt-Identitaet.eu	Nancy Pyrini University of the Aegean email: nancypyrini@aegean.gr	Dr Linda Daniela University of Latvia email: linda.daniela@lu.lv	Dr Mariano Sanz Prieto Fundación Siglo22 email: msanz@siglo22.net

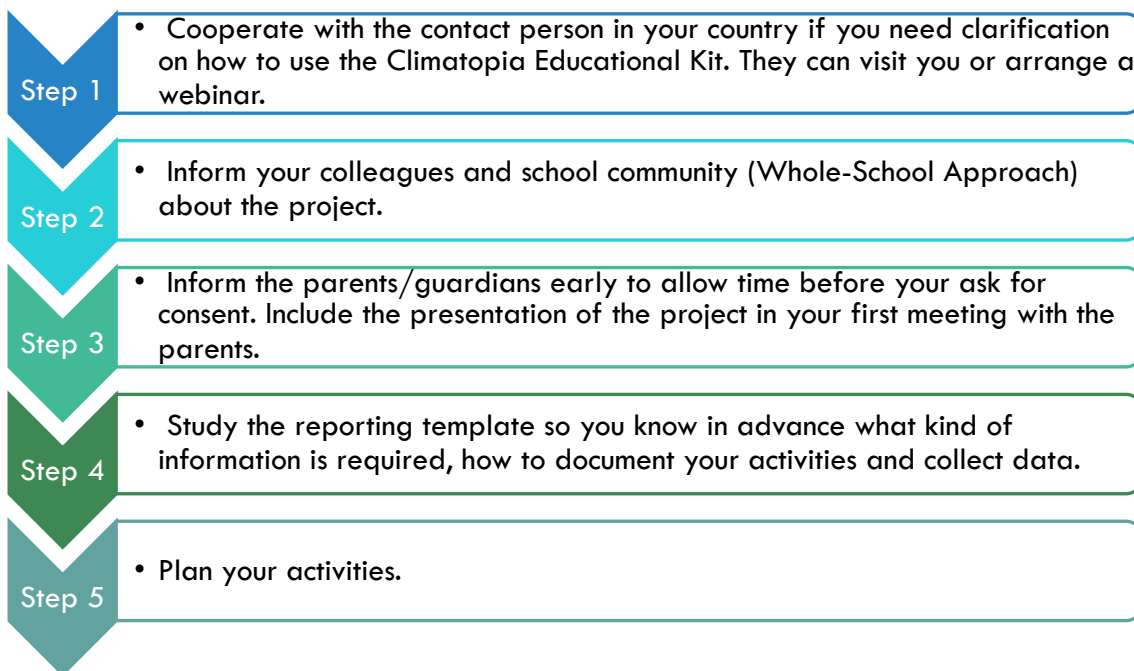
Teacher Coordinators

The role of the Teacher Coordinator is to participate in the pilot projects, to support the training and coordination of the Pilot Teachers and to provide feedback to the Contact Persons on the development of the pilots.

The Teacher Coordinators can also be the Pilot Teachers. In other words, they may not need to involve other teachers in their school rather than run the Climatopia educational programme themselves. However because the project follows the [A Whole School Approach to Learning for Environmental Sustainability](#) it is desirable to involve as many teachers in the school unit as possible, the principal, vice principals, administrative staff, parents/guardians and stakeholders from the local community.

Another important note is that teachers involved in the project either as Teacher Coordinators or Pilot Teachers do not need to be STEM teachers. The project's approach is interdisciplinary and aims to be inclusive therefore teachers of any discipline can make a significant contribution to the implementation of the Climatopia educational programme.

The First Steps of the Teacher Coordinators



Responsibilities of the Teacher Coordinators



Recruit at least two Pilot Teachers to form the "Climatopia Team". The "Climatopia Team" empowers the dynamic of the project in your school.



Work closely with the Contact Persons and the Scientific Team for their continuous support and monitoring of the pilots.



Organize field-trips and activities in Science Museums, Science Centers (subject to approval by the competent educational bodies). Try to involve parents/guardians in these activities to the best possible extent.



Organize at least one activity with the participation of parents/guardians and the local community.

Responsibilities of the Pilot Teachers



Pilot the “Climatopia Educational Kit” and the “Climatopia Simulation and Decision-making Game”



Administration
of pre- and post tests

Pilots Deployment Plan

The Climatopia project aims to raise awareness of environmental and climate change challenges on a solid psychological, pedagogical (R1) and scientific background (R2) in a gamified learning environment (R3). The project results will be pilot tested in four European countries (Austria, Greece, Latvia and Spain) in at least two schools from each country.

