O3 FabCitizen Open Learning Scenarios

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Remark: This document represents the current status of work in progress. The final document will contain the results by the end of the project.

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Inhalt

About this document

In the project, we have designed more than 160 learning scenarios including worksheets as learning materials. All of those are available through the website. This document only contains sample scenarios to outline the main ideas of the project.

About the Fab Citizen Project

The main goal is to enable schools, in particular teachers, parents and pupils, to participate in high quality citizen science projects in both curricular and extracurricular contexts.
Citizen Science (CS) has raised a lot of attention in the last years. Its main goal is to involve citizens in different types of science projects, in particular to 1) improve engagement and 2) to increase research capacities, e.g. by shared data collection. Many projects have incorporated citizen science approaches. Whereas citizen science works well for educational purposes (e.g. in inquiry-based science education), the acceptance of CS on a scientific level ranges from low to questionable. Even though the European Association for Citizen Science has clear guidelines and support mechanisms, many CS projects are not taken seriously. This is the main starting point for the FabCitizen project: We aim at providing tools to increase the quality of CS projects, in particular in schools. For this purpose, we will integrate FabLabs as the main educational environment as they can provide both, technological as well as methodological expertise.
We base our project on clearly defined requirements, amongst them

- In schools, CS projects need to be embedded into the curriculum in various subjects
- To ease the implementation, teachers need high quality (open) scenarios and learning materials
- CS projects need support in terms of methodological and technological expertise.

In the project, we will achieve the following main results:

- A Citizen Science competency framework describing knowledge, skills and attitudes to successfully engage in high quality CS projects
- A pedagogical concept incorporating aspects of service learning to connect
- A guide for FabLabs as the key infrastructure to educate and train citizens.
- More than 100 Open learning scenarios to train teachers, pupils and parents in early secondary school
- A collection of Open Educational Resources supporting the approach
- A good practice guide for schools and FabLabs across Europe

The project will provide guidance and concrete support to universities, FabLabs, schools and the surrounding communities to participate in successful, high quality CS projects. As part of our trials, we will initiate around 100 CS projects. In the long run, we create new methods and materials for broader engagement and quality improvement in CS.

1 Open Learning Scenarios

In the following, we derive the framework for FabCitizen - as a starting point, we define the main phases of learning activities, followed by the main principles for designing learning activities.

1.1 Main concepts and frameworks

The pedagogical framework and guideline for conducting CS projects in schools has been elaborated in IO2 (Pedagogical and Competency Framework). It consists of the following steps / phases. The basis of the model are the structures put forward by Bonney et al. (2009) and Shirk et al. (2012). The process map is color-coded i.e. turquoise refers to the school-specific processes that have been adapted to the context of the school, light-blue refers to standard processes and green refers to the competency-oriented processes. In addition the model represents the involvement of the stakeholders (i.e. the community, researchers, teachers, students and parents) in each step. The focus is given to the involvement of the school rather than of the community, as the methodology is developed for the educational sector.

