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

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IO3.2: Selection and translation of the 10 common digital scenarios - EN

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Intellectual Output:	IO3.2: Selection and translation of the 10 common digital scenarios - EN
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1. Intellectual Output 3 – **ClimaTePD** scenarios

The ClimaTePD project aims to support in-service secondary school teachers in developing digital competences and teaching skills on climate change. To this end, synchronous and asynchronous training courses as well as digital teaching scenarios are being developed to support teachers in developing their own activities in online, face-to-face or blended teaching environments.

Thus, following the ClimaTePD work plan, the Intellectual output 3 aims to deliver digital training scenarios for in-service teachers on climate change topics. Training scenarios aim at helping teachers in developing competences related to:
  (i)   embedding the dimension of climate change into their teaching;
  (ii)   using IBL and gamification principles when teaching about climate change and;
  (iii)   developing digital skills and teaching methods for delivering climate change instruction in face-to-face, online and blended environments.

Digital training scenarios are developed in the framework of in-service secondary teachers' training activities (see Intellectual Output 5), that will be held via an open access online platform for in-service teachers' training (see Intellectual Output 4) within the implementation of the ClimaTePD project. This platform will also act as a digital database and a digital repository (see Intellectual Output 7) which will provide teachers useful material for setting up and developing their own scenarios.

2. IO3 Implementation

The work on IO3 consisted of development of 5 digital scenarios by each consortium partner, resulting in 25 scenarios. These scenarios will be uploaded to ClimaTePD's platform and will be available in English and in the language of the country that developed them.

Following an on-line selection process, 10 of these 25 digital scenarios are selected (2 from each country-partner) by teachers, educational stakeholders and other relevant policy makers from each country through an online voting system. These 10 scenarios are included in the teachers' training in IO5 and as such they will be translated in every language of the consortium as well as in English.

As specified in the project proposal, the digital scenarios follow the IBL approach, a step-by-step learning procedure that can be defined as "a process of discovering new relations, with the learner formulating hypotheses and then testing them by conducting experiments and/or making observations." (Pedaste et al, 2012, p.82). Also, in the context of developing these digital scenarios, other innovative teaching approaches are used, such as storytelling, dilemma and debate (Ratcliffe, 1997; Okada, 2016) in order to address socio-scientific issues (SSI) related to the embedment of the dimension of climate change in secondary teachers' teaching practices and didactics.

2.1.   IO3 Methodology

Focusing on the selected process, the Consortium adopted the following procedures and tasks:

1. Selecting from each country the teaching challenges that resulted from the discussions and negotiations held in the workshops.
2. Drafting a framework for the development of the digital scenarios from the partners of the Consortium.
3. Defining the teaching approaches and the training activities for each digital scenario.
4. Development of a minimum of five digital scenarios in each participating country open for voting (in each consortium language i.e. FORTH will produce 5 digital scenarios in Greek).
5. Selection of the 2 out of 5 most popular digital scenarios by teachers, educational stakeholders and other relevant policy makers through an online voting system held in each
country (5 participating countries will choose 2 scenarios each-10 scenarios in total will be selected).

2.2.   IO3 - Results

The above-mentioned tasks will lead to the implementation of the following IOs:

- IO.3.1. Development of 5 national digital training scenarios for in-service secondary teachers on climate change, using IBL and gamification and developing digital teaching skills.
- IO.3.2. Selection and translation of the 10 common digital scenarios for in-service secondary teachers on climate change, using IBL and gamification and developing digital teaching skills.

3. IBL Scenarios

All scenarios developed by project partners in English are designed according to the IBL template, available in Annex 1. The scenarios of the partners are available in a separate document **IO 3.1,** due to its considerable volume. All scenarios in English will be available for teachers in the open repository.

	Bulgarian Scenarios	Spanish Scenarios
1.	Dress to impress	Intensive livestock farming
2.	Bionic architecture of the future	Changes in the live cycle of plants
3.	Cataclysm in a bottle	Climate summit
4.	A treasure hunt in the recycle bin	Energy audit of the school
5.	Vacation on a plastic island? Just bring some bacteria!	Fighting the fires
	Greek Scenarios	Turkish Scenarios
1	Food/solid waste	Argumentation: answering to Climate change dilemmas
2	Earthquakes	Design of Household appliance, working with solar energy
3	Water, the source of life	Big Data for Climate change: AIR Quality
4	Environmental migrants	Calculate Your School's Footprint.

5	Renewable energy sources	Investigate CCRC tools for land managers
	German Scenarios	
1	Climate breakfasts	
2	Fair trade and climate protection	
3	Sinking islands	
4	Sustainable mobility	
5	Weather extremes	

4. The process of scenario selection

Following the unified procedure of scenario selection, all partners prepared google forms questionnaires (on their own language) following the model in Annex 1. They had about two weeks to organize and collect answers from teachers and educational stakeholders.

Based on the data collected in the online surveys, the following scenarios are selected:

Partners Country	Votes in the online questionnaire	Selected scenarios
Spain	27 votes	Energy audit of the school Climate Summit
Bulgaria	33 votes	Bionics for future architects Vacation on a plastic island
Turkey	14 votes	Alternative Energy Sources: Green Science Green Energy is always by my side
Greece	16 votes	Can I predict the future of the planet? Do you have a climate-friendly carbon footprint?
Germany		Sinking islands Weather extremes

Besides selecting their preferences for the presented scenarios, the following quantitative data is collected from the teachers involved in the survey.

1. How every scenario fits into the school program, how much interest it will for the students and will it be feasible for implementing in class.

