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ClimaTePD: “Towards a new model of Teachers' Professional Competence Development on Climate Change”

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IO3.1: Development of digital scenarios

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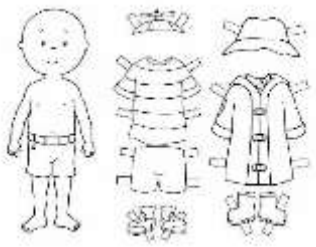
Bulgaria

Title	**Dress to impress**
Country	Bulgaria
Scenario Rationale (explain your reasoning behind offering this course/what is the marked need for this course/how this course fulfils these needs.)	Using a "time machine" students are transported in a specific year. Thus, they have to propose appropriate clothing (and accessories: hat, umbrella), figuring out the weather in the same day, but in another year. The students are divided into several groups. With a "time machine", each group is transported in another time period and has to design (select) appropriate clothing for the same day and place, changing only the year. Students can travel back and forth in time. For students: The scenario aims to explore the climate change issues in everyday context in an amusing and funny way. For teachers: This scenario aims to assist teachers who would like to apply the basic principles of organizing and orchestrating learning about Climate change according to inquiry-based methodology. Inquiry elements: ● students need to explore what was the weather in that specific day (temperature, precipitations, storms); ● students have to explore the typical clothing in this year and to propose a relevant outfit. ● Younger students can design and draw the design on a paper doll; older students can make a digital poster or design the outfit in a computer program; ● At the end, students can make a poster presentation and exhibition of their designs in class or online;
Scenario objectives (teachers' competence development - knowledge, skills, dispositions/ attitudes)	Develop teacher's competences related to: Develop Teachers' Knowledge: ● Develop teachers' Pedagogical Knowledge in terms of underlying concepts belonging to STEM domains, insights in learning and teaching according to IBL methodology; ● Develop teachers' knowledge on a design of "non-traditional" training. ● Develop teachers' knowledge on new technologies and their affordances as a tool for more effective lesson planning and orchestration of this learning; Improve teachers' skills to: ● Carry out an inquiry to learn about designing an Inquiry-Based Learning lesson involving reflection on learning and exchange with peers; ● Plan, organize and assess students' inquiry activities;

	● Plan, manage and coordinate an IBL lesson [in an online learning environment]; ● Know and use new technologies and apply them in class - to conduct technology-enhanced learning. Form Attitudes ● Develop critical attitudes to one's own learning ● Disposition to promote students' IBL skills as a useful way to participate in scientific development
Learning outcomes (aspects of competences addressed)	After the training the participating teachers will be able to: ● Design and implement an IBL lesson (or series of lessons), related to searching and interpreting information, exploring how climate affect our everyday life, ● Develop a plan for scenario for conducting technology-enhanced lesson in class or online (visit of a virtual museum); ● Make links with other subjects (STEM, ART, history) ● Prepare a set of instructions for use of mobile devices in class for educational purposes.
Training outline/methodology (briefly explain the expected level of inquiry – confirmation, structured, guided, open, and how many and which phases of the IBL model are included. The first and last one are obligatory)	Guided inquiry The Six phases of IBL model are included
Time for completing (How many learning hours are needed for teachers to complete the scenario**)**	**Overall: 6 hours of training** **For 45 minutes lesson: 6 hours of training** **4 attendance classes (blended learning)** **Phase 1** – 1 learning hours **Phase 2** – 1 learning hours **Phase 6** – 2 learning hours **2 distant classes** **Phase 3**– 30 minutes **Phase 4** – 30 minutes **Phase 5** – 1 hour
Assessment	1. Participation in: a. the brainstorming and discussions sessions b. activity in the electronic platform 2. Design of the learning process (predefined assessment criteria)

	3. Presentation of the learning design
Example of paper doll	

SCENARIO DESCRIPTION

Subphase	Activity	Tools	Learning/Digital Resources
Phase 1: Problem / topic			**Ex. duration: 1 learning hour**
Motivation	Task: Explore several old photographs or pictures, or make a visit to a (virtual) museum and explore the clothes of the personages.	Individual work	
Introduction to the topic	Task: Reflect about your choice of clothes today. Do they have something in common with the climate change?	Discussion: ● Why you put these clothes today? ● Do clothes have something to do with climate change? ● What kind of scenario will best present the topic of climate issues in a micro perspective?	Zoom, Google meet, Microsoft teams
Specify the context	Formulating the problem situation/ hypothesis	Brainstorming and mind map: ● How pupils can find the evidences of the climate change in their everyday life?	Miro Mural
Reflection	Understanding the different aspects that need to be considered when introducing training and learning about climate change and local aspects.	Reflection	Hints: ● How to make the activity more amusing for the pupils? ● Could you involve teachers and make internal links with other subjects (STEM, history, ART) and form a team? ● Could you combine this activity with an outdoor

Subphase	Activity	Tools	Learning/Digital Resources
			activity such as a visit to history museum or gallery?
Phase 2: Operationalization			**Ex. duration: 1 learning hour**
Indicators for successful learning design	TODO List	Notes Questions: ● Is there a ban on using mobile devices in the school? ● If we want to visit a virtual museum – which is the most appropriate? ● How to organize training for children with SEN	Hints: ● General topic of the educational project ● List of disciplines, related to the topic ● learning goals, outcomes and activities – inquiry-based and creativity-based ones ● Expected final products ● Achievements' assessment
Forming teams	By subjects or by schools	Mindmap: Formed teams of 3-4 teachers with common interests	Miro Mural
Planning the methods for work with students	In teams: formulating a hypothesis about appropriate activities corresponding to the general topic chosen and students age	Hypothesis	
Ethical issues	**Discussion** about potential treads of exclusion of students – due to healthy problems, etc. How should everyone, including children with SEN, be included in the IBL project?	Discussion	Literature on the topic, conversation with an experienced colleague and / or a colleague specialized in working with children with SEN

Subphase	Activity	Tools	Learning/Digital Resources
Methodology	Description of needed information to organize the activity: ● Available websites and weather resources ● Available artefacts – old pictures, photos, old newspapers etc. ● Printouts - paper dolls etc.	File	● Links to appropriate websites ● Links to virtual museums, galleries; ● Links to appropriate printouts
Phase 3: Data Collection			**Ex. duration: 30 min**
Collect information about weather stations and websites	Study weather stations and weather web sites, – what is the covered period	Files: Electronic tables, text documents	
Collect information about virtual museums and virtual collections	Study virtual museum and their collections, available in local language	Files: Electronic tables, text documents	
Collect information about games and gamification activities, that could be related to the topic	Identify appropriate games or gamification activities – web sites, web games, print-outs, templates for paper dolls and others.	Files: Electronic tables, text documents	
Collect artefacts by visiting a (school) library - optional	Investigate how you can find real artefacts such as old newspapers, paper bulletins, photos and others to bring them in the class	Artefact	
Phase 4: Data Analysis			**Ex. duration: 30 min**
Categorizing data	Evaluation and ranking the websites according to specific criteria	File: electronic tables	
Summary of the student's activities	Summarizing the ideas for amusing activities and others teachers' ideas	Files	

Subphase	Activity	Tools	Learning/Digital Resources
	related to the students' learning activities		
Phase 5: Interpretation			**Ex. duration: 1 hour**
Training design	Create a basic design for classroom training with technologies: goals, activities, responsibilities, materials, equipment	Files: Text file – design description	Template for training design description
Reflection	Discussion in teams on the possibilities for contextualizing the common scenario design	Reflection	
Phase 6: Communication			**Ex. duration:2 hours**
Scenario design presentation	Presenting the design of the training scenarios in front of the whole groups	Files: ● Computer presentation (*PPT, *PPTX, *Prezi, others), ● Text documents (*DOC, *DOCX, *PDF, others) Discussion, comments, feedback by other participants to the presenting team	Assessment card for evaluation of the training design
Feedback	Participants provide critical feedback, suggestions, comments to the presenters	Discussion	Zoom, Google meet, Microsoft teams
Possibilities for follow-up public dissemination of the results	The participants generate ideas for public presentation of the results after the training delivery – selecting a repository / online platform for sharing experience, collecting	Mindmap	Miro Mural

Subphase	Activity	Tools	Learning/Digital Resources
	artefacts (photos, videos), In place presentation on school corridors, etc.		
Reflection at the end of the teachers' training	The teachers assess the role of the IBL in comparison with other teaching / learning methods, assessing advantages and disadvantages of the IBL. They provide self-assessment of the design developed during the training and generate suggestions for improvement.	Reflection	Self-assessment cards

Title	Bionic architecture of the future How nature can inspire the future architects?
Country	Bulgaria
Scenario Rationale (explain your reasoning behind offering this course/what is the marked need for this course/how this course fulfils these needs.)	During this scenario, teachers will prepare learning activities explaining the principles of the bionics, presenting the nature as a source of inspiration for ideas for more resilient architecture. For students: The scenario aims to explain the concepts behind "bionics" and to show how plants and animals can provide ideas for many engineering and architecture solutions. From the ancient times, the man used the nature as a source of inspiration for improving his architectural, engineering and construction tasks. First people observed and imitated plants and animals intuitively, but lately this became a fully conscious approach. Nature is reach in solutions and original examples of how to build, construct and design spaces for living, hiding and moving. The date of birth of the science called "bionics" is considered to be September 13, 1960. On this day in Dayton, USA, scientists from around the world meet at a special forum dedicated to "living prototypes in artificial systems - the key to new technology." Bionics is a science, dedicated to investigate the application of methods and systems found in the nature, to study their principles, and to transfer them in the design of complex engineering systems and modern technologies. The great Leonardo da Vinci is considered as the father of the bionics. In the records and sketches of the genius, people can find the first attempts to technically implement some of the natural solutions, found for example in the constructing flying machines similar to birds. Bionics does not blindly copy the nature, but aims to take the most rational, the best, the most perfect constructive ideas. Its emblem expresses this approach - a scalpel and a soldering iron, united with the symbol of the integral and the motto "living prototypes - the key to new technologies".
Scenario objectives (teachers' competence development - knowledge, skills, dispositions/ attitudes)	Develop teacher's competences related to: ● IBL methodologies application in class, using active methods and hands-on activities; ● Explore new technologies and their affordances as a tool for more effective lesson planning and orchestration of this learning; ● Explore games and digital tools; ● Carry out an inquiry to learn about designing an Inquiry-Based Learning lesson involving reflection on learning and exchange with peers; ● Plan, organize and assess students' inquiry activities;

	● Plan, manage and coordinate an IBL lesson [in an online learning environment]; ● Develop critical attitudes to one's own learning ● Disposition to promote students' IBL skills as a useful way to participate in scientific development
Learning outcomes (aspects of competences addressed)	The teachers will be able to: - plan and design a multidisciplinary and interdisciplinary scenario, bridging the gap between the different disciplines - integrate digital tools in their teaching - combine digital tools with hands-on activities and experimental processes - develop an IBL lesson involving knowledge transfer and reflection between the students
Training outline/methodology (briefly explain the expected level of inquiry – confirmation, structured, guided, open, and how many and which phases of the IBL model are included. The first and last one are obligatory)	IBL: ● Structured inquiry ● Explore sources of information and facts about bionics principles and examples Gamification: ● Hands-on activities/experiments with DIY materials ● Exposition of models Digital tools: Online sources of information, Online gallery, database with good examples
Time for completing (How many learning hours are needed for teachers to complete the scenario**)**	**Overall: 4 hours of training** **For 45 minutes lesson: 3 hours of training** **3 attendance classes (blended learning)** **Phase 1** – 1 learning hour **Phase 2** – 30 minutes **Phase 6** – 30 minutes **3 distant classes** **Phase 3**– 30 minutes **Phase 4** – 30 minutes **Phase 5** – 1 hour
Assessment	Formative assessment, protfolio

DURATION

Subphase	Activity	Tools	Learning Resources
Phase 1: Problem / topic			**Ex. duration: 30 min.**
Motivation	Bioarchitecture of the future – explore the following examples and find more details about the buildings;	Individual work, Research more information about the following buildings: ● Nautilus house, Mexico - here ● Urban Cactus, Rotterdam - here ● World Trade Center, Bahrain- here	How do you feel about these buildings? What are the main achievements in these buildings? Explore other pictures and examples as in annex 1.
Introduction to the topic	Read the introduction text for the scenario. Find more sources and information about the bionics and about other inventions, inspired by the nature.	Internet sources File links	
Specify the context	Formulating the problem situation/ hypothesis	Brainstorming and mind map: ● Where we can find more examples of the bionics?	Google Jamboard
Reflection	Understanding the different aspects that need to be considered when introducing training and learning about bionics. What are its main principles?	Reflection	Hints: ● Interdisciplinary links with STEM, and ART subjects? ● Could you combine this activity with an outdoor activity such as a visit to specific buildings, artefacts in your town?
Phase 2: Operationalization			**Ex. duration:**
Indicators for successful learning design	TODO List	Notes ● Questions:	Hints: ●General topic of the educational project ●List of disciplines, related to the topic

Subphase	Activity	Tools	Learning Resources
		● Is there a ban on using mobile devices in the school? ● How to organize training for children with SEN	● learning goals, outcomes and activities – inquiry-based and creativity-based ones ● Expected final products ● Achievements' assessment
Planning the methods for work with students	In teams: formulating a hypothesis about appropriate activities corresponding to the general topic and students age	Hypothesis	
Ethical issues	**Discussion** about potential treads of exclusion of students – due to healthy problems, etc. How should everyone, including children with SEN, be included in the IBL project?	Discussion	Literature on the topic, conversation with an experienced colleague and / or a colleague specialized in working with children with SEN
Methodology	Description of needed information to organize the activity: ● Available websites and resources ● Printouts	File	● Links to appropriate websites ● Links to appropriate printouts
			●
Phase 3: Data Collection			**Ex. duration:**
Collect information about DIY activities for children	Study web sites and discuss with other teachers appropriate ideas for DIY activities	Files: Electronic tables, text documents	Consider ideas such as described in Annex 2

Subphase	Activity	Tools	Learning Resources
Collect information about games and gamification activities, that could be related to the topic	Identify appropriate games or gamification activities – web sites, web games, print-outs, templates	Files: Electronic tables, text documents	
Collect information for the activity "Bionics in my town"	Investigate if you can find examples of the implementation of the bionic in your town. Draft an exploration list such as in Annex 3	Files, Design an exploration list and printouts as in the example;	Consider ideas such as: Annex 3
Phase 4: Data Analysis			**Ex. duration:**
Summary of the student's activities	Summarizing the ideas for amusing activities and others' ideas related to the students' learning activities	Files	
Phase 5: Interpretation			**Ex. duration:**
Training design	Create a basic design for classroom training activities, exploring the learnings goals and objectives, technologies, game activities, equipment	Files: Text file – design description	Template for training design description
Reflection	Discussion in teams on the possibilities for contextualizing the common scenario design	Reflection	
Phase 6: Communication			**Ex. duration:**
Scenario design presentation	Presenting the design of the training scenarios in front of the whole groups	Files: • Computer presentation (*PPT, *PPTX, *Prezi, others),	Assessment card for evaluation of the training design

Subphase	Activity	Tools	Learning Resources
		● Text documents (*DOC, *DOCX, *PDF, others) Discussion, comments, feedback by other participants to the presenting team	
Feedback	Participants provide critical feedback, suggestions, comments to the presenters	Discussion	Zoom, Google meet, Microsoft teams
Reflection at the end of the teachers' training	The teachers assess the role of the IBL in comparison with other teaching / learning methods, assessing advantages and disadvantages of the IBL. They provide self-assessment of the design developed during the training and generate suggestions for improvement.	Reflection	Self-assessment cards

Annex 1. Inspiration

"Nautilus" House, Mexico	  
Urban Cactus, Rotterdam	
World Trade Center, Bahrain	

Explore similarities in the examples below:

	
Termite in the Valencia Biopark	**Straw huts in Nairobi**
	
Siberian spruce	**Temple Kōfuku-ji, Nara, Japan**
	
Wood	**The Temple of Artemis, Efes**

Annex 2

Follow the model and design DIY activities for kids, that can be made in your classroom.
Prepare a step-by-step instruction and recipe, including materials, time, and processes for your students;

DIY1 - Stone art in the architecture designs

Photos of the expected results	
	
Materials needed:	- Pebbles of various shapes and smooth surface, - Painting materials: colorful paints, brushes, - water container, - paper napkins
Time:	10- 15 min
Project steps:	1. Make a project of the drawing (plants, insects, fish, birds, sun, etc.) that you will make on the stone. 2. Choose a suitable stone in shape and surface. 3. Apply the base color on the stone with a flat brush and allow to dry. 4. Draw the design of the drawing on the stone using paint brushes. 5. Decorate your classroom and make an exhibition with your works of art!

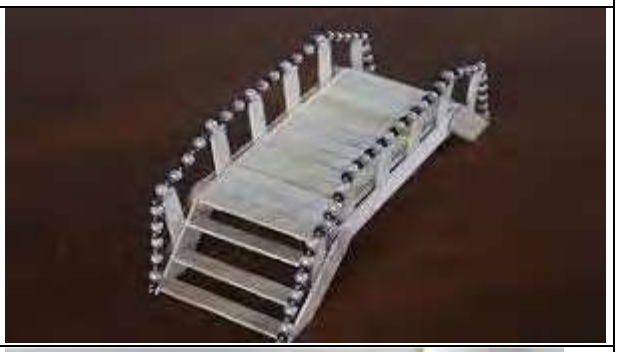
DIY2 - Building a bridge for the future

Explore the story:

Clifton Suspension Bridge

This bridge is designed in 1831 by the famous English engineer Brunel. Though Brunel's projects were not always successful, they often contained innovative solutions to long-standing engineering problems.
One day, while walking in the garden, he was surprised to see that numerous cobwebs were hanging from the trees and bushes, and even the strong wind could not tear them. Thus, the desired image of the new bridge structure, similar to a spider's web, suddenly appeared in front of the eyes of the engineer.

Build your own bridge!

Photos of the expected results	
	
	
Materials needed:	- wooden sticks, straws, - glue, clips, - beads for decoration, paints and a paint brush.
Time:	10- 15 min
Project steps:	1. Draw a model of your future bridge. You can use the ideas presented in the photos or make your own unique design.

	2. For the base of the bridge, arrange several wooden sticks next to each other (5-6 sticks). 3. Place one cross stick with glue at both ends so that you get a platform that will be a solid foundation for the bridge. 4. Do the same with a few more platforms depending on how long you plan to have your bridge. 5. Attach the platforms to each other with cross sticks. 6. If you want to make U-shaped railings of the bridge from the rods by attaching them with ash to each other. Glue them in the middle of a bridge. 7. Use your imagination and decorate your bridge. 8. Test its strength.

Title	Cataclysm in a bottle
Country	Bulgaria
Scenario Rationale (explain your reasoning behind offering this course/what is the marked need for this course/how this course fulfils these needs.)	The planet Earth is constantly changing over time. These changes are difficult to see and realize in a human life, but when we look back in time we can discover clear evidence of how the nature has changed. The climate has a huge impact on the biosphere and on all living organisms on Earth. During the last few years are recorded several devastating weather cataclysms in different places around the globe, such as floods, prolonged droughts, forest fires, severe storms, hurricanes and unbearable heat. This scenario aims to explain the causes of the natural cataclysms by using in-class experiments and active learning approaches. These activities can inspire more in-depth research projects. For students: The scenario aims to explain how form different natural phenomena. For teachers: This scenario aims to assist teachers to introduce and orchestrate a lesson for natural cataclysms, based on in-class experiments and following the inquiry-based principles. Inquiry elements: ● students will learn about the extreme weather phenomena; ● students will make hands-on experiments. ● Scenario can serve as introduction activity for more in-depth investigation of specific weather cataclysm.
Scenario objectives (teachers' competence development - knowledge, skills, dispositions/ attitudes)	Develop teacher's competences related to: Develop Teachers' Knowledge: ● Develop teachers' Pedagogical Knowledge in terms of underlying concepts belonging to STEM domains, insights in learning and teaching according to IBL methodology; ● Develop teachers' knowledge on a design of "non-traditional" training. ● Develop teachers' knowledge on new technologies and their affordances as a tool for more effective lesson planning and orchestration of this learning; Improve teachers' skills to: ● Carry out an inquiry to learn about designing an Inquiry-Based Learning lesson involving reflection on learning and exchange with peers; ● Plan, organize and assess students' inquiry activities; ● Plan, manage and coordinate an IBL lesson; ● Know and use new technologies and apply them in class - to conduct technology-enhanced learning.