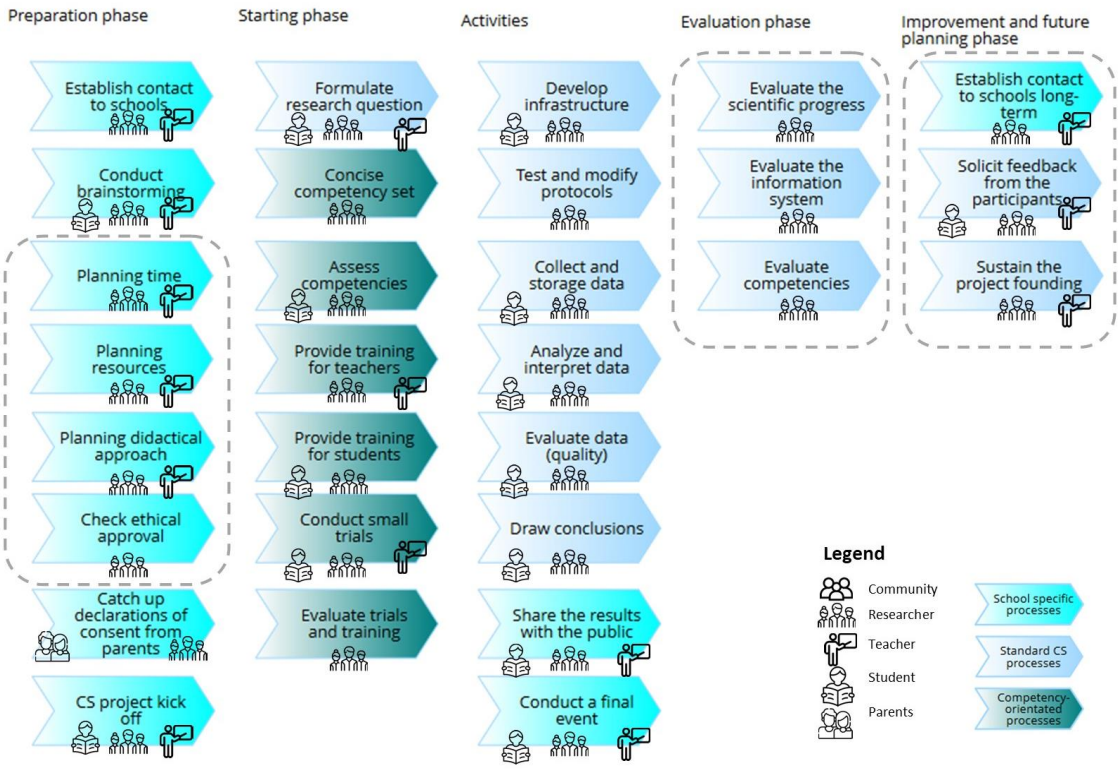

Figure 1: Generic competency-based methodology for educational Citizen Science projects

The process represents the temporal component to some extent. First, it runs from right to left (oriented at the project phases) and within the project phases from above down runs off. Since some processes can also run in parallel, this is marked by dashed lines. The dashed lines make it clear that the order of the processes within them can be interchanged. Following phases and sub-steps form the basis of the model. For further details, please see the corresponding document (https://fabcitizen.eu/intellectual-outputs/)

1.2 Learning Scenario Descriptions

Based on the overall framework and principles, we follow a common description format.

Learning Scenario Title	*Title of the Learning Scenario*
Description	*Short summary of the scenarios*
Context / Target group	*Type of school, age / grade of students*
Curricula topics	*References to FabCitizen and national curricula*
Competencies	*References to the FabCitizen and other competencies*
Educational approach	*Educational background / method / approach*
Learning Activities (LA)	*Phases of the learning scenario. Relation to the FabCitizen framework*
LA1	
LA2	
LA3	
LA4	
LA5	

Roles	*Who will participate in the learning scenarios (e.g. teacher, student, parents)?*
Tools and Materials	*Which materials (e.g. paper, computers) and tools (e.g. software, open educational resources) are needed?*
Comments	*Comments by the author which might help teachers when applying the scenario*

1.3 OER Collection

As part of the project, we have collected useful OERs which can be used within and beyond our learning scenarios – in total we have collected 204 collections with 503 individual OER. The FabCitizen OER collection is described in the following way.

- Name: Name of the OER
- Description: Short description of the OER
- Language
- Subject: Classification of school subjects
- Key Words
- Age Range: Age or grade
- Competency: Relation to the FabCitizen competency framework
- Level: Complexity of the OER
- Author
- License
- OER Platform: If applicable, link to platform where the OER was found
- Direct link
- Retrieved
- Format: File format

The collection is available online
https://docs.google.com/spreadsheets/d/1tGIUMtUNbs8U0vJTIVRqd0CykmhvssPajz5SRILnmN4/edit?usp=sharing

A short version is shown in Annex B.

2 Learning Scenarios

In this part, we describe a sample open learning scenario. Corresponding learning materials (e.g. worksheets) are either provided in the Annex or linked (to digital resources).

Each scenario will be validated in the pilot phase (IO4) with teachers and experts in all participating countries. All scenario descriptions will be available as Open Educational Practice (OEP), the learning materials will be provided as Open Educational Resources.

2.1 Sample Scenario

The following sample scenario shows how the scenarios can be structured. It consists of the scenario description with a focus on lear

Table 1. Sample Learning Scenario

Scenario Title	Decomposition
Main ideas and description	This learning scenario introduces algorithmic descriptions of problem solutions as well as decomposition. The problem in this case is how to estimate the rate of damaged / ill trees in a wide area. The scenario is related to the biology and maths curriculum.
Context	From grade 5
Curricula	Geography: Use of maps, scale Biology: Forests and trees, tree diseases, nature protection Mathematics: Surfaces, scales, units
Competencies	Students can 1 Divide a problem into smaller sub-problems, 2) Use step-by-step instruction to describe a solution, 3) Use variables for calculations, 4) Use conditions within loops
Pedagogy	Explorative learning
Learning Activities	
LA1 Context	The teacher introduces problems which cannot be solved as a whole – examples are counting all animals in an area, sorting large amounts of things. Students get the task to go out to a close-by forest. The question is asked whether they can count all trees within one lesson. Additionally, tree diseases are introduced. What kind of diseases exist and how can they be observed (e.g. parasites such as birch moth, bark beetle; acid rain, …). This introduction needs to be modified depending on the geographical area.
LA2: Exploration	Students get the task to estimate the number of trees in a given forest. They g out to the area to get a visual impression of the problem. First, they calculate the surface of the area. This can be done using a map and estimating the total size. After this, students determine an adequate sample size to decompose the problem (a realistic sample is 50m*50m). The students split up in groups and distribute tasks (one person for measuring the length / width of the area, one person to count all trees, some persons to find and count damaged trees). Students measure the step length to calculate how many steps equal 50m. The worksheet provides step-by-step tasks to solve the problem.
LA3: Elaboration	Students go into the woods and find a place from where they can walk down the sample (50 by 50 metres). The corner points are marked (or a student stops there). A counter should count the number of steps (e.g. REPEAT walk_one_step UNTIL counter= number_of_steps) When the square is marked, students start counting the number of trees and agree on the number in case of differences. Afterwards students try to count damaged trees (sick by parasites, breakage etc). Finally, the students calculate the total number of trees and the rate of damaged trees.