Summary of the data reports from Spain

Likert scale 5 max-1 min., mean values

5 Scenarios from Spain	Fit to the program?	Interesting?	Feasible?
Energy audit of the school	**4,3**	**4,3**	**4,2**
Climate Summit	4,3	4	4,1
Changes in the life cycle of plants	4,2	3,6	3,7
Fighting the Fires	3,6	3,8	3,8
Intensive livestock farming	3,4	3,4	3,6

Summary of the data reports from Bulgaria

Likert scale 5 max-1 min., mean values

5 Scenarios from Bulgaria	Fit to the program?	Interesting?	Feasible?
Dress to impress	3,38	**4,53**	3,59
Bionics for future architects	3,21	4,30	3,48
Cataclysm in a bottle	3,53	**4,63**	3,50
Treasure hunt	**4,07**	**4,60**	**4,33**
Vacation on a plastic island	3,61	4,61	3,42

Summary of the data reports from Greece

Likert scale 5 max-1 min., mean values

5 Scenarios from Greece	Fit to the program?	Interesting?	Feasible?
Can I predict the future of the planet	3,68	4,06	3,81
Help climate by reducing food waste	3,125	3,75	3,25
Do you have a climate-friendly carbon footprint?	3,5	3,875	3,5
STEM careers in climate change	3,125	3,75	3,3125
Environmental crisis forces people to leave their home regions	3	3,5	2,9375

2. How familiar are you in using Active learning methods in class?

Likert scale 5 max-1 min., mean values

	Spain	Bulgaria	Greece
How familiar you are in using active learning methods in class	3,8	4,13	3.625
How experienced you are in using active learning methods in class	3,2	3,63	3.563
How used are you to use games or gamification techniques in class?	2,9	3,33	2.563

5. **Final scenarios**

Based on the agreed structure of Teacher training methodology (IO5), some additional changes are reflected in the selected scenarios.

The final version of the scenarios in English is available in Annex 2.

6. Conclusions

The activities on IO3 were implemented as planned, although scenario description, selection and adaptation proved to be more demanding and time-consuming than expected. In addition, the activities in IO3 allowed project partners to get more insight information about teachers' main expectations and pre-dispositions of using IBL, gamification techniques and digital tools in their classes.

Based on the agreed structure of Teacher training methodology (IO5), some additional changes are made in the selected scenarios. The final version of the 10 scenarios in English is available in Annex 2.

Annex 1 - Scenario template

Scenario Rationale	Scenario goals and objectives
Scenario objectives	(teachers' competence development - knowledge, skills, dispositions/ attitudes)
Learning outcomes	(aspects of competences addressed)

Subphase	Activity	Tools	Learning/Digital Resources
Phase 1: Problem / topic			
Motivation			
Introduction to the topic			
Reflection			
Phase 2: Operationalization			
Indicators for successful learning design			
Planning the methods for work with students and methodology			
Ethical issues			
Phase 3: Data Collection			
Collect information about			
Prepare a collection (artefacts) for a practical activity - optional			
Phase 4: Data Analysis			
Categorizing data			
Summary and reflection of the student's activities			
Phase 5: Interpretation			
Training experiments and hands-on activities			
Reflection			
Phase 6: Communication			
Scenario design presentation			
Feedback			
Possibilities for follow-up public dissemination of the results			
Reflection at the end of the teachers' training			

Annex 2 Selecting scenarios

Bulgaria

Country	Bulgaria
Collected votes	33 votes
Distribution of votes	28/ 84% Teacher, teacher-to-be 5/ 15 % Educational Stakeholder Teacher-trainer

The scenarios rankings:

1. **Scenario 2 Bionics for future architects –137 points**
2. **Scenario 5 Vacation on a plastic island –124 points**

Scenario 1 Dress to impress 92 points
Scenario 2 Bionics for future architects 137 points
Scenario 3 Cataclysm in a bottle 113 points
Scenario 4 Treasure hunt 100 points
Scenario 5 Vacation on a plastic island 124 points

	1 place	2place	3 place	4 place	5 place
Dress to impress	6	8	5	10	3
Bionics for future architects	12	7	13	2	6
Cataclysm in a bottle	14	5	3	5	4
Treasure hunt	7	7	8	3	7
Vacation on a plastic island	12	11	5	3	2

2. Information about the scenarios
- How well it will fit the program?
- How interesting will be for the children?
- How feasible is it?

|	Fit to the program?	Interesting?	Feasible?
Scenario 1	3,38	4,53	3,59
Scenario 2	3,21	4,30	3,48
Scenario 3	3,53	**4,63**	3,50
Scenario 4	**4,07**	**4,60**	**4,33**
Scenario 5	3,61	**4,61**	3,42

Active learning

- **How familiar** you are in using active learning methods in class (such as Inquiry-based learning, experiments, debates and others)?

  Mean value   4,13

- **How experienced** you are in using active learning methods in class (such as Inquiry-based learning, experiments, debates)?
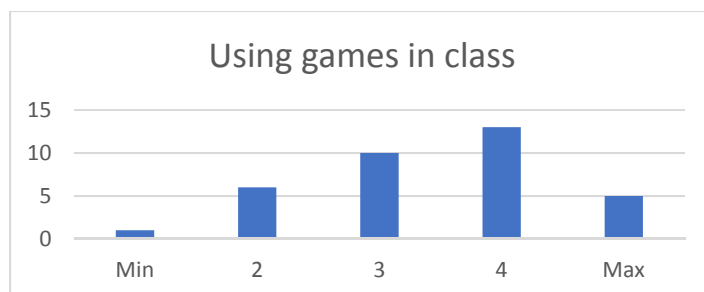
  Mean value   3,63
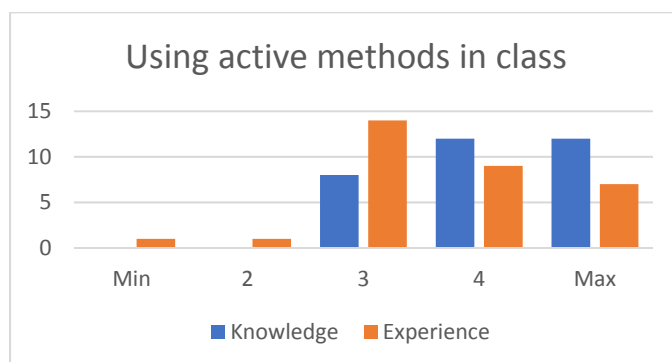
Games and Gamification
- **How used** are you to use games or gamification techniques in class?