	Form Attitudes ● Develop critical attitudes to one's own learning Disposition to promote students' IBL skills as a useful way to participate in scientific development
Learning outcomes (aspects of competences addressed)	After the training the participating teachers will be able to: ● Design and implement an IBL lesson (or series of lessons), related to searching and interpreting information for natural cataclysms, ● Develop a plan for scenario for lesson, covering inquiry-based learning and experiments; ● Make interdisciplinary connections and links with other subjects (STEM)
Training outline/methodology (briefly explain the expected level of inquiry – confirmation, structured, guided, open, and how many and which phases of the IBL model are included. The first and last one are obligatory)	IBL: ● Structured inquiry ● Explore sources of information and facts about natural cataclysms Gamification: ● Hands-on activities/experiments with DIY materials Digital tools: Online sources of information, Online gallery, database with good examples
Time for completing (How many learning hours are needed for teachers to complete the scenario**)**	**Overall: 6 hours of training** **For 45 minutes lesson: 6 hours of training** **4 hours of attendance class (blended learning)** **Phase 1** – 1,5 learning hours **Phase 2** – 30 minutes **Phase 6** – 2 learning hours **2 hours of distant work** **Phase 3**– 30 minutes **Phase 4** – 30 minutes **Phase 5** – 1 hour
Assessment	● Participation in: ○ the brainstorming and discussions sessions ○ activity in the electronic platform ● Design of the learning process (predefined assessment criteria) Presentation of the learning design

DURATION

Subphase	Activity	Tools	Learning Resources
Phase 1: Problem / topic			**Ex. duration:**
Motivation	Individual task: Make a short investigation about the most severe climate phenomena in your region (droughts, floods, heat peaks, seasons). Do you or your students have personal experience surviving some extreme weather conditions?	Individual work	
Introduction to the topic	Investigate extreme weather events during the last two or three years. Prepare an infographic with a timeline and put some pictures or evidences.	Identify reliable sources of information.	Canva, PPTX,
Specify the context	Formulate the problem situation/ hypothesis	Make a mind map: ● Which natural phenomena to explain?	Miro Mural
Reflection	Understanding the different aspects that need to be considered when introducing training and learning about extreme climate conditions.	Reflection	Hints: ● How to make the activity more amusing for pupils? ● Could you involve STEM teachers from subjects such as (chemistry, biology, etc) and make interdisciplinary links?
Phase 2: Operationalization			**Ex. duration:**
Indicators for successful learning design	TODO List	Notes	Hints:

Subphase	Activity	Tools	Learning Resources
		Questions: ● Is there a ban on using mobile devices in the school? ● How to organize training for children with SEN	●General topic of the educational project ●List of disciplines, related to the topic ●learning goals, outcomes and activities – inquiry-based and creativity-based ones ●Expected final products ●Assessment model
Planning the methods for work with students	Formulate hypothesis about appropriate activities corresponding to the general topic chosen and the students' age	Hypothesis	
Ethical issues	**Discussion** about potential treads of exclusion– due to healthy problems, etc. How should everyone, including children with SEN, be included in the IBL project?	Discussion	Literature on the topic, conversation with an experienced colleague and / or a colleague specialized in working with children with SEN
Safety issues	**Ensure that experiments are appropriate for the age and the skills of the students; Make safety rules and carefully plan contingency activities.**	Prepare a list with safety rules; Firefighter; First aid kit; Napkins, Rubber gloves; Safety plastic glasses Waterproof apron; others	
Methodology	Description of the sources of information to organize the activity:	File	● Links to appropriate websites

Subphase	Activity	Tools	Learning Resources
	● Websites with additional information ● Printouts – working lists, tables with recycling options, others ● Artefacts for making the experiments		● Links to appropriate printouts ● List of artefacts
Phase 3: Data Collection			**Ex. duration:**
Collect information about extreme weather events	Study web sites and collect information about natural phenomena	Files: Electronic tables, text documents	
Collect information about making DIY experiments in class	Study information about DIY experiments in class; Explore good practices, collections and others	Files: Electronic tables, text documents	
Collect information about games and gamification activities, that could be related to the topic	Identify appropriate games or gamification activities – web sites, web games, print-outs, templates and others.	Files: Electronic tables, text documents	
Phase 4: Data Analysis			**Ex. duration:**
Categorizing data	Evaluation and ranking the websites according to specific criteria	File: electronic tables	
Summary of the student's activities	Summarizing the ideas for amusing activities and others teachers' ideas related to the students' learning activities	Files	
Phase 5: Interpretation			**Ex. duration:**

Subphase	Activity	Tools	Learning Resources
Training design	Create a basic design for classroom training with exploring appropriate technologies: goals, activities, responsibilities, materials, equipment	Files: Text file – design description	Template for training design description
Describe the experiments	Following the examples in Annex 1, describe the experiments that you want to explore in class	Files: Text file –description of the experiments	
Reflection	Discussion in teams on the possibilities for adaptation and modification of the scenario design	Reflection	
Phase 6: Communication			**Ex. duration:**
Scenario design presentation	Present the design of the training scenarios in front of the whole groups	Files: ● Computer presentation (*PPT, *PPTX, *Prezi, others), ● Text documents (*DOC, *DOCX, *PDF, others) Discussion, comments, feedback by other participants to the presenting team	Assessment card for evaluation of the training design
Feedback	Participants provide critical feedback, suggestions, comments to the presenters	Discussion	Zoom, Google meet, Microsoft teams

Annex 1.
List with experiments

1. THE VOLCANO MASTER

	
Materials:	-medium-size jar or metal medium-tall box, -a metal tray in which to perform the experiment. -vinegar, - baking soda, -a teaspoon of liquid soap, stirrer, napkin, -plasticine, - red egg paint (or confectionery paint, or strawberry flavor red colorant),
Time	20 minutes
Step-by-Step instruction	1. Place the jar in the tray. 2. Wrap the jar with plasticine or metal folio. Make it to look like a real volcano – they have the shape of a pyramid with a cut top! 3. Make from plasticine or other material various animals, plants, houses. 4. Place the figures and houses around the volcano and see if the hot lava will reach them ... 5. Pour the vinegar to half of the jar, then put the red dye (we all know that the color of the lava is RED). 6. Add the liquid soap, it will turn into a big volcanic bomb. 7. Put the baking soda in the piece of napkin. Fold the napkin in a way that the soda cannot fall out of it. 8. Count slowly 10-9-8-7-6…3-2-1 and put the napkin with the soda in the

	jar. The Volcano will erupt in a second!

2. TORNADO IN A JAR

	
Materials:	-medium-size jar or bottle, - liquid soap, - brocade particles, - colorant
Time	5 minutes
Step-by-Step instruction	1. Fill the bottle with water 2. Color it lightly with blue paint. 3. Add a little (as much as the bottle cap) liquid soap to the already colored water. 4. Add some of the brocade particles. 5. Close the bottle and tighten well, because it becomes dangerous! 6. Turn the bottle upside down and turn it clockwise, because in our hemisphere, winds, storms move in that direction. Watch the whirlwind of your powerful tornado.

3. TZUNAMI IN A JAR

	
Materials:	-medium-size jar or bottle, - colored blue paint, - oil
Time	5 minutes
Step-by-Step instruction	1. Fill the half of the bottle or jar with water 2. Pour the colored blue paint into the bottle. 3. Fill the other part with oil. 4. Tighten the bottle cap and turn it horizontally. 5. Hold the bottle with both hands and swing it so that a huge tsunami wave forms in it.

4. CLOUD EXPLORER

	
Materials:	- ice cream stick, - cardboard,

	- pencils (if students will draw the types of clouds) or printed clouds, - glue, scissors, - research notebook.
Time	15 minutes
Step-by-Step instruction	1. Cut the cloud observer frame 2. Go outside or near the window and look at the sky 3. Make observations 4. Record the results in the research notebook. Do not forget to put the date, the place and the hour.

Title	A treasure hunt in the recycle bin
Country	Bulgaria
Scenario Rationale (explain your reasoning behind offering this course/what is the marked need for this course/how this course fulfils these needs.)	Every year, over 3,000 million of tons of household waste are dumped in Bulgaria. This makes about 450 kg per person. More than half of the waste is biodegradable, and biodegradable waste can also be recycled or composted. Some estimations show that about 60% of the waste is biodegradable, and 38% from it is a food waste - fruit and vegetable peels, tea bags, other organic products - paper or cardboard. For students: This scenario aims to introduce the concepts of recycling and the savings from the recycling of different types of waste. For teachers: This scenario aims to assist teachers who would like to design their own scenario about waste, recycling and composting using inquiry-based methodology.
Scenario objectives (teachers' competence development - knowledge, skills, dispositions/ attitudes)	Develop teacher's competences related to: Develop Teachers' Knowledge: ● Develop teachers' Pedagogical Knowledge in terms of underlying concepts belonging to STEM domains, insights in learning and teaching according to IBL methodology; ● Develop teachers' knowledge on a design of "non-traditional" training. ● Develop teachers' knowledge on new technologies and their affordances as a tool for more effective lesson planning and orchestration of this learning; Improve teachers' skills to: ● Carry out an inquiry to learn about designing an Inquiry-Based Learning lesson involving reflection on learning and exchange with peers; ● Plan, organize and assess students' inquiry activities; ● Plan, manage and coordinate an IBL lesson [in an online learning environment]; ● Know and use new technologies and apply them in class - to conduct technology-enhanced learning. Form Attitudes ● Develop critical attitudes to one's own learning ● Disposition to promote students' IBL skills as a useful way to participate in scientific development
Learning outcomes	After the training the participating teachers will be able to: ● Design and implement an IBL lesson (or series of lessons), related to searching and interpreting information, exploring waste and recycling opportunity,

	● Develop a plan for scenario for conducting technology-enhanced lesson in class or online; ● Make interdisciplinary connections and links with other subjects (STEM, ART)
Training outline/methodology	Guided inquiry The Six phases of IBL model are included
Time for completing (How many learning hours are needed for teachers to complete the scenario)	**Overall: 6 hours of training** **For 45 minutes lesson: 6 hours of training** **4 hours of attendance class (blended learning)** **Phase 1** – 1,5 learning hours **Phase 2** – 30 minutes **Phase 6** – 2 learning hours **2 hours of distant work** **Phase 3**– 30 minutes **Phase 4** – 30 minutes **Phase 5** – 1 hour
Assessment	● Participation in: o the brainstorming and discussions sessions o activity in the electronic platform ● Design of the learning process (predefined assessment criteria) ● Presentation of the learning design

DURATION

Subphase	Activity	Tools	Learning/Digital Resources
Phase 1: Problem / topic			**Ex. duration: 1,5 learning hours**
Motivation	Task: Individual task: research what kind of waste is dumped at home within a week / or a day. Record the results on the Worksheet 1. Calculate the % of waste that is subject to recycling: paper, plastic, glass, metal, organic waste.	Individual work	
Introduction to the topic	Task: What's in the recycle bin (trash can) in the room? Materials needed - a base of biodegradable material (such a large piece of paper) on which to dispose the content of the recycle bin, a pair of disposable gloves. The content of the recycle bin is displayed, the trash is sorted out by types of recycling. A list is made and for each category, are calculated the % of the waste that can be recycled: paper, plastic, glass, metal, organic waste.	Discussion: ● How much of the waste can be recycled: paper, plastic, glass, metal, organic waste? ● What kind of scenario can best introduce the topic of recycling waste, forming attitudes, skills and knowledge on the topic?	Zoom, Google meet, Microsoft teams
Specify the context	Formulate the problem situation/ hypothesis	Brainstorming and mind map: ● How pupils can learn better about recycling?	Miro Mural
Reflection	Understanding the different aspects that need to be considered when introducing training and learning about waste management and recycling at home.	Reflection	Hints: ● How to make the activity more amusing for pupils? ● Could you involve STEM teachers from subjects such as (chemistry, biology, etc) and make interdisciplinary links?

Subphase	Activity	Tools	Learning/Digital Resources
Phase 2: Operationalization			**Ex. duration: 1 learning hour**
Indicators for successful learning design	TODO List	Notes Questions: ● Is there a ban on using mobile devices in the school? ● How to organize training for children with SEN	Hints: ● General topic of the educational project ● List of disciplines, related to the topic ● learning goals, outcomes and activities – inquiry-based and creativity-based ones ● Expected final products ● Assessment model
Forming teams	By subjects or by schools	Mindmap: Form teams of 2-3 teachers with common interests	Miro Mural
Planning the methods for work with students	In teams: formulate hypothesis about appropriate activities corresponding to the general topic chosen and the students' age	Hypothesis	
Ethical issues	**Discussion** about potential treads of exclusion– due to healthy problems, etc. How should everyone, including children with SEN, be included in the IBL project?	Discussion	Literature on the topic, conversation with an experienced colleague and / or a colleague specialized in working with children with SEN
Methodology	Description of the sources of information to organize the activity: ● Websites with additional information ● Printouts – working lists, tables with recycling options, others	File	● Links to appropriate websites ● Links to appropriate printouts
Phase 3: Data Collection			**Ex. duration: 30 min**

Subphase	Activity	Tools	Learning/Digital Resources
Collect information about waste types and their recycling	Study web sites and collect information about types of waste and how it can be recycled	Files: Electronic tables, text documents	
Collect information about composting	Study information about composting	Files: Electronic tables, text documents	
Collect information about games and gamification activities, that could be related to the topic	Identify appropriate games or gamification activities – web sites, web games, print-outs, templates and others.	Files: Electronic tables, text documents	
Phase 4: Data Analysis			**Ex. duration: 30 min**
Categorizing data	Evaluation and ranking the websites according to specific criteria	File: electronic tables	
Summary of the student's activities	Summarizing the ideas for amusing activities and others teachers' ideas related to the students' learning activities	Files	
Phase 5: Interpretation			**Ex. duration: 1 hour**
Training design	Create a basic design for classroom training with exploring appropriate technologies: goals, activities, responsibilities, materials, equipment	Files: Text file – design description	Template for training design description
Reflection	Discussion in teams on the possibilities for adaptation and modification of the scenario design	Reflection	
Phase 6: Communication			**Ex. duration:2 hours**
Scenario design presentation	Present the design of the training scenarios in front of the whole groups	Files: ● Computer presentation (*PPT, *PPTX, *Prezi, others), ● Text documents	Assessment card for evaluation of the training design

Subphase	Activity	Tools	Learning/Digital Resources
		(*DOC, *DOCX, *PDF, others) Discussion, comments, feedback by other participants to the presenting team	
Feedback	Participants provide critical feedback, suggestions, comments to the presenters	Discussion	Zoom, Google meet, Microsoft teams
Possibilities for follow-up public dissemination of the results	Participants generate ideas how to involve parents, school administration or local community (public gardens) in the scenario implementation.	Mindmap	Miro Mural

Title	Planning vacation on a plastic island?! Just bring some bacteria!
Country	Bulgaria
Scenario Rationale (explain your reasoning behind offering this course/what is the marked need for this course/how this course fulfils these needs.)	**Scenario goals and objectives:** To generate ideas for tackling with the "floating plastic islands" which become an increasing environmental problem. To introduce the problem of the floating plastic islands, the teachers will have to explore the problem in a more general perspective. What kind of materials were used before the "plastic age" in which we live? The word plastic comes from ancient Greek and means "flexible, easy to shape". The first predecessors of today's plastic were synthesized from natural materials in the second half of the XIX century: rubber, celluloid for photographic films, fabrics - substitutes for expensive natural silk. The first all-artificial plastic was invented in the early twentieth century - this is the bakelite. From the years 1930s, production of plastics become an industry. This happens with the advent of vinyl (PVC, PVC, polyvinyl chloride), nylon, polyethylene and Teflon. Polypropylene was discovered in the 1950s. The production of plastics developed during the Second World War and after it, finding application in many domestic and industrial applications. In the modern world, man is surrounded by plastic - plastic bags, plastic bottles, straws, cups, plates, toys ... Plastic waste does not always end up in garbage containers. Some of them end up in the world's oceans. There they remain invisible to humans, but gathered in one place, endanger the lives of aquatic life. About 140 million tons of synthetic waste are already floating in the Earth's oceans. Every year they increase by 8 million tons. Scientists have estimated that with this rate of plastic use by 2050, there will be more plastic in the water than fish. These facts sound really alarming. It is practically impossible to make people stop using plastic. However, can technology be used to "destroy" plastic and make everything biodegradable? For students: to learn more about the problem of plastic waste and to generate ideas for tackling with the "floating plastic islands". For teachers: This scenario aims to enable teachers to organize and adapt an inquiry-based learning plan, combining both digital technologies and open digital resources and tools, with gamification approaches, quizzes, crosswords, games and others. Inquiry elements: ● Hands-on activities: students need to explore what was the weather in that specific day (temperature, precipitations, storms); ● Experimental processes and data analysis ● At the end, students can make a poster presentation and

	exhibition;
Scenario objectives (teachers' competence development - knowledge, skills, dispositions/ attitudes)	Students develop skills such as problem solving, socialisation and cooperative work, personal autonomy, the ability to interact, the development of values, the simulation of situations and their decision-making skills. Teachers develop and improve competences related to: ● Digital skills ● Scenarios' development using IBL methodology and gamification ● Improve their digital teaching ● Evaluate students' activities ● Integrate digital tools in their teaching ● Bridge different disciplines under a topic Improve teachers' skills to: ● Carry out an inquiry to learn about designing an Inquiry-Based Learning lesson involving reflection on learning and exchange with peers; ● Plan, organize and assess students' inquiry activities; ● Plan, manage and coordinate an IBL lesson [in an online learning environment]; ● Know and use new technologies and apply them in class - to conduct technology-enhanced learning. Form Attitudes ● Develop critical attitudes to one's own learning ● Disposition to promote students' IBL skills as a useful way to participate in scientific development
Learning outcomes (aspects of competences addressed)	After the training the participating teachers will be able to: ● Design and implement an IBL lesson (or series of lessons), related to searching and interpreting information about plastic waste, ● Develop a plan for scenario for conducting technology-enhanced lesson in class or online; ● Make links with other subjects (biology, geography, STEM, ART) ● Prepare a set of instructions for use of maps, digital instruments, mobile devices in class for educational purposes.
Training outline/methodology (briefly explain the expected level of inquiry – confirmation, structured, guided, open, and how many and which phases of	Guided inquiry The Six phases of IBL model are included

the IBL model are included. The first and last one are obligatory)	
Time for completing **(**How many learning hours are needed for teachers to complete the scenario**)**	**Overall: 4 hours of training** **For 45 minutes lesson: 4 hours of training** **3 attendance classes (blended learning)** **Phase 1** – 1 learning hour **Phase 2** – 30 minutes **Phase 6** – 30 minutes **3 distant classes** **Phase 3**– 30 minutes **Phase 4** – 30 minutes **Phase 5** – 1 hour
Assessment	● Participation in: ○ the brainstorming and discussions sessions ○ activity in the electronic platform ● Design of the learning process (predefined assessment criteria) ● Presentation of the learning design

DURATION

Subphase	Activity	Tools	Learning/Digital Resources
Phase 1: Problem / topic			**Ex. duration: 1 learning hour**
Motivation	Task: Explore information about plastic waste, select videos, text and pictures.	Individual work	Links (BG) - https://www.eea.europa.eu/bg/articles/ekologichni-li-sa-novite-produkti - https://www.europarl.europa.eu/news/bg/headlines/priorities/borbata-ss-zamrsiavaneto-s-plastmasa
Introduction to the topic	Task - Brainstorming: What are the consequences of the plastic overuse and plastic waste: A) for the Ocean life and animals? B) for the wild life on the land (terrestrial inhabitants)?	Discussion: ● What happens to the plasϴc waste? ● What is disposable life of the plastic waste? ● What is the impact of the plasϴc waste?	Zoom, Google meet, Microsoft teams
Specify the context	Formulating the problem situation/ hypothesis	Brainstorming and mind map: ● "Plastics - our friend or foe?" ● Provide evidences	Miro Mural
Reflection	Understanding the different aspects that need to be considered when introducing training and learning about plastic waste and the life in the Oceans.	Reflection	Hints: ● How to make this activity more amusing for the pupils? ● Could you involve teachers and make internal links with other subjects (STEM, history, ART) and form a team?
Phase 2: Operationalization			**Ex. duration: 1 learning hour**
Indicators for successful learning design	TODO List	Notes	Hints: ●General topic of the educational project ●List of disciplines, related to the topic

Subphase	Activity	Tools	Learning/Digital Resources
		Questions: ● Is there a ban on using mobile devices in the school? ● Using online maps? ● How to organize training for children with SEN	●learning goals, outcomes and activities – inquiry-based and creativity-based ones ●Expected final products ●Achievements' assessment
Planning the methods for work with students and methodology	Select and plan tools and materials for Warming up activity	Brainstorming and collection of ideas	Hints: ● How to make this activity more attractive for pupils?
	Games and digital tools, corresponding to the students age	Digital quiz games Online maps Online videos	● Links to appropriate websites
	Description of needed information to organize the activity: ● Available websites ● Maps, printouts	File	● Links to appropriate websites ● Links to online maps; ● Appropriate printouts
Ethical issues	**Discussion** How should everyone, including children with SEN, be included in the IBL project?	Discussion	Literature on the topic, conversation with an experienced colleague and / or a colleague specialized in working with children with SEN
Phase 3: Data Collection			**Ex. duration: 30 min**
Collect information about life-cycle of the plastics	Collect data about the life-cycle and life-span of some of the most used plastic products?	Files: Electronic tables, text documents	Hints: https://www.wwf.org.au/news/blogs/the-lifecycle-of-plastics
Collect information about plastic islands	Students/Teachers explore more specifically the plastic islands	Files: Electronic tables, text documents	Hints:

Subphase	Activity	Tools	Learning/Digital Resources
	• What are plastic islands, what can you find in them?		• How plastic waste accumulates in large plastic islands in the ocean? • What are the short-term and long-term consequences of the plastic waste?
Collect information and localize the largest plastic islands on the map.	• Search for information for the location of the largest plastic islands and find them on a map. • Determine which is the approximate distance from your place?	Files: Electronic maps, text documents, printouts	Google maps / Google Earth https://earth.google.com ARCGIS or other online maps.
Collect information about "Plastic-eating organisms"	• Study: "Plastic-eating organisms – are there fantastic creatures?"	Files: Electronic tables, text documents	For example: https://en.wikipedia.org/wiki/Ideonella_sakaiensis
Prepare a collection (artefacts) for a practical activity - optional	Students need to recognize which material can be biodegradable. • Materials for a practical activity "Which of these materials can be eaten?"	Artefacts or Printouts- "collection" of different materials	Select printouts of specific types of plastic waste
Phase 4: Data Analysis			**Ex. duration: 30 min**
Categorizing data	Brainstorming, students work on groups: Select some of the most used by the group types of plastic waste and make a time-line;	Brainstorming, Discussion: Post-it notes	Write ideas on post-it notes and rank them in the direction Biodegradable/ Plastics with short life-span/Long life-span;
	"What to do if you can't recycle it ?!"	Brainstorming, Discussion: Post-it notes	Write ideas on post-it notes and rank them in the direction

Subphase	Activity	Tools	Learning/Digital Resources
	Ask students, working in groups, to suggest ways to reduce the use of plastic by humans.		- from personal / individual contribution (number with number 1) to global policy (number consecutively with 2, 3…, etc.). Use Miro, Mural, Google Jamboard or post-it notes
Summary and reflection of the student's activities	Summarize the ideas	Files	
Phase 5: Interpretation			**Ex. duration: 1 hour**
Training experiments and hands-on activities	Create a basic design for classroom training: • Design a poster / brochure with a message on the topic: How to replace the plastics?	Files: Text file	Template for training design description Templates for posters; Templates for brochures; MS Powerpoint; Canva; Picktochart; MS Sway;
	Storytelling: • Compose a fairy tale for the path of a plastic bottle - create an infographic, an e-book or a scrap-book	Files: Text file	Guidelines for making a fairy tale; Templates for an infographic e-book or scrap-book; Canva; Picktochart; MS Powerpoint; MS Sway;
Reflection	Discussion in teams on the possibilities for contextualizing the scenario design	Reflection	
Phase 6: Communication			**Ex. duration:2 hours**
Scenario design presentation	Presenting the design	Files: ● Computer presentation	Assessment card for evaluation of the training design

Subphase	Activity	Tools	Learning/Digital Resources
		(*PPT, *PPTX, *Prezi, others), ● Text documents (*DOC, *DOCX, *PDF, others) Discussion, comments, feedback by other participants to the presenting team	
Feedback	Participants provide critical feedback, suggestions, comments to the presenters	Discussion	Zoom, Google meet, Microsoft teams
Possibilities for follow-up public dissemination of the results	The participants generate ideas for public presentation of the results after the training and follow-up activities;	Mindmap	Miro Mural
Reflection at the end of the teachers' training	The teachers assess the role of the IBL in comparison with other teaching / learning methods, assessing advantages and disadvantages of the IBL.	Reflection	Self-assessment cards They provide self-assessment of the design developed during the training and generate suggestions for improvement.