LA4: Reflection	Finally the whole algorithm in the four solution steps (calculate area, walk / mark area, count trees, calculate trees) should be written down. Students also can discuss in which other situations they could decompose to find a quicker solution.
Roles	Students , Teacher / additional person for field trip
Tools and Materials	Worksheet: Estimating trees Pen and paper (marking types of trees, conditions, amount Area map

The following figure shows sample tasks from the related guiding worksheets.

How many trees are in the forest below? How many are damaged?

Scale: 1:10000

How big is the surface, use variables to calculate.
length_map = _____
width_map = _____
surface_map = _____ * _____ = _____

How long / side is the area in real?
length_real = _____
width_real = _____
surface_real = _____ * _____ = _____ m

Task: Go to the forest and mark a 50m * 50m square.
Step_length = _____ cm = _____ m
Number_of_steps = 50m / Step_length =

How many trees have you counted? How many are damaged
Counted_number_of_trees= _____
Counted_damaged_trees = _____

Now you can count the number of trees in the whole area. How many squares do you need for the full area?
Our_square * ____X_____ = real_square; X = _____

Overall_number_of_trees = _____ * Counted_number_of_trees =
Overall_number_of_damaged_tree = ___ * Counted_number_of_damaged_trees =

Great, you have helped us a lot to understand the situation in the forest!

Task: Summarize all steps you went through to measure the number of damaged tress. Use variables, conditions and loops, e.g.
IF step_counter == 100, THEN turn right by 90 degrees
IF tree = damaged, THEN counted_damaged_trees++1
REPEAT go_one_step UNTIL step_counter == Number_of_steps

Fig. 2. Sample work sheet

The scenario is just one example which was designed together with teacher trainers.

3 Summary

The project has developed more than 160 learning scenarios and corresponding learning materials. Those are validated and improved continuously. Additionally, we provide resources for teachers by recommending further OER in the field. Overall, this is the largest collection of OER in the field of Citizen Science in Europe.

Annex A List of Learning Scenarios

DE	No.	Name	Topic
DE	DE0	SummerSchool 01: Creating an App to monitor food waste in the community	Bio diversity, plants and animals
DE	DE1	AppInventor 1: Outdoor App - Plant List	Bio diversity, plants and animals
DE	DE2	AppInventor 2: Outdoor App - Part 2	Bio diversity, plants and animals
DE	DE3	AppInventor 3: What is a database	Basic scenario - data management
DE	DE4	AppInventor 4: Teachable machine	Programming, algorithms, artificial intelligence
DE	DE5	AppInventor 5: Creation of the TinyWebDB and a country capital app	Data storage
DE	DE6	AppInventor 6: Creating a database (TinyDB)	Basic scenario - database
DE	DE7	AppInventor 7: Creating a web database (TinyWebDB)	Basic scenario - database
DE	DE8	AppInventor 7: Create a Scavenger Hunt Quiz	
DE	DE9	Scavenger Hunt Quiz: List	lists and data
DE	DE10	Scavenger Hunt Quiz: Min Max Function	min max values and data
DE	DE11	Discover and research social media	Social Media
DE	DE12	Research the CO2 production of a car	Environmental action
DE	DE13	Calliope Mini1 - Getting to know the Calliope Mini	Programming, algorithms, microcontrollers
DE	DE14	Calliope Mini 2 - First steps	Programming, algorithms, microcontrollers
DE	DE15	Calliope Mini 3 - We build a noise traffic light	Programming, algorithms, microcontrollers
DE	DE16	Sensebox 1 - First steps with the SenseBox	Programming, algorithms, microcontrollers, sensors
DE	DE17	Sensebox 2 - Getting to know the Sensebox	Programming, algorithms, microcontrollers, sensors
DE	DE18	Sensebox 3 - Getting to know the Sensebox and its sensors	Programming, algorithms, microcontrollers

DE	DE19	Sensebox 4 - Short introduction round and display measured values	Programming, algorithms, microcontrollers, sensors
DE	DE20	Sensebox 5 - Let's get to know the fine dust sensor and the measuring unit µm better	Programming, algorithms, microcontrollers, sensors
DE	DE21	Sensebox 6 - Let's get to know the CO2 sensor & build a CO2 traffic light & save the data on the SD card	Data analysis, data interpretation
DE	DE22	Sensebox 7 - Transferring data from the SenseBox & register the senseBox	Data analysis, data interpretation, programming, web services
DE	DE23	Sensebox 8 - Analyze the data from the sensebox (e.g. from the API)	Data transformation, data storage
DE	DE24	SenseBox 9: Present your results in plenary	
DE	DE25	SenseBox 0: Creation of research question for the CO2 traffic light	Creation of research questions for the Co2 traffic light project
DE	DE26	SenseBox 10: Getting to know the ultrasonic sensor	Use the ultrasonic sensor
DE	DE27	Spot security issues	Information Security, Data Security
DE	DE28	Development of a noise traffic light	Physics, technology, IT
DE	DE29	Transmission of the noise meter data	Physics, technology, IT
DE	DE30	Analysing and evaluating the data from the noise traffic light	Physics, technology, IT
DE	DE31	Basics of data analysis in Excel - data transformation and data analysis	Data , Mathematics, IT
DE	DE32	Basics of data analysis in Excel - Data visualization	Data , Mathematics, IT
DE	DE33	How good word speech recoginition 1 ?	Computer science, IT
DE	DE34	How good works speech recognition 2?	Computer science, IT
DE	DE35	Stratosphere balloon 01	
DE	DE36	Stratosphere balloon - What does a stratosphere balloon?	Physics, technology, IT