 Average 3,33

- **Which games** or gamification techniques do you use mostly in class?

10 answers:
- Role playing games; Scenarios playing;
- Pyramid; researching specific roles;
- Victorina;
- Computer games; Ice-breakers;
- case studies; crosswords;
- brainstorming; mind-maps;
- Team and individual competitions;

Technology infrastructure
What kind of technology infrastructure do you have access/you can use to organize your lessons?

	Easy to organize	Feasible to organize	Difficult to organize	Not possible to organize	Don't have such infrastructure

Computer classroom	5	13	9	2	2
Classroom with 1 computer for the teacher and beamer;	30	3	0	0	0
Classroom with Smart Whiteboard	8	15	5	2	2
Students have their own laptops in class	3	3	8	4	14
Students can use their own handheld devices (tablets/mobiles)	18	5	5	0	4
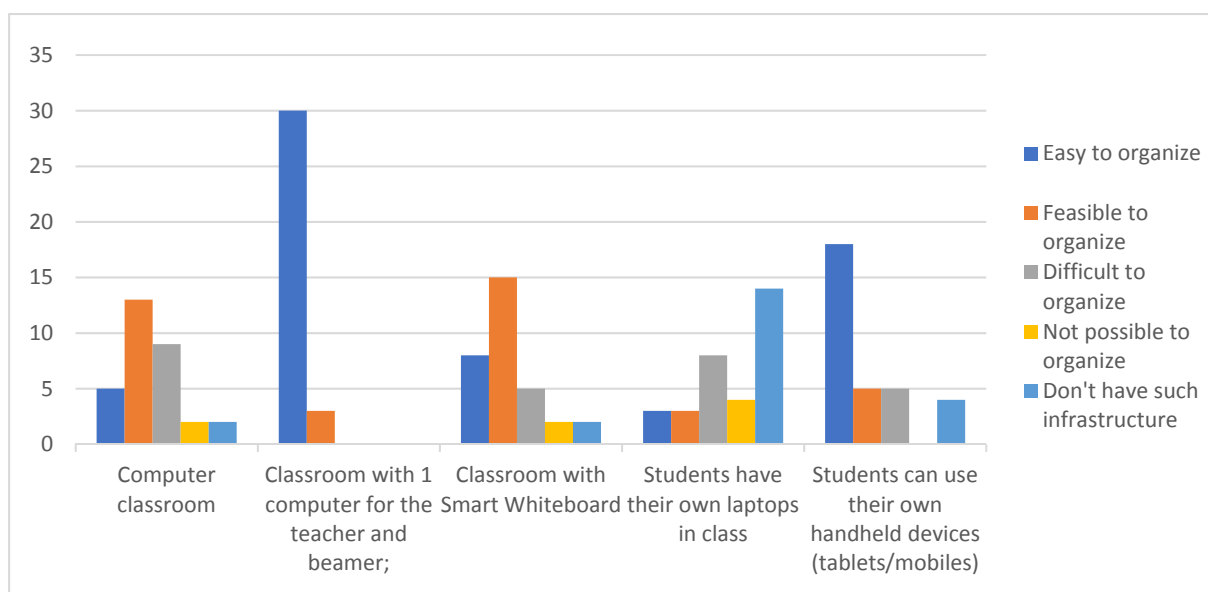
Screenshot of the Google form in Bulgarian language
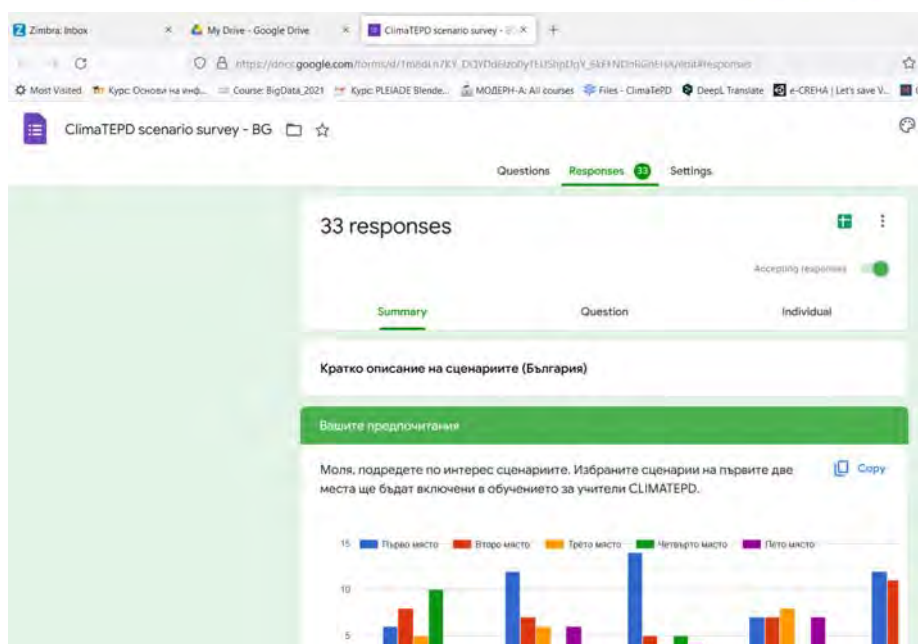
Spain

Country	Spain
Collected votes	27
Distribution of votes	**78 % TEACHER, TEACHER-TO-BE** **0 % TEACHER-TRAINER** **19 % EDUCATIONAL STAKEHOLDER** **3 % OTHER**

The scenarios rankings:
1. **Energy audit of the school – 97 points**
2. **Climate Summit – 95 points**
3. Changes in the life cycle of plants – 77 points
4. Fighting the Fires – 72 points
5. Intensive livestock farming – 61 points

2. Information about the scenarios
- How well will it fit the program?
- How interesting will it be for the children?
- How feasible is it?

