Project Number: 101006468

Project Acronym: PAFSE

Project title: Partnerships for Science Education

D2.4 SCHOOL PROJECT MANAGEMENT RESOURCES AND SCIENTIFIC INQUIRY INSTRUMENTS

Technical information

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Status of the document: Living document (periodic revision)

Contents

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List of abbreviations

AMU	Uniwersytet Im. Adama Mickiewicza W Poznaniu
CTI	Institouto Technologias Ypologiston kai Ekdoseon Diofantos
EU	European Union
ISEL	Instituto Superior de Engenharia de Lisboa
KPI	Key Performance Indicator
NGO	Non-Governmental Organisation
PAFSE	Partnerships for Science Education
PBL	Project-Based Learning
PRP	Prevenção Rodoviária Portuguesa
SC	Steering Committee
SDG	Sustainable Development Goals
STEM	Science, Technology, Engineering, Mathematics
UN	United Nations
UOI	Panepistimio Ioanninon
UCY	University of Cyprus
UMINHO	Universidade do Minho
UNL	NOVA University of Lisbon
WP	Work Package

1. Introduction

Partnerships for Science Education (PAFSE) promotes project-based learning in connection with real-world problems connected with public health and sustainable development. It proposes to develop actions enhancing the relevance of science education to students' daily lives, including connections to the challenges encountered by society. The EU-funded project organizes science education activities at low secondary level engaging students and school stakeholders (universities, research centres, start-ups, enterprises, governmental organisations, NGOs) in health promotion and disease prevention actions that benefit the health and well-being of the community. Each educational scenario addresses a specific public health topic and will offer teacher guidance notes, a sequence of technology-enhanced teaching-learning activities, formative and summative assessment instruments as well as templates and instruments for a student research project on perceptions and behaviours in the community in relation to the same public health topic. Projects leaded by schools are addressed within educational scenarios co-created with partners interested in STEM education and developed under a relevant public health issue through their continuous engagement in open schooling approach. Therefore, PAFSE addresses the needs of lower secondary schools working in partnership with their local communities and interested stakeholders in contributing to community preparedness for public health threats and reduce the risk of communicable disease and epidemics. More broadly, the PAFSE project strengthens the capacity of schools to implement public health education in partnership with local community stakeholders in an open schooling context.

One important outcome from the PAFSE project will be a set of educational scenarios on a range of public health issues, including an understanding of microbes and zoonosis, and the value of disease prevention measures in protecting communities. These educational scenarios will take the form of tools to support the work of teachers and students on a broad range of issues related to public health hazards and challenges. Each scenario enactment includes a local community survey and a public discourse event, aiming to develop students' competence on project management and collection/analysis/making sense of scientific evidence, but also to engage the community leadership in translating the information to support action of local citizens and other community players. Therefore, the project rises the competency of students to participate and commit in actions that fight diseases and promote health and well-being, enhances the levels of scientific literacy and preparedness at the community level, and introduces health education activities in formal and informal learning environments (e.g., classroom, science clubs, social organizations, parents' associations). The overall aim is to increase the global population awareness and preparation to deal with future epidemics and other public health hazards and support efforts for the attainment of the sustainable development goals (SDGs). The PAFSE model for open schooling will be applicable in addressing public health challenges, but also in encouraging the involvement of schools in climate change initiatives or in efforts to respond to other global challenges. These deliverable details the school inquiry-based projects linked to each educational scenario and provides for instruments schools to organize the project and for students to conduct research in community environment. Indeed, PAFSE is a project that promotes project-based learning (PBL).

Evidence from educational research shows that PBL has great potential to help people learn meaningfully, to increase motivation and to enhance the relevance of the learning experience. It is a powerful approach to teach and learn, designed to involve students in the study and resolution of authentic challenges. PBL is most effective when it engages students in analysing and representing a problem of relevance to their personal lives, it provides them with the tools to collect information and analyse evidence and it exposes them to peer feedback and the critique of friendly experts. Through PBL, students experience the joy and pleasure of co-creating with peers, teachers and mentors from civil society and research organisations. They will make powerful connections between what is taught in disciplines, real-life in the workplace and public health challenges that society faces, thereby understanding the relevance of working collaboratively to generate knowledge, products and services that address societal and entrepreneurial needs.

This is an approach to teaching in which students address real-world challenges, through an inquiry-based instructional method, to accomplish meaningful projects, thus engaging in knowledge construction. The development of critical thinking is facilitated when students have the opportunity to participate in problem-solving and knowledge generation in authentic situations and evidence suggests that PBL is a valid approach to conduct this pathway. It includes a driving question, collaboration among students, the use of scaffolding and the use of learning technologies, a strong emphasis on critical thinking and communication skills, and