Many authors have remarked that climate change seems to be a problem almost designed to defy human understanding. We are not good at dealing with intangible entities, and in climate change both causes and effects remain mostly invisible in our daily lives. Power plants are kept at a comfortable distance from major cities. Trash is discreetly collected and swiftly taken away from our doorstep. To make things worse, the effects of climate change are also delayed in time. Even if we stop polluting tomorrow, the temperature of the planet will keep rising for many decades to come—and unfortunately we did not evolve to think of cause-and-effect over such time scales. But comic panels can compress time and space, making these invisible connections more clear, much like what happens when we look at a scientific diagram.

In recent years, comics have been used to engage non-expert readers with a whole variety of scientific subjects, from neuroscience to genetics and astrophysics. And yet, climate change remains a largely unexplored subject for comics—especially if compared to the volume of ink spilled on the subject (Farinella, 2020). The Climatopia comics will address this need.

Experts have put forward a litany of bleak scientific reports outlining what climate change means for the future of life on Earth—forests incinerated by wildfires, farms laid bare by drought, cities submerged under rising seas. Pupils are often left to wonder if this is what will happen, or if this is merely what could happen should we fail to act. During the writing of the Climatopia scripts pupils will have the opportunity to investigate this question.

The learning outcomes, following the Climatopia intervention, will be measured.

First Phase of the Pilots

Before starting any activity related to the project, students will have to answer the pre-tests. The codes will be provided by the University of the Aegean according to the anonymization procedure described above. The first phase of the pilot implementation concerns the testing of the "Climatopia Educational Kit".

The educational material includes:

FOR TEACHERS

Theoretical and Psychological Framework

Chapter 1: Basic Human Needs under the light of Climate Change

Chapter 2: Self-directed Learning to Improve Quality of Life

Chapter 3: Learning Activities

Chapter 3 is based on and supplemented by the storybook "Climatopia"

The Self-Training Handbook

Chapter 1: Basic Scientific Concepts Related with Climate Change

Chapter 2: Guidelines on the General Components of Comic Creation Activities

Chapter 3: Open Educational Resources for Comics Creation

FOR PUPILS

The Climatopia Comic Book

A Comic Book that encompasses the science knowledge children need to acquire, combining the benefits of visualization with powerful metaphors and character-driven narratives. Climate change, its causes and consequences, and the attitudes and policies that need to be adopted to stop or reverse the phenomenon, as well as related concepts such as global warming, greenhouse gases (CO₂ and CH₄), recycling, biodiversity, renewable energy and the green economy, are approached in the form of questions and problems faced by the characters in the story.

The comic book characters deal with widespread misconceptions about these concepts and phenomena in order to find answers and solutions.

The expected impact of the "Climatopia Educational Kit" is to:

Learning to know

Engage pupils and the public with valid scientific knowledge as well as with social and political issues.

Learning to be

Contribute to pupils complete development: mind and body, intelligence, sensitivity, aesthetic appreciation and spirituality.

Learning to live together

Build capacity for empathy, group-based decision making, crisis management, tolerance, flexibility and understanding of change as well as to raise awareness of diversity, equality and inclusion in the learning processes.

Learning to Do

Be able to produce comics on climate change.

Learning to transform oneself and society

Integrate the values inherent in sustainable development into all aspects of learning; to empower people to assume responsibility for creating and enjoying a sustainable future.

STEM Activities Deployment Plan

It is suggested that the text and the comic be completed in eight teaching units.

Teaching Units 1-3 deal with the basic concepts related to the causes of climate change. These concepts and the network of relationships between them are illustrated in the concept map below (Figure 1).