	Fit to the program?	Interesting?	Feasible?
Energy audit of the school	4,3	4,3	4,2
Climate Summit	4,3	4	4,1

Changes in the life cycle of plants	4,2	3,6	3,7
Fighting the Fires	3,6	3,8	3,8
Intensive livestock farming	3,4	3,4	3,6

Active learning

- **How familiar** are you with using active learning methods in class (such as Inquiry-based learning, experiments, debates and others)? 3,8
- **How experienced** are you in using active learning methods in class (such as Inquiry-based learning, experiments, debates)? 3,2
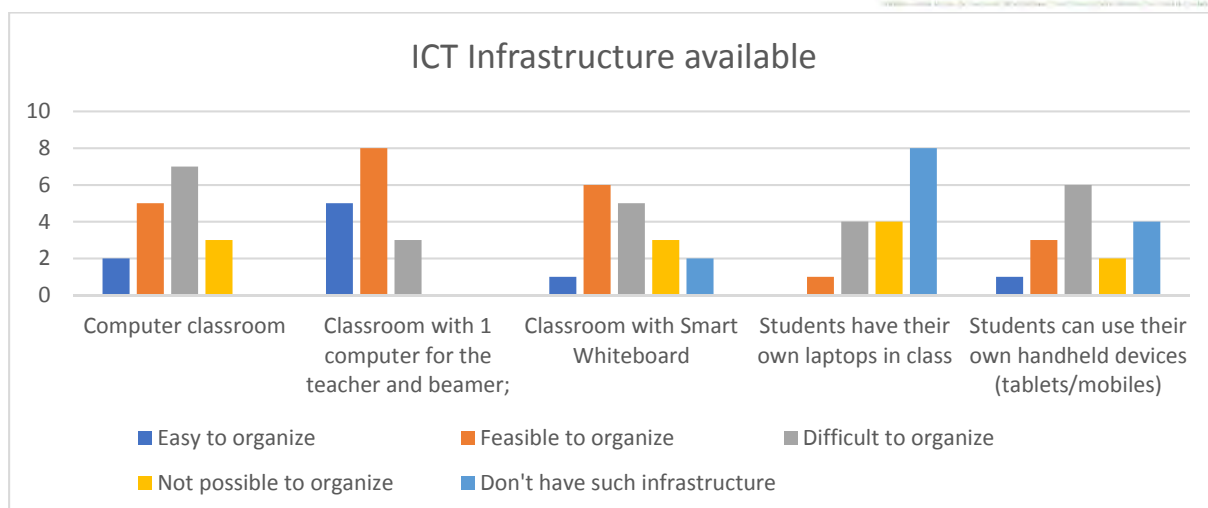
Games and Gamification
- **How used** are you to use games or gamification techniques in class? 2,9
- **Which games** or gamification techniques do you use mostly in class? Role playing, Escape Room, discussions, Problem-Solving, goals and rules, adaptative challenges, control, feedback, uncertainty, sensorial activities, students designing their own games, adaptations of board games, Breakouts, inquiry-based learning, digital games. Tools: FlipGrid, EdPuzzle, Kahoot, Quizizz, Blooket, EducaPlay, Classcraft, Minecraft.

Technology infrastructure
What kind of technology infrastructure do you have access/you can use to organize your lessons?

	Easy to organize	Feasible to organize	Difficult to organize	Not possible to organize	Don't have such infrastructure
Computer classroom	9	6	8	2	2
Classroom with 1 computer for the teacher and beamer;	25	1	1	0	0
Classroom with Smart Whiteboard	14	7	4	2	0
Students have their own laptops in class	5	11	6	3	1
Students can use their own handheld devices (tablets/mobiles)	3	9	5	7	2

Greece

Country	Greece
Collected votes	16
Distribution of votes	87.5 % TEACHER 18.8 % TEACHER-TRAINER 6.3 % EDUCATIONAL STAKEHOLDER 0.0 % OTHER

The scenarios rankings:

1. **Scenario 1: Can I predict the future of the planet- 54 points**
2. Scenario 2: Help climate by reducing food waste – 52 points
3. **Scenario 3: Do you have a climate-friendly carbon footprint? – 53 points**
4. Scenario 4: STEM careers in climate change – 46 points
5. Scenario 5: Environmental crisis forces people to leave their home regions – 35 points

2. Information about the scenarios
- How well will it fit the program?
- How interesting will it be for the children?
- How feasible is it?

	Fit to the program?	Interesting?	Feasible?
Scenario 1	59	65	61
Scenario 2	50	60	52
Scenario 3	56	62	56
Scenario 4	50	60	53

Scenario 5	48	56	47

Active learning

- **How familiar** are you with using active learning methods in class (such as Inquiry-based learning, experiments, debates and others)? **3.625**
- **How experienced** are you in using active learning methods in class (such as Inquiry-based learning, experiments, debates)? **3.563**

Games and Gamification
- **How used** are you to use games or gamification techniques in class? **2.563**
- **Which games** or gamification techniques do you use mostly in class?