interdisciplinary learning [1-4]. Students are provided with tools to collect information and analyse evidence, while exposed to peer feedback and the critique of friendly experts. Through project-based learning and digital learning resources embracing relevant topics (e.g., zoonosis, social and environmental determinants of health, non-communicable diseases, child obesity, pollution, green mobility, sustainable development goals), PAFSE engages a wide range of actors in innovative teaching-learning activities, promotes health literacy at school community and engages local stakeholders in collaborative science education activities. PBL in schools serves the purpose of supporting the design and implementation of high-quality inquiry projects related to Public Health that guide students in collecting evidence and engaging the local community in open discourse processes. It also provides relevant conditions for global support on action-research community projects leaded by schools. Evidence also shows that PBL can be more effective than traditional educational approaches regarding supporting long-term knowledge retention, improving mastery of 21st century skills, and preparing students to synthesize and explain concepts [5-6]. Students' achievements grow not only to the extent to which the project concerns, but also in other areas of knowledge. Project work triggers learning (understood as the accumulation and use of substantive knowledge) but also horizontal competence (acquiring or improving skills that will be used in other non-project situations) [7]. Therefore, the PAFSE education model serves not only as a context for building students' competences on project management and on processing scientific evidence, but also for engaging schools and communities in tackling public health issues from a scientific perspective.

The strong expertise of the PAFSE consortium in project management and design and implementation of educational scenarios connected with public health promoted that the full potential of project-based learning is reached. Furthermore, schools and teachers receive high-quality training to enact the educational scenarios, providing enough support to students, while allowing them to also work independently. Teachers also identify the different levels of expertise among students, to guarantee that the less experienced ones have higher support from teachers and colleagues. Given that project-based learning brings some challenges (e.g., students taking responsibility for the learning process, the need of positive interdependence, individual accountability, equal participation, and social skills), the piloting phase will be crucial to further developments of the learning scenarios and learning points in the scale-up of PAFSE project.

At the moment, 27 scenarios for public health education and 30 inquiry-based projects were developed and are being piloted. Teachers are being prepared to activate the scenario in professional development workshops, which provides advice on project management, design and administration, data analysis and reporting, and supports in the organization of school public events, one for each project that will be implemented. Students are engaged by teachers in conducting empirical studies, such as surveys and observations, collecting evidence on the local community perceptions, beliefs, attitudes and behaviour, and are supported with project management tools with a defined structure for management, design and administration of their projects, so that they can produce proposals for community health and well-being communicated in the events. Students with the support of the teacher design instruments to collect data on relevant public health topics and prepare the tools for analysing the information and communicating the findings in public discourse events. These 27 open schooling events taking place at the EU level represent an effort for the school and the local partnership to reach out to the community to inform them about the results of the project and to discuss the issue related to public health that was selected for the scenario.

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2. Summary

The remit of WP2 is to design and develop all the educational tools and materials that will be used for the purposes of the PAFSE project, including educational resources, educational scenarios, and learning research data collection instruments, as well as to provide the two web-based environments for hosting, organizing and sharing the learning resources and for supporting the networking, collaboration and communication of the learning and teaching communities.

WP2 specific goals are:

- Provide a web-based interactive digital educational environment that combines:
  o A platform for interactive communication and digital learning collaboration.
  o Multilingual digital educational repository for hosting, organizing and delivering digital educational resources for Public Health Education.
- Provide high-quality digital educational resources and learning objects.
- Provide high-quality educational scenarios for Public Health Education.
- Support the design of high-quality inquiry projects related to Public Health Education that guide students in collecting evidence and engaging the local community in open discourse processes.

Deliverable 2.4 concerns to WP2 and is part of Task 2.4 "Support the design of high-quality inquiry projects related to Public Health Education that guide students in collecting evidence and engaging the local community in open discourse processes." It develops templates for instruments (e.g., questionnaires, interview protocols, observation protocols) that students will finalize with the support of teachers and use to collect evidence from their communities about citizen's perceptions, beliefs or behaviours in relation to public health risks and communicable diseases. Different options are given to schools as 30 projects were developed, giving multiple options to schools in terms of research activities to be implemented and connected to each educational scenario. Therefore specific inquiry activities (and corresponding management structures) are developed according to the topic of the educational scenarios, that guide students in organizing their project, reaching out to the community to collect evidence using structured data collection instruments and analyze the data to form recommendations for community preparedness and public health risk mitigation measures. The school project resources include data analysis tools, databases, activity sheets, observation grids, questionnaires.

The document is an extended version of milestone 4 "First versions of the project management resource and inquiry instruments will be made available internally for pilot testing" made available at EC platform on the 30th of August.

Deliverable 2.4 "School Project Management Resources and Scientific Inquiry Instruments" notifies that school projects are fully described and templates for PM instruments that students will use to conduct their projects on community environment.

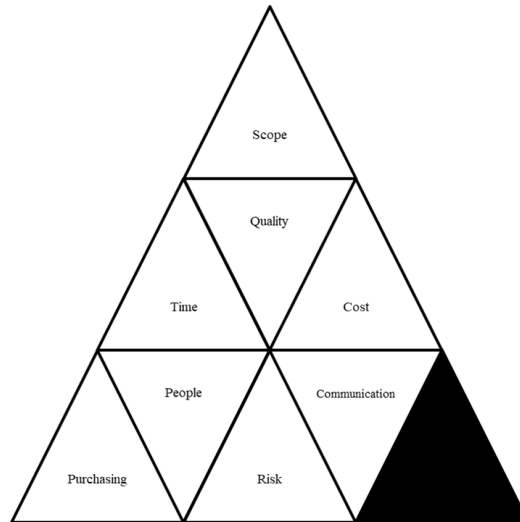# 3. Document history and co-authorship

This document is the first version of D2.4 to be available in month 15 as PAFSE deliverable.