DE	DE37	Stratosphere balloon 02 - collect environmental data	Physics, technology, IT
DE	DE38	Stratosphere balloon - learn programming with the calliope Mini	Physics, technology, IT
DE	DE39	Charge your mobile phone with solar energy and adjust the angle optimally	Physics, technology, IT
DE	DE40	Read data from the solar panel	Physics, technology, IT
DE	DE41	Planning a Citizen Science-based Course	all
IT	IT1	Introduction to Smartphones as a teaching tool	Physics, technology, IT
IT	IT2	Introduction to Smartphone Sensors	Physics, technology, IT
IT	IT3	Accelerometer focus and gravity force Part 1	Physics, technology, IT
IT	IT4	Accelerometer focus and gravity force Part 2	Physics, technology, IT
IT	IT5	Walking diagrams	Physics, technology, IT
IT	IT6	Cultural Heritage Accessibility	Arts, social science, history, Technology
IT	IT7	Compass and GPS	Physics, technology, IT
IT	IT8	Image sensor	Physics, technology, IT
IT	IT9	QR code: what is it and how to create	Technology, IT
IT	IT10	Coding & Scratch	Technology, IT, coding
IT	IT11	Let's build an interactive tourist map of the city! (Part 1)	Art, history, architecture, IT, coding
IT	IT12	Let's build an interactive tourist map of the city! (Part 2)	Art, history, architecture, IT, coding
IT	IT13	Data, metadata e informations	Data collection
IT	IT14	Metadata of historical photos, monuments, etc.	Technology, IT, Data analysis
IT	IT15	Monuments through the passage of time, photographic documentation collection	Art, History, Conservation of cultural heritage.
IT	IT16	Stereophotogrammetry 101	Physics, technology, IT

IT	IT17	Conservation of cultural heritage through stereophotogrammetry and 3D reconstruction	Art, history, architecture, IT
IT	IT18	Virtual and augmented reality	Art, history, architecture, IT
IT	IT19	Reproduction of a cultural heritage in virtual/augmented reality	Art, history, architecture, IT
IT	IT20	Light condition and luminosity evaluation	Physics, technology, IT
IT	IT21	Color by Addition	Physics, technology, IT
IT	IT22	Colors accuracy	Physics, technology, IT
IT	IT23	Ambient Noise	Physics, technology, IT
IT	IT24	Insulators efficacy	Physics, technology, IT
IT	IT25	Internet of Things & IoT Apps	Physics, technology, IT
IT	IT26	Monitoring of Apulian olive trees	Sciences, biology, agrotechnics.
IT	IT27	Digitization of the heritage of popular, folkloristic and gastronomic culture of southern Italy	Physics, technology, IT
IT	IT28	The Basics of 3D Printing for the Reconstruction, Study and Preservation of Cultural Heritage	Physics, technology, IT
IT	IT29	3D Printing of monuments and works of art reconstructed through stereophotogrammetry	Physics, technology, IT
IT	IT30	2D modeling for beginners: let's build our own three-dimensional wooden toy	Physics, technology, IT
IT	IT31	Creating an image library	Art, history, architecture, IT
IT	IT32	Composition of a command to produce images by AI	Art, history, architecture, IT
IT	IT33	Real Image Vs. AI image (by Midjourney)	Art, history, architecture, IT
IT	IT34	How to use AI for artistic production pt. Painting (by Midjourney)	Art, history, architecture, IT
IT	IT35	How to use AI for artistic production pt. Contemporary Art (by Midjourney)	Art, history, architecture, IT
IT	IT36	3D scanner configuration for Cultural Heritage	Art, history, architecture, IT
IT	IT37	Object scanning	Art, history, architecture, IT
IT	IT38	Refine a scanned 3D object with Meshmixer	Art, history, architecture, IT