Eight teachers use gamification techniques
- Flash cards
- Quizzes / reward quizzes (4)
- Individual and group missions and leaderboards
- Digital games (e.g. ChoiCo)
- Role-playing games
- Drama techniques
  Narrative techniques
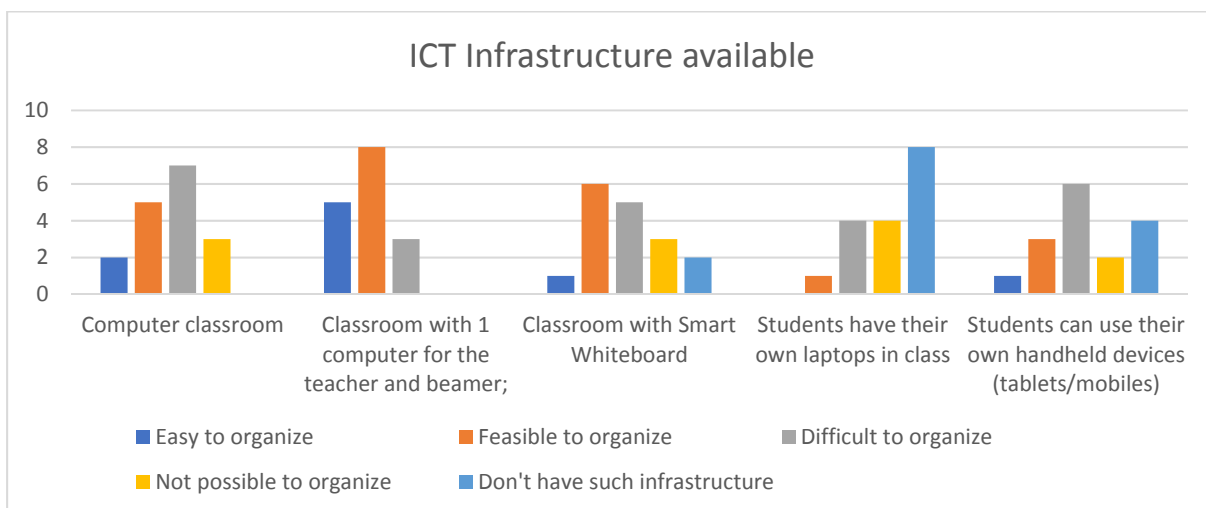- Badges
- Stimulations
- Group games
- Crosswords

Technology infrastructure
What kind of technology infrastructure do you have access/you can use to organize your lessons?

	Easy to organize	Feasible to organize	Difficult to organize	Not possible to organize	Don't have such infrastructure
Computer classroom	2	5	7	3	
Classroom with 1 computer for the teacher and beamer;	5	8	3		
Classroom with Smart Whiteboard	1	6	5	3	2
Students have their own laptops in class		1	4	4	8
Students can use their own handheld devices	1	3	6	2	4

(tablets/mobiles)					

Turkey

Country	TURKEY
Collected votes	14
Distribution of votes	50% TEACHER, TEACHER-TO-BE 36% TEACHER-TRAINER 14% EDUCATIONAL STAKEHOLDER 0% OTHER

The scenarios rankings:
Scenario 1- Alternative Energy Sources: 39 points
Scenario 2-Green Energy is always by my side 42 points
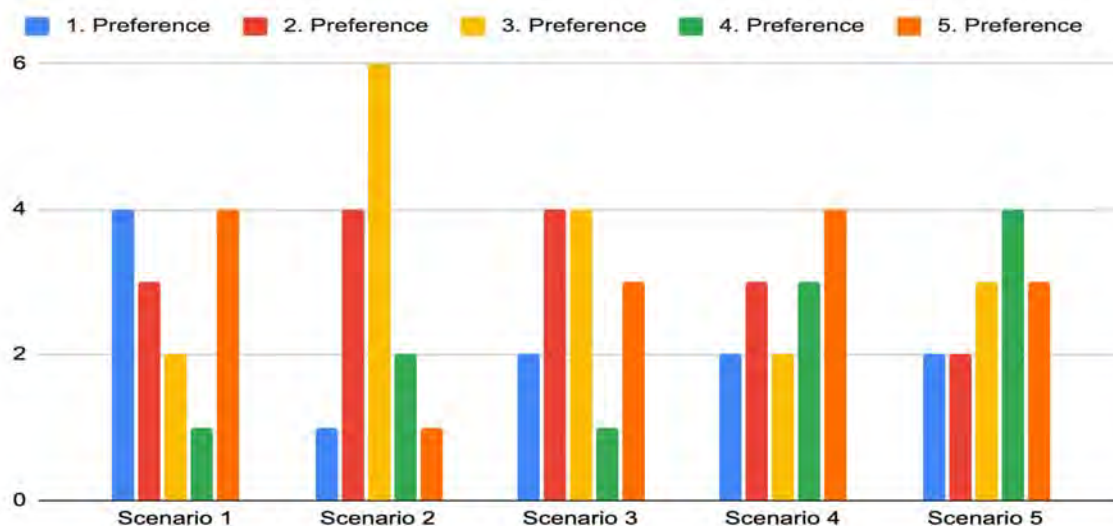Scenario 3-Sustainable energy sources 42 points
Scenario 4- Keeps my computer warm
Scenario 5-Sustainability of Natural Resources

	Frequency				
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
1. Preference	4	1	2	2	2
2. Preference	3	4	4	3	2
3. Preference	2	6	4	2	3

4. Preference	1	2	1	3	4
5. Preference	4	1	3	4	3

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
1. Preference	29%	7%	14%	14%	14%
2. Preference	21%	29%	29%	21%	14%
3. Preference	14%	43%	29%	14%	21%
4. Preference	7%	14%	7%	21%	29%
5. Preference	29%	7%	21%	29%	21%

According to statistics, scenario 1 stands out as a first choice. In the second choice, scenario two and scenario three take their place in equal weight. In this case, scenario two and one of scenario three can be chosen as the second choice. If it's not Third Choices, the scenario is two miles ahead. In the fourth preference, the fifth scenario was preferred by the teachers. Finally, the least preferred scenario by the teachers is seen in the table as the fourth and first scenarios.