Version	Date	Released by	Notes
1.0	21.11.2022	Carolina Santos (UNL – School of Public Health), Tassos Mikropoulos (UOI)	First version

3. Document history and co-authorship

4. Project Management Framework and Instruments

1. Plan: Determine How to Do It

2. Plan: Define Project Scope

- What are the outputs?
Example: scientific poster

-What are the requirements of project outputs?
Example: A3 format, Color, 5 sections (introduction, goals, methods, results, conclusions, recommendations).

- Are there any constraints to produce the project outputs?
Example: work will be completed in two weeks

- Define the tasks to produce the outputs – build the Work Breakdown Structure

Work Breakdown Structure (filled with examples)

3. Plan: Determine Project Time

    a. Define the detailed activities for each WBS element
    b. Put the activities in sequence
    c. Estimate the resources (human and acquisitions) for each activity
    d. Estimate the calendar time (days or weeks) for each activity
    e. Create the Gantt Chart

Resource Breakdown Structure (filled with examples)

Activity	Human Resource	Other Resources
Define the questionnaire	1 hour	paper
Parameterize the questionnaire in google forms	15 minutes	laptop
Set home survey	15 minutes	laptop or mobile phone
Prepare the scientific poster	3 hours	laptop

Gantt Chart (filled with examples)

Activity	Week 1	Week 2	Week 3	Week 4	Week 5
Define the questionnaire	■				
Parameterize the questionnaire in google forms		■			
Set home survey			■	■	
Prepare scientific poster					■

4. Plan: Determine Project Cost

    a. Estimate how much each activity will cost
Note: include the cost for Labor, Supplies, overhead (like office space and equipment)

    b. Add the estimates to determine the total cost of your project

Cost Breakdown Structure (filled with examples)

Activity	Human Resource	Other Resources	Human Resource Cost	Other Resources Cost (supplies)
Define the questionnaire	1 hour	paper	20 €	n.a
Parameterize the questionnaire in google forms	15 minutes	laptop	5 €	n.a
Set home survey	15 minutes	laptop or mobile phone	5 €	n.a
Prepare scientific poster	3 hours	laptop	60 €	40 euros
Total	4h30	-	90 €	-

5. Plan: Determine Project Quality

    a. Ensure your project produces quality outputs
    b. Plan what quality means to your project
    c. Determine how you will assure quality

Quality Breakdown Structure (filled with examples)

Requirement	Quality planning	Quality assurance	Quality control
1.1	Minimum number of responses to the survey	Minimum number of responses to the survey: 50	Monitor the number of responses to the survey on a weekly basis
1.2	Minimum number of observations	Minimum number of observations: 5	Monitor the number of observations on a daily basis
1.3	Minimum number of interviews:	Minimum number of interviews: 10	Monitor the number of interviews on a daily basis
1.4	Poster template with five sections	Poster with five sections: introduction, goals, methods, results, conclusions, recommendations.	Monitor the developments of students' poster

6. Plan: Determine Project Risks

   a. Identify the two types of risks (uncertain future events that can affect your project): threats have a negative impact on your project; opportunities have a positive impact on your project

Risk Breakdown Structure (filled with examples)

Risk	Probability (How likely is it to happen)	Impact (How big of an effect will it have)	Owner (who takes care about the risk)	Action Plan (initiatives to reduce threats and increase opportunities)
Modest number of responses to the survey	High	High	Students: – Mary – Peter – John	–Identification of other potential target groups –Invitations and re–invitations
Modest number of people that accepted invitation to attend the open schooling event	Medium	Medium	Professor Francis Students: - Sophia - Caroline	- Re–invitations by email - Telephone calls

7. Plan: Plan Procurement Processes

   a. Determine what goods and services you need
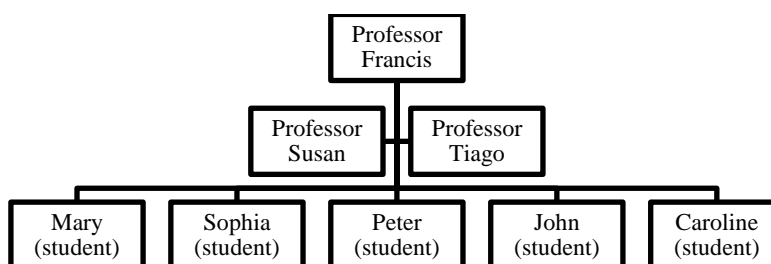   b. Have what you need at the time that you need it.