SPAIN

Title	Intensive livestock farming
Country	Spain
Scenario Rationale (explain your reasoning behind offering this course/what is the marked need for this course/how this course fulfils these needs.)	The environmental impact of intensive livestock farming makes it a contributor to climate change. The discussion of alternative models is active in Spain, Germany and other countries (link), and it has recently reached the EU parliament. In this scenario students will develop a reasoned position about one of the following alternatives to intensive livestock farming: Certified Organic Livestock, Holistic Management, Pastured pork, and others (full list). They will develop their position on the basis of carrying out an inquiry in small groups.
Scenario objectives (teachers' competence development - knowledge, skills, dispositions/ attitudes)	Develop teacher's competences related to: ● Planning and delivering the curriculum ● Facilitate student learning ● Integrate the students' context into formal education ● Professional development and innovation
Learning outcomes (aspects of competences addressed)	Develop Teachers' Knowledge: ● Content Knowledge about the relation between intensive livestock farming and climate change, about the alternatives to intensive livestock farming ● Develop teachers' Pedagogical Knowledge in terms of underlying concepts belonging to climate change, insights in learning and teaching according to IBL methodology; ● Develop teachers' knowledge on a design of "non-traditional" training. ● Develop teachers' knowledge on new technologies and their affordances as a tool for more effective lesson planning and orchestration of this learning; Improve teachers' skills to: ● Facilitate an inquiry-based learning activity as applied to the specific topic of intensive livestock farming ● Plan, manage and coordinate an IBL lesson that uses gamification and digital tools ● Know and use new technologies and apply them in class - to conduct technology-enhanced learning. Form Attitudes ● Critical attitude towards the topic of intensive livestock farming ● Develop critical attitudes to one's own learning ● Disposition to promote students' IBL skills as a useful way to

	participate in scientific development ● Promote and apply innovative teaching methods
Training outline/methodology (briefly explain the expected level of inquiry – confirmation, structured, guided, open, and how many and which phases of the IBL model are included. The first and last one are obligatory)	Guided inquiry The Six phases of IBL model are included Students receive points or badges when they successfully complete each of the phases of the inquiry process (needs Edmodo platform or similar)
Time for completing (How many learning hours are needed for teachers to complete the scenario**)**	**Overall: 7 hours of attendance classes** **Phase 1** – 1 hour **Phase 2** – 1 hour **Phase 3**– 2 hours **Phase 4** – 1 hour **Phase 5** – 1 hour **Phase 6** – 2 hours
Assessment	● Student involvement in the learning process ● Student performance of the tasks in each phase of the inquiry ● Final result

DURATION

Subphase	Activity	Tools	Learning/Digital Resources
Phase 1: Problem / topic			**Ex. duration: 1 learning hour**
Motivation	Read the newspaper article where the Spanish minister of consumption recommends to eat less meat	https://archive.is/xEiiH	Internet / printed article
Introduction to the topic	Read the newspaper article about what European countries are doing to reduce intensive livestock farming (ILF) and answer the following questions: - What is the general feeling about ILF in these countries? - What are the most common actions that are taken to provide alternatives to ILF in these countries? - Who is promoting these actions in each country? Read about the alternatives to ILF	Newspaper article: https://elpais.com/clima-y-medio-ambiente/2022-01-11/el-debate-de-las-macrogranjas-en-otros-paises-europeos.html Alternatives to ILF: http://beyondfactoryfarming.org/get-informed/locations/manitoba/alternatives-intensive-livestock-operations	Internet / printed article
Specify the context	Split the group class in small groups of students. Assign one alternative to ILF to each group. Each group defines an inquiry question. For example: "How does pastured pork contribute to mitigating the effects of farming in the global threat of climate change?"; or "what are the affordances of certified organic livestock when it comes to feeding a high number of people?"	How do define an inquiry question: https://lessonresearch.net/content-resource/inquiry-question/	Miro Mural

Subphase	Activity	Tools	Learning/Digital Resources
Phase 2: Operationalization			**Ex. duration: 1 learning hour**
Define the constructs	Each group defines the constructs that will guide the inquiry, for example: "sustainable", "profitable", "fair", "economy", "system".		
Planning the methods for work with students	As preparation for the inquiry process, students play a game about the reliability of sources of information. Each group defines a data collection and analysis strategy.		Quizz about the reliability of information sources: https://quizizz.com/admin/quiz/5bbb8394f62cdb001ba92fd0/reliable-sources
Methodology	Description of needed information to organize the activity		
Phase 3: Data Collection			**Ex. duration: 2 hours**
Collect information about each alternative to ILF	Study web sites and make notes in a text document	Certified Organic Livestock: https://www.ams.usda.gov/sites/default/files/media/Organic%20Livestock%20Requirements.pdf https://www.ams.usda.gov/sites/default/files/media/GuideForOrganicLivestockProducers.pdf Holistic management: https://savory.global/what-is-holistic-management/	Google Drive or similar

Subphase	Activity	Tools	Learning/Digital Resources
		https://holisticmanagement.org/holistic-management/ Pastured Pork: https://www.thespruceeats.com/what-is-pastured-pork-2216585 https://stokes.ces.ncsu.edu/wp-content/uploads/2017/07/Pastured-Pork-Basics.pdf?fwd=no Etc.	
Phase 4: Data Analysis			**Ex. duration: 1 hour**
Categorizing data	Organising the information in a mind map		Padlet or similar
Phase 5: Interpretation			**Ex. duration: 1 hour**
Making inferences	Each group goes back to the inquiry question to try to answer it with the data collected.		
Reflection	Discussion in teams on how the data has been analysed and interpreted		
Phase 6: Communication			**Ex. duration: 2 hours**
Presentation	Each group makes a multimedia presentation to communicate the results of their inquiry		Powerpoint, Prezi, Canva or similar
Feedback	Participants provide critical feedback, suggestions, comments to the presenters	Discussion	Voting tool such as Mentimeter
Reflection at the end of the lesson	With the help of the teacher, students reflect on what they have learnt through this activity.	Reflection	Self-assessment cards

Title	Changes in the live cycle of plants
Country	Spain
Scenario Rationale (explain your reasoning behind offering this course/what is the marked need for this course/how this course fulfils these needs.)	Wheat is a very present cereal in our diet, as the main source of bread, pasta, and baked goods. Overall warmer temperatures and extreme climate phenomena are one of the most well known effects of climate change. How these two factors affect the growing of wheat for human consumption is the focus of this scenario. Students inquiry about the consequences of raising temperatures and extreme climate phenomena (floodings, draughts) on a hypothetical wheat production plant, and they will define lines of action to avoid these scenarios or to compensate for its effects. The best proposals will win the competition in a hypothetical call for funding.
Scenario objectives (teachers' competence development - knowledge, skills, dispositions/ attitudes)	Develop teacher's competences related to: ● Planning and delivering the curriculum ● Facilitate student learning ● Integrate the students' context into formal education ● Professional development and innovation
Learning outcomes (aspects of competences addressed)	Develop Teachers' Knowledge: ● Content Knowledge about the relation between climate change and the live cycle of wheat ● Develop teachers' Pedagogical Knowledge in terms of underlying concepts belonging to climate change, insights in learning and teaching according to IBL methodology; ● Develop teachers' knowledge on a design of "non-traditional" training. ● Develop teachers' knowledge on new technologies and their affordances as a tool for more effective lesson planning and orchestration of this learning; Improve teachers' skills to: ● Facilitate an inquiry-based learning activity as applied to the specific topic of a wheat production plant ● Plan, manage and coordinate an IBL lesson that uses gamification and digital tools ● Know and use new technologies and apply them in class - to conduct technology-enhanced learning. Form Attitudes ● Critical attitude towards the topic of climate change ● Develop critical attitudes to one's own learning ● Disposition to promote students' IBL skills as a useful way to participate in scientific development

	● Promote and apply innovative teaching methods
Training outline/methodology (briefly explain the expected level of inquiry – confirmation, structured, guided, open, and how many and which phases of the IBL model are included. The first and last one are obligatory)	Guided inquiry The Six phases of IBL model are included
Time for completing (How many learning hours are needed for teachers to complete the scenario**)**	**Overall: 6,5 hours of attendance classes** **Phase 1** – 1 hour **Phase 2** – 1 hour **Phase 3**– 0,5 hours **Phase 4** – 1 hour **Phase 5** – 1 hour **Phase 6** – 2 hours
Assessment	● Student involvement in the learning process ● Student performance of the tasks in each phase of the inquiry ● Final result

Subphase	Activity	Tools
Phase 1: Problem / topic		
Motivation	Open question: where do we find wheat in our daily lives?	
Introduction to the topic	Discussion about wheat: - What is it? - Where does it come from?	
Specify the context	We will work with a hypothetical wheat production plant and two phenomena: raising temperatures and extreme climate phenomena (floodings, draughts) In small groups, each of them defines an inquiry question, in the line of "what can be done to avoid or mitigate the effects of climate change in wheat crops?".	Article: How wheat yields are influenced by climate change https://www.agric.wa.gov.au/climate-change/how-wheat-yields-are-influenced-climate-change-western-australia Article: Global warming threatens the world's wheat production https://sitn.hms.harvard.edu/flash/2019/global-warming-threatens-worlds-wheat-production-paris-agreement-cannot-prevent/
Phase 2: Operationalization		
Planning the methods for work with students	Determine the information needed to complete the activity: - How does a wheat crop work - How do floodings happen - How do draughts happen - How to avoid floodings and draughts	
Methodology	Decide where to look for the information	
Phase 3: Data Collection		
Collect information about	Students collect information about floodings and draughts, and how to minimise them. They take notes on a digital document	Video: "Flooding explanation" https://www.youtube.com/watch?v=udRNUBHbE0o

Subphase	Activity	Tools
floodings and draughts		Video: "What is a drought?" https://www.youtube.com/watch?v=97RWKSs65T0
Simulate the effects of floodings and draughts on a wheat crop	Create a wheat crop in Roblox Studio and simulate the effects of floodings and draughts of different intensities	Roblox: https://www.roblox.com/
Phase 4: Data Analysis		
Categorizing data	Quizz, memory, crossword puzzle or similar to check to what extent students understood how draughts and floods take place	
Phase 5: Interpretation		
Making inferences	Each group goes back to the inquiry question to try to answer it with the data collected. They define actions to avoid floodings and draughts	
Reflection	Discussion in teams on how the data has been analysed and interpreted	
Phase 6: Communication		
Presentation	Each group presents proposals for a hypothetical call for funding to avoid the impacts of floodings and draughts in wheat crops	
Feedback	The class votes for the best proposals	Discussion
Reflection at the end of the lesson	With the help of the teacher, students reflect on what they have learnt through this activity.	Reflection

Title	Climate summit
Country	Spain
Scenario Rationale (explain your reasoning behind offering this course/what is the marked need for this course/how this course fulfils these needs.)	Environmental organisations claim that the recent Climate Summit in Glasgow (COP26) did not achieve sufficient commitment by countries to fight climate change. In this scenario, students carry out an inquiry about how the agreements from this (and previous) summits are or have been implemented in their country. Through design thinking, students will propose solutions about a set of specific problems belonging to the following topics: weather and climate, atmosphere, water, energy, and plants and animals. For each of these topics, they will prepare and participate in a role play activity where they must make a new climate agreement in their country, considering the views from the civil society, the government, companies, NGOs, etc..
Scenario objectives (teachers' competence development - knowledge, skills, dispositions/ attitudes)	Develop teacher's competences related to: ● Planning and delivering the curriculum ● Facilitate student learning ● Integrate the students' context into formal education ● Professional development and innovation
Learning outcomes (aspects of competences addressed)	Develop Teachers' Knowledge: ● Content Knowledge about specific problems belonging to climate change: weather and climate, atmosphere, water, energy, and plants and animals ● Develop teachers' Pedagogical Knowledge in terms of underlying concepts belonging to climate change, insights in learning and teaching according to IBL methodology; ● Develop teachers' knowledge on a design of "non-traditional" training. ● Develop teachers' knowledge on new technologies and their affordances as a tool for more effective lesson planning and orchestration of this learning; Improve teachers' skills to: ● Facilitate an inquiry-based learning activity as applied to the specific topic of climate change education ● Plan, manage and coordinate an IBL lesson that uses gamification and digital tools ● Know and use new technologies and apply them in class - to conduct technology-enhanced learning. Form Attitudes ● Critical attitude towards the topic of climate change ● Develop critical attitudes to one's own learning ● Disposition to promote students' IBL skills as a useful way to

	participate in scientific development ● Promote and apply innovative teaching methods
Training outline/methodology (briefly explain the expected level of inquiry – confirmation, structured, guided, open, and how many and which phases of the IBL model are included. The first and last one are obligatory)	Guided inquiry The Six phases of IBL model are included Students get points or badges for completing each phase of the inquiry process (needs Edmodo or similar)
Time for completing **(**How many learning hours are needed for teachers to complete the scenario**)**	**Overall: 12 hours of attendance classes** **Phase 1** – 1 hour **Phase 2** – 1 hour **Phase 3** – 2 hours **Phase 4** – 2 hours **Phase 5** – 3 hours **Phase 6** – 3 hours
Assessment	4. Student involvement in the learning process 5. Student performance of the tasks in each phase of the inquiry 6. Final result

Subphase	Activity	Tools	Learning/Digital Resources
Phase 1: Problem / topic			**Ex. duration: 1 learning hour**
Motivation	Open question: What is a climate summit? Do we know of any that has taken place recently? And prior to this one, were there others?		
Introduction to the topic	Read the news article: critical views about the COP26 results	News article: https://www.nature.com/articles/d41586-021-03431-4	
Specify the context	Present the main problems associated with climate change: - Weather and climate - Atmosphere - Water - Energy - Plants and animals Break the class in groups of 3-4 students and assign one of these problems to each group		
Phase 2: Operationalization			**Ex. duration: 1 learning hour**
Planning the methods for work with students	Determine the information that each group needs to complete the activity: - What has been done in your country about this problem since the second to last climate summit - What is the current state of the problem		
Methodology	Brainstorm and decide where to look for the information		Brainstorming and collaboration tools: https://stormboard.com/?r=cxl-dtt , https://padlet.com/
Phase 3: Data Collection			**Ex. duration: 2 hours**

Subphase	Activity	Tools	Learning/Digital Resources
Collect information	Students collect information according to the plan from phase 2		Google Drive or similar
Phase 4: Data Analysis			**Ex. duration: 2 hours**
Categorizing data	Propose solutions to the current state of each topic by using design thinking		Design thinking: https://tll.gse.harvard.edu/files/hgsetll/files/designthinkingeducation.pdf
Phase 5: Interpretation			**Ex. duration: 3 hours**
Prepare the role play	Introduce the task: role play where a new climate agreement must be reached in your country, involving different societal actors. Make sure all students share the same understanding of 4 different societal actors: - Civil society - Government - Company - NGO Each group prepares a sheet with arguments for the topic that they have inquired about, from the point of view of each of these profiles, in the context of a new climate agreement. Set the rules of the debate.		
Phase 6: Communication			**Ex. duration: 3 hours**
Perform the role play	5 role plays are performed, one for each of the climate change problems, where the 4 different profiles have to agree on what to do before 2025. Role plays can be run sequentially or in parallel.		
Reflection at the end of the lesson	With the help of the teacher, students reflect on what they have learnt through this activity.	Reflection	Self-assessment cards

Title	**Energy audit of the school**
Country	Spain
Scenario Rationale (explain your reasoning behind offering this course/what is the marked need for this course/how this course fulfils these needs.)	Schools themselves can play a role in reducing and mitigating the effects of climate change and in particular the problem of raising temperatures. In this scenario, students inquiry about energy consumption of their school in terms of energetic efficiency, carbon dioxide impact of student transportation to and from school, etc. to make a diagnose of how sustainable their school is. On this basis, they make a video where they propose actions to be shared with the school principal and with the municipality to achieve a more sustainable school in the next 5 years.
Scenario objectives (teachers' competence development - knowledge, skills, dispositions/ attitudes)	Develop teacher's competences related to: ● Planning and delivering the curriculum ● Facilitate student learning ● Integrate the students' context into formal education ● Professional development and innovation
Learning outcomes (aspects of competences addressed)	Develop Teachers' Knowledge: ● Content Knowledge about specific problems belonging to climate change: energetic efficiency, and carbon dioxide emissions. ● Develop teachers' Pedagogical Knowledge in terms of underlying concepts belonging to climate change, insights in learning and teaching according to IBL methodology; ● Develop teachers' knowledge on a design of "non-traditional" training. ● Develop teachers' knowledge on new technologies and their affordances as a tool for more effective lesson planning and orchestration of this learning; Improve teachers' skills to: ● Facilitate an inquiry-based learning activity as applied to the specific topic of climate change education ● Plan, manage and coordinate an IBL lesson that uses gamification and digital tools ● Know and use new technologies and apply them in class - to conduct technology-enhanced learning. Form Attitudes ● Critical attitude towards the topic of climate change ● Develop critical attitudes to one's own learning ● Disposition to promote students' IBL skills as a useful way to participate in scientific development ● Promote and apply innovative teaching methods

Training outline/methodology (briefly explain the expected level of inquiry – confirmation, structured, guided, open, and how many and which phases of the IBL model are included. The first and last one are obligatory)	Guided inquiry The Six phases of IBL model are included Students get points or badges for completing each phase of the inquiry process (needs Edmodo or similar)
Time for completing (How many learning hours are needed for teachers to complete the scenario**)**	**Overall: 12 hours of attendance classes** **Phase 1** – 1 hour **Phase 2** – 2 hours **Phase 3** – 2 hours **Phase 4** – 2 hours **Phase 5** – 2 hours **Phase 6** – 3 hours
Assessment	7. Student involvement in the learning process 8. Student performance of the tasks in each phase of the inquiry 9. Final result

DURATION

Subphase	Activity	Tools	Learning/Digital Resources
Phase 1: Problem / topic			**Ex. duration: 1 learning hour**
Motivation	Introduction about energy consumption and its relation with climate change, the energy crisis		News article about the current energy crisis: https://cnnespanol.cnn.com/2021/10/07/avecina-crisis-energetica-mundial-no-tiene-una-solucion-rapida-trax/
Introduction to the topic	Open question to the whole class: What is an energy audit? Have we heard of it? What could it be?		
Specify the context	Proposal / task: we are going to make a video where we present the results of an energy audit of the school and propose solutions to improve it in the next 5 years.		
Phase 2: Operationalization			**Ex. duration: 2 learning hours**
Planning the methods for work with students	Determine the scope of the audit: which topics to cover? What data is available or possible to collect? Divide the class in groups of 3-4 students and assign one topic to each group.		
Methodology	Determine the data collection strategies: - Which data will be collected? - Which tools will be used? Direct observation, survey, … - With which frequency will the measurements be done at? Every hour, every week, …		

Subphase	Activity	Tools	Learning/Digital Resources
	- How to access energy consumption data? Bills? Electricity, water, gas (if applicable).		
Phase 3: Data Collection			**Ex. duration: 2 hours**
Prepare the data collection	Collect the materials needed to carry out the audit. Develop the other data collection tools, such the survey about mobility to the school for students and parents	Materials: - Map of the school: which areas to analyse, etc. - Thermometers - Feathers or wind-sensitive material to detect windows or doors that don't close properly, etc. - Compass to determine the orientation of the building and of each space	
Collect information	During a week, each group of students collects the data according to the plan and register it in a spreadsheet with one tab for each of the measured variables		Google Drive or similar
Phase 4: Data Analysis			**Ex. duration: 2 hours**
Categorizing data	Analyse the data and make graphs		Google Drive or similar
Phase 5: Interpretation			**Ex. duration: 2 hours**
Write a report	Each group elaborates a report on the topic the have been assigned in the context of an energy audit of the whole school.		

Subphase	Activity	Tools	Learning/Digital Resources
Make proposals	Students make proposals to improve the current situation in the next 5 years following the model: problem - solution		
Voting	Students vote for the best actions / proposals to share with the school principal and the municipality. The best proposals will be collected in the video.		Online voting tool such as https://www.mentimeter.com/
Phase 6: Communication			**Ex. duration: 3 hours**
Elaborate a communicative artifact	Make a video to communicate the results of the audit and the proposals. It includes: - Make a storyboard - Looking for footage or recording footage - Edit the video (image and sound)		
Reflection at the end of the lesson	With the help of the teacher, students reflect on what they have learnt through this activity.	Reflection	Self-assessment cards

Title	Fighting the fires
Country	Spain
Scenario Rationale (explain your reasoning behind offering this course/what is the marked need for this course/how this course fulfils these needs.)	The increasing outburst, duration and extension of forest fires in Mediterranean climates (California, Greece, Australia) has involved that some countries apply restrictions for general use of green spaces such as Natural Parks of protected areas. This decision threatens the promotion of a healthy lifestyle and detaches citizens from nature if they can't enjoy it in their free time especially in the context of a global pandemic that involves staying in the house by prescription. In this scenario, students investigate the history of forest fires in Mediterranean climates, as well as how forest fires are initiated and how they develop according to variables such as: overall temperature, climate, wind, etc. Students make predictions about forest fires in the future if no action is taken.
Scenario objectives (teachers' competence development - knowledge, skills, dispositions/ attitudes)	Develop teacher's competences related to: ● Planning and delivering the curriculum ● Facilitate student learning ● Integrate the students' context into formal education ● Professional development and innovation
Learning outcomes (aspects of competences addressed)	Develop Teachers' Knowledge: ● Content Knowledge about the specific problems belonging to climate change, namely forest fires ● Develop teachers' Pedagogical Knowledge in terms of underlying concepts belonging to climate change, insights in learning and teaching according to IBL methodology; ● Develop teachers' knowledge on a design of "non-traditional" training. ● Develop teachers' knowledge on new technologies and their affordances as a tool for more effective lesson planning and orchestration of this learning; Improve teachers' skills to: ● Facilitate an inquiry-based learning activity as applied to the specific topic of forest fires as part of the global threat of climate change ● Plan, manage and coordinate an IBL lesson that uses gamification and digital tools ● Know and use new technologies and apply them in class - to conduct technology-enhanced learning. Form Attitudes ● Critical attitude towards the topic of climate change

	● Develop critical attitudes to one's own learning ● Disposition to promote students' IBL skills as a useful way to participate in scientific development ● Promote and apply innovative teaching methods
Training outline/methodology (briefly explain the expected level of inquiry – confirmation, structured, guided, open, and how many and which phases of the IBL model are included. The first and last one are obligatory)	Guided inquiry The Six phases of IBL model are included
Time for completing (How many learning hours are needed for teachers to complete the scenario**)**	**Overall: 12 hours of attendance classes** **Phase 1** – 1 hour **Phase 2** – 1 hour **Phase 3** – 2 hours **Phase 4** – 2 hours **Phase 5** – 2 hours **Phase 6** – 4 hours
Assessment	● Student involvement in the learning process ● Student performance of the tasks in each phase of the inquiry ● Final result

DURATION

Subphase	Activity	Tools	Learning/Digital Resources
Phase 1: Problem / topic			**Ex. duration: 1 learning hour**
Motivation	Nowadays with the pandemic we want to enjoy our green spaces, but recently several of them have been closed because of the risk of fire.		News articles: Natural parks closed because of risk of fire in: Catalonia (Spain): https://en.ara.cat/society/camping-and-routes-banned- catalonia-heatwave-fire-risk_1_4083319.html Australia: https://parks.tas.gov.au/explore-our-parks/know- before-you-go/campfires-and-fire-restrictions
Introduction to the topic	There is a relation between wild fires and climate change		● Video: Devastating wildfires sweep through Europe - BBC News ● https://www.youtube.com/watch?v=hHEfKyh2Xmk ● Video: The climate science behind wildfires: why are they getting worse? ● https://www.youtube.com/watch?v=4oJ0j1OZSTU ● Information: Wildfires and climate change: ● https://www.c2es.org/content/wildfires-and-climate-change/
Specify the context	Split the class in groups of 3-4 students. Assign one Mediterranean region affected by wild fires in 2021 to each group.		List of wild fires in 2021: https://en.wikipedia.org/wiki/Wildfires_in_2021
Phase 2: Operationalization			**Ex. duration: 1 learning hour**
Define the concepts	The three sides of the fire behavior triangle are weather, topography and fuels. Define these concepts with students:		