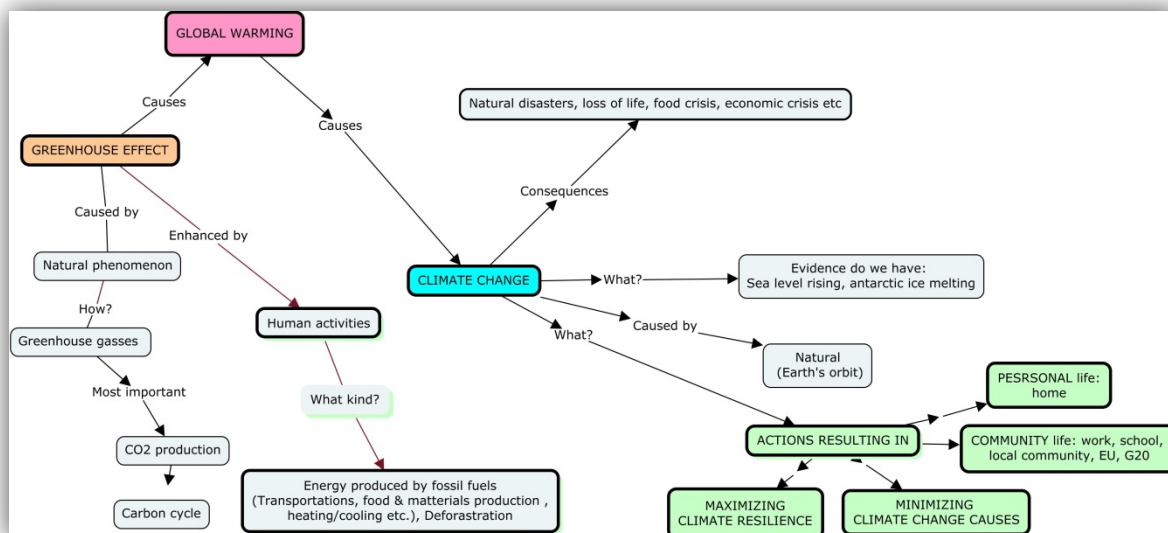


Figure 1. Ioannides Christos (2022). The Climatopia Conceptual Map.

In Units 4-6 pupils discuss the impact of climate change on six different areas of social activity.

In Units 7-8 pupils use all the knowledge and skills they have acquired to propose solutions to the problem of climate change by composing their own ending to the comic.

The text of the story is used as a reference text so that pupils can refer to, identify and elaborate on the concepts under study. As a form of storytelling with which pupils are familiar, the comic brings the characters to life, helps children to identify with them and to seek solutions together to the problem of climate change.

Then, lesson plans are suggested for using the educational material by unit. Each teacher has the possibility to adapt the lesson plans according to the dynamics of his/her classroom.

Lesson Plans and Worksheets are available in Chapter 3: Learning Activities of the "Theoretical and Psychological Framework" Handbook.

After completing the learning activities and co-authoring the comic book, the pilot teachers will administer the post-tests to their classes.

Second Phase of the Pilots

The second phase of the pilot implementation concerns the testing of the "Climatopia Decision-making Game".

Scientists, educators and policymakers continue to face challenges when it comes to finding effective strategies to engage the public on climate change. The Climatopia Consortium argues that games on the subject of climate change are well-suited to address these challenges because they can serve as effective tools for education and engagement.

Public concern about climate change has declined since peaking in 2007. Many have become wary of information shared about the topic, while attitudes, perceptions and beliefs about climate change continue to be strongly mediated by political ideologies. Programmes such as the United Nations Decade of Education for Sustainable Development have made global calls to teach about climate change. These calls are now increasingly reflected in international assessments of science education. Many countries have responded with curricular reform, creating a demand for tools that can help teach about the physical and social processes that cause long-term atmospheric warming. Clearly, there is an urgent need for effective ways to engage diverse audiences about global climate change. Serious games support climate change understanding and decision-making. Climate change effects are accelerating, as is the need for appropriate actions. We know that by

making sound choices now and in the future, we can foster climate resilience and reduce risks and costs for future generations and ourselves.

The educational material includes:

FOR PUPILS, TEACHERS AND PARENTS/GUARDIANS

The Climatopia Serious Decision-Making Game

The game aims to effectively apply the knowledge acquired by the students in the context of their engagement with the learning activities of the project in a game of simulation and decision-making with ... consequences!

The expected impact of the “Climatopia Decision-making Game” is to:

Learning to know

Engage pupils and the public with valid scientific knowledge as well as with social and political issues.

Learning to be

Learn to make sound choices now and in the future, to foster climate resilience and reduce risks and costs for future generations and ourselves.

Learning to live together

Build capacity for empathy, group-based decision making, crisis management, tolerance, flexibility and understanding of change as well as to raise awareness of diversity, equality and inclusion in the learning processes.

Learning to Do

Have an important influence on both adaptation and mitigation actions.

Learning to transform oneself and society

Integrate the values inherent in sustainable development into all aspects of learning; to empower people to assume responsibility for creating and enjoying a sustainable future.