Acquisitions Breakdown Structure (filled with examples)

Supply	Supply Cost (supplies)	When to be available	How to be available
Paper	20 euros	In the beginning of the project	Commitment of school top management
Printer	50 euros	In the beginning of the project	Commitment of school top management
Mobile laptop	700 euros	In the beginning of the project	Commitment of school top management
Printed post	40 euros	Before the open schooling event	Poster printing in Stapples Office Center

8. Plan: Plan People

   a. Acquire the project team
   b. Map the project team in the Organization Breakdown Structure
   c. Assign the project team members to roles
   d. Assign the project team members to activities
   e. Train the project team
   f. Determine how you will motivate and reward the team
   g. Map Stakeholders – people or groups interested in the project
   h. Determine how you will engage stakeholders in the project

Organization Breakdown Structure (filled with examples)

Responsibility assignment matrix (filled with examples)

Activity	Team members							
	Mary (student)	**Sophia** (student)	**Peter** (student)	**John** (student)	**Caroline** (student)	**Professor Francis (Science)**	**Professor Susan (Science)**	**Professor Tiago (ICT)**
Define the questionnaire	X	X	X			C/P		
Parameterize the questionnaire in google forms					X	C/P		
Set home survey	X	X	X	X	X/P	C/P		
Analyze data							C/P	
Prepare poster	X	X	X	X	X			C/P
Coordinate the overall implementation of the project						X	X	

Letter	Role
X	Executes work
P	Controls progress
C	Should be consulted
I	Should be informed

Stakeholders Matrix (filled with examples)

Stakeholder name	Directly involved in the project (yes/no)	Served or Affected by the Project (yes/no)	Likely to be user of the results of the project (yes/no)
Parents	yes	yes	yes
School community	yes	yes	yes
School management	no	yes	yes
Municipality	no	yes	yes
Residents' association	no	yes	yes
Primary healthcare center and Hospital	no	yes	yes
National Directorate for Education	yes	yes	yes

Stakeholders Management Matrix (filled with examples)

Stakeholder name	Who they are and why should be involved in the project	Why the project is relevant for them	Strategies to obtain support
Parents	Students' families should be involved in the survey to collect the relevant responses. Their involvement also maximizes the impact of the project in terms of global literacy.	Due to their interest in pupils' education and school health and well being	Present the school project in parents meeting
School community	The school community should be involved in the survey to be organized by students in school environment. Their involvement also maximizes the impact of the project in terms of global literacy.	Due to their interest in students' education and school health and well being	Present the school project in a school community meeting
School management	The school management assures relevant resources for students' projects and should be involved in the survey Their involvement also maximizes the impact of the project in terms of global literacy.	Due to their interest in students' education and school health and wellbeing. Also due to their interest in demonstrating the interest of school in contributing to community health (to be a health promotion school).	Present the school project in parents meeting.

Stakeholder name	Who they are and why should be involved in the project	Why the project is relevant for them	Strategies to obtain support
Municipality	The municipality should be involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to municipality interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project). .
Residents' association	Residents' associations should be involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to residents' associations interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project). .
Primary healthcare center and Hospital	The Primary healthcare center and Hospital should be involved in the open schooling event where students share the results of their projects and communicate recommendations.	Due to their interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project). .
National Directorate for Education	The National Directorate for Education is supporting the project and interested in the results in terms of students' learnings.	Due to their interest in novel methodologies for STEM education and role in policy making.	Invitation to participate in the open schooling event.

9. Plan: Plan Communication

a. Assure the right information to the right people, at the right time, in a useful format
b. Assure effective project meetings
c. Build the communications plan

Communications plan (filled with examples)

Organized by (from)	Participants (to)	What	When	How/Where	Purpose
Professor Francis	Team	Kick-off meeting	10 september	Laboratory	Provide a complete description of the project and what the end product will be.
Professor Francis	Team	Team meeting	Every week (Wednesday, 14h)	IT classroom	- Overall plan for the project - Discuss project developments and plan next stage - Instruct team on how to - Provide updates on the progress of the project and if there are any issues with completion
Professor Francis	Team and Parents	Meeting	Before the project starts (date to be defined)	School meeting room	Explain the project and invite for participation in the survey
Professor Francis and Team	Parents	Meeting	Before the project starts (date to be defined)	Virtual meeting	Explain the project and invite for participation in the survey and open schooling event.
Professor Francis, Team, School management	School community Municipality Residents' association Primary healthcare center and Hospital National Directorate for Education	Invitations to stakeholders participation in open schooling event	Before the open schooling event (date to be defined)	By email	Explain the project and invite for participation in the open schooling event.

10. Plan: Build the project charter

1.0 Project identification	
Name	Describe the project name and project acronym
Summary description	Describe the project in one paragraph
Project owner	Identify the owner of the project (e.g.: school X)
Project manager	Identify the project manager
Stakeholders	Identify the stakeholders and briefly describe why they are interested parties
Team and roles	Identify the team and sumarize the role of each resource in the project (e.g: student, ICT teacher, Science Teacher, School manager, designer, software developer…)

2.0 Needs that support the project

Which pain? Which need not solved by the current state-of-the-art? Which solution (s) are you going to deliver?

3.0 Project goals

Describe what you want to achieve in the short-term, medium term and long term. Follow SMART principles.