Subphase	Activity	Tools	Learning/Digital Resources
	- Weather includes wind, temperature, cloudiness, moisture and air pressure - Topography is the physical features of an area, including slope and aspect - Fuels are vegetation and structures		
Methodology	Determine how the information about how each fire originated and how it developed will be collected		
Phase 3: Data Collection			**Ex. duration: 2 hours**
Collect information	Collect the information according to the plan from phase 2		
Phase 4: Data Analysis			**Ex. duration: 2 hours**
Categorizing data	Students organise the information. Students compete for the best organised information.	Criteria of what it is a well- organised set of information	Google Drive or similar
Phase 5: Interpretation			**Ex. duration: 2 hours**
Make predictions	Students make predictions about forest fires in the future according to the current temperatures of the areas that they researched.		
Phase 6: Communication			**Ex. duration: 4 hours**
Make a map	Each group of students makes a collaborative map with the information collected about the fires in each region		https://storymaps.arcgis.com/
Reflection at the end of the lesson	Students reflect on what they have learnt through this lesson		Self-assessment criteria

Greece

Title	Can I predict the future of the planet?
Country	Greece
Scenario Rationale (explain your reasoning behind offering this course/what is the marked need for this course/how this course fulfils these needs.)	People from an early age try to understand the world around them, to interpret various environmental phenomena and to predict their evolution. Simulations help to represent and visualize phenomena in order to help people understand them. In addition, simulations allow individuals to think, describe and explain phenomena and processes by modeling them. Climate change is associated with rising temperatures and it is highly correlated with the greenhouse gas emissions. https://scied.ucar.edu/simple-climate-model Students explore how the rate of carbon dioxide emissions affects the amount of CO_2 in the Earth's atmosphere and how affects the temperature. Changing the parameters students can predict the increase or decrease of the planet's temperature. This simulation engages students in authentic scientific research, which underlines the critical issue of global warming.
Scenario objectives (teachers' competence development - knowledge, skills, dispositions/ attitudes)	● ICT integration in teaching and learning ● Pedagogical content knowledge (PCK), which is the intersection between pedagogical knowledge and content ● Technological pedagogical content (TPACK, Knowledge Pedagogical Content) focuses on the integration of technology in teaching and learning as a combination of all three sources of knowledge of teachers: technology, pedagogy and content. ● Development of the 21st century learning skills. All the frameworks above are being transformed into PCK-21 and TRACK-21. [1](Koh et al., 2015). Under this framework, this learning scenario focuses on the development of: -Teachers' technological knowledge (TK) - teachers' knowledge in using ICT technological tools (simulations) -Pedagogical knowledge for 21st century learning (PK-21CL) - learning issues and teaching methods to support inquiry learning process -Content knowledge (CK) - teachers' knowledge on the topic of climate change Additionally, this learning scenario focuses on new methodologies and more specifically to the: ▪ Development of innovative methodologies to support learning

[1] Koh, J.H.L., Chai, C.S., Benjamin, W. et al. Technological Pedagogical Content Knowledge (TPACK) and Design Thinking: A Framework to Support ICT Lesson Design for 21st Century Learning. Asia-Pacific Edu Res 24, 535–543 (2015). https://doi.org/10.1007/s40299-015-0237-2

	included the selection and exploitation of educational materials such as activities that engage learners in critical and creative thinking, activities that are related to real-world tasks ▪ Connection between teaching, learning and assessment ▪ Lesson design with clear objectives and outcomes ▪ Lesson with coherent stages (e.g. presentation, practice, production, evaluation)
Learning outcomes (aspects of competences addressed)	a) Cultivating students' motivation in natural sciences b) Cultivating their interest in scientific subjects, c) Cultivating their critical thinking, d) Incorporating innovative strategies, such as active learning, where students are encouraged to take responsibility for their learning and how to construct and develop their knowledge. A message for educational community is to encourage students observe, make hypotheses, explore, give solutions and reach to conclusions. Teachers should cultivate students' curiosity, passion, and offer them many opportunities to explore scientific knowledge and cultivate their skills that can be applied in their everyday lives. It is clear that technology integrated in education has benefits that affect both teachers and students as it offers access to many digital recourses, digital tools and assignments. Due to the technological evolution, simulations have become an inseparable part of many students' lives. The basic principles of learning science support the active participation of students, their social interaction, the development of self-regulation and their scientific thinking.
Training outline/methodology	Inquiry Based Science Education (IBSE) is a pedagogical strategy based on the student's physical curiosity, which is the power that leads to the understanding of knowledge. Learning is organized around questions and problems in a highly learner-centered environment. Students gain knowledge through questions, assumptions, experiments and observations.
Time for completing (How many learning hours are needed for teachers to complete the scenario)	**Overall: 14 hours of training** **For 45 minutes lesson: 12 hours of training** **Phase 1** – 2 learning hours (blended learning) **Phase 2** – 2 learning hours (blended learning) **Phase 3** – 2 learning hours (distance learning) **Phase 4**– 2 learning hours (distance learning) **Phase 5** – 2 learning hours (distance learning) **Phase 6** – 2 learning hours (blended learning)
Assessment	Formative assessment

DURATION

Subphase	Activity	Tools	Learning Resources
Phase 1: Problem / topic			**Ex. duration: 2 hours**
Introduction to the topic	VIDEO	https://youtu.be/_EWOrZQ3L-c Climate Change: The State of the Science	Video presentation, Discussion, Brainstorming, Team activities
Motivation	Video ESA Climate Change	https://youtu.be/ezAZ5WVAOyI The video offers an overview of how European satellites keep watch over our world. It includes interviews with Josef Aschbacher, our Director of Earth Observation Programmes, and Michael Rast, our Earth Observation Senior Advisor	Video presentation, Discussion, Brainstorming, Team activities
Reflection	Presentation	Write a short report of opinions about climate change based on key points of videos	H5P tools
Phase 2: Operationalization			**Ex. duration: 2 hours**
Record the globe's temperature	Simulation	https://applets.kcvs.ca/historicalTemperatures/historicalTemp.html What happen to the temperature of planet in a global scale?	Quiz Open Questions Presentations

Subphase	Activity	Tools	Learning Resources
Record global air pollution	Simulation	http://www.globalcarbonatlas.org/en/CO2-emissions Using graphs and maps compare the CO_2 emissions in global scale	Quiz Open Questions Presentations
Make hypotheses	Video	https://youtu.be/7KQ-cAqwtXs Met Office Hadley Center videos reveal the temperature changes around the world, under two different emission scenarios. The first one shows that emissions increase continually during the century. The second scenario refers to emissions that decrease over the century. By the end of the century the global average temperature rise is 4 degrees of Celsius with the increasing emissions and only 2 degrees Celsius with the decreasing emissions. Why is the planet's temperature rising? Is there any connection between carbon dioxide emissions and temperature?	Video presentation, Discussion, Brainstorming, Team activities
Make hypotheses	Simulation Guided learning	Use the simulation to explore and discover the connection between weather, geography and air quality. Students can also explore the human impact on air quality by changing for example the number of cars in the area. Change the parameters to set different conditions and watch how they affect the air quality of the area. Make sure you wait long enough to see the result. The graph shows the	Questions Screenshots

Subphase	Activity	Tools	Learning Resources
		Air Quality Index (AQI), a number that indicates the amount of air pollution in the model area. https://lab.concord.org/embeddable.html#interactives/air-pollution/air-pollution-master.json	
Phase 3: Data Collection			**Ex. duration: 2 hours**
Introduction to the simulation and the modelling	Guided learning	Based on the model below when the rate of carbon dioxide increases, the emission amount of carbon dioxide and temperature changes. https://scied.ucar.edu/simple-climate-model ▪ Students understand the effect of atmospheric carbon dioxide on the Earth's average temperature. ▪ Students explore and understand that the amount of carbon dioxide in the atmosphere increases each time the emissions are greater than zero. ▪ Students learn how changes in the rate of carbon dioxide emissions affect the amount of carbon dioxide in the atmosphere and the average global temperature.	Discussion
Changing the climate change scenarios/ Changing the parameters	Investigation	Students change the concentration and the emission rates of CO_2 and record the temperature of the planet.	Keeping screenshots/ notes H5P Questions

Subphase	Activity	Tools	Learning Resources
Phase 4: Data Analysis			**Ex. duration: 2 hours**
Problem solving on climate change topic	Research design	Write questions to compare temperature through the different levels of CO_2	Multiple choice questions H5P context
Reach to conclusions/ Reflect	You can further explore the simulation that presents the effects of temperature rise and the factors that contribute to the greenhouse effect. Record your findings simply by selecting a time to change two variables from the model, keeping prices of other variables constant. Discuss with your classmates which are the main causes of the greenhouse effect.		H5P context
Phase 5: Interpretation			**Ex. duration: 2 hours**
Designing learning scenario	Writing activities	Wiki discussion to exchange ideas	
Reflection	Discussion on difficulties	Wiki discussion to exchange ideas	

Phase 6: Communication			**Ex. duration:2 hours**
Scenario design presentation	Presenting the design of the training scenarios in front of the classroom	Files: prezi, ppt, poster	
Peer review assessment	Comments on learning scenario	Discussion	

Title	Do you have a climate-friendly carbon footprint?
Country	Greece
Scenario Rationale (explain your reasoning behind offering this course/what is the marked need for this course/how this course fulfils these needs.)	Energy consumption is firmly connected with carbon dioxide emissions and with climate change, at large. Globally, energy consumption is by far the number one source of greenhouse gas emissions coming mainly from human activities. About two-thirds of global greenhouse gas emissions are related to the fossil fuels used for heating, transportation and industry. The energy production and the energy consumption by the people around the world have a huge impact on the climate. The main goals of this scenario are: For the students: It is important students to take the active role of a responsible citizen as well as to discuss and make decisions on up to date topics related to the challenges that the world is facing (the growing demand for electricity, the environmental sustainability, etc.). It is also critical for students to realize the effects of energy waste due to the needs of the modern way of leaving. This scenario is in line with the 4.7 Goal of the Sustainable Development Goals (SDGs), which highlights the fact that "*all learners acquire the knowledge and skills needed to promote sustainable development, including through sustainable education development and sustainable lifestyle…* ». Providing inclusive and equitable quality education for all is one of the main goals of UNESCO, in which the well-informed citizens play a key role. Therefore, Education for Sustainable Development (ESD) is an important tool to achieve this goal. To achieve the 4.7 Goal, teachers hold a key role to educate students and equip them with knowledge and skills for the environmental sustainable development. This scenario focuses on: ● Making a correlation between the daily energy consumption, peoples' habits and climate change. ● Exploring and understanding scientific data and information coming from scientific articles and other relevant sources about energy consumption and its effects to climate change. ● Surveys to engage the local school community (e.g. about the students' and teachers' carbon footprint).
Scenario objectives (teachers' competence development - knowledge, skills, dispositions/ attitudes)	Knowledge development: ● Knowledge, skills and teachers' competencies development based on environment and sustainable development. ● Innovative approaches of exploratory learning methodology to teach Climate Change. ● Deeper understanding of Sustainability and Climate Change and

	how to integrate the topic in the classroom. ● Improve their digital teaching skills, including digital educational tools, optical tools, Internet and multimedia in their teaching Skills development: ● Development of the scientific and critical way of thinking. ● Develop ways to approach an environmental problem based on their cognitive skills. ● Develop activities and multifaceted studies based on real problems that require collaborative research and decision making. Dispositions: ● Increase students' awareness on the environment and the sustainable development.
Learning outcomes (aspects of competences addressed)	Content pedagogical knowledge for the development of a set of teaching and learning strategies that include exploratory student-centered learning, for the development of metacognitive components in creative thinking.
Training outline/methodology (briefly explain the expected level of inquiry – confirmation, structured, guided, open, and how many and which phases of the IBL model are included. The first and last one are obligatory)	1. Framing questions; 2. Presenting the content; 3. Providing learning guidance; 4. Analysing data, reporting and presenting conclusions; 6. Evaluation
Time for completing (How many learning hours are needed for teachers to complete the scenario**)**	Overall: 7 hours of training For 45 minutes lesson: 7 hours of training Phase 1 – 1 learning hours (blended learning) Phase 2 – 1 learning hours (blended learning) Phase 3 – 2 learning hours (distance learning) Phase 4– 1 learning hours (distance learning) Phase 5 – 1 learning hours (distance learning) Phase 6 – 1 learning hours (blended learning)
Assessment	

DURATION

Subphase	Activity	Tools	Learning Resources
Phase 1: Problem / topic			**Ex. duration: 1 hour**
Introduction	-Present the topic to the students and start a discussion to engage them with the topic -Starting from the students' initial curiosity about the topic to further inspire them -Presentation of the students' experiences on the topic	https://www.eea.europa.eu/signals/signals-2017/articles/energy-and-climate-change https://www.ucsusa.org/resources/benefits-renewable-energy-use 30min	Articles/ Videos
Topic	Looking for videos and other recourses (articles) that prove the connection between energy consumption and climate change	Discussion 30min	-What is the topic? -Why should we study this topic? https://www.epa.gov/greenvehicles/fast-facts-transportation-greenhouse-gas-emissions **Αναλυτική περιγραφή των ανανεώσιμων πηγών ενέργειας** **Μπορούν οι ανανεώσιμες πηγές ενέργειας να αντικαταστήσουν τα ορυκτά καύσιμα ;**
Reflect	Knowledge, viewpoints, questions, methods	Padlet, Discussion's web 2.0 tools	
Phase 2: Operationalization			**Ex. duration: 1 hour**
Index for designing	-Understand what the students already know about the topic	Definitions What is carbon footprint? What are alternative energy sources?	To clarify the concept of carbon dioxide equivalent, you can use the video (Campbell, 2010):

Subphase	Activity	Tools	Learning Resources
			https://www.youtube.com/watch?v=niotf0oHvQY
Design methodologies	-Design further activities		
Phase 3: Data Collection			**Ex. duration: 2 hours**
Make a research plan about the carbon footprint	Creating questionnaires	Quizzes e.g https://bit.ly/3690G1T	asks clarifying questions to guide investigation
Start a research within the local community about the carbon dioxide and peoples' transportation	-use surveys, interviews and data gathering methods -consolidate and organize data	1. http://www.carbonfootprint.com/calculator.aspx 2. Fill out the counter with the information you gathered in your homework, or convert it into the requested format unless already done. 3. Write down your carbon footprint and the global average. 4. Test how the different options can change your carbon footprint. Which of the alternative options could you follow in your everyday life?	-use surveys and interviews to collect data -consolidate and organize data
Phase 4: Data Analysis			**Ex. duration: 1 hour**
Organising the steps of the research plan	Ideas: Energy consumption	Suggestions for minimising carbon dioxide emissions by using different means of transportation. Data collection Data organisation	Open ended questions

Subphase	Activity	Tools	Learning Resources
		Data analysis Data presentation	
Connection with the community	Engage the community	Consult the action plan Compare your initial plan with the data collected Review and reflect on the results invite key stakeholders to discuss on your results, the suggestions and celebrate completion of the project	
Phase 5: Interpretation			**Ex. duration: 1 hour**
Conclusion	Carbon footprint summary discussion	Class collage	**Consequence wheel** Also called a cause-and-effect wheel or futures wheel, this is an excellent strategy for exploring the consequences of an event or the effects of an issue on people and places.
Phase 6: Communication			**Ex. duration: 1 hour**
Presentation of the scenario		Ppt	
Evaluation by the experts		Discussion, wiki	
Difficulties during the scenario's implementation		Discussion, wiki	

Title	Environmental crisis forces people to leave their home regions
Country	Greece
Scenario Rationale (explain your reasoning behind offering this course/what is the marked need for this course/how this course fulfils these needs.)	Environmental migrants are people who are forced to leave their home region due to climate change or other severe environmental problems. Environmental migrants or climate refugees, leave their place and move to a new area, either inside their country (internal migration) or in a different country (external migration). As this phenomenon has significantly increased, especially during the last decades (Tasoulas, 2021), it is crucial to further study in schools about: (a) the environmental factors affecting the environmental migration (i.e. extreme environmental phenomena, natural disasters, desertification, water scarcity, sea-level rise, etc.), caused either by natural processes or human actions; (b) specific examples of countries with an increased rate of the environmental migration; (c) its legal dimensions (environmental migrants vs climate refugees); and (d) the ways that the governments and the society face and respond to environmental migration. Thus, the trainees will be able to learn more about this multidisciplinary subject.
Scenario objectives (teachers' competence development - knowledge,skills,dispositions/ attitudes)	❖ <u>Knowledge (*teachers would*)</u>: - Recognise and group the major drivers of the environmental migration either caused by natural processes or human actions - determine specific countries as examples to best describe this phenomenon - critically think about the terms "migrant" and "refugee" - propose solutions to overcome or minimise environmental migration ❖ <u>Skills (*teachers would be able to develop their)* :</u> - metacognitive skills - collaboration skills - cognitive understanding - digital literacy by using digital tools included in the current educational scenario ❖ Dispositions (*teachers would cultivate their)*: - self-directed learning - curiosity - self-reflection - environmental awareness

Learning outcomes (aspects of competencies addressed)	
Training outline/methodology (briefly explain the expected level of inquiry – confirmation, structured, guided, open, and how many and which phases of the IBL model are included. The first and last one are obligatory)	The digital training scenario is developed based on **structured inquiry-based learning (IBL)** methodology. Structured Inquiry is a teacher-based inquiry. This means that the teacher is the one who controls specific learning activities, the resources that learners use to develop their knowledge and their understanding on the topic, and the summative assessment learners complete demonstrating their understanding. (https://www.edutopia.org/article/bringing-inquiry-based-learning-into-your-class-trevor-mackenzie) Additionally, the scenario is based on **gamification** which is a useful teaching strategy transforming the learning environment and the regular activities into a game. Turning learning into fun, it is beneficial for students' learning and teachers' training, too. (https://www.iste.org/explore/course-mind/4-learning-science-strategies-proven-boost-understanding) Moreover, many different digital tools (apps, videos, online quizzes, etc.) will be integrated in the current educational scenario.
Time for completing (How many learning hours are needed for teachers to complete the scenario**)**	Overall, 7 hours of attendance. Phase 1: 45 min Phase 2: 90 min Phase 3: 45 min Phase 4: 45 min Phase 5: 90 min Phase 6: 90 min
Assessment	Formative assessment
Module dependencies (text or graphical map)	
Relation to other scenarios (the names of the other partners' scenarios treating the similar problem/topic)	- Fighting the fires - Intensive livestock farming - Bionic architecture of the future - Sustainable mobility - Climate change - more heat, heavy rain and storms

Subphase	Activity	Tools	Learning Resources
Phase 1: Problem/topic			**Ex. duration:**
Introduction to the topic	VIDEO	What is climate migration?	5 min
Exploring the topic/ Motivation	Open questioning & Brainstorming -Have you ever heard about environmental/climate migration? -Why should we learn about the topic? Why is it important to investigate it? -When do you think that the term first appeared?	• Word Clouds • Google Scholar • The Climate Trail	30 min
Reflection on the topic	-Can you name which aspects of the phenomenon should be further investigated?	• Bubbl.us	10 min
• **Phase 2: Operationalization**			**Ex. duration:**
Definition	-How could you define environmental/climate migration? Comparison with the official definition.	• Bubbl.us • Glossary | Office for Climate Education	15 min
Investigating prior knowledge	-In what way do you think that climate change affects migration? Can you name some environmental factors that affect environmental migration? Reflect on this. - Which regions or countries globally are affected by climate migration the most? What do you think? Reflect on this.	Desertification - A Visual Disaster What is Desertification? | Young People's Trust For the Environment (e.g. Expect tens of millions of internal climate migrants by 2050, says World Bank - Carbon Brief)	30 min

Subphase	Activity	Tools	Learning Resources
		• Google Scholar • Kahoot (quiz or T/F) • Discussion	
Explore specific-country examples	Presentation of the case study of Africa. Which African countries are most affected? Which are the areas that people moved and changed their residence?	(e.g. Climate-driven migration in Africa) • Google Scholar • Bubbl.us • Kahoot	20 min
Making hypothesis	The Lake Chad region. Make an evidence-based hypothesis about a) the environmental factors that affect the drought of the Lake Chad region in Sub-Saharan Africa and b) the degree of each factor's effect.	(e.g. Climate-driven migration in Africa) • Google Scholar	25 min
Phase 3: Data Collection			**Ex. duration:**
Investigating the causes of the Lake Chad region's drought (in the literature)	Identify factors Find graphs indicating the degree of the lake's drought over the past years	• Google Scholar • https://mynasadata.larc.nasa.gov/search?keys=Drought • Data on statistics on environmental migration	40 min
Reflection on the process	Discussion on the factors found and the method of gathering data.		5 min
Phase 4: Data Analysis			**Ex. duration:**
Analysing and grouping the data	-Can you group the factors which lead to this phenomenon? -Can you distinguish them into natural (e.g. storms) and anthropogenic (e.g. deforestation) factors?	• Google Scholar • Bubbl.us • https://pediaa.com/what-is-the-difference-between-	25 min

Subphase	Activity	Tools	Learning Resources
		anthropogenic-and-natural-climate-change/	
Summary of the findings and reflection on the process	Discuss and make a consequence wheel.	https://k12teacherstaffdevelopment.com/tlb/what-is-a-consequence-wheel/	20 min
Phase 5: Interpretation			**Ex. duration:**
Interpretation of the causes found.	Discussion with the community about what actually the results mean.		15 min
Proposal of solutions	Evidence-based proposal of possible actions that can be taken by individuals and policymakers for the climate-driven migration in Africa. Further discussion.		30 min
Debating about the 'Law Problem'	Small groups of six take the role of policy makers and debate about whether people that need to move because of the environmental crisis have to be recognised by law as refugees or migrants.	https://www.groupmap.com/map-templates/six-thinking-hats/	45 min

Phase 6: Communication			Ex. duration: 90 min

Scenario development presentation	Presentation on the development of a training scenario in front of all groups	Files: Computer presentation (*PPT, *PPTX, *Prezi, others), Text documents (*DOC, *DOCX, *PDF, others) Discussion, comments, feedback by other participants to the team presenting the topic	Assessment on the scenario's development
Feedback	Participants provide critical feedback, suggestions, comments to the presenters	Further discussion	Zoom, Google meet, Microsoft teams
Possibilities for follow-up public dissemination of the results	The participants present their results to the public – use the repository of the online training platform, collect artefacts (photos, videos), present the results in a school event, etc.	Mindmap	Miro Mural
Reflection at the end of the teachers' training	The teachers assess the role of the IBL in comparison with other teaching/learning methods, assessing the advantages and disadvantages of the IBL. They provide a self-assessment of the design developed during the training and generate suggestions for improvement.	Reflection	Self-assessment cards

Title	Help climate following a diet low to food waste
Country	Greece
Scenario Rationale (explain your reasoning behind offering this course/what is the marked need for this course/how this course fulfils these needs.)	Food loss and food waste as well as sustainable agriculture and resilient food supply chain are directly linked to climate crisis, the greenhouse effect and the significant increase of carbon dioxide (CO_2) emissions. Food that ends up in landfills, in addition to the energy needed to produce, process, transport, prepare and store them, which are also wasted, produce methane, which is an even more potent greenhouse gas than CO2. As food waste is firmly related to the increase of CO_2 emissions the students will learn about the greenhouse effect and the greenhouse gases through interactive simulations provided by the University of Colorado. https://phet.colorado.edu/el/ Students: The current scenario aims to inform students about the major problem of food waste and food loss and how food waste affects CO2 emissions. Moreover, this scenario will inspire students to follow everyday tips to minimise the environmental consequences of food waste and succeed in a sustainable future with less food waste on the planet. More specifically, students will also investigate how much food is wasted in the EU and worldwide, which is the reason why we throw away so much food, which is the impact of food waste in the environment and how they could help reduce the food waste and the food loss. Teachers: The current educational scenario aims to support teachers and their digital skills' development, presenting simulations to their classrooms, creating quizzes, crosswords, games by using open access digital tools available online. Furthermore, this scenario will combine hands-on activities and experimental processes with data analysis and data sharing in platforms that students already use, such as e-me, the online educational platform that students and teachers in Greece use for asynchronous learning.
Scenario objectives (teachers' competence development - knowledge, skills, dispositions/ attitudes)	Students develop skills such as problem solving, socialisation and cooperative work, personal autonomy, the ability to interact, the development of values, the simulation of situations and their decision-making skills. Teachers develop and improve competences related to: ● Digital skills ● Scenarios' development using IBL methodology and gamification ● Improve their digital teaching ● Evaluate students' activities ● Integrate digital tools in their teaching

	● Bridge different disciplines under a topic
Learning outcomes (aspects of competences addressed)	The teachers will be able to: - plan and design a multidisciplinary and interdisciplinary scenario, bridging the gap between the different disciplines - integrate digital tools in their teaching - combine digital tools with hands-on activities and experimental processes - develop an IBL lesson involving knowledge transfer and reflection between the students
Training outline/methodology (briefly explain the expected level of inquiry – confirmation, structured, guided, open, and how many and which phases of the IBL model are included. The first and last one are obligatory)	IBL promotes skills development and it has been used as an instructional approach in STEM disciplines. IBL helps learners to develop their own questions to examine, engage in self-directed inquiry and work individually or in groups. It stimulates learners to adopt a critical inquiring mind, critical thinking and problem solving skills. Apart from IBL, gamification helps learners externalise their understanding and foster metacognition. Gamification refers to the use of games to motivate learners and enhance their learning process, improve their imagination, and engage them in promoting active, experiential and problem-based learning.
Time for completing (How many learning hours are needed for teachers to complete the scenario**)**	
Assessment	● Brainstorming and discussion of the topics ● Evaluation of the activities ● Reports ● Presentations ● Brochures ● Data presentation ● Poster development ● Experimental process
Module dependencies (text or graphical map)	This scenario combines different disciplines and different modules such as Chemistry, Physics, Maths, Biology, Art
Relation to other scenarios	Energy-Do you have a climate-friendly carbon footprint?