As a result, scenario one and scenario two stand out as our scenarios because we have to choose two scenarios.

2. Information about the scenarios
- How well will it fit the program?
- How interesting will it be for the children?
- How feasible is it?

For scenario 1

Some of the participants' views on the first scenario are below.

"A comprehensive and well-suited activity for integrating different perspectives into the process. It can be applied to each grade level at the secondary school level in a different context."

In the title, a participant's views on the first scenario are below.

"Along with the positive aspects of the event, its negative aspects were also stated by using its critical analytical skills ethically. I think that an event held by adhering to such ethical principles should be in the first place. Foods with different pH levels can be preferred as organic material in the event. The process of organic material in the event. After it is finished, it can be talked about recycling, such as composting, and thus the sustainability process is put to work. "

For scenario 2

The comments for scenario two are as follows.

"It is an activity that I think would be more appropriate and understandable to explain green energy to students in our country's conditions. Emphasizing the importance of '0 emissions' is the main purpose and applicability here."

"It is a beautiful event that combines the theme of global climate change and energy and can be integrated at different levels."

For scenario 3

There are also some criticisms from the feedback for the third scenario, and you can see a few of them below.

"This activity, in which I am also involved, is applicable in the conditions of our country, but it also has negative consequences. In this case, the activity can be designed by asking questions about alternative raw materials by sharing with the students and suggesting that the student use his imagination and the knowledge he has acquired. For example: The negative effects of energy developed on soil pollution and living life and the actions that can be taken to reduce these effects."

Another feedback is that;

"Although individual solutions for sustainable development are not sufficient for mass ones, the individual must conscientiously fulfill his duties as much as possible. Lighter and composite materials can be used for individually cost-effective solutions by giving more room to the carbon emission levels of air conditioners. For example, couldn't composite compressed sawdust, apelite or cork composite be used instead of wood? Wood is ultimately about encouraging logging."

For scenario 4

The following is the view regarding the scenario that deals with the use of solar panels in relation to our fourth scenario.

"It can be a good first step for portable solar panels to be used and popularized in our lives. It is a very good suggestion that it will reduce battery usage."

For scenario 5

The feedbacks we received from the relevant participants in our scenario are also listed below.

> "I think it is a positive feature for this project work that it offers solutions by addressing many animate and inanimate factors."

> "The fact that the event addresses many areas makes it suitable for use in educational studies. But I did not find it very effective in terms of originality."

> "An activity that can be evaluated in the context of effective use of energy resources related to an existing problem situation."

Selected Scenarios:

As a result of the feedback we received from the participants regarding the five scenarios implemented in the workshop, the following two scenarios were selected.

Scenario 1- Alternative Energy Sources: Green Science
Participants are provided with some green science kits and asked in what way that could be used in secondary school curricula for teaching ideas about climate change. The participants may also investigate public's awareness about alternative energy sources and provide them information about alternative energy sources including research and innovation in this field.

Scenario 2-Green Energy is always by my side

The participants 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 a system to their home or schools.

Annex 3

Bulgaria

Planning vacation on a plastic island?! Just bring some bacteria!

Scenario Rationale	**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)	Teachers develop and improve competences related to: ● Scenarios' development using IBL methodology and gamification ● Evaluate students' activities ● Digital skills - 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 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.
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.

SCENARIO DESCRIPTION

Subphase	Activity	Tools	Learning/Digital Resources
Phase 1: Problem / topic			
Motivation	Task: Explore information about plastic waste, select videos, text and pictures.		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	Discussion: ● What happens to the plastic waste?	Zoom, Google meet, Microsoft teams

Subphase	Activity	Tools	Learning/Digital Resources
	plastic overuse and plastic waste: A) for the Ocean life and animals? B) for the wild life on the land (terrestrial inhabitants)?	● What is disposable life of the plastic waste? ● What is the impact of the plastic waste?	
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			
Indicators for successful learning design	TODO List	Notes Questions: ● Is there a ban on using mobile devices in the school? ● Using online maps? ● 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
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

Subphase	Activity	Tools	Learning/Digital Resources
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			
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 • What are plastic islands, what can you find in them?	Files: Electronic tables, text documents	Hints: ● 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			
Categorizing data	Brainstorming, students work on groups: Select some of the most used by the	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;

Subphase	Activity	Tools	Learning/Digital Resources
	group types of plastic waste and make a time-line;		
	"What to do if you can't recycle it ?!" Ask students, working in groups, to suggest ways to reduce the use of plastic by humans.	Brainstorming, Discussion: Post-it notes	Write ideas on post-it notes and rank them in the direction - 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			
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			
Scenario design presentation	Presenting the design	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

Subphase	Activity	Tools	Learning/Digital Resources
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.

Bionic architecture of the future – the nature as inspiration for future architects

Scenario Rationale	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	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	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

SCENARIO DESCRIPTION

Subphase	Activity	Tools	Learning Resources
Phase 1: Problem / topic			
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			
Indicators for successful learning design	TODO List	Notes Questions: ● Is there a ban on using mobile	Hints: ●General topic of the educational project

Subphase	Activity	Tools	Learning Resources
		devices in the school? ● How to organize training for children with SEN	●List of disciplines, related to the topic ●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			
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
Collect information about games and	Identify appropriate games or gamification activities – web	Files: Electronic tables, text documents	

Subphase	Activity	Tools	Learning Resources
gamification activities, that could be related to the topic	sites, web games, print-outs, templates		
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			
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			
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			
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

Subphase	Activity	Tools	Learning Resources
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. Build your own Inspiration gallery following the examples

"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 - Design DIY activities

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

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!