Examples
Project completed – March 22
Open schooling event – April 22

4.0 Project scope

Identify the tasks of the project

5.0 Key Deliverables

Identify goods or services produced as a result of the project. A deliverable could be a report, a document, a software product, a server upgrade or any other building block of an overall project.

Examples
Questionnaire
Book
Poster
Infographic
System map
Brochure

6.0 Milestones and dates

Identify the principal landmarks of project execution stablished according to what is described in the project scope.

Examples
Survey concluded
Open schooling event prepared

7.0 Constraints

Identify the principal project constraints (cost, technical, other)

Examples
Budget 200 € (limit)
Project should be finished in 15 December (limit)

8.0 Risks and opportunities

Identify issues that may emerge in the future and influence project implementation

Examples
Modest number of responses to the survey
Modest number of people that accepted invitation to attend the open schooling event

9.0 Project success criteria

Identify the criteria or measures of success. These are the project acceptance criteria.

Examples
Project completed before Christmas period
Open schooling event in a community setting with the participation of the entire school community, parents, and local stakeholders.

10.0 Project success factors

Identify the factors that you will manage in order to positively influence the success of the project.

Examples
Appropriate engagement of students and parents.
Interest of teachers in project-based learning.

5. School Projects

1. Project management resource and inquiry instruments on the topic "Looking after myself and others – Healthy Eating"

Overview

Obesity is one of the most serious global public health challenges of the 21st century, affecting every country in the world. In addition, it is not only a chronic disease, but also a major risk factor for the world's leading causes of poor health and early death including cardiovascular disease, several common cancers and diabetes.

The main aim of this unit is to raise 8th grade students' awareness of rational nutrition and the health risks of unhealthy eating and not physical activity. Additionally, the unit aims to foster student's understanding about the role of socio-economic, political, and cultural environment in the rising prevalence of childhood obesity worldwide (determinants of childhood) and provide critical health literacy. Additionally, the educational scenario supports students' participation in civic society initiatives and in the design of local responses for the issue of childhood obesity, while providing significant interactions with the community and STEM related professions (researchers, public health specialists, data scientists, policy makers, enterprises). The scenario is based on the mandatory curriculum of natural sciences at EU level and promotes the following fundamental learnings:
- Understanding Healthy eating and health risks of unhealthy eating
- Understanding the role of Physical activity for health
- Indicating the relationship between childhood obesity and lifestyle
- Explaining the main determinants of childhood obesity
- Indicating the associated risk factors and suggesting possible solutions regarding childhood obesity
- Interpreting childhood obesity information related to public health and analysing their importance in the quality of population's life
- Developing Critical Health Literacy
- Critically analyse action strategies in the promotion of individual, family, and community health, starting from issues framed in local, regional or national problems
 - Developing responsible citizenship

Estimated duration
After initial socioscientific and technical background on the topic in classroom environment, 4-5 sessions of 40-45 minutes for supplementary learning activities and school project.

School Research Project

Overview. The project is based on guided research about childhood obesity focusing the contribution of the school to students and community health. Students will be developing digital skills (e.g., finding, reviewing, organising, and sharing information effectively, handling data appropriately, using different online resources and tools to study), socio-scientific argumentation skills and improve communication and collaboration skills while understanding the multiplicity of factors leading to childhood obesity and mapping solutions for reducing or mitigating their impact with the support of stakeholders.
First, students will analyse in collaboration with the teacher the principal research questions related to a socio-scientific issue concerning childhood obesity, goals, data collection methods and instruments.

Research Questions:
What are the possible causes, health risks and solutions related to childhood obesity?
What are individuals' and governments' responsibility for reducing childhood obesity?
What are the community's perceptions and knowledge concerning childhood obesity?

Relevance. Scientific evidence indicates that the way public places and communities' functions, influences health, wellbeing and incidence of diseases. With the project students will be contributing to tackle inequalities by identifying potential strengths and weaknesses of spaces located at the school, at the neighbourhood and

the community, giving attention to the vulnerable groups. Based on the collected evidence, they will suggest relevant actions.

Methodology/Implementation.

Session 1
Students are organized in groups of 4-5 students. Each group addresses one question.
Preparation of a research plan with the components of a research project: theoretical background, objectives, participants, methodology, results and conclusions, approximate timeline, form of actions.
Collection of documents and articles for bibliographical analysis from multiple digital and not digital sources.
Evaluation of the documents based on criteria and selection of the relevant valid information. Giving attention to misinformation and disinformation using specific criteria.
Discussion about the nature of science and the required consensus in science.
Each group shortly presents the results of its investigation for valid sources for bibliographical analysis.
Teacher and students give feedback for improvement of research plan.

Session 2
Students are organized in groups of 4-5 students:
Task: Drawing a childhood obesity concept map, writing possible causes, health risks and solutions related to childhood obesity.

A brainstorming of possible causes, health risks and solutions related to childhood obesity to address the topics is promoted by the teacher. Additionally, an expert will be invited to discuss with the students and answer their questions related to childhood obesity in Cyprus and globally. During the discussion with the expert, students will have the opportunity to ask specific questions related to their school environment and their community, improve their concept maps and write a short report concerning causes, health risks and possible solutions related to childhood obesity.