IT	IT39	Insert texture on the object scanned in 3D with Meshmixer	Art, history, architecture, IT
IT	IT40	Visualization of the 3D scan through Google Cardboard	Art, history, architecture, IT
GR	GR1	Earthquake Early Warning Systems and Seismic Waves signal processing with Python (40 hrs)	Geophysics, Physics, Mathematics, Geography - Geosciences, Programming, Technology
GR	GR2	Natural Disasters and Disaster Risk Management	Geophysics, Physics, Mathematics, Geography - Geosciences, Programming, Technology
GR	GR3	Natural Disasters monitoring	Geophysics, Physics, Mathematics, Geography - Geosciences, Programming, Technology
GR	GR4	Natural Disasters impact	Geophysics, Physics, Mathematics, Geography - Geosciences, Programming, Technology
GR	GR5	Natural Disasters mitigation	Geophysics, Physics, Mathematics, Geography - Geosciences, Programming, Technology
GR	GR6	Natural Disasters mitigation - Activity	Geophysics, Physics, Mathematics, Geography - Geosciences, Programming, Technology
GR	GR7	What is Citizen Science and Disaster Citizen Science?	Geophysics, Physics, Mathematics, Geography - Geosciences, Programming, Technology
GR	GR8	Earthquakes	Geophysics, Physics, Mathematics, Geography - Geosciences, Programming, Technology
GR	GR9	Seismology overview - Historic events	Geophysics, Physics, Mathematics, Geography - Geosciences, Programming, Technology
GR	GR10	Terminology and types of faults	Geophysics, Physics, Mathematics, Geography - Geosciences, Programming, Technology

GR	GR11	Seismic Waves	Geophysics, Physics, Mathematics, Geography - Geosciences, Programming, Technology
GR	GR12	Hypocenter and Epicenter	Geophysics, Physics, Mathematics, Geography - Geosciences, Programming, Technology
GR	GR13	Epicenter – Epicenter activity	Geophysics, Physics, Mathematics, Geography - Geosciences, Programming, Technology
GR	GR14	Earthquakes and Early Warning Systems (Alarm time)	Geophysics, Physics, Mathematics, Geography - Geosciences, Programming, Technology
GR	GR15	Earthquakes and Early Warning Systems – Seismographs	Geophysics, Physics, Mathematics, Geography - Geosciences, Programming, Technology
GR	GR16	Earthquakes and Early Warning Systems – Game	Geophysics, Physics, Mathematics, Geography - Geosciences, Programming, Technology
GR	GR17	A test upon a real case study	Geophysics, Physics, Mathematics, Geography - Geosciences, Programming, Technology
GR	GR18	Earthquakes and Early Warning Systems - Steps	Geophysics, Physics, Mathematics, Geography - Geosciences, Programming, Technology
GR	GR19	Coding an Early Warning System	Geophysics, Physics, Mathematics, Geography - Geosciences, Programming, Technology
GR	GR20	Take care of your steps!	Computer science, data processing ● Variables ● Design algorithm/ pseudocode Mathematics ● Aggregation
GR	GR21	BUILDING A RAIN GAUGE	Study of the environment, Water/Interest in science ● Self efficacy ● Motivation ● Data ● Scientific inquiry skills

			● Basic digital knowledge
GR	GR22	When Autumn begins	Environmental Science Unit 3: Nature is our home Chapter 1: Ecosystems of Greece
GR	GR23	Let's count Food Waste at school's restaurant!	Environmental science
GR	GR24	Let's take care of honeybee's population	Study of the environment Biology of insects
GR	GR25	Ladybugs count!	Environmental study
GR	GR26	Tracking earthquakes!	Physics
GR	GR27	Let's measure Light pollution!!	Light pollution Astronomy
GR	GR28	Let's take action on microplastic pollution!	Environmental study
GR	GR29	Let's all take action on FOOD WASTE!!! - 1	Care of the Environment
GR	GR30	Let's all take action on FOOD WASTE!!! - 2	Environmental study
GR	GR31	Food advertising	Environmental study
GR	GR32	Eat local!	Environmental study
GR	GR33	**Spill the beans!**	Environmental study
GR	GR34	Mind the Water!	Environmental study
GR	GR35	Adopt a beach	Environmental study
GR	GR36	Adopt a river	Environmental study
GR	GR37	Cosmic Muon Images	Environmental study
GR	GR38	Deep Sea Explorers	Environmental study
GR	GR39	Gravitational Wave Noise Hunting	Environmental study
GR	GR40	Gravitational Wave Noise Hunting	Environmental study
LT	LT1	Is this Greenwashing?	Business Management, Literacy, Science