After completing the game activities the pilot teachers will administer the post-tests to their classes.

Climatopia Decision-making Game

Instructions

In this section, teachers will find a useful guide to help their students understand and use Climatopia's Game.

Educators will be responsible for carrying the game to the classroom, so they should understand it completely to be able to explain it and answer questions about it. Depending on the age of the students, the teacher may choose one of the three levels that have been created and guide the students through the process.

The Game

Climatopia's game was created using the digital platform Genially. This tool allows the users to create and design interactive digital materials such as presentations, breakouts, infographies or videos. Furthermore, Genially has many resources and images that can be provided with interactivity and animations. It is a free software in which any user can design their own content using templates, taking inspiration from other users or creating their own materials from scratch.

General Description

Climatopia's game is an interactive trip in which students will have to make decisions and answer questions that should determine the future of this planet. The game has numerous interactive slides in which the learner can navigate and click on the interactive elements. Students will have to follow the storyline in order to save Climatopia from destruction.

Learners start by seeing how Climatopia works and what elements (such as the atmosphere or the biosphere) make life possible on it. After that, they will know more about Climatopia's current situation. This situation is devastating because pollution causes irreversible damage to the planet. So, the 4 elements (Earth, Water, Air and Fire) will appear and guide the pupils through the different periods of time.

Students will travel back in time, to the period of the Industrial Revolution, when steam machines appeared. Here, they will have to make decisions that can be beneficial or harmful for Climatopia's present. Also, in this period they may learn about contamination, deforestation and transport.

Air is in charge of guiding the students through the present. Here, students should learn about the plight of the planet, and they have to make decisions that affect the future of Climatopia. Depending on the decisions they make, the future will either be ideal or catastrophic for the planet.

The final decisions are set in the future and depending on them, students will either achieve an ideal or a devastated Climatopia. Whatever the end, students will be able to analyze the main aspects of the ideal Climatopia society, knowing how some sectors such as education, business or institutions would change.

Levels of Difficulty

In order to adapt the level of difficulty to the age of the pupils who are going to play the game, three different games have been created according to the following age ranges:

Basic: 6 to 10 years old.

Medium: 10 to 14 years old.

Advanced: 14 to 18 years old.

All three levels follow the same storyline but have differences in complexity. As explained above, at all levels students will have to visit the past, present and future of Climatopia.

The most notable difference in the three levels is the number of theoretical questions students have to answer. At the basic level, students will not have to answer these types of questions due to their complexity. In addition, the vocabulary is adapted according to the age of the students, in order to make it easier to understand. On the other hand, the medium and advanced games do present theoretical questions adapted to the abilities of the pupils who will enter the game.

Recommendations for classroom use

This section provides some recommendations for teachers on how to bring the game into the classroom effectively. It is important for teachers to know their student's capabilities to analyze how they will use the game in the classroom. Due to the age of the pupils, the game cannot be introduced in the same way, so it's necessary to differentiate how to present the game in each classroom.

Basic Level

For this level, the youngest pupils probably don't have reading and comprehension skills completely developed so it would be a mistake to

leave students to work alone. Furthermore, the game has different theoretical notions related to pollution and climate change. Many students will not understand many words of this game but there are necessary concepts in their learning. So, it's crucial for the teacher to have the possibility to explain these terms to them.

Therefore, it would be indispensable for the teacher to contextualize the activity to facilitate the students' understanding. The teacher can carry out motivational activities before introducing the game, in order to increase the students' interest. For example, you can choose to introduce the game through audio-visual materials such as songs or videos related to the fight against climate change.

One of the ways to present this material is by playing the game together. That is, the teacher can present the game on the classroom blackboard and the pupils will play it all together. In this way, the teacher can follow up on the students' performance in the game and answer any questions that may arise.

Another recommendation would be to organise students in heterogeneous collaborative groups. It is beneficial for pupils to be grouped heterogeneously in order to promote the inclusion of diversity. Thus, students will be able to discuss the game among themselves and it will be easier to understand it. The teacher can act as a guide to answer possible doubts and help groups that have problems. In this way, pupils will work autonomously in groups and will be able to help those members who need it.

Medium Level

At this level of complexity, the students have already developed some lecture comprehension skills and they know vocabulary related to climate change and pollution. Furthermore, they are able to work autonomously without the teacher's guidelines.

As in the previous level, pupils can be grouped into heterogeneous teams and work collaboratively while playing the game. In this way, the students who need it most can get help from the others and, together, they can discuss the decisions they need to make to save Climatopia.

For older pupils in this age range, the game can be played individually or in pairs. Each pupil or two pupils should have a digital device that allows them to play the game. In this way they will have the opportunity to do reflective work by themselves or with their peers. Peer work allows pupils to obtain different opinions from their own and enrich their learning. From this age, pupils can start to reflect on the environment and the need to end climate change. A good option would be to carry out brainstorming sessions and guided reflections after the game.

Advanced Level

At the latter level, students already have the necessary skills to understand and play the game without any problems. At this level, it is essential that the game focuses on provoking student reflection. It is fundamental that students become aware of the importance of this topic and are able to have critical thoughts about it.

Therefore, in order to make it more interesting for them, cooperative exercises (such as 1-2-4 or spin the sheet) could be used for initial reflections about environment and climate change. After playing the Climatopia game, some of the dynamics can be repeated to observe the learning and reflections that have emerged after playing the game.

On the other hand, the game can be brought into the classroom in different ways. Students can work on it individually, in pairs or in cooperative groups. This is at the teacher's discretion, as pupils are able to work in all three ways without any problems.

Panorama of Climatopia's Open Educational Resources

Implementation Phase	Project Result	Description	Target Group
Phase A The Climatopia Educational Kit	Theoretical and Psychological Framework	Chapter 1: Basic Human Needs under the light of Climate Change Chapter 2: Self-directed Learning to Improve Quality of Life Chapter 3: Learning Activities Chapter 3 is based on and supplemented by the storybook "Climatopia"	Teachers Parents
	The Self-Training Handbook	Chapter 1: Basic Scientific Concepts Related with Climate Change Chapter 2: Guidelines on the General Components of Comic Creation Activities Chapter 3: Open Educational Resources for Comics Creation	Teachers Parents
	The Climatopia Comic Book	A Comic Book that encompasses the science knowledge children need to acquire, combining the benefits of visualization with powerful metaphors and character-driven narratives. Climate change, its causes and consequences, and the attitudes and policies that need to be adopted to stop or reverse the phenomenon, as well as related concepts such as global warming, greenhouse gases (CO ₂ and CH ₄), recycling, biodiversity, renewable energy and the green economy, are approached in the form of questions and problems faced by the characters in the story. The comic book characters deal with widespread misconceptions about these concepts and phenomena in order to find answers and solutions.	Pupils

Phase B STEM Activities Deployment Plan	Teaching Units 1-3	Teaching Units 1-3 deal with the basic concepts related to the causes of climate change.	Teachers Pupils
	Teaching Units 4-6	In Teaching Units 4-6 pupils discuss the impact of climate change on six different areas of social activity.	Teachers Pupils
	Teaching Units 7-8	In Teaching Units 7-8 pupils use all the knowledge and skills they have acquired to propose solutions to the problem of climate change by composing their own ending to the comic.	Teachers Pupils
	The Climatopia Story	The extended 21-chapter story on which the Comic was based and on which the Lesson Plans are based.	Teachers Pupils Parents
Phase C The Decision-Making Serious Game	The Decision-Making Serious Game	<p>The game aims to effectively apply the knowledge acquired by the students in the context of their engagement with the learning activities of the project in a game of simulation and decision-making with ... consequences!</p> <p>The game has three levels: the Basic suggested for Primary Education, the Medium suggested for Lower Secondary and the Advanced for Upper Secondary.</p>	Teachers Pupils Parents

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Annex I

Parent/Guardian Consent to participate with conditions

CLIMATOPIA PROJECT

Project ID: 2021-1-LV01-KA220-SCH-000032830

I have read and understood the parent/legal guardian information leaflet for Climatopia pilot studies.

I understand what the study is about and what the results will be used for.

I have had time to consider and research whether my child will take part in the study.

I am aware that my child will fill out the evaluation questionnaires will use an application for augmented reality.

I understand that my child's personal information will not appear on any research data from this pilot study.

I am fully aware of all of the procedures involving my child.

I am fully aware of any risks and benefits associated with the study for my child.

I understand that my child's participation is a choice under free will and that we are free to withdraw from the research study at any time without disadvantage and without giving any reason.

I hereby **consent to my child** (*please fill in the child's full name and surname*) _____

involvement in this pilot study.

Full name and surname of
parent/guardian:

School:

Date:

Signature:

If you have questions about the study, please contact the Project Coordinator, Professor Linda Daniela <linda.daniela@lu.lv>.



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