Students are urged to search information concerning individuals' and governments' responsibility for reducing childhood obesity, for the next lesson (homework) and drawing a prediction model for childhood obesity (homework), using a specific Model coding sheet. Teacher will evaluate the students' prediction models and give feedback in the next lesson.

Session 3
Students are organized in groups of 4-5 students:
Task 1: Investigating individuals' and governments' responsibility for reducing childhood obesity.
An expert will be invited to discuss with the students and answer their questions related to individuals' and governments' responsibility for reducing childhood obesity. After the discussion with the expert, students are urged to write a short report concerning individuals' and governments' responsibility for reducing childhood obesity at home (homework).

Task 2: Designing of a questionnaire (social research tool) to investigate the community's perceptions and knowledge concerning childhood obesity.
Teacher explains the fundamental principles of question selection and formulation, when designing a questionnaire. Students decide on the questionnaire form and sections, and they are divided in groups equal in number to the questionnaire sections. Each group is responsible for designing one questionnaire section. Each group of students shortly presents their questions and design a final questionnaire. Some students get the responsibility to write the questionnaire in an online form, which allows to be more easily delivered to its targets. Students are urged to collect data about the community's perceptions and knowledge concerning childhood obesity.

Task 3: Data analysis of a questionnaire
Some students of different groups get the responsibility to analyse the answers of the questionnaire, preparing tables, graphics and text.

Session 4
Students are organized in groups of 4-5 students.

Task 1: Presentation of the results of the questionnaire, trying to identify the community perceptions and knowledge gaps and how to promote conceptual understanding. At the end, build an infographic to summarize the results.

Task 2: Creating a scientific poster in power point, writing Introduction, Methodology, Results, Conclusions and Discussion. Creating a health brochure. The poster will be entitled: *Childhood Obesity: Challenges and Solutions*. The poster could be printed and be displayed in a prominent place in the school, in local mass media, possibly at some website, and in open schooling event.

Task 3: Creating a health brochure
Students are provided with appropriate guidance in order to design a poster and health brochure as home work. Teacher will evaluate the students' posters and brochures and give feedback in the next lesson.

Session 5
Task1: Open schooling event
During session 5 students will be holding a community event to share the results of their research with the participation of students, teachers, parents, social partners of the local community.

Each group will be presenting their evidence and informing the public about the questions they have addressed in the project while improving communication skills and developing responsible citizenship.

Students, parents, school community and relevant local stakeholders attend the event and understand how the prevalence of NCDs is influenced by a set of common behavioral factors related with lifestyles but also social and environmental factors. They also get high-level understanding on strategies to minimize the phenomena and how they may have an influence on the relevant settings (e.g., home, school, workplace, public space at the community).

Teaching-learning process milestones:
Students will be able to:
1. develop digital skills (e.g., finding, reviewing, organising and sharing information effectively, handling data appropriately, using different online resources and tools to study)
2. understand the multiplicity of factors leading to obesity
3. mapping causes, health risks and solutions of childhood obesity
4. design and carry out a prediction model for childhood obesity
5. investigate health risks of being obese
6. investigate economic and societal costs of being obese
7. investigate individual and social responsibilities and solutions to childhood obesity
8. investigate community's perceptions and knowledge concerning childhood obesity
9. develop responsible citizenship and critical health literacy

Teaching-learning process for school project (summary):
1. Collection of evidence (data, articles, pictures).
2. Evaluation of the evidence based on criteria and selection of the relevant and non-biased information.
3. Design Concept maps.
4. Design prediction model for childhood obesity
5. Design a questionnaire
6. Create a poster and present this in open schooling event.
7. Create a health brochure and distribute it in open schooling event.

Organization of the open schooling event:
1. Each project output (poster and health brochure) is presented by the students in a community setting.
2. Students will communicate their research project outcomes. Students emphasize that health literacy and health promotion is a responsibility of all, not only of the ministry of health or healthcare providers.
3. Additionally, students explain the importance of critical health literacy, which mainly consists of the critical evaluation of health information, the comprehension of the interconnection between health and society (in particular the notion of social determinants of health), and the participation in civic collective actions for the promotion of health.

Data Analysis and Reporting

1. Content analysis
2. Questionnaire results analysis
3. Report writing with most important findings
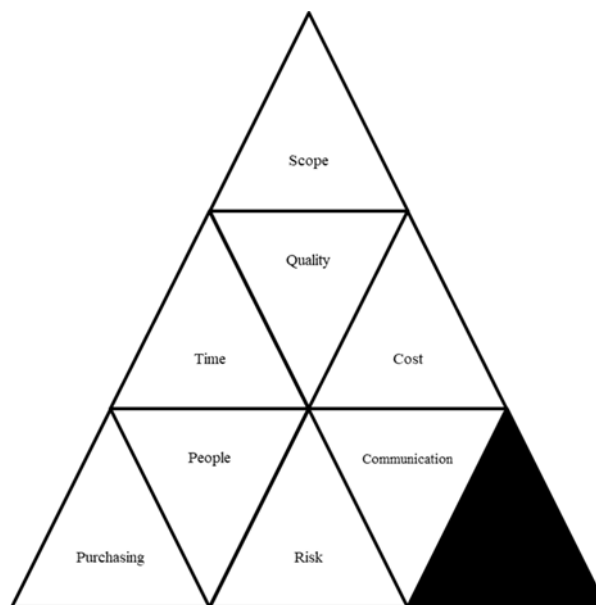4. Development of scientific poster, health brochure and final presentation.