LT	LT2	Reputation management in times of social media	Technology, Literacy, Science, Business Management
LT	LT3	The Basics of Fact-Checking	Technology, Literacy, Science
LT	LT4	Introduction to Citizen Science: SciStarter	Technology, Literacy, Science
LT	LT5	Online Citizen Science Tools	Technology, Literacy, Science
LT	LT6	Online Citizen Science Tools: Zooniverse	Technology, Literacy, Science
LT	LT7	Citizen Science and Ethics	Technology, Literacy, Science
LT	LT8	Creating Infographics	Technology, Literacy, Science
LT	LT9	Critical thinking	Technology, Literacy, Science
LT	LT10	Making good choices online	Technology, Literacy, Science
LT	LT11	Meet the Scientists	Technology, Literacy, Science
LT	LT12	Think like a Scientist	Science, Biology, Chemistry
LT	LT13	Get to know your Facebook data	Information technologies
LT	LT14	Thinking like a scientist	Technology, Literacy, Science
LT	LT15	Can you trust your newsfeed?	Technology, Literacy, Science
LT	LT16	Choose your citizen science project	Information technology, science, biology, chemistry
LT	LT17	Is it possible to be anonymous on the Internet?	Information Technology, Literacy, Science, Privacy
LT	LT18	Know the fake content online	Information technology, science
LT	LT19	Your privacy when everything is online	Information Technology, Literacy, Science, Privacy
LT	LT20	Analyzing and interpreting different types of data	Information Technology, Literacy, Science, Privacy
LT	LT21	How to define a clickbait?	Information Technology, Literacy, Science, Privacy
LT	LT22	How to master critical reading?	Information Technology, Literacy, Science, Privacy
LT	LT23	How to define and create fake news?	Information Technology, Literacy, Science, Privacy
LT	LT24	Digital media ethics	Information Technology, Literacy, Science, Privacy

LT	LT25	Digital media monitoring	Information Technology, Literacy, Science, Privacy
LT	LT26	How to spot disinformation?	Information Technology, Literacy, Science, Privacy
LT	LT27	What does Facebook know about everyone?	Information Technology, Literacy, Science, Privacy
LT	LT28	How to Spot Fake News in media messages?	Information Technology, Literacy, Science, Privacy
LT	LT29	What does Google know about everyone?	Information Technology, Literacy, Science, Privacy
LT	LT30	How to trust influencers content?	Information Technology, Literacy, Science, Privacy
LT	LT31	How to conduct effective information research?	Information Technology, Literacy, Science, Privacy
LT	LT32	What does Instagram know about everyone?	Information Technology, Literacy, Science, Privacy
LT	LT33	How to tell if e-shop is legit?	Information Technology, Literacy, Science, Privacy
LT	LT34	How to be safe with online advertising?	Information Technology, Literacy, Science, Privacy
LT	LT35	How to be safe when playing games online?	Information Technology, Literacy, Science, Privacy
LT	LT36	How to be safe from unauthorized usage of personal pictures?	Information Technology, Literacy, Science, Privacy
LT	LT37	How to protect yourself from scams on e-mails (Phishing)?	Information Technology, Literacy, Science, Privacy
LT	LT38	How to create a strong password?	Information Technology, Literacy, Science, Privacy
LT	LT39	How to Identify Trolls on Social Media?	Information Technology, Literacy, Science, Privacy
LT	LT40	How to check website credibility?	Information Technology, Literacy, Science, Privacy

Annex B OER Collection (short version)

Name	Description	Language	Subject	Key Words	AgeRange	Competence
Big data against childhood Obesity	Meals photo collection & behavioural data in order to find possible correlations with childhood obesity	English	Physical Education	Meals photo collection & behavioural data	K5-9	CT14 Data Tracking / Collection
Eyes on Radon	This is a Citizen Science project focused on radon gas.	English	Science	radon; citizen science; health; radioactivity; gas	K5-9	CT14 Data Tracking / Collection
OpenTEK	OpenTEK wants to document climate change impacts reported by communities and researchers and bring these different data sources together to understand better how people and ecosystems are being impacted by climate change	English	Science	Citizen Science, Climate Change, Environment, Local Indicators of Climate Change Impacts (LICCI).	K5-9	CT14 Data Tracking / Collection
Leipsydria	A CS project on water management; in progress (more info will follow)	English	Science	Water management	K5-9	CT14 Data Tracking / Collection
Introduction to Citizen Science and Fangstjournalen	Citizen Science project “Fangstjournalen” and how Citizens engage in collecting data and co-creating knowledge. A knowledge- creation helping us to learn more about the world we live in.	English	Science	Citizen Science	K5-9	CT14 Data Tracking / Collection
FAIR data in a Citizen Science project, “Fangstjournalen”	how Research Data Management, data sharing and following the FAIR guiding principles for research data can increase the impact and the value of the research	English	Science	FAIR data, Citizen Science	K5-9	CT14 Data Tracking / Collection
The 10 principles of Citizen Science from ECSA	A brief introduction to the 10 principles of good citizen science practice	English	Science	principles citizen Science	K5-9	CT14 Data Tracking / Collection
Online Citizen Science in the Classroom	Citizen Scientists in the Classroom: Investigating the Role of Online Citizen Science in Primary School Science Education' funded by the Teaching and Learning Research Initiative. The aim of the project was to explore the impact on student learning and engagement with science of incorporating online citizen science (OCS) projects in classrooms.	English	Science	Online Citizen Science	K5-9	CT14 Data Tracking / Collection
This Thing Called Science Part 6: Citizen Science	Strengthening critical thinking with scepticism and analysis and introduces the basic elements of the scientific process.	English	Science	citizen science	K5-9	CT14 Data Tracking / Collection