DURATION

Subphase	Activity	Tools	Learning Resources
Phase 1: Problem / topic			**Ex. duration:**
Topic Introduction	Presentation	Introduce the problem: Food loss and food waste and their contribution in the climate crisis	Discussion and brainstorming Open questions
	Video	https://www.youtube.com/watch?v=sjiUtZpv0bI https://www.youtube.com/watch?v=CP0bRQ7rqF8	video presentation - discussion in groups - concept map development Miro
Motivation	Video	https://www.youtube.com/watch?v=1ZtQCK9AG20 https://www.youtube.com/watch?v=77inUTx0QlM	video presentation and discussion on the greenhouse effect Open questions
	Simulation	https://phet.colorado.edu/el/	The simulation on greenhouse effect and greenhouse gasses will be presented in f2f, digital or blended educational environments. A digital quiz will be part of this section with information regarding the greenhouse effect
	Resources on e-me online educational platform	https://climate.nasa.gov/causes/	Resources about greenhouse effect
Reflection	One slide presentation	Students will develop one slide presentation about the correlation between the food waste and food loss with the greenhouse effect and other environmental consequences	Presentations
Phase 2: Operationalization			**Ex. duration:**

Subphase	Activity	Tools	Learning Resources
How much food do you throw away?	Warming up activity	Students discuss and describe a personal experience of the amount of food that they throw away in their houses. A list of food that they usually waste is under development	Discussion and reflections on the list developed
Can you guess it?	Digital quiz game	Students will guess the categories of food people waste more, in which countries people have more food waste, etc.	Kahoot, etc.
Food waste experiment plan and design	experiment development working in teams discuss and set the parameters give the time frame of the experiment describe the process	Measurement collection	hands-on activities
Phase 3: Data Collection			**Ex. duration:**
Can you estimate how much food you waste in your house?	Students discuss with their teammates and write down their initial ideas about the amount and the categories of food waste in their houses.		Students submit their final suggestions in an online form.
Be a researcher for a week - weigh your food waste	Students weigh the food that they throw away everyday in their houses. They repeat the measurements for a week and collect all the measurements of	google drive share files	Students learn how to use shared files in order to keep track of the data collected

Subphase	Activity	Tools	Learning Resources
	the team in a shared file. The food should be also categorised in meat/fish, vegies, dairy products, fruit, etc.		
Think differently! What can you do with your food waste if you don't throw it away?	Students make a brochure (art) with alternative ways of treating food waste in their houses	Art application	Students present their brochures in front of their peers and discuss about their solutions and their thoughts- round tables
Make your plant fertiliser!	Students use the leftovers such as banana peels, coffee, eggshells, etc. as soil fertiliser.	Further investigation	Students can develop their own experiments and collect further data
Phase 4: Data Analysis			**Ex. duration:**
Data analysis - experimental results	Students present their data in graphs over time	excel spreadsheets	Graphic representation of the food waste amounts in students' houses in a week period. Students holding the role of scientists creating graphs of their data using excel spreadsheets
Further data analysis	Students analyse the food waste into categories presenting the vitamins and all the nutrients that are valuable for the human bodies	excel spreadsheets, etc	Graphic representation of the categories of food waste and their correlation with the nutritional value for the human body
Problem solving on food waste and food loss crisis	Research on the networks and communities in each country that fight against the food waste and food loss, research programmes and other relevant initiatives	Literature review	Brief report
Phase 5: Interpretation			**Ex. duration:**
Scenario development	A basic plan for teaching in the classroom or online interpreting	Files:	Template for scenarios' development

Subphase	Activity	Tools	Learning Resources
	digital technologies and other digital tools presented in the current scenario	Information and good practises on the development of educational scenarios	
Reflection	Discussion in teams or individually on the online training platform the possibilities for contextualising the current scenario	Reflection form	Open questions
Evaluation	Evaluation of the current scenario	Evaluation form on the online training platform	Open and closed questions (online questionnaire)
Phase 6: Communication			**Ex. duration:**
Art with food waste	How has food waste inspired art workers? Research on art pieces, music, theatre plays, etc.	Slides with all the art pieces that students found	Presentation
Poster presentation with the research results	Presentation of the research results in a poster	ppt	Poster development and poster presentation
Round table during a webinar	Teamwork question in round table: students discuss on topics related to food waste and the environmental crisis, climate change and sustainable development	Online meeting apps	Webinar organisation

Title	STEM careers in climate change
Country	Greece
Scenario Rationale (explain your reasoning behind offering this course/what is the marked need for this course/how this course fulfills these needs.)	The development of this educational scenario, which connects STEM professions with climate change, in agreement with the main priorities of the EU to strengthen the collaboration between industry and education. At the same time it highlights the importance of STEM studies and professions as well as the innovation in teaching natural sciences at school.[2,3] For students: Students talk about different environmental problems, they try to convince their peers about the climate crisis and how it affects their lives forming arguments on the ways that people can protect the environment. The current scenario aims at cultivating students' data analysis skills using mathematical graphs and algebra as well as developing their cognitive skills through scientific research of environmental problems. Students develop their motivation and expand their knowledge in STEM and aspire to follow a career path in these fields. Students who cultivate creative skills are very apt to follow a profession to protect the planet from climate change. Moreover, inspired by the women in science, more and more girls follow a scientific STEM career. In the frame of the current scenario students decide to act and protect the environment and inspire people to be more sensitive to climate change. They decide to make posters by using comics and digital tools. STEM career and its correlation with Responsible Research and Innovation (RRI): It is more than obvious that STEM professions hold an important role in dealing with the climate crisis. Geologists investigate climate change, chemists and environmentalists work on the effect of carbon dioxide in the environment, oceanographers study the effect of climate change on sea level rise, physicists investigate the atmosphere's energy changes, mathematicians analyze models that try to predict the environmental effects on a global level in the coming years. Students aim at investigating the real problem of climate change and its effects on the environment (temperature rise, sea level rise, ice melting, etc.) using graphs and digital tools, etc. Students take on the role of a scientist to suggest ways to protect the planet from climate

[2] https://www.educationandemployers.org/wp-content/uploads/2014/06/joyce_-_stimulating_interest_in_stem_careers_among_students_in_europe.pdf

[3] https://www.europarl.europa.eu/RegData/etudes/STUD/2015/542199/IPOL_STU(2015)542199_EN.pdf

	change.
Scenario objectives (teachers' competence development - knowledge, skills, dispositions/ attitudes)	The educational material will be developed focusing on: (a) the learning objectives, (b) the modern approaches ofthe teaching and learning methodologies, and (c) the ways of using multiple methodological tools to get the best learning outcomes.
Learning outcomes (aspects of competences addressed)	Design of teaching practices in formal and informal learning environments: ● school classroom ● local community ● research institutions ● digital storytelling tools The activities included in this scenario follow an interdisciplinary and exploratory approach of natural sciences' teaching focusing on: ● RRI ● STEM careers ● scientific studies ● problem-solving ● digital storytelling ● visits at research institutes
Training outline/methodology (briefly explain the expected level of inquiry – confirmation, structured, guided, open, and how many and which phases of the IBL model are included. The first and last one are obligatory)	● framing and focusing questions; ● organising and creating learning process ; ● evaluating, synthesising and reporting conclusions; ● possibly taking action of some sort; ● reconsidering consequences and outcomes of each of the above phases.
Time for completing (How many learning hours are needed for teachers to complete the scenario**)**	Overall: 7 hours of training For 45 minutes lesson: 7 hours of training Phase 1 – 1 learning hours (blended learning) Phase 2 – 1 learning hours (blended learning) Phase 3 – 2 learning hours (distance learning) Phase 4– 1 learning hours (distance learning)

	Phase 5 – 1 learning hours (distance learning) Phase 6 – 1 learning hours (blended learning)
Assessment	Evaluation which is based on feedback aims at the improvement of the educational process, at the assessment of the students' progress and at the assessment of the acquired knowledge and skills/competencies during the scenario. "Diagnostic assessment" is used for the initial detection of the students' perceptions/ideas about STEM subjects, "formative assessment" is mainly used for monitoring, guidance and student's support during the teaching and "summative assessment" is used for the final evaluation in relation to the intended final objectives of the educational scenario/teaching process.

DURATION

Subphase	Activity	Tools	Learning Resources
Phase 1: Problem / topic			**Ex. duration: 1 hour**
Introduction to the topic	Video with the effects of climate change	Internet	https://youtu.be/NegtxrwUkmo
Motivation	Search for images representing i) Sea level rise ii.Ice melting and iii.Temperature rise	Internet	●http://www.esa.int/Our_Activities/Space_for_climate/An_ocean_of_change ●http://www.esa.int/Our_Activities/Space_for_climate/Ice_retreat ●http://www.esa.int/Our_Activities/Space_for_climate/Talking_climate ●http://climate.nasa.gov/climate_resources/18/ ●http://data.giss.nasa.gov/gistemp/maps/ ●http://www.esa.int/ESA ●http://www.esa.int/Our_Activities/Space_for_climate/A_global_challenge ●http://esamultimedia.esa.int/docs/EarthObservation/ESA_CCI_140605
Reflection	Discussion on the impact of climate change	Wiki	How can we explain to students the impact of climate change? Give some examples
Phase 2: Operationalization			**Ex. duration: 1 hour**
Collaboration with the school community	Concept map based on climate change	Mindmapping tools	https://bubbl.us/Mzg0NDE1NC83NjIyODE2LzhmMjY3NjhhYjExOTVjYjk4YTY3Yjg2YWMzOWY0NTJl-X
Phase 3: Data Collection			**Ex. duration: 2 hours**
Problem solving on graphical representation	Representing statistical or algebrian problems on graphs	Google doc Questions	https://earthobservatory.nasa.gov/images/89896/polar-sea-ice-at-record-lows https://earthobservatory.nasa.gov/features/SeaIce https://sealevel.nasa.gov/understanding-sea-level/key-indicators/global-mean-sea-level/ https://mynasadata.larc.nasa.gov/mini-lesson/analyzing-seasonal-ice-and-snow- extent-student-activity
Reflection	Presentation of participants' views and ideas		Discussion

Subphase	Activity	Tools	Learning Resources
Phase 4: Data Analysis			**Ex. duration: 1 hour**
Exploration of STEM careers in climate change		Cards Game Role play	https://mynasadata.larc.nasa.gov/hydrosphere/stem-career-connections
Phase 5: Interpretation			**Ex. duration: 1 hour**
Conclusion		Class collage	**Consequence wheel** It is also called a cause-and-effect wheel or futures wheel, this is an excellent strategy to explore the consequences of an event or the effects of an issue affecting people and geographical areas.
Phase 6: Communication			**Ex. duration: 1 hour**
Presentation Learning scenario		Ppt	
Evaluation by the experts		Discussion, wiki	
Difficulties in scenario's implementation		Discussion, wiki	

Germany

Title	The impact of food on climate
Country	Germany
Scenario Rationale (explain your reasoning behind offering this course/what is the marked need for this course/how this course fulfils these needs.)	Food, its production and origin have a great impact on the climate, it generates CO2 through production, packaging and transport. Therefore, it is important to raise awareness that our food has an impact on the climate and that we can have an impact on climate change by changing a few small habits. In this scenario, students eat their breakfast together at school and analyse the different components of the breakfast in terms of their origin, packaging and production This scenario is focused on consumer education and the lifeworld of students The aim of consumer education in schools is to enable students to develop reflective and self-determined consumer behavior. Consumer education is to be understood as a lifelong process and a central element of an education that prepares students for both current and future challenges in their private and professional lives.
Scenario objectives (teachers' competence development - knowledge, skills, dispositions/ attitudes)	Students develop skills such as analysis, reasoning, cooperative work, personal autonomy, interaction skills, developing values, and their decision-making skills. Teachers develop and improve competences related to: ● Digital skills ● Scenarios' development using IBL methodology ● Evaluate students' activities ● Integrate digital tools in their teaching ● Bridge different disciplines under a topic ● Moderation skills
Learning outcomes (aspects of competences addressed)	The teachers will be able to: ● plan and design a multidisciplinary scenario ● integrate digital tools into their teaching ● combine digital tools with hands-on activities and experimental processes ● develop an IBL lesson that incorporates knowledge transfer and reflection among students.
Training outline/methodology (briefly explain the expected level of inquiry – confirmation, structured, guided, open, and how	IBL promotes skill development and has been used as a teaching method in STEM subjects. IBL helps learners develop and investigate their own questions, conduct self-directed research, and work individually or in groups. It encourages learners to develop a critical spirit of inquiry, critical thinking, and problem-solving skills related to their consumption behaviour.

many and which phases of the IBL model are included. The first and last one are obligatory)	It includes 1. Problem definition 2. Operationalisation 3. Data collection 4. Data analysis 5. Interpretation 6. Communication / presentation
Time for completing (How many learning hours are needed for teachers to complete the scenario**)**	2-3 h
Assessment	● Brainstorming and discussion of the topics ● Evaluation of the activities ● Data processing ● Presentations
Module dependencies (text or graphical map)	This scenario combines different disciplines and different modules such as Geography, Economy, Ethics, Maths and Art
Relation to other scenarios (the names of the other partners' scenarios treating the similar problem / topic)	Energy-Do you have a climate-friendly carbon footprint? Food Waste

DURATION

Subphase	Activity	Tools	Learning Resources
Phase 1: Problem / topic			**Ex. duration:**
Topic Introduction	Group discussion	**Introduce the problem:** The potential impact of our breakfast on climate change ● Production ● Origin ● Packaging	Presentation of the food products (ahead of having breakfast) on the common table **Leading question:** What do eating breakfast and protecting the climate have to do with each other? Discussion on the potential influence bases on open questions
Phase 2: Operationalization			**Ex. duration:**
Which elements have an influence on climate change?	Warming up activity	Students discuss and describe which aspects of food production and consumption have an effect on climate. They develop a first list	Discussion and reflection on the list developed
How can we find it out?	Research activity	Students check different internet sites in order to find out sources of information about food carbon footprint etc.	Explore carbon food calculators, https://www.earthday.org/foodprints-calculators/
Design a food and climate assessment table	Students design a spreadsheet (spreadsheet tool) to collect data according to the parameters they set (main parameters are	Table, Spreadsheet system	Design a data collection tool that reflects the parameter worked out by the students

Subphase	Activity	Tools	Learning Resources
	production, packaging, transportation). They develop an own scala.		
Phase 3: Data Collection			**Ex. duration:**
What is the effect of each food product?	Students discuss with their teammates and write down their observations and research data about the different foods.	Spreadsheet Online Tools for Carbon foot print	Students enter the data on a spreadsheet
Phase 4: Data Analysis			**Ex. duration:**
Data analysis - experimental results	Students present their data in graphs according to the three main categories: Production, transport, packaging	spreadsheets	Graph food products and their carbon footprint. Students take on the role of scientists and use Excel spreadsheets to create graphs of their data.
Further data analysis	Students analyse the food products into the different categories	spreadsheets, etc	Graph food products according to the different categories
Problem solving on high CO2 for certain food products	Research on the internet about potential alternatives for the food products	Online research	Brief report
Phase 5: Interpretation			**Ex. Duration:**
Evaluation	Evaluation and ranking of the food products in terms of impact on climate change	Text processing / presentation tool	Make a list of the impact of food products Name potential alternatives for lowering the CO2 foot print

Subphase	Activity	Tools	Learning Resources
Reflection	Discussion in teams or individually on the outcomes of the research	White board	Open questions
#Phase 6: Communication			**Ex. duration:**
(Multimedia-) Presentation	Students present the results of their research using a variety of media	Digital presentation tool Multimedia elements (self-produced or found on the Internet)	Presentation
Round table for the whole class	Students develop consumption strategies that are in line with their taste, with economical aspects and are possible to put into practice. They design a poster reflecting the main ideas for improvement	Design a poster using digital tools	Presentation and Design

Title	Fair trade and climate protection
Country	Germany
Scenario Rationale (Explain your reasoning behind offering this course/what is the marked need for this course/how this course fulfils these needs.)	Across the world, farmers are on the front lines of climate change. Small changes are already having an impact on agriculture and farm families. This is especially true for smaller farms in the Southern Hemisphere. The reasons are many: higher temperatures, drought, flooding, weather extremes, soil erosion, plant diseases, and pollution of seawater from rising sea levels are just some of the threats facing farmers today. About 80% of the world's food comes from 500 million smallholder farmers. And these smallholders, with a small carbon footprint, are severely affected by climate change. Consumers and their consumption behaviour can have an impact, for example, by supporting initiatives that help farmers cope with climate change or by making a significant contribution to preventing climate change. In this scenario, students approach the topic of Fair-Trade certification and explore what the Fair-Trade Initiative is doing to address the issue of climate change and help farms become more resilient to climate change. In addition, they will receive initial information about the Global Goals for Sustainable Development, as the fair also targets some of these goals.
Scenario objectives (teachers' competence development – knowledge, skills, dispositions/ attitudes)	**Students learn about** ▪ Apply knowledge about climate change to explain changes affecting small scale farmers ▪ Learn about Fair Trade certification and the social and environmental ideas around it ▪ Identify actions to support farmers to become more resilient against climate change ▪ Discuss the life situation of small-scale farmers In addition, the focus of the activity is on scientific work: Analysis and evaluation, presentation of results, and estimation of impact. Students develop skills such as analysis, reasoning, cooperative work, personal autonomy, interaction skills, development of values and their ability to make decisions. Teachers develop and improve competences related to: ▪ Digital skills ▪ Scenarios' development using IBL methodology ▪ Evaluate students' activities ▪ Integrate digital tools in their teaching

	▪ Bridge different disciplines under a topic ▪ Moderation skills
Learning outcomes (aspects of competences addressed)	The teachers will be able to: ▪ plan and design a multidisciplinary scenario ▪ integrate digital tools into their teaching ▪ combine digital tools with hands-on activities and experimental processes ▪ develop an IBL lesson that incorporates knowledge transfer and reflection among students.
Training outline/methodology (briefly explain the expected level of inquiry – confirmation, structured, guided, open, and how many and which phases of the IBL model are included. The first and last one are obligatory)	This activity follows a structured IBL approach. Learners learn to develop their own questions, search for qualitative data, find arguments and present them. IBL helps learners develop and investigate their own questions, conduct self-directed research, and work individually or in groups. It encourages learners to develop a critical inquiring mind, critical thinking, and problem-solving skills. It includes 7. Problem definition 8. Operationalisation 9. Data collection 10. Data analysis 11. Interpretation 12. Communication / presentation
Time for completing (How many learning hours are needed for teachers to complete the scenario**)**	3 h
Assessment	▪ Brainstorming and discussion of the topics ▪ Evaluation of the activities ▪ Evaluation of the data processing ▪ Presentations
Module dependencies (text or graphical map)	This scenario combines different disciplines and different modules such as Geography, Biology, Economy and Ethics

DURATION

Subphase	Activity	Tools	Learning Resources
Phase 1: Problem / topic			**Ex. Duration: 30**
Topic Introduction	Introduce the topic with a video and a presentation followed by group discussion Do you know fair trade? Do you sometimes buy fair trade products?	Youtube Padlet for collecting and presenting the results of the discussion	watch youtube video https://www.youtube.com/watch?v=IjCs8aMfZZw
	Presentation on the Sustainable Development Goals	Youtube	https://www.youtube.com/watch?v=0XTBYMfZyrM
	Discussion: Which Goals can be possibly addressed by Fair Trade	Padlet for collecting and presenting the results of the discussion	
Phase 2: Operationalization			**Ex. Duration: 30min**
How are small-scale farmers threatened by climate change?	Brainstorming activity: students collect possible impacts of climate change on smallholder farmers	Google / Search engine Mind-Mapping tool Online Information sites	
What can fair trade do to improve farmers' resilience to climate change?	Research Question Students formulate a research question that connects the issues for small farmers and how they might support the Fair-Trade Initiative	Text processing	
What does fair trade do in the context of the Sustainable Development Goals? How are these related to the fair-trade initiative?	Design activity Students design collaboratively (Teacher-Lead) a mind-map linking the fair trade initiative and the sustainable development goals	Mind-mapping software	Information from UN= and UNESCO
Phase 3: Data Collection			**Ex. Duration: 30**

Subphase	Activity	Tools	Learning Resources
How are small-scale farmers threatened by climate change?	**Research activity** Students investigate the threads for small-scale-farmers	Google / Search engine Text-processing Online Information sites	Websites from UNO, Unvesco, Fair Trade Presentation template
What does fair trade do in the context of the Sustainable Development Goals? How are these related to the fair trade initiative?	**Research activity** Group work: Students make a short investigation on the meaning of fair trade in the scope of the 1. For no poverty (Goal 1) 2. For decent work and economic growth (Goal 8) 3. For climate change (Goal 13)	Google / Search engine Text-processing Online Information sites	Websites from UN, Unvesco, Fair Trade Presentation template
What can Fair Trade contribute to climate change mitigation and resilience?	Research Activity: Using online information from the Fair-Trade website, students gather information about the organization's key activities and how they help farmers combat climate change and become resilient to climate change.	Google / Search engine Text-processing Online Information sites	Websites from UN, Unesco, Fair Trade Presentation template
Phase 4: Data Analysis			**Ex. Duration: 30**
Analysies of the data based on the data collection phase	Students process their collected information and place it into three main categories: 1. What are the issues threating small-scale farmers? What can fair trade accomplish? How do they fit with the Sustainable Development Goals?	Spreadsheet /presetation tool	
Phase 5: Interpretation			**Ex. Duration: 15**
Interpretation	Students explain the connection between fair trade, sustainable development goals, and the lives of smallholder farmers	Text processing / presentation tool	

Subphase	Activity	Tools	Learning Resources
Reflection – Round table with the whole class	Students reflect upon the situation of farmers and ways to support them. They reflect upon if and to which extension people can adapt their consumption and support the fair-trade initiative	White board Design tool such as GIMP	
#Phase 6: Communication			**Ex. Duration: 45**
Design of a Instagram or Face-book story	Designing an Instagram or Facebook story in which they present the results of their investigation and promote the consumption of fair-trade products	Digital presentation Multimedia elements (self-produced or found on the Internet)	

Title	Sinking Islands
Country	Germany
Scenario Rationale (explain your reasoning behind offering this course/what is the marked need for this course/how this course fulfils these needs.)	The Pacific island nation of Kiribati has become a symbol of global climate change and its impact on a country and a culture. By the end of this century, the Pacific island nation of Kiribati will cease to exist and disappear under an ocean that is rising higher and higher as a result of climate change. That's why the country is buying land in mountainous Fiji so its people can move there when rising sea levels make it impossible to live on its own low-lying islands. In this activity, students use data to predict sea level rise, including uncertainties and discuss the consequences of this dramatic change for the entire population of Kiribati. They discuss and decide who should pay for the dramatic changes to the island and its inhabitants.
Scenario objectives (teachers' competence development – knowledge, skills, dispositions/ attitudes)	**Students learn about** ▪ Apply knowledge about climate change to explain rising sea levels ▪ Make a prediction about rising sea levels and estimate the uncertainty in their prediction ▪ Discuss the life situation of the Kiribati inhabitants In addition, the focus of the activity is on scientific work: Analysis and evaluation, presentation of results, and estimation of uncertainties. Students develop skills such as analysis, reasoning, cooperative work, personal autonomy, interaction skills, development of values and their ability to make decisions. Teachers develop and improve competences related to: ▪ Digital skills ▪ Scenarios' development using IBL methodology ▪ Evaluate students' activities ▪ Integrate digital tools in their teaching ▪ Bridge different disciplines under a topic ▪ Moderation skills
Learning outcomes (aspects of competences addressed)	The teachers will be able to: ▪ plan and design a multidisciplinary scenario ▪ integrate digital tools into their teaching ▪ combine digital tools with hands-on activities and experimental processes ▪ develop an IBL lesson that incorporates knowledge transfer and reflection among students.