Target Audience for Recommendations

Parents, science teachers, local community – public.
Public Health Authorities and other stakeholders (organisation for family orientation, organisation of doctors and health advisers).

Main Partner responsible: UCY (University of Cyprus)

Project Management Framework and Instruments

1. Plan: Determine How to Do the Project

a.   What is the scope of the project? i.e., what are you investigating?
b.   Set the timeline for this project; i.e., how long will it take?
c.   How the project should proceed to achieve the desired quality,
           i.e., regular inspections/reviews of reports/trial runs etc.
d.   Determine the costs of overheads etc.
e.   Purchasing of what is required to conduct the project.
f.   Identify the people involved and their assigned tasks.
g.   Identify the risks associated with the project and ways
           of mitigating these.
h.   Communication and dissemination of the results of
           the project.

2. Plan: Define Project Scope

- What are the outputs?
Outputs: Open schooling event, scientific presentation of the school project, scientific poster, brochure for healthy promotion

- What are the requirements of project outputs?
Project outputs: Introduction, goals, methods, results, conclusions, recommendations.
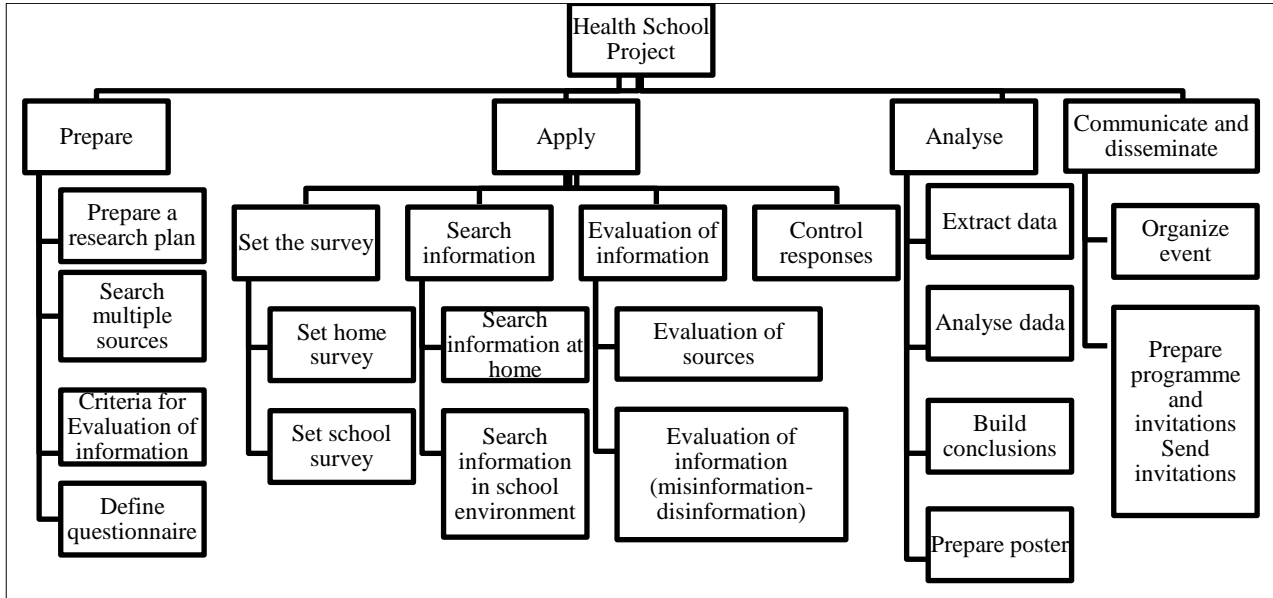
- Are there any constraints to produce the project outputs?
The approval by the ministry of education for the implementation of the project is delayed

- Define the tasks to produce the outputs – build the Work Breakdown Structure

Work Breakdown Structure
(filled with examples, these may change according to your project organisation)

3. Plan: Determine Project Time

  a. Define the detailed activities for each WBS element
  b. Put the activities in sequence
  c. Estimate the resources (human and acquisitions) for each activity
  d. Estimate the calendar time (days or weeks) for each activity
  e. Create the Gantt Chart

Resource Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources
Make assumptions	15 min	paper
Determine multiple sources	15 min	Paper and tablet
Search for information	30 min	Tablet
Evaluate information	15min	Paper and tablet
Discussion with an expert	30min	-
Define the questionnaire	1 hour	paper
Parameterize the questionnaire in google forms	15 minutes	laptop
Set home survey	15 minutes	laptop or mobile phone
Prepare poster and brochure	3 hours	laptop

Gantt Chart
(filled with examples, these may change according to your project organisation)

Activity	Week 1	Week 2	Week 3	Week 4	Week 5
Define the questionnaire	■				
Parameterize the questionnaire in google forms		■			
Prepare observation sheet	■				
Do observations in school environment			■		
Set home survey			■	■	■
Prepare poster and brochure					■

4. Plan: Determine Project Cost

    a.   Estimate how much each activity will cost

Note: include the cost for Labor, Supplies, overhead (like office space and equipment)

    b.   Add the estimates to determine the total cost of your project

Cost Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources	Human Resource Cost	Other Resources Cost (supplies)
Define the questionnaire	1 hour	paper	20 euros	n.a
Parameterize the questionnaire in google forms	15 minutes	laptop	5 euros	n.a
Prepare observation sheet	1 hour	paper	20 euros	n.a
Do observations in school environment	3 hours	paper or laptop	60 euros	n.a
Set home survey	15 minutes	laptop or mobile phone	5 euros	n.a
Prepare poster and brochure	5 hours	laptop	60 euros	40 euros
Total	10h30	-	170 €	-

5. Plan: Determine Project Quality

    a.   Ensure your project produces quality outputs
    b.   Plan what quality means to your project
    c.   Determine how you will ensure quality

Quality Breakdown Structure
(filled with examples, these may change according to your project organisation)

Requirement	Quality planning	Quality assurance	Quality control
1.1	Minimum number of responses to the survey	Minimum number of responses to the survey: 10	Monitor the number of responses to the survey on a weekly basis
1.2	Minimum number of observations	Minimum number of observations: 5	Monitor the number of observations on a daily basis
1.3	Minimum number of interviews:	Minimum number of interviews: 5	Monitor the number of interviews on a daily basis
1.4	Poster template with five sections and brochure with 1 section	Poster with five sections: introduction, goals, methods, results, conclusions, recommendations. Brochure with one section: healthy promotion	Monitor the developments of students' poster

6. Plan: Determine Project Risks

    a.   Identify the two types of risks (uncertain future events that can affect your project): threats have a negative impact on your project; opportunities have a positive impact on your project

Risk Breakdown Structure
(filled with examples, these may change according to your project organisation)

Risk	Probability (How likely is it to happen)	Impact (How big of an effect will it have)	Owner (who takes care about the risk)	Action Plan (initiatives to reduce threats and increase opportunities)
Modest number of responses to the survey	High	High	Students: – Biology Teachers – Researcher	–Identification of other potential target groups –Invitations and re–invitations
Modest number of people that accepted invitation to attend the open schooling event	Medium	Medium	Biology teachers Students:	- Re–invitations by email - Telephone calls

7. Plan: Plan Procurement Processes

    a.   Determine what goods and services you need
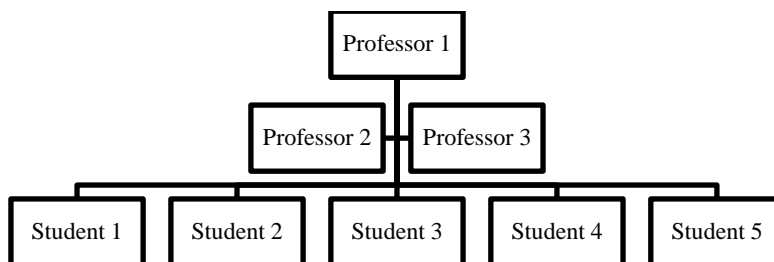   b.   Have what you need at the time that you need it

Supplies Breakdown Structure
(filled with examples, these may change according to your project organisation)

Supply	Supply Cost (supplies)	When to be available	How to be available
Paper	XX euros	In the beginning of the project	Commitment of school top management
Printer	XX euros	In the beginning of the project	Commitment of school top management
Mobile laptop	XXX euros	In the beginning of the project	Commitment of school top management
Printed post	XX euros	Before the open schooling event	Poster printing in Stapples Office Center

8. Plan: Plan People

    a.   Acquire the project team
    b.   Map the project team in the Organization Breakdown Structure
    c.   Assign the project team members to roles
    d.   Assign the project team members to activities
    e.   Train the project team
    f.   Determine how you will motivate and reward the team
    g.   Map Stakeholders – people or groups interested in the project
    h.   Determine how you will engage stakeholders in the project

Organization Breakdown Structure
(filled with examples, these may change according to your project organisation)

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                    ┌─────────────┐
                    │ Professor 1 │
                    └─────────────┘
              ┌─────────────┬─────────────┐
         ┌──────────┐   ┌──────────┐
         │Professor 2│──│Professor 3│
         └──────────┘   └──────────┘
   ┌─────────┬─────────┬─────────┬─────────┐
┌────────┐┌────────┐┌────────┐┌────────┐┌────────┐
│Student 1││Student 2││Student 3││Student 4││Student 5│
└────────┘└────────┘└────────┘└────────┘└────────┘
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Responsibility assignment matrix
(filled with examples, these may change according to your project organisation)

Activity	Team members							
	Student 1	Student 2	Student 3	Student 4	Student 5	Professor1 (Science)	Professor2 (Science)	Professor3 (ICT)
Define the questionnaire	X	X	X			C/P		
Parameterize the