BE AWARE OF THE EARTHQUAKE	The purpose of this project is empower engagement locally and create and raise awareness for the students about earthquakes by using basic seismometers. We will provide them to study with collaboration in order to make them aware of what is going on if an earthquake happens in the local. In the other hand, they will inform their families about our studies by details. When we reach our purpose, we will take the next step and start to creating awareness in the local by spreading.'	English	Science	EARTHQUAKE, monitoring	K5-9	CT14 Data Tracking / Collection
Nutrition based on calculations?	Students and teachers will be engaged in a series of activities, data collection methods and discussions with the eventual aim to address the issue of obesity and to provide researchers with much needed data, enabling them to influence policy makers to adopt new strategies on the issue of childhood obesity.	English	Science	Nutrition, calculations	K5-9	CT14 Data Tracking / Collection
Sustainable development guide for protection of the enviroment	Students' contact with real environmental problems (eg climate change, energy problem) and their exploration based on the knowledge of the science program. Students, as scientists, study causes, as members of the community are puzzled and seek solutions, as members of civil protection make proposals.	English	Science	Sustainable development, enviroment	K5-9	CT14 Data Tracking / Collection
Big data against childhood Obesity	Students and teachers will be engaged in a series of activities, data collection methods and discussions with the eventual aim to address the issue of obesity and to provide researchers with much needed data, enabling them to influence policy makers to adopt new strategies on the issue of childhood obesity.	English	Science	Big data, childhood obesity	K5-9	CT14 Data Tracking / Collection
Integrating Citizen Science into the classroom – Students contribute to DNA Barcoding research and biodiversity conservation	y incorporating the IBSE and RRI approach in our learning module, we enable students not only to learn about but also to contribute to real-life environmental research. Our learning module FutureForest covers a range of topics concerning biodiversity by focusing on the forest ecosystem. It provides the concept of biodiversity by exploring its three levels, which are species diversity, ecosystem diversity and genetic diversity.	English	Science	Citizen Science, DNA, biodiversity conservation	K5-9	CT14 Data Tracking / Collection
SMART CITIZEN KIT	Tools for citizen action in environmental monitoring and methodologies for community engagement and co-creation.	English	Science	crowd sensing initiative, neighborhoods, kit,	K5-9	CT14 Data Tracking / Collection

				maps of noise, air quality		
A Roadmap to Citizen Science Education (MOOC)	materials and stories of implementation from innovative citizen science education projects. Citizen Science Education is based on the assumption that teachers and researchers can find a common ground of discussion and develop practices that are advantageous both, for the education sector, and the science sector.	English	Science	Citizen Science, education	K5-9	CT14 Data Tracking / Collection
REINFORCE (Help the ATLAS scientists look for signatures of new massive long-lived particles produced in proton-proton collisions, which could be a sign of New Physics)	Students & teachers supporting researchers in frontier citizen science (Gravitational Waves Noise Hunting; Deep Sea Hunters; new Particles at the Large Hadron Collider (LHC) of CERN); Atmospheric Muons' and cosmic rays to probe big structures) (in progress)	English	Science	particles, collisions, New Physics	K5-9	CT14 Data Tracking / Collection
PULCHRA City Challenges Platform	schools and stakeholders create partnerships in their local communities to foster science education for all citizens in 6 City Challenge Themes	English	Science	air quality monitoring, modelling and mitigation	K5-9	CT14 Data Tracking / Collection
PULCHRA City Challenges Platform - Greek case (Laboratory of Environmental and Energy Design of Buildings and Settlements)	schools and stakeholders create partnerships in their local communities to foster science education for all citizens in 6 City Challenge Themes	English	Science	air quality monitoring, modelling and mitigation	K5-9	CT14 Data Tracking / Collection
PULCHRA City Challenges Platform - Greek case Athens	schools and stakeholders create partnerships in their local communities to foster science education for all citizens in 6 City Challenge Themes	English	Science	air quality monitoring, modelling and mitigation	K5-9	CT14 Data Tracking / Collection
PULCHRA City Challenges Platform - Greek case Volos	schools and stakeholders create partnerships in their local communities to foster science education for all citizens in 6 City Challenge Themes	English	Science	air quality monitoring, modelling and mitigation	K5-9	CT14 Data Tracking / Collection
PULCHRA City Challenges Platform - Greek case Athens	schools and stakeholders create partnerships in their local communities to foster science education for all citizens in 6 City Challenge Themes	English	Science	air quality monitoring, modelling and mitigation	K5-9	CT14 Data Tracking / Collection

PULCHRA City Challenges Platform - Greek case Athens	schools and stakeholders create partnerships in their local communities to foster science education for all citizens in 6 City Challenge Themes	English	Science	air quality monitoring, modelling and mitigation	K5-9	CT14 Data Tracking / Collection
PULCHRA City Challenges Platform - Greek case Athens	schools and stakeholders create partnerships in their local communities to foster science education for all citizens in 6 City Challenge Themes	English	Science	air quality monitoring, modelling and mitigation	K5-9	CT14 Data Tracking / Collection
PULCHRA City Challenges Platform - Greek case Athens	schools and stakeholders create partnerships in their local communities to foster science education for all citizens in 6 City Challenge Themes	English	Science	air quality monitoring, modelling and mitigation	K5-9	CT14 Data Tracking / Collection
PULCHRA City Challenges Platform - Greek case Athens	schools and stakeholders create partnerships in their local communities to foster science education for all citizens in 6 City Challenge Themes	English	Science	air quality monitoring, modelling and mitigation	K5-9	CT14 Data Tracking / Collection
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PULCHRA City Challenges Platform - Greek case Athens	schools and stakeholders create partnerships in their local communities to foster science education for all citizens in 6 City Challenge Themes	English	Science	air quality monitoring, modelling and mitigation	K5-9	CT14 Data Tracking / Collection
PULCHRA City Challenges Platform - IE	schools and stakeholders create partnerships in their local communities to foster science education for all citizens in 6 City Challenge Themes	English	Science	air quality monitoring, modelling and mitigation	K5-9	CT14 Data Tracking / Collection
PULCHRA City Challenges Platform - IE	schools and stakeholders create partnerships in their local communities to foster science education for all citizens in 6 City Challenge Themes	English	Science	air quality monitoring, modelling and mitigation	K5-9	CT14 Data Tracking / Collection
PULCHRA City Challenges Platform - IE	schools and stakeholders create partnerships in their local communities to foster science education for all citizens in 6 City Challenge Themes	English	Science	air quality monitoring, modelling and mitigation	K5-9	CT14 Data Tracking / Collection
PULCHRA City Challenges Platform - IE	schools and stakeholders create partnerships in their local communities to foster science education for all citizens in 6 City Challenge Themes	English	Science	air quality monitoring, modelling and mitigation	K5-9	CT14 Data Tracking / Collection
GAIA project	large IoT infrastructure in pilot schoolsl gamification and educational scenarios that use real-time energy consumption data .	English	Science	air quality monitoring, school environment	K5-9	CT14 Data Tracking / Collection
Citizen science - in researching biodiversity	Citizen science used in biodiversity research, citizen science itself, and the different layers presented here are also applicable to other kinds of scientific ventures.	English	Science	Citizen science, biodiversity	K5-9	CT14 Data Tracking / Collection
Citizen Science and Scientific Crowdsourcing: an Introduction	history, theoretical foundations, and practical aspects of designing and running citizen science projects.	English	Science	Citizen Science, Scientific Crowdsourcing	K5-9	CT14 Data Tracking / Collection
Citizen Science Projects: How to Make a Difference	Discover how to build your own citizen science project to address global challenges and create positive change.	English	Science	Citizen Science Projects	K5-9	CT14 Data Tracking / Collection
Open Science Training Handbook	Open Science & Citizen Science Training Handbook	English	Science	Open Science	K5-9	CT14 Data Tracking / Collection
Community Planning Toolkit	Community Planning Toolkit / Guidelines for community engagement	English	Science	Community Engagement	K5-9	CT14 Data Tracking / Collection
Californian Academy Sciences Citizen Science Toolkit: Teaching Science Through Citizen Science	help educators integrate citizen science projects into classroom curricula or afterschool programming. It contains resources—including lessons, readings, and worksheets—to help communicate the value of citizen science to students and cultivate their sense of	English	Science	Citizen Science Toolkit	K5-9	CT14 Data Tracking / Collection

	empowerment and impact when performing science investigations.					
Citizen Science with GIS&T	Designing a Citizen Science Project & GIS&T Tools for Citizen Science	English	Science	Citizen Science	K5-9	CT14 Data Tracking / Collection
Smartcitizen.me	Generate real-time data and awareness about pollution in urban areas and empower communities to seek solutions	English	environmental sciences	air pollution, urban community	K11-17	CT14 Data Tracking / Collection
OSDG Project	OSDG is a free, open-source tool that assigns SDG labels to your input.	English	environmental sciences	community platform, SDG Goals	K11-17	CT26 Data analysis and interpretation
Citizen science projects around Food	Citizen science projects around the Food system	English	environmental sciences	food system; citizen science	K11-17	CT14 Data Tracking / Collection
Food waste experiment	In Svinnkollen, students helped to develop and test an app to investigate their food waste at school. The app told about today's menu and the climate impact of the various dishes. Using artificial intelligence, the app calculated how much climate impact the thrown food has - both for each individual student, and for the class as a group.	other	environmental sciences	Food waste experiment	K11-17	CT14 Data Tracking / Collection
The vegetables experiment	Thousands of students helped researchers find out how much fruit and vegetables children in Sweden eat.	other	environmental sciences	The vegetables experiment	K11-17	CT4 Algorithms
The Best-Before-Date Experiment	Approximately 1,800 Swedish pupils helped researchers at SLU (the Swedish University of Agricultural Sciences) study how different food items were stored in refrigerators in Swedish homes, and at what temperature. The project was coordinated by VA (Public & Science) as part of ForskarFredag – the Swedish events during the European Researchers' Night.	other	environmental sciences	The Best-Before-Date Experiment	K11-13	CT14 Data Tracking / Collection