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.

Annex 3 - Design your own template for school detectives.

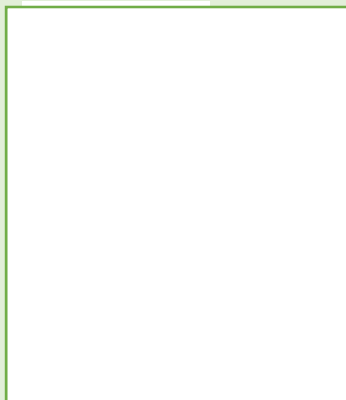| Project „School detectives: bio-inspired buildings in my town " |
|---|
| **Name:** |
| **Class:** |

1. Observe different types of buildings (bridges, houses, monuments, or other objects) in your town, in which you can identify details, inspired by the nature in their construction.
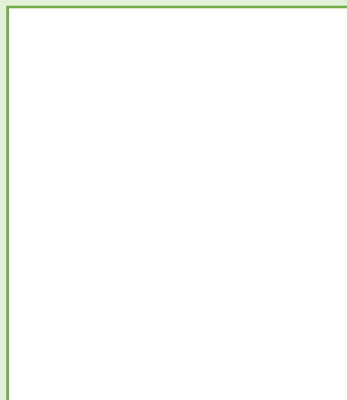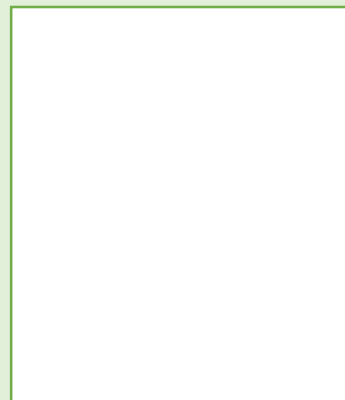
....

....

2. Take photos of the buildings and their specific bio-inspired elements

Picture 1	Picture 2	Picture 3

3. Use your imagination and make a model of an object from the future (building, car, plane, house, school, etc.), which have to include various natural details. Present your model to your classmates by describing what it will look like and what natural elements it will have.

Greece

Can I predict the future of the planet?

Scenario Rationale	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	● 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.

SCENARIO DESCRIPTION

Subphase	Activity	Tools	Learning Resources
Phase 1: Problem / topic			
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

Subphase	Activity	Tools	Learning Resources
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
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	Questions Screenshots

Subphase	Activity	Tools	Learning Resources
		shows the 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			
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
Phase 4: Data Analysis			
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		H5P context

Subphase	Activity	Tools	Learning Resources
	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.		
Phase 5: Interpretation			
Designing learning scenario	Writing activities	Wiki discussion to exchange ideas	
Reflection	Discussion on difficulties	Wiki discussion to exchange ideas	

Phase 6: Communication			
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	

Do you have a climate-friendly carbon footprint?

Scenario Rationale	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	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	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.

SCENARIO DESCRIPTION

Subphase	Activity	Tools	Learning Resources
Phase 1: Problem / topic			
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	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

Subphase	Activity	Tools	Learning Resources
			Αναλυτική περιγραφή των ανανεώσιμων πηγών ενέργειας **Μπορούν οι ανανεώσιμες πηγές ενέργειας να αντικατασταστήσουν τα ορυκτά καύσιμα ;**
Reflect	Knowledge, viewpoints, questions, methods	Padlet, Discussion's web 2.0 tools	
Phase 2: Operationalization			
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): https://www.youtube.com/watch?v=niotf0oHvQY
Design methodologies	-Design further activities		
Phase 3: Data Collection			
Make a research plan about the carbon footprint	Creating questionaries	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.	-use surveys and interviews to collect data -consolidate and organize data

Subphase	Activity	Tools	Learning Resources
		4. Test how the different options can change your carbon footprint. Which of the alternative options could you follow in your everyday life?	
Phase 4: Data Analysis			
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 Data analysis Data presentation	Open ended questions
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			
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			
Presentation of the scenario		Ppt	
Evaluation by the experts		Discussion, wiki	
Difficulties during the scenario's		Discussion, wiki	

Subphase	Activity	Tools	Learning Resources
implement ation			

Germany

Sinking Islands

Scenario Rationale	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	**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	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	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 1. Problem definition 2. Operationalisation 3. Data collection 4. Data analysis 5. Interpretation 6. Communication / presentation
Time for completing	4 h
Assessment	▪ Brainstorming and discussion of the topics ▪ Evaluation of the activities ▪ Evaluation of the data processing ▪ Presentations
Module dependencies	This scenario combines different disciplines and different modules such as Geography, Maths and Ethics

SCENARIO DESCRIPTION

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	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

Subphase	Activity	Tools	Learning Resources
	Presentation followed by group discussion		
	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**
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)	Spreadsheet Online Information sites Google / Search engine	data on a spreadsheet Data from scientific sources

Subphase	Activity	Tools	Learning Resources
	(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		
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	White board Design tool such as GIMP	

Subphase	Activity	Tools	Learning Resources
	slowing down the rise of the sea level		
#Phase 6: Communication			Ex. Duration: 45
(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	

Weather Extremes

Scenario Rationale	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	**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	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 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
	  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**)**	4 h
Assessment	▪ Brainstorming and discussion of the topics ▪ Evaluation of the activities ▪ Evaluation of the data processing ▪ Presentations
Module dependencies	This scenario combines different disciplines and different modules such as Geography, Maths and Ethics

SCENARIO DESCRIPTION

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		

Subphase	Activity	Tools	Learning Resources
	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**
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	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

Subphase	Activity	Tools	Learning Resources
	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		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 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/extremwettereignisse https://www.br.de/wissen/wetter-extremwetter-klimawandel-100.html https://wiki.bildungsserver.de/klimawandel/ind

Subphase	Activity	Tools	Learning Resources
			ex.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	
#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	White board Mentimeter	

Subphase	Activity	Tools	Learning Resources
	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).		