Training outline/methodology (briefly explain the expected level of inquiry – confirmation, structured, guided, open, and how many and which phases of the IBL model are included. The first and last one are obligatory)	This activity follows a structured IBL approach. Learners learn to develop their own questions, search for data, find arguments. IBL helps learners develop and investigate their own questions, conduct self-directed research, and work individually or in groups. It encourages learners to develop a critical inquiring mind, critical thinking, and problem-solving skills. It includes 13. Problem definition 14. Operationalisation 15. Data collection 16. Data analysis 17. Interpretation 18. Communication / presentation
Time for completing (How many learning hours are needed for teachers to complete the scenario**)**	4 h
Assessment	▪ Brainstorming and discussion of the topics ▪ Evaluation of the activities ▪ Evaluation of the data processing ▪ Presentations
Module dependencies (text or graphical map)	This scenario combines different disciplines and different modules such as Geography, Maths and Ethics

DURATION

Subphase	Activity	Tools	Learning Resources
Phase 1: Problem / topic			**Ex. Duration: 45**
Topic Introduction	**Introduce the problem:** to the topic with a video / followed by individual research on the geographical situation of the island and its key data Presentation followed by group discussion	Youtube Google / Search engine Google Maps Google earth Padlet for collecting and presenting the results	watch youtube video https://www.youtube.com/watch?v=hW9Eakqu6aY Google Earth
	Students discuss about their feelings if they lived in Kiribati (pronounced *Kiribas)*. students discuss reasons for sea level rises. *(Increasing temperatures cause sea level increases in two ways – land and sea ice melt, and oceans expand as they get warmer. Note: water only expands when it is heated once it reaches a temperature beyond 4°C.)*		
Phase 2: Operationalization			**Ex. Duration: 45min**
Why is the sea level rising?	Brainstorming activity Group discussion Students collect main reasons for see level rise	White board	
How can we find it out?	Research activity Students formulate a research question	Text processing	
Design a model for predicting sea level rise (according to data collected)	Design activity Students design a spreadsheet (spreadsheet tool) to predict the rise of the sea level – the model can include different scenarios.	Table, Spreadsheet system Graph tool	Data from scientific sources
Phase 3: Data Collection			**Ex. Duration: 30**

Subphase	Activity	Tools	Learning Resources
How to predict sea level rise ?	Research activity Students check out different website (country specific) that have data on rising sea levels (past and future) *(The sea will cover land that is 40 cm above sea level in 2088; the earliest this could happen is 2055; average predicted sea level rise by 2030 is 10 cm; maximum and minimum values by 2030 are 2 and 18; sea level rise by 2030 is 10 cm ± 8 cm; sea level rise by 2080 is 34 cm ± 28 cm*	Spreadsheet Online Information sites Google / Search engine	data on a spreadsheet Data from scientific sources
Phase 4: Data Analysis			**Ex. Duration: 30**
Data analysis – experimental results	Students process their data and develop a graph according to the different scenarios	spreadsheet	
Phase 5: Interpretation			**Ex. Duration: 45**
Interpretation	Students explain the reasons for sea level rising and predict how long Kiribati Island inhabitants can stay on their island (*Discuss when people might abandon Kiribati: When Sea levels cover much of the land? When sea water has contaminated groundwater so that drinking water is scarce? When the islands are fully submerged?)*	Text processing / presentation tool	
Reflection – Round table with the whole class	Students reflect upon the changes that the Kiribati inhabitants are about to face They write down and present on a poster concrete idea for slowing down the rise of the sea level	White board Design tool such as GIMP	
#Phase 6: Communication			**Ex. Duration: 45**

Subphase	Activity	Tools	Learning Resources
(Multimedia-) Presentation	Students present the results of their research using a variety of media	Digital presentation tool (Powerpoint or similar) Multimedia elements (self-produced or found on the Internet)	Presentation
Plenary discussion	Students discuss and decide whether countries that make most carbon dioxide (including the USA, China and the countries of the EU) should buy land for vulnerable islanders to escape to. Take a class vote.	White board Mentimeter	

Title	Sustainable Mobility
Country	Germany
Scenario Rationale (explain your reasoning behind offering this course/what is the marked need for this course/how this course fulfils these needs.)	Mobility is an integral part of everyone's daily life. No matter who or what age, everybody wants to get from A to B. Whether it's the way to school, the drive to work or the next family vacation. However, transport is also one of the biggest emitters of greenhouse gases in Germany! The fact that the choice of mobile transport has an impact on the climate has already been proven in many studies: Transportation consumes energy, mostly from fossil sources, and releases climate- damaging CO2 when fuel is burned. To meet the requirements of the Paris Climate Agreement and the 2030 target of the Federal Climate Protection Act, transport in Germany must reduce its greenhouse gas emissions quickly and drastically in the coming years. In order to promote the acceptance of and willingness for sustainable mobility in society, it is necessary to have expert knowledge about the effects as well as to reflect on one's own mobility behavior to finally realize that everyone can make a difference
Scenario objectives (teachers' competence development – knowledge, skills, dispositions/ attitudes) Students ask relatives and people from their social environment about their mobility behaviour, work out the effects on climate change and act out possible variants of travel behaviour in a role play.	**Students learn about** ▪ The learners identify the connection between (daily) mobility and climate change ▪ Discuss the role of the transport sector in greenhouse gas emissions ▪ Reflect their own mobility behaviour ▪ Develop and discuss alternatives for sustainable mobility In addition, the focus of the activity is on scientific work: Analysis and evaluation, presentation of results, and estimation of uncertainties. Students develop skills such as … collecting, analysing and processing information from reputable sources, reasoning, cooperative work, personal autonomy, interaction skills, development of values and their ability to make decisions after weighing alternatives. Teachers develop and improve competences related to: ▪ Digital skills ▪ Scenarios' development using IBL methodology ▪ Evaluate students' activities ▪ Integrate digital tools in their teaching ▪ Bridge different disciplines under a topic ▪ Moderation skills
Learning outcomes (aspects of competences	The teachers will be able to: ▪ plan and design a multidisciplinary scenario

addressed)	▪ integrate digital tools into their teaching ▪ combine digital tools with hands-on activities and experimental processes ▪ develop an IBL lesson that incorporates knowledge transfer and reflection among students.
Training outline/methodology (briefly explain the expected level of inquiry – confirmation, structured, guided, open, and how many and which phases of the IBL model are included. The first and last one are obligatory)	This activity follows a structured IBL approach. Learners learn to develop their own questions, search for data, find arguments. IBL helps learners develop and investigate their own questions, conduct self-directed research, and work individually or in groups. It encourages learners to develop a critical inquiring mind, critical thinking, and problem-solving skills. It includes 19. Problem definition 20. Operationalisation 21. Data collection 22. Data analysis 23. Interpretation 24. Communication / presentation
Time for completing (How many learning hours are needed for teachers to complete the scenario**)**	4 h
Assessment	▪ Brainstorming and discussion of the topics ▪ Evaluation of the activities ▪ Evaluation of the data processing ▪ Presentations
Module dependencies (text or graphical map)	This scenario combines different disciplines and different modules such as Geography, Maths and Ethics and Economics, IT
Relation to other scenarios (the names of the other partners' scenarios treating the similar problem / topic)	

DURATION

Subphase	Activity	Tools	Learning Resources
Phase 1: Problem / topic			**Ex. Duration: 45**
Motivation and introduction into the topic	**Introduce the problem:** to the topic with a video	Youtube	watch youtube video https://www.youtube.com/watch?v=G4H1N_yXBiA
	Students discuss the content of the video and the following questions: 1. The students should ask themselves which factors particularly promote and intensify climate change (solution: greenhouse effect). 2. Subsequently, they should question what or which elements are responsible for the greenhouse effect and which sectors contribute a large share to the emission of these elements (solution: transport/mobility)		
Phase 2: Operationalization			**Ex. Duration: 45min**
Students formulate a research question	Students find the problem: What impact does mobility have on climate change? How can I influence this problem positively?	White board	
	Students express first assumptions about possible solutions to the problems		
How can we find it out?	Teacher divides the overarching question of "sustainable mobility" into three sub-questions and forms three groups		
	Brief discussion about potential sources for addressing the research question.	Online/Digital Mindmapping	

Subphase	Activity	Tools	Learning Resources
		tools like FreeMind or FreePlane	
Phase 3: Data Collection			**Ex. Duration: 30**
Each group collects infomations concerning their research question	Research activity **Group 1:** Explore own mobility/own traffic behavior ***Group 2:*** Connection between mobility and climate ***Group 3:*** What alternatives are there (sustainable mobility)? What can I do?	Spreadsheet Online Information sites, Google / Search engine	**Group 1:** Students use material 1 of the following document: https://www.greenpeace.de/bildungsmaterial/Verkehrt.pdf And e.g. the following links to research: ● https://de.statista.com/statistik/daten/studie/151737/umfrage/nutzung-von-verkehrsmitteln-in-deutschland/ ● https://de.statista.com/statistik/daten/studie/1031434/umfrage/meistgenutzten-verkehrsmittel-in-hamburg-nach-einkommensgruppen/ ● https://www.umweltbundesamt.de/themen/verkehr-laerm/klimaschutz-im-verkehr#undefined --> Reflection on their own traffic behavior and similarities and differences to the general situation in Germany. Students should research e.g. at Statista to be able to create a diagram in phase 4. **Group 2:** Students use material 2 of the following document: https://www.greenpeace.de/bildungsmaterial/Verkehrt.pdf And e.g. the following links to research: ● https://www.quarks.de/umwelt/klimawandel/co2-rechner-fuer-auto-flugzeug-und-co/

Subphase	Activity	Tools	Learning Resources
			● https://de.statista.com/infografik/2111/ausstoss-in-deutschland-in-millionen-tonnen-co2-aequivalente/ ● https://www.umweltbundesamt.de/themen/klima-energie/treibhausgas-emissionen/emissionsquellen#energie-stationar ● https://www.umweltbundesamt.de/daten/verkehr/umweltbelastungen-durch-verkehr#verkehr-belastet-luft-und-klima **Group 3:** Students use material 3 of the following document: https://www.greenpeace.de/bildungsmaterial/Verkehrt.pdf And e.g. the following links to research: ●https://www.greenpeace.de/sites/default/files/publications/20170830-greenpeace-kursbuch-mobilitaet-kurzfassung.pdf.pdf ●https://de.statista.com/statistik/daten/studie/314723/umfrage/co2emissionen-entwicklung-nach-verkehrszweig/ ●https://www.zeit.de/serie/sauber-durch-die-stadt?utm_referrer=https%3A%2F%2Fwww.google.com%2F ●https://www.umweltbundesamt.de/themen/verkehr-laerm/nachhaltige-mobilitaet
Phase 4: Data Analysis			**Ex. Duration: 30**
	Group 1: Creates a chart in Excel with data	spreadsheet, ppt	

Subphase	Activity	Tools	Learning Resources
Analysis, selection and gathering of the results relevant to the research question	**Group 2 + 3:** records results in powerpoint		
	Each group creates a quiz about the content of the lecture	e.g.: Who wants to be a millionaire?, Kahoot or similar	
	Groups upload results to cloud for later general access in phase 6	DropBox, Google Drive, etc.	
Phase 5: Interpretation			**Ex. Duration: 45**
Interpretation	Students discuss the results of group work and answer the 3 questions	Text processing / presentation tool	
#Phase 6: Communication			**Ex. Duration: 45**
(Multimedia-) Presentation	Expert Groups: 1-3 "experts" from each group come together and present their results in their new group		Presentation
Discussion	Learners discuss in plenary about the group work results --> if necessary also comparison of assumptions After presentation group 1: other groups reflect on their own traffic behavior and compare with the results presented		

Subphase	Activity	Tools	Learning Resources
	After presentation group 3: Which mentioned alternatives are already used or are considered?		
Reflection	Students reflect on lesson topic by answering the following questions for themselves: 1. What/what insights do I take away from today's lesson for myself? 2. What will I try to do differently in the future? Students save resolutions in the mind map and reflect/review behavior change after about 3-6 months.	Digitale Mindmap Tools like FreeMind and FreePlane	

Title	Weather Extremes
Country	Germany
Scenario Rationale (explain your reasoning behind offering this course/what is the marked need for this course/how this course fulfils these needs.)	For a long time, events such as droughts, strong winds and rains, and devastating fires seemed to be far away, especially for Germany and northern Europe, but also North America. In the meantime, however, more and more weather that appears to be extreme is showing that the effects of climate change are not limited to exotic countries, but are also being felt on our own doorstep. Year for year, Germany registers new temperature records due to hot days and significantly fewer cold days. In addition, winds are increasingly sweeping through the country with a completely new intensity. But the saddest wake-up call for the change that is taking place in this country may have been the flood disaster in the Ahr Valley in 2021, which should serve as a warning to even the last skeptic. In order to point out the danger of extreme weather and to understand how it can arise, it therefore seems sensible to draw attention to this problem in a well-founded manner. In this way, students can be made aware of the immediate consequences of climate change in their home countries. Thereby, the effects of climate change do not remain photos and videos from distant regions, which are seen on TV from time to time, but a direct connection to the students is created.
Scenario objectives (teachers' competence development – knowledge, skills, dispositions/ attitudes)	**Students learn about** ▪ Apply knowledge about climate change to explain rising sea levels ▪ Make a prediction about rising sea levels and estimate the uncertainty in their prediction ▪ Discuss the life situation of the Kiribati inhabitants In addition, the focus of the activity is on scientific work: Analysis and evaluation, presentation of results, and estimation of uncertainties. Students develop skills such as analysis, reasoning, cooperative work, personal autonomy, interaction skills, development of values and their ability to make decisions. Teachers develop and improve competences related to: ▪ Digital skills ▪ Scenarios' development using IBL methodology ▪ Evaluate students' activities ▪ Integrate digital tools in their teaching ▪ Bridge different disciplines under a topic ▪ Moderation skills

Learning outcomes (aspects of competences addressed)	The teachers will be able to: ▪ plan and design a multidisciplinary scenario ▪ integrate digital tools into their teaching ▪ combine digital tools with hands-on activities and experimental processes ▪ develop an IBL lesson that incorporates knowledge transfer and reflection among students.
Training outline/methodology (briefly explain the expected level of inquiry – confirmation, structured, guided, open, and how many and which phases of the IBL model are included. The first and last one are obligatory)	This activity follows a structured IBL approach. Learners learn to develop their own questions, search for data, find arguments. IBL helps learners develop and investigate their own questions, conduct self-directed research, and work individually or in groups. It encourages learners to develop a critical inquiring mind, critical thinking, and problem-solving skills. It includes 25. Problem definition 26. Operationalisation 27. Data collection 28. Data analysis 29. Interpretation 30. Communication / presentation
Time for completing (How many learning hours are needed for teachers to complete the scenario**)**	4 h
Assessment	▪ Brainstorming and discussion of the topics ▪ Evaluation of the activities ▪ Evaluation of the data processing ▪ Presentations
Module dependencies (text or graphical map)	This scenario combines different disciplines and different modules such as Geography, Maths and Ethics

DURATION

Subphase	Activity	Tools	Learning Resources
Phase 1: Problem / topic			**Ex. Duration: 45**
Introduction into the topic	Introducing the problem/topic with a video	Youtube Google / Search engine Google Maps Google earth Padlet for collecting and presenting the results	watch youtube video https://www.youtube.com/watch?v=yqMLmKUFbas Google Earth
	Students discuss about weather extremes in Germany in the last couple of years: What changes have you noticed so far?		
Phase 2: Operationalization			**Ex. Duration: 45min**
Causes of weather extremes and predictions of future developments	Brainstorming activity Group discussion: Students collect main reasons for Weather Extremes and how the weather could develop within the next years	White board Mindmapping-tools like FreeMind or FreePlane	
How can we find it out?	Research activity Students formulate a research question: (how are climate change and weather extremes related? How have weather extremes developed in recent years?) --> global perspective	Text processing	
Phase 3: Data Collection			**Ex. Duration: 30**

Subphase	Activity	Tools	Learning Resources
Collect Informations about weather extremes in different parts of the world?	Research activity Students check out different websites (country specific) that have data on weather extremes in the past and future Group 1: Collecting data according to how the global weather and weather extremes in particular developed until 2020 by reading articles or interpretating statistics found in online research Group 2: Collecting data and forecasts according to the question on how the global weather and the frequency of weather extremes might develop in the future by using online research Group 3: Collecting data to find out which reasons are mostly striking for the intensity and frequency of weather extremes by using online research	Online Information sites, Google / Search engine or Youtube	Group 1: Use the follwing links and find other relevant sources/data: ● https://www.tagesschau.de/ausland/europa/klimawandel-extremwetter-101.html ● https://www.welthungerhilfe.de/informieren/themen/klimawandel/wetterextreme-klimawandel-folgen/#c19841 ● https://www.dw.com/de/tödliches-klima-weltweit-durch-hitze-sturm-und-flut-klima-risiko-index/a-51506072 Group 2: Use the follwing links and find other relevant sources/data: ● https://www.tagesschau.de/ausland/weltklimarat-erderwaermung-bericht-101.html ● https://www.tagesschau.de/inland/klimarisikoanalyse-deutschland-101.html

Subphase	Activity	Tools	Learning Resources
			● https://www.nationalgeographic.de/umwelt/2022/02/stuerme-deutschland-orkan-interview-unwetter ● https://zdfheute-stories-scroll.zdf.de/deutschland-klimawandel-hitze-starkregen/index.html ● IPCC interactive Atlas Group 3: Use the follwing links and find other relevant sources/data: ● https://www.bmuv.de/themen/gesundheit-chemikalien/gesundheit/gesundheit-im-klimawandel/extremwetterereignisse ● https://www.br.de/wissen/wetter-extremwetter-klimawandel-100.html

Subphase	Activity	Tools	Learning Resources
			● https://wiki.bildungsserver.de/klimawandel/index.php/Wetterextreme_und_Klimawandel ● https://www.wwf.de/themen-projekte/klimaschutz/klimaforschung-extremwetter-sind-folgen-des-klimawandels ● https://www.eskp.de/naturgefahren/sturmgefaehrdung-in-deutschland-935265/ ● https://wiki.bildungsserver.de/klimawandel/index.php/Starkniederschläge_und_Hochwasser
Phase 4: Data Analysis			**Ex. Duration: 30**
Analysis, selection and gathering of the results relevant to the research question	Students structure and process their data and develop a short presentation for their results	Word Excel Powerpoint Prezi	
Phase 5: Interpretation			**Ex. Duration: 45**
Interpretation	Students interpret their group results and summarize the main aspects	Text processing / presentation tool	

Subphase	Activity	Tools	Learning Resources
#Phase 6: Communication			**Ex. Duration: 45**
(Multimedia-) Presentation	Students present the results of their research using a variety of media	Digital presentation tool (Powerpoint/Prezi or similar) Multimedia elements (self-produced or found on the Internet)	Presentation
Plenary discussion and Reflection of topic	After the presentations, the individual results are put in relation to each other and a conclusion is drawn --> Intensity increases; also Germany, Europe/North America are now directly affected --> Comparison with the assumptions made in phase 2 (possible reasons and forecasts).	White board Mentimeter	

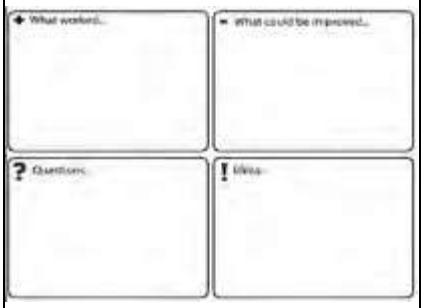
Turkey

Title	Alternative Energy Sources: Green Science
Country	Turkey
Scenario Rationale (explain your reasoning behind offering this course/what is the marked need for this course/how this course fulfils these needs.)	Fossil fuels (oil, coal and natural gas) are among the traditional sources of power generation. Nonetheless, fossil fuels produce vast quantity of greenhouse gases (carbon dioxide, methane, nitrous oxide, fluorinated gases) when burned. Such human activities increase the concentration of some of these gases in the atmosphere, which causes the global warming. Therefore, understanding alternative energy sources to overcome global warming is among the priorities of most countries. Sustainable Development Goals (SDGs) 13 is also about climate action. Thus, this activity focuses on the science behind the power, alternative energy sources, and the difference between renewable energy and alternative energy sources. In this activity participants will explore how alternative energy sources can reduce greenhouse gases. Participants are provided with some green science kits and asked in what way that could be used in secondary school curricula for teaching idea about climate change. The participants may also investigate public' awareness about alternative energy sources and provide them information about alternative energy sources including research and innovation in this field. This activity aims to enhance teachers' competences in teaching about climate change and alternative energy sources. It also provides resources and strategies to help teachers to grasp underlying ideas and to create effective learning environments for teaching about climate change.
Scenario objectives (teachers' competence development - knowledge, skills, dispositions/ attitudes)	Develop teacher's competences related to: Knowledge development: ● Discover the significance of adapting and using alternative energy sources to generate power. ● Exploring a different number of ways to reduce air pollution. ● Knowledge, skills and teachers' competencies development based on environment and sustainable development. ● Innovative approaches of exploratory learning methodology to teach Climate Change. ● Deeper understanding of Sustainability and Climate Change and how to integrate the topic in the classroom.

	● Improve their digital teaching skills, including digital educational tools, optical tools, Internet and multimedia in their teaching Skills development: ● Carry out an inquiry-based activities on alternative energy sources ● Plan, organize and assess students' inquiry activities; ● Development of the scientific and critical way of thinking. Attitudes: ● Increase students' awareness on the environment and the sustainable development.
Learning outcomes (aspects of competences addressed)	● Knowledge and skills on how to teach the science behind the power produced with fossils fuels and alternative energy sources. Make a SWOT analysis of both. ● Awareness that citizens make their decisions based on their knowledge, beliefs, social values, worldviews, as well as based on the understanding about science and its nature.
Training outline/methodology (briefly explain the expected level of inquiry – confirmation, structured, guided, open, and how many and which phases of the IBL model are included. The first and last one are obligatory)	This professional development activity ● Focuses on teachers' needs and allow them to work in groups to develop inquiry-based activity and reflect on their own teaching practices ● Use the type of innovative methods that teachers will use in their own evolving teaching ● Take into account contextual factors (such as assessment structures and the curriculum)
Time for completing (How many learning hours are needed for teachers to complete the scenario**)**	Overall: 8 hours of training For 45 minutes lesson: 8 hours of training
Assessment	

DURATION

Subphase	Activity	Tools	Learning Resources
Contextualizing the issue			**Ex. duration:**
Set the scene- Emphasize	Global Climate Crisis	Brainstorming, discussion	45 minutes News articles / Videos

Subphase	Activity	Tools	Learning Resources
		The goal here is to build a common starting point for students.	https://www.un.org/sustainabledevelopment/climate-change/
Define the problem	Think-Pair-Share	Students take ownership of problem as they define it. To formula a need-statement: [User] needs a way to [X]	45 minutes
Ideate	Group work	Phrase how might we statement. Create innovative solutions to the defined problem and select the optimum solution	45 minutes
Prototype	Co-create	Model the optimum solution	2 x 45 minutes
Test	Getting feedback Reflection	Gain further insight as to feasibility of selected solution	2 x 45 minutes
Assess	Assess the project and prototype multiple times		45 minutes

Title	Green Energy is always by my side
Country	Turkey
Scenario Rationale (explain your reasoning behind offering this course/what is the marked need for this course/how this course fulfils these needs.)	REPowerEU: Joint European action for more affordable, secure and sustainable energy The European Commission has recently proposed an outline of a plan to make Europe independent from unreliable suppliers and volatile fossil fuels. The new geopolitical and energy market reality requires Europe to drastically accelerate the clean energy transition. In this activity participants will explore how to eliminate Europe's dependency on fossil fuels. The participants may develop green energy technologies (e.g., an electrical ventilator works with solar panels) and make a SWOT analysis of their initiatives. In this activity, participants investigate the process of generating electrical energy with solar energy systems and calculating cost-benefit if they install such system to their home or schools. • In this module, participants are asked to solve a problem by developing and improving a technology. For instance, they may design and develop green energy technologies (e.g., an electrical ventilator works with solar panels). This activity aims to enhance teachers' competences in teaching about alternative energy sources. They are expected to generate creative solutions to a challenging problem and to work like engineers. It also provides resources and strategies to help teachers to grasp underlying ideas and to create effective learning environments for teaching about climate change. Through such practical real-world connections, future teachers will have an opportunity to see how STEM is part of their everyday world. That kind of tasks enable teachers to develop content knowledge and also pedagogical content knowledge.

euronewsgreen

More solar panels need to be made In Europe to cut dependency on Russian gas, says EU

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By MlteveCimtpho/1wirlt Ruurers
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The European Commission hns said that it will do "whMeve.r It takes" 10 rebuild Europe's solar ll!llllufueturing industry.

The EU's energy commissionerannouneed thnews on Thursday, as part 0I' the> bl<>c's plans to cut t11lianccon Rus•ian gas as f:!Sl as !hey can.

"We need 10 bring manufacturing back 10 11urope, and lhc CommissiolW111ing to do wbnlevor it talccs 10 make it happen," Kadri Simson told the Solar Power Summit conference in Brussels.

W• need ro bring mamtfacruring buck ro Europ., and the Commission is willing l0 do wlratevcr it tokes 10 make it /lapfH!"

EU's energy oommiJ•sfoner

"Pari of Ihis i1 looking al po..u;bil' fiuanciJtg op/i0/1$,•"'"added.

Where are most solar panels made?

China i• the world leader in pr®uclion of solnr energy, having Installed more than 30.1 GW of pho1ovollaic (PV) capacit)l since OJ9. As the Dlltion with the largest population and carbon footprint, this commitment to renewable energy is encouraging.

The United Stales, India, Japan, and VielJlam nlllk next on lhe list of top solar producers.

There are only a small amount of panels made in Europe. The countries currently producing solar cells are Italy, France and Slovenia.

Ho-w much solar power does the EU currently use?

Europe'ssolar gtowlh is accelerating year on year, as lhe bloc commiiS to relying on more renewable sources for its energy needs.

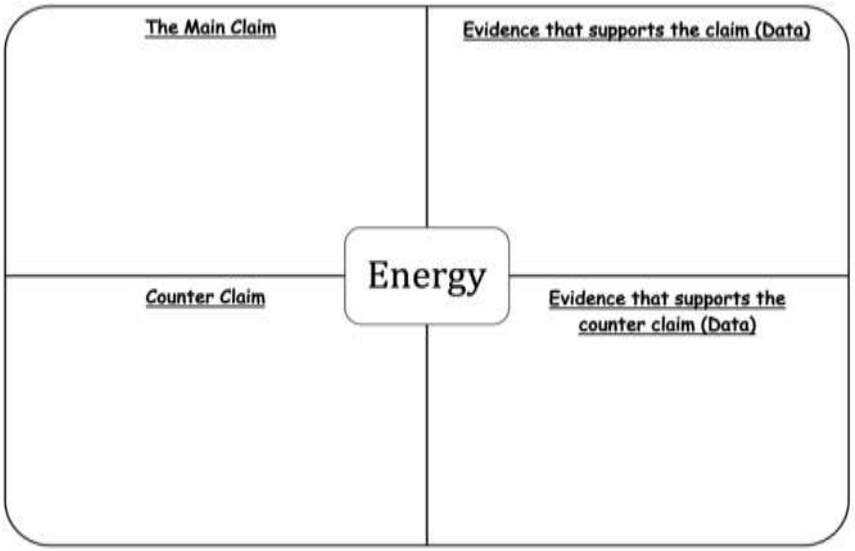
Solor panels generated a record 101'"'ceni of EU electricity in Junc,July 2021, up from !he some penod in 2018.

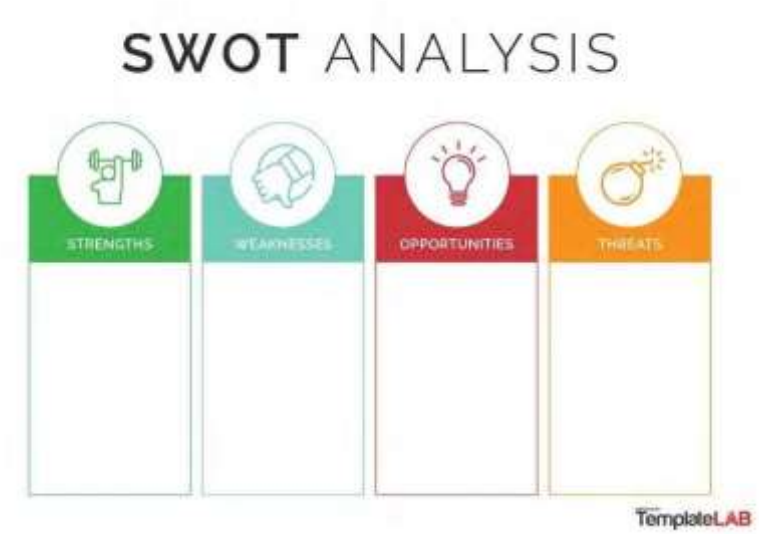
Seven EU countries gencrn1od over a tctllh of their electricity from solar panei:nJWJ<>July 2021, with lhe Ncllteltlands (17 per cent), Germany (17 per celit), Sp3in (16 per cent). Greece (13 per ctnt) and Italy (tJ per cent) leadins, the way, according to en rgy thinktnnk Ember.

Hltitgilry has also quadruple<! its solar shore since Junc Juty 201S, while the Netherlands and Spoin ba\'C doubled. £stoni• and Poland have gone from nes.r.zero solnr in 2018 10 IO per cent and *S* per cent resl)ectively in June-July 2021. And for the first rime:. solar overtook coal power in Hungary in summer 2021, a milestone !hat had already been reached the previous year in Greece and Portugal.

"Europe hilSd a record·\>reaking sunllltler for solor power, but it is yet to bamess iS full poten1illl, \Vealhtr extremes havt g1voo governments an urg nt wake-up caU and now they must turn climate targciS into climate action by olcpping up .alar deploymL7ll• says Charles M0011!, Eo.roplead at Ember.

SollJ'Cc:
hllnsWL .WS,Ol.Q.nV 022/03/31/11l0
e-wlar·oonels-nced-to-b<>mHdo>in-eurpl!!;l.<!::fl!l:
depcndency-on-russian-ans-says-cu

	
Scenario objectives (teachers' competence development - knowledge, skills, dispositions/ attitudes)	Develop teacher's competences related to: Knowledge development: ● Discover the significance of adapting and using alternative energy sources to generate power. ● Knowledge, skills and teachers' competencies development based on environment and sustainable development. ● Enable teachers to develop content knowledge and also pedagogical content knowledge ● Innovative approaches of exploratory learning methodology to teach Climate Change. ● Deeper understanding of Sustainability and Climate Change and how to integrate the topic in the classroom. ● Improve their digital teaching skills, including digital educational tools, optical tools, Internet and multimedia in their teaching. Skills development: ● Carry out an inquiry-based activities on alternative energy sources. ● Plan, organize and assess students' inquiry activities. ● Development of the scientific and critical way of thinking. Attitudes: ● Increase students' awareness on the environment and the sustainable development.
Learning outcomes (aspects of competences	● Consider about the economy of science. ● Knowledge and skills on how to teach the science behind

addressed)	the energy produced with fossils fuels and alternative energy sources. Make a SWOT analysis of both. ● Awareness that citizens make their decisions based on their knowledge, beliefs, social values, worldviews, as well as based on the understanding about science and its nature. 
Training outline/methodology (briefly explain the expected level of inquiry – confirmation, structured, guided, open, and how many and which phases of the IBL model are included. The first and last one are obligatory)	This professional development activity ● Focuses on teachers' needs and allow them to work in groups to develop inquiry-based activity and reflect on their own teaching practices ● Use the type of innovative methods that teachers will use in their own evolving teaching ● Take into account contextual factors (such as assessment structures and the curriculum)
Time for completing (How many learning hours are needed for teachers to complete the scenario**)**	Overall: 8 hours of training For 45 minutes lesson: 8 hours of training
Assessment	
Module dependencies (text or graphical map)	
Relation to other scenarios	

(the names of the other partners' scenarios treating the similar problem / topic)	

DURATION

Subphase	Activity	Tools	Learning Resources
Contextualizing the issue			**Ex. duration:**
Set the scene- Emphasize	REPowerEU	Brainstorming, discussion The goal here is to build a common starting point for students.	45 minutes News articles / Videos https://ec.europa.eu/commission/presscorner/detail/en/ip_22_1511 https://www.euronews.com/green/2022/03/31/more-solar-panels-need-to-be-made-in-europe-to-cut-dependency-on-russian-gas-says-eu
Define the problem	Think-Pair-Share	Students take ownership of problem as they define it. To formula a need-statement: [User] needs a way to [X]	45 minutes
Ideate	Group work	Phrase how might we statement. Create innovative solutions to the defined problem and select the optimum solution	45 minutes
Prototype	Co-create	Model the optimum solution 	2 x 45 minutes 
Test	Getting feedback	Gain further insight as to feasibility of selected solution	2 x 45 minutes

Subphase	Activity	Tools	Learning Resources
	Reflection		
Assess	Assess the project and prototype multiple times		45 minutes

Title	The use of data in climate change and introducing argumentation
Country	Turkey
Scenario Rationale (explain your reasoning behind offering this course/what is the marked need for this course/how this course fulfils these needs.)	Assessment is an essential part of the teaching and learning process in education. Teaching about climate change is an important part of scientific literacy; nonetheless, assessing students' understanding about climate change is not a straightforward issue. One aspect would be the use of scientific knowledge to identify questions and to draw evidence-based conclusions to understand climate issues (OECD, 2015). Scientific knowledge is characterised by proper scientific explanations or arguments involving the coordination of the data and the claim (product of observation vs. product of interpretation of those observations) to support or refute an explanatory conclusion, model or prediction (Osborne et al., 2004). It should be noted that, in order to interpret statements about climate issues or risk assessment, an understanding the concepts of correlation, cause and effect is required. correlation is a statement of numerical facts; it does not necessarily imply causation and effects. A claim (assertion or proposition) is an assertion put forward publicly for general acceptance." data (evidence, grounds, support) can be observations, facts, physical evidence or experimental results that are used for to support or refute a given claim. In this scenario, three PISA (Programme for International Student Assessment) Test Questions will be discussed with teachers. Each question will be analysed in terms of knowledge, competency, context and cognitive demand dimension. In this activity participants will explore how to assess students' understanding about climate change issues, in particular, how to assess students' competencies in using scientific evidence. Following queries can be used during the session to guide the discussion: ● What would be the aims of these three PISA questions? ● What science knowledge is required to answer this question? How would you score responses of this question? ● What competence is required to answer this question? How would you score responses of this question? ● How would you use these questions in your lessons? ● How would your students feel about these questions? ● In what way, would you use these questions as preliminary,

	diagnostic, formative and summative evaluations?[4]
Scenario objectives (teachers' competence development - knowledge, skills, dispositions/ attitudes)	Develop teacher's competences related to: Knowledge development: 1. Awareness that scientific knowledge is characterized by proper scientific explanations or arguments involving the coordination of the data and the claim (product of observation vs. product of interpretation of those observations) to support or refute an explanatory conclusion, model or prediction. 2. Knowledge, skills and teachers' competencies development based on environment and sustainable development. 3. Understanding the concepts of correlation, cause and effect. 4. Enable teachers to develop content knowledge and also pedagogical content knowledge 5. Innovative approaches of exploratory learning methodology to teach Climate Change. 6. Deeper understanding of Sustainability and Climate Change and how to integrate the topic in the classroom. 7. Improve their digital teaching skills, including digital educational tools, optical tools, Internet and multimedia in their teaching. Skills development: Knowledge and skills on how to use different assessment tools related to climate change. Attitudes: 8. Increase students' awareness on the environment and the sustainable development.
Learning outcomes (aspects of competences addressed)	9. Consider about the nature of science.

[4] Preliminary evaluation usually occurs in the early stages of the teaching and learning process, through informal observations and questioning that teachers perform to learn about their students' skills, attitudes, and characteristics. Diagnostic evaluations occur before or during the instruction and are concerned with skills and characteristics that are necessary for the current topic, and for student achievement. This type of evaluation could be based on informal assessments, or formal assessment such as written or standardized tests. Summative evaluations occur at the end of an instructional period and are used to certify student achievement over a range of skills. Summative evaluations are based on formal tests, which are used to collect data about student achievement, although that data is rarely used to inform teaching and learning. Conversely, formative evaluations occur during instruction to establish whether students have achieved sufficient mastery of skills and understanding of subjects, and whether further instruction in these skills is needed.

	10. How scientific claims are supported by data and reasoning in science.
Training outline/methodology (briefly explain the expected level of inquiry – confirmation, structured, guided, open, and how many and which phases of the IBL model are included. The first and last one are obligatory)	This professional development activity 11. Focuses on teachers' needs and allow them to work in groups to develop inquiry-based activity and reflect on their own teaching practices 12. Use the type of innovative methods that teachers will use in their own evolving teaching 13. Take into account contextual factors (such as assessment structures and the curriculum)
Time for completing (How many learning hours are needed for teachers to complete the scenario**)**	Overall: 3 hours of training For 45 minutes lesson: 3 hours of training
Assessment	
Module dependencies (text or graphical map)	
Relation to other scenarios (the names of the other partners' scenarios treating the similar problem / topic)	

GREENHOUSE questions (used in PISA 2006 and 2015) (Source: www.oecd.org/pisa)

PISA 2015

Greenhouse effect
I(Ilroduclon

2

THE GREENHOUSE EFFECf: FACf OR FICf iON?

Living things need eMrgy 10 survive.The energy that sustains life on the Earth comes from lhe Sun, whichradiates energy inlo spacebecause it is so hot A liny proportion of this energy rei!ches the Earth.

The farth'salmosphere actlike a protective blanket over the surface of our plane!, preventing the variations In temperalure that would exislin anairless world Most of the radi1ted energy coming fromlhe Sun passesthrough lhe Earlh's atmosphere. The Earth absorbs some of !his energy, and some is reflected back from the Earth's surface. Part of vhis reflected energy is itlbsorbed by the a1mosphere.

Asa r ult of lhis the averagelemperaiUre above the Earth's surface is higher than il would beif there were no atmosphere. The Earth's atmosphere has the same effect as a greenhouse, hence the term greenhoue effect.

Thegreenhouse effect is said to have become more pronounced during the twenlielh centUry.

It is a fact that the average temperatureof the Earth's atmosphere has increased.In newspapers and periodicals the increased carbon dioxide emissi()n is often stated as the main source of the temperaturerise in the twentieth century.

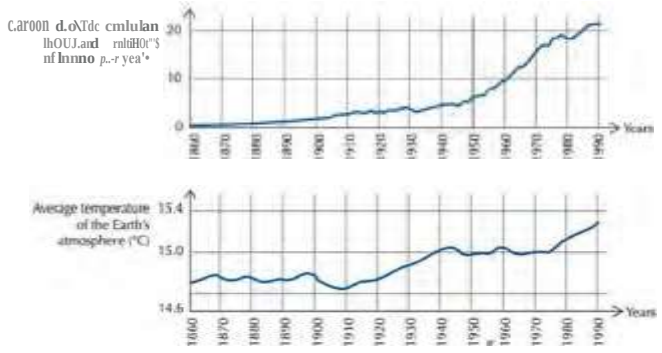
Gr.eenhouse effect
Introduetion

Now dick on Next to view the first question.

1

2

A student named Andre becomes interested in lhe possible relalionship between the average temperaiUre of the Earth's atmosphere and the carbon dioxide emission on the Earth.
In a library he comes across the following two graphs.



Andre concludes. from the two graphs. that it is certain thaithe increase in the average temperature of the Earth's atmosphere is due lo 1heincrease ir> the carbon dioxide emission.

QUESTION 1

What is it about the graphs that supports Andre's conclusion?

……
……
……..

QUESTION 2

Another student, Jeanne, disagrees with André's conclusion. She compares the two graphs and says that some parts of the graphs do not support his conclusion.

Give an example of a part of the graphs that does not support André's conclusion. Explain your answer.

……
……
……
……
……..

QUESTION 3

André persists in his conclusion that the average temperature rise of the Earth's atmosphere is caused by the increase in the carbon dioxide emission. But Jeanne thinks that his conclusion is premature. She says: "Before accepting this conclusion you must be sure that other factors that could influence the greenhouse effect are constant".

Name one of the factors that Jeanne means.

……
……
……
……
……..

PISA 2015 Framework categorisation for GREENHOUSE questions

Framework categories	Question 1	Question 2	Question 3
Knowledge type	Epistemic	Epistemic	Procedural
Competency	Explaining phenomena scientifically	Explaining phenomena scientifically	Explaining phenomena scientifically
Context	Environmental, global	Environmental, global	Environmental, global
Cognitive demand	Medium	Medium	Medium

Question 1 requires students not only to understand how the data is represented in the two graphs, but also to consider whether this evidence scientifically justifies a given conclusion. This question assesses students' competencies in using scientific evidence. This is one of the features of epistemic knowledge in the PISA 2015 framework. This question requires an interpretation of graphs involving a few linked steps; thus, according to the framework, it is categorised as medium cognitive demand.

Question 2 requires students to study the two graphs in detail. The question assesses students' competencies in using scientific evidence. The knowledge, competency, context and cognitive demand are in the same categories as question 1.
Question 3 requires students to consider control variables in terms of the critical review of evidence used to support claims. This is categorised as "procedural knowledge" in the PISA 2015 framework. The question assesses students' competencies in explaining phenomena scientifically.

GREENHOUSE SCORING – QUESTION 1 (Source: www.oecd.org/pisa)

Full credit:

- Responses that refer to the increase of both (average) temperature and carbon dioxide emission.

- As the emissions increased the temperature increased. Both graphs are increasing.
- Because in 1910 both the graphs began to increase
- Temperature is rising as CO2 is emitted.
- The information lines on the graphs rise together.
- Everything is increasing.
- The more CO2 emission, the higher the temperature.

- Responses that refer (in general terms) to a positive relationship between temperature and carbon dioxide emission.

- The amount of CO2 and average temperature of the Earth is directly proportional.
- They have a similar shape indicating a relationship.

No credit:

- Responses that refer to the increase of either the (average) temperature or the carbon dioxide emission.

- The temperature has gone up.
- CO2 is increasing.
- It shows the dramatic change in the temperatures.

- Responses that refer to temperature and carbon dioxide emission without being clear about the nature of the relationship.

- The carbon dioxide emission (graph 1) has an effect on the earth's rising temperature (graph 2).
- The carbon dioxide is the main cause of the increase in the earth's temperature.

- Other responses.

- The carbon dioxide emission is greatly rising more than the average Earth's temperature. [Note: This answer is incorrect because the extent to which the CO2 emission and the temperature are rising is seen as the answer, rather than that they are both increasing.]
- The rise of CO2 over the years is due to the rise of the temperature of the Earth's atmosphere.
- The way the graph goes up.
- There is a rise.

- Missing.

GREENHOUSE SCORING – QUESTION 2

Full credit: Responses that refer to one particular part of the graphs in which the curves are not both descending or both climbing and gives the corresponding explanation, such as:

- In 1900–1910 (about) CO2 was increasing, whilst the temperature was going down.
- In 1980–1983 carbon dioxide went down and the temperature rose.
- The temperature in the 1800's is much the same but the first graph keeps climbing.
- Between 1950 and 1980 the temperature didn't increase but the CO2 did.
- From 1940 until 1975 the temperature stays about the same but the carbon dioxide emission shows a sharp rise.
- In 1940 the temperature is a lot higher than in 1920 and they have similar carbon dioxide emissions.

Partial credit:
- Responses that mention a correct period, without any explanation.
- Responses that mention only one particular year (not a period of time), with an acceptable explanation.

- In 1980 the emissions were down but the temperature still rose.

- Responses that give an example that doesn't support André's conclusion but makes a mistake in mentioning the period. [Note: There should be evidence of this mistake – e.g. an area clearly illustrating a correct answer is marked on the graph and then a mistake made in transferring this information to the text.]

- Between 1950 and 1960 the temperature decreased and the carbon dioxide emission increased.

- Responses that refer to differences between the two curves, without mentioning a specific period.

- At some places the temperature rises even if the emission decreases.
- Earlier there was little emission but nevertheless high temperature.
- When there is a steady increase in graph 1, there isn't an increase in graph 2, it stays constant. [Note: It stays constant "overall".]
- Because at the start the temperature is still high where the carbon dioxide was very low.

- Responses that refer to an irregularity in one of the graphs.

- It is about 1910 when the temperature had dropped and went on for a certain period of time.
- In the second graph there is a decrease in temperature of the Earth's atmosphere just before 1910.

- Responses that indicate difference in the graphs, but explanation is poor

- In the 1940's the heat was very high but the carbon dioxide very low

No credit:

- Responses that refer to an irregularity in a curve without referring specifically to the two graphs.

- It goes a little up and down.
- It went down in 1930.

- Responses that refer to a poorly defined period or year without any explanation.

- The middle part. 1910.

- Other responses.

- In 1940 the average temperature increased, but not the carbon dioxide emission.
- Around 1910 the temperature has increased but not the emission.

GREENHOUSE SCORING – QUESTION 3

Full credit:

- Responses that give a factor referring to the energy/radiation coming from the Sun.

- The sun heating and maybe the earth changing position.
- Energy reflected back from Earth. [Assuming that by "Earth" the student means "the ground".]

- Responses that give a factor referring to a natural component or a potential pollutant.

- Water vapour in the air.
- Clouds.

- The things such as volcanic eruptions. Atmospheric pollution (gas, fuel).
- The amount of exhaust gas.
- CFC's.
- The number of cars.
- Ozone (as a component of air).

No credit:

- Responses that refer to a cause that influences the carbon dioxide concentration.
  - Clearing of rain forest.
  - The amount of CO2 being let off. Fossil fuels.

- Responses that refer to a non-specific factor.
  - Fertilisers.
  - Sprays.
  - How the weather has been.

- Other incorrect factors or other responses.
  - Amount of oxygen.
  - Nitrogen.
  - The hole in the ozone layer is also getting bigger.

- Missing.

	UNIT:	5 :(reenhouse		
	QUESTION:	5.1 %	5.2 %	5.3 %
OECD	Australia	67	44	21
	Austria	46	28	17
	Belgium	57	40	20
	Canada	70	44	22
	Czech Republic	50	32	21
	Denmark	56	35	15
	Finland	67	48	32
	France	64	44	19
	Germany	52	37	22
	Greeece	48	33	25
	Hungary	50	31	17
	Iceland	59	33	H
	Ireland	59	37	19
	Italy	40	27	14
	Japan	69	54	18
	Korea	64	49	18
	Luxembourg	45	25	11
	Mexico	16	14	16
	Netherlands	60	42	34
	New Zealand	63	37	20
	Norway	53	29	15
	Poland	43	32	16
	Portugal	52	28	18
	Slovak Republic	40	27	16
	Spain	60	35	22
	Sweden	55	30	17
	Switzerland	54	38	23
	Turkey	*40*	19	9
	United Kingdom	65	36	20
	United States	54	29	18
	OECO average	54	34	19
	Argentina	35	20	8
	Azerbaijan	17	11	5
	Brazil	34	18	16
	Bulgaria Chile	29	20	14
	ChineseTaipei	41	23	9
	Co.lombia	65	52	29
	Croatia	16	14	15
	Estonia	43	32	18
	Hong Kong- China	66	44	30
	Indonesia	75	53	31
	Israel	28	17	15
	Jordan	44	32	21
	Kyrgyzstan	*27*	16	13
	Latvia	11	4	3
	Lie-chrenstein	55	38	22
	Lithuania	58	40	*2b*
	Macao-China	49	30	20
	Montenegro	61	43	21
	Qatar	36	10	6
	Romania	13	6	*7*
	Russian Federation	27	20	15
	Serbia	49	33	20
	Slovenia	23	16	8
	Thailand	*42*	36	23
	Tunisia	22	12	H
	Unul!uav	38	17	12
		45	23	12

Percentage corrects for each country on PISA 2006 questions (Source: www.oecd.org/pisa)

DURATION

Subphase	Activity	Tools	Learning Resources
Contextualizing the issue			**Ex. duration:**
Working on PISA questions	Think-Pair-Share	PISA science questions	Overall: 3 hours of training For 45 minutes lesson: 3 hours of training www.oecd.org/pisa https://www.oecd.org/pisa/test/

Title	Depletion of the Ozone Layer
Country	Turkey
Scenario Rationale (explain your reasoning behind offering this course/what is the marked need for this course/how this course fulfils these needs.)	Identification of key scientific ideas which constitute for understanding climate change issues is important. Teaching about climate change requires teachers to have a content knowledge as well as pedagogical content knowledge about climate change. This scenario mainly focuses on science knowledge behind the depletion of ozone layer which is import to understand the notion of climate change issues. Different form of explanation and representations are used in science. For instance, a chemical phenomenon can be described by macroscopic modelling, which might be explained by particulate modelling and/or may be represented/quantified in terms of mathematical modelling. A multiple representation of the action of a homogeneous catalyst on the depletion of the ozone layer[5,6,7] is used for discussing content knowledge about climate change. In this scenario, three PISA (Programme for International Student Assessment) Test Questions will also be discussed with teachers.
Scenario objectives (teachers' competence development - knowledge, skills, dispositions/ attitudes)	Identification of key scientific ideas which constitute for understanding climate change issues is important. Curriculum specifications typically provide information at a macro level about what is to be taught. However, it would be better to move from unclear and ambiguous 'general goals' towards 'content specific goals' and to design teaching accordingly. Thus, these content specific

[5] Cakmakci, G. & Aydogdu, C. (2011). Designing and evaluating an evidence-informed instruction in chemical kinetics. Chemistry Education Research and Practice, 12(1). 15-28. https://doi.org/10.1039/C1RP90004H
[6] Molina M. and Rowland F.S., (1974), Stratospheric sink for chlorofluoromethanes: chlorine atom-catalysed destruction of ozone, Nature, 249, 810-812.
[7] Cakmakci, G. (2009). Emerging issues from textbook analysis in the area of chemical kinetics. Australian Journal of Education in Chemistry, 70, 31-38.

	goals can provide a much more fine-grained analysis of learning points that need to be addressed by teacher. In this respect, specifying teaching goals can be informed by research evidence. In other words, students' common difficulties in this field, such as the alternative conceptions reported in the literature (see Table 1), should be taken into account. For the concept of catalysis, content specific teaching goals include: To open up students' own ideas about catalysts and catalysis. To emphasise the idea that: • a catalyst is a substance that could be a solid, liquid or a gas. • higher levels of radiation resulting from the depletion of the ozone layer have been linked with increases in skin cancers and cataracts • the depletion of ozone in the stratosphere partly results from the chlorine-catalysed decomposition of O3 To build on the ideas that: • a reaction occurs if the collision has enough energy to be either equal to or greater than the activation energy, and if the orientation of the collisions allows for bond formation; • a catalyst accelerates a reaction by altering the mechanism so that the activation energy is lowered. To draw attention to, and to emphasise, the ideas that: • a catalyst is a substance that works by changing the mechanism of the reaction; • the reaction rate may depend on the amount of catalyst – on its concentration–for homogenous catalysis, or depend on its surface area for heterogeneous catalysis; • when catalysts and reactants are in the same phase, the reaction proceeds through an intermediate species; • in reversible reactions a catalyst reduces both forward and reverse activation energies equally; as a result, it speeds up both forward and reverse reactions and cannot increase the final equilibrium yield, but it gets to the final equilibrium state faster. To draw attention to: • mechanisms of a catalysed reaction and uncatalysed reaction. A proposed mechanism can never be proven to be correct. It can only be consistent with all available data the nature, scope and limitations of models (e.g., teachers should be aware of the limitations of models that they introduce to students) and the relationships between different forms of explanations. To teach;

	• students how to reason in a coherent way, and to show them the limits of each level of explanation. Develop teacher's competences related to: Knowledge development: • Understanding the concepts of correlation, cause and effect. • Enable teachers to develop content knowledge and also pedagogical content knowledge Skills development: • Knowledge and skills on how to use different assessment tools related to climate change. Attitudes: • Increase students' awareness on the environment and the sustainable development.
Learning outcomes (aspects of competences addressed)	• How scientific claims are supported by data and reasoning in science.
Training outline/methodology (briefly explain the expected level of inquiry – confirmation, structured, guided, open, and how many and which phases of the IBL model are included. The first and last one are obligatory)	This professional development activity • Focuses on teachers' needs and allow them to work in groups to reflect on their own teaching practices • Use different form of representations in science in their teaching • Take into account contextual factors (such as assessment structures and the curriculum)
Time for completing (How many learning hours are needed for teachers to complete the scenario**)**	Overall: 4 hours of training For 45 minutes lesson: 4 hours of training
Assessment	PISA science questions (OZONE)
Module dependencies (text or graphical map)	
Relation to other scenarios (the names of the other partners' scenarios	

treating the similar problem / topic)	

Different form of representations in science

A chemical phenomenon/event can be described by macroscopic modelling, which might be explained by particulate modelling and/or may be represented/quantified in terms of mathematical modelling (see Figure 1).

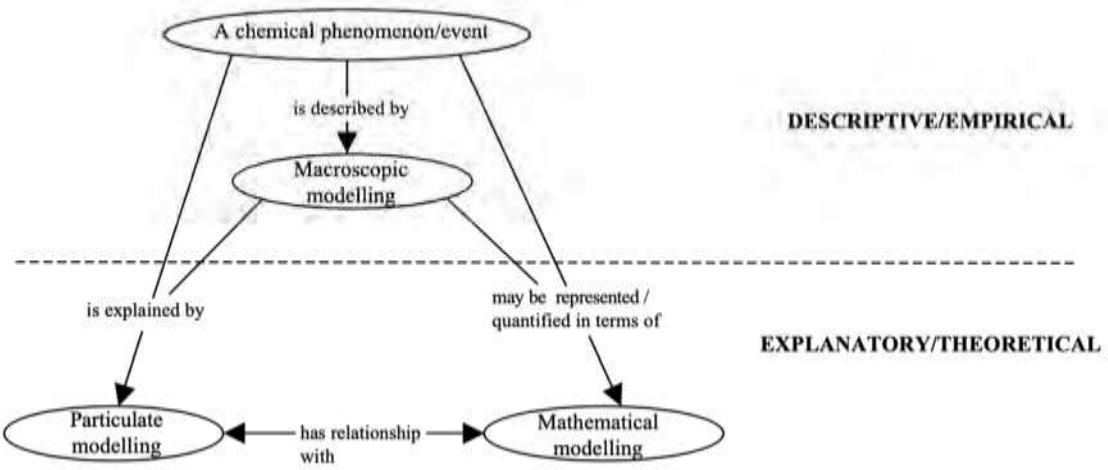


Figure 1: The relationships between chemical phenomena/events and theories/models

Macroscopic modelling is descriptive in nature. This phrase refers to knowledge of what happens; interpreting the phenomenon in terms of what might be perceived (i.e., at a macroscopic, phenomenological level) but not referring to unseen entities and processes—such as the interaction of particles/molecules/ions—without any description of underlying mechanisms to account for the phenomenon.

Particulate and/or mathematical modelling incorporates some form of theoretical model or causal mechanism to account for the phenomenon/event. The causal mechanism proposed might involve a chain of events between variables or the evocation of formally defined theoretical constituents in chemistry. Explanation goes beyond the phenomenon by drawing upon theoretical entities that are not observable or directly measurable in the phenomenon itself. This category includes two subcategories: particulate modelling and mathematical modelling.

Particulate modelling incorporates those responses in which students use corpuscular models such as interaction of particles/ions/atoms/ molecules, or use the principles of the collision or transition-state model in their reason- ing. The emphasis is on the microscopic processes taking place during the reaction and the relationships of such processes to the macroscopic behaviour of the reaction.

Mathematical modelling involves algebra, diagrams, mathematical formulae, or equations. Mathematical modelling consists of physical properties (e.g., concentration, temperature) and mathematical functions represented in the form of an equation (e.g., reaction rate = $k.[A]^{m}$). Graphs can also be used to present equation relationships (e.g., the Maxwell–Boltzmann energy distribution). Explanations in this category are also embedded in theories of kinetics, but at a mathematical or symbolic level.

Depletion of the Ozone Layer

Ozone (O_3) is present in the ozone layer in the stratosphere and provides protection against biologically destructive, short wave-length ultraviolet radiation from the sun. Higher levels of radiation resulting from the depletion of the ozone layer have been linked with increases in skin cancers and cataracts. Mario J. Molina and F. Sherwood Rowland (1974) discovered that the depletion of ozone in the stratosphere partly results from the Chlorine-catalysed decomposition of O_3, and it is for this work that in 1995 they shared the Nobel Prize in Chemistry. Chlorine atoms in the stratosphere originate from the decomposition of chlorofluorocarbons (CFCs), such as $CClF_3$ and CCl_2F_2 amongst other sources. At one time, CFCs were used widely as refrigerants, solvents for degreasing, spray-can propellants, and blowing agents for making plastic foams. Usage of CFCs is banned in many nations; in fact, its use is spreading to Third World countries, such as the nations of Africa and many in South America, and its availability has a profound effect on their economies.

Equations for the corresponding elementary reaction (**without a catalyst**):

$O_{3(g)} + O\bullet_{(g)} \longrightarrow 2\,O_{2(g)}$ Ea= 17.1 kJ/mol

Equations for the corresponding elementary reaction (**with a catalyst**; Cl• (atomic chlorine radical) is the catalyst for this reaction).
The mechanism can be divided into two steps:

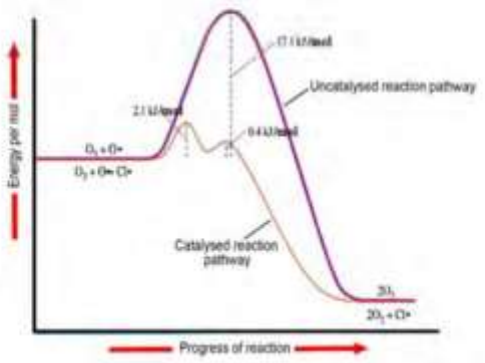
Step 1: Cl• reacts with ozone to form ClO • and O_2

$Cl\bullet_{(g)} + O_{3(g)} \longrightarrow ClO\bullet_{(g)} + O_{2(g)}$ Ea= 2.1 kJ/mol

Step 2: ClO• reacts with O• to produce Cl• and O_2

$ClO\bullet_{(g)} + O\bullet_{(g)} \longrightarrow Cl\bullet_{(g)} + O_{2(g)}$ Ea= 0.4 kJ/mol

Overall: $O_{3(g)} + O\bullet_{(g)} \xrightarrow{Cl\bullet} 2\,O_{2(g)}$ Ea= 2.1 kJ/mol



DURATION

Subphase	Activity	Tools	Learning Resources
Contextualizing the issue			**Ex. duration:**
Depletion of the Ozone Layer	Discussion on different form of representations in science	Depletion of the Ozone Layer	45 minutes
Working on PISA questions	Think-Pair-Share	PISA science questions	Overall: 3 hours of training For 45 minutes lesson: 3 hours of training www.oecd.org/pisa https://www.oecd.org/pisa/test/

Title	Climate crises and biodiversity loss
Country	Turkey
Scenario Rationale (explain your reasoning behind offering this course/what is the marked need for this course/how this course fulfils these needs.)	Environmental issues are a major area of concern. interventions that tackle with climate change and reversing biodiversity decline challenges are highly desirable. Nonetheless, tackling with these challenges is not straightforward. In particular, conservation or restoration of large wild animals on the climate mitigation and adaptation potential of ecosystems needs attention (Malhi et al., 2002)[8]. In this activity participants will carry out research to find out possible answers to the following questions: • What is the relationship between large animal conservation and climate change goals? • What the roles of the large wild animals in climate change mitigation and adaptation? • By carrying out this research, what strikes you the most? Based on their research they will summarise their key findings and key messages to be delivered to the public. They will develop a social media poster or concept cartoon with a short text to inform their

[8] Malhi, Y. et al. (2022). The role of large wild animals in climate change mitigation and adaptation. Current Biology. 32: R181–R196.

	followers on their findings. There are several free tools to be used while designing their poster and concept carton. For instance, www.canva.com is among them.
Scenario objectives (teachers' competence development - knowledge, skills, dispositions/ attitudes)	Develop teacher's competences related to: Knowledge development: ● Knowledge, skills and teachers' competencies development based on environment and sustainable development. ● Enable teachers to develop content knowledge and also pedagogical content knowledge ● Innovative approaches of exploratory learning methodology to teach Climate Change. ● Deeper understanding of Sustainability and Climate Change and how to integrate the topic in the classroom. ● Improve their digital teaching skills, including digital educational tools, optical tools, Internet and multimedia in their teaching. Skills development: ● Carry out research on climate change and reversing biodiversity decline Attitudes: ● Increase students' awareness on the environment and the sustainable development.
Learning outcomes (aspects of competences addressed)	● Consider the relationships between ecosystem and climate change
Training outline/methodology (briefly explain the expected level of inquiry – confirmation, structured, guided, open, and how many and which phases of the IBL model are included. The first and last one are obligatory)	This professional development activity ● Focuses on teachers' needs and allow them to work in groups to carry our research on climate change and reversing biodiversity decline
Time for completing (How many learning hours are needed for teachers to complete the scenario**)**	Overall: 3 hours of training For 45 minutes lesson: 3 hours of training

Assessment	How many saw/read your post and text on social media Total number of participants reached What were their reactions on your posts?
Module dependencies (text or graphical map)	
Relation to other scenarios (the names of the other partners' scenarios treating the similar problem / topic)	

DURATION

Subphase	Activity	Tools	Learning Resources
Contextualizing the issue			**Ex. duration:**
Set the scene-Emphasize	Think-Pair-Share Group work	Brainstorming, discussion	Overall: 3 hours of training For 45 minutes lesson: 3 hours of training

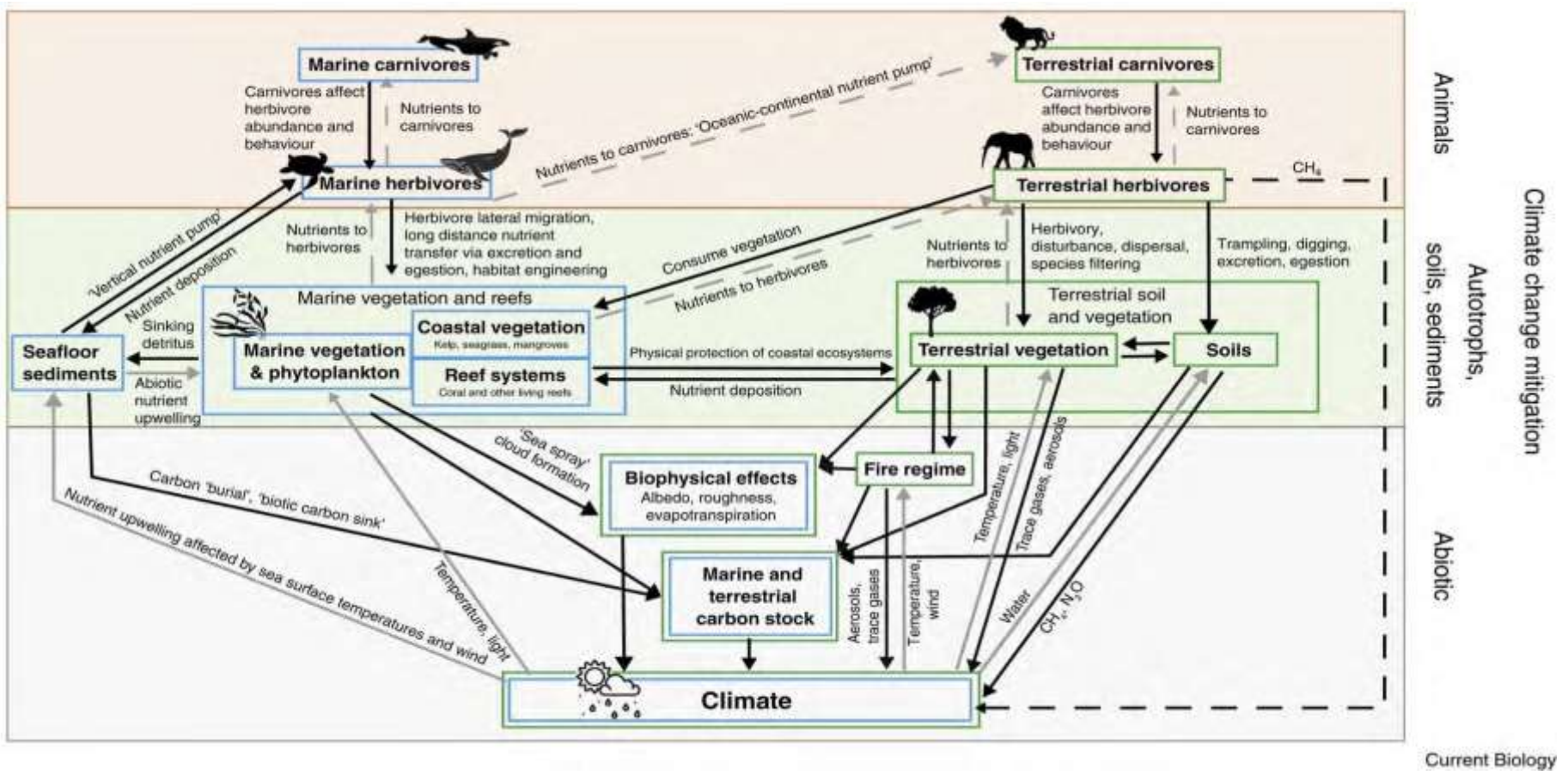


Figure 1: Climate change mitigation

Source: Malhi, Y. et al. (2022). The role of large wild animals in climate change mitigation and adaptation. Current Biology. 32: R181–R196.