Spain

"Energy audit of the school"

Scenario Rationale	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, student's 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	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	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

SCENARIO DESCRIPTION

Subphase	Activity	Tools	Learning/Digital Resources
Phase 1: Problem / topic			
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?		

Subphase	Activity	Tools	Learning/Digital Resources
	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, … - How to access energy consumption data? Bills? Electricity, water, gas (if applicable).		
Phase 3: Data Collection			
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		Google Drive or similar

Subphase	Activity	Tools	Learning/Digital Resources
	tab for each of the measured variables		
Phase 4: Data Analysis			
Categorizing data	Analyse the data and make graphs		Google Drive or similar
Phase 5: Interpretation			
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.		
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			
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

"Climate summit"

Scenario Rationale	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	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	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

SCENARIO DESCRIPTION

Subphase	Activity	Tools	Learning/Digital Resources
Phase 1: Problem / topic			
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			
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		

Subphase	Activity	Tools	Learning/Digital Resources
	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			
Collect information	Students collect information according to the plan from phase 2		Google Drive or similar
Phase 4: Data Analysis			
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			
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		

Subphase	Activity	Tools	Learning/Digital Resources
	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			
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

Turkey

Alternative Energy Sources: Green Science

Scenario Rationale	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	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	● 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.

SCENARIO DESCRIPTION

Subphase	Activity	Tools	Learning Resources
Contextualizing the issue			
Set the scene-Emphasize	Global Climate Crisis	Brainstorming, discussion The goal here is to build a common starting point for students.	News articles / Videos 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]	
Ideate	Group work	Phrase how might we statement. Create innovative solutions to the defined	

Subphase	Activity	Tools	Learning Resources
		problem and select the optimum solution	
Prototype	Co-create	Model the optimum solution	
Test	Getting feedback Reflection	Gain further insight as to feasibility of selected solution	
Assess	Assess the project and prototype multiple times	Self-check form as bellow	

✚ What worked…

━ What could be improved…

❓ Questions…

❗ Ideas…

Green Energy is always by my side

Scenario Rationale	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.
	Consider figures below.
Scenario objectives	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

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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.

</td></tr>
<tr><td>**Learning outcomes**</td><td>

Consider about the economy of science.
Knowledge and skills on how to teach the science behind 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.

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SCENARIO DESCRIPTION

Subphase	Activity	Tools	Learning Resources
Contextualizing the issue			
Set the scene- Emphasize	REPowerEU	Brainstorming, discussion The goal here is to build a common starting point for students.	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.	

Subphase	Activity	Tools	Learning Resources
		To formula a need-statement: [User] needs a way to [X]	
Ideate	Group work	Phrase how might we statement. Create innovative solutions to the defined problem and select the optimum solution	
Prototype	Co-create	Model the optimum solution	
Test	Getting feedback Reflection	Gain further insight as to feasibility of selected solution	
Assess	Assess the project and prototype multiple times		

euronews.green

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

Solar panel generation is on the rise in Europe.-
Copyright Canva

By MaeveCampbell with Reuters
Updated: 31/03/2022

The European Commission has said that it will do "whatever it takes" to rebuild Europe's solar manufacturing industry.

The EU's energy commissioner announced the news on Thursday, as part of the bloc's plans to cut reliance on Russian gas as fast as they can.

"We need to bring manufacturing back to Europe, and the Commission is willing to do whatever it takes to make it happen," Kadri Simson told the Solar Power Summit conference in Brussels.

We need to bring manufacturing back to Europe, and the Commission is willing to do whatever it takes to make it happen.

EU's energy commissioner

"Part of this is looking at possible financing options," he added.

Where are most solar panels made?

China is the world leader in production of solar energy, having installed more than 30.1 GW of photovoltaic (PV) capacity since 2019. As the nation with the largest population and carbon footprint, this commitment to renewable energy is encouraging.

The United States, India, Japan, and Vietnam rank next on the 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.

How much solar power does the EU currently use?

Europe's solar growth is accelerating year on year, as the bloc commits to relying on more renewable sources for its energy needs.

Solar panels generated a record 10 per cent of EU electricity in June-July 2021, up from the same period in 2018.

Seven EU countries generated over a tenth of their electricity from solar panels in June-July 2021, with the Netherlands (17 per cent), Germany (17 per cent), Spain (16 per cent), Greece (13 per cent) and Italy (13 per cent) leading the way, according to energy thinktank Ember.

Hungary has also quadrupled its solar share since June-July 2018, while the Netherlands and Spain have doubled. Estonia and Poland have gone from near-zero solar in 2018 to 10 per cent and 5 per cent respectively in June-July 2021. And for the first time, solar overtook coal power in Hungary in summer 2021, a milestone that had already been reached the previous year in Greece and Portugal.

"Europe has had a record-breaking summer for solar power, but it is yet to harness its full potential. Weather extremes have given governments an urgent wake-up call and now they must turn climate targets into climate action by stepping up solar deployment," says Charles Moore, Europe lead at Ember.

Source:
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

The Main Claim	Evidence that supports the claim (Data)
Counter Claim	Evidence that supports the counter claim (Data)

Energy

SWOT ANALYSIS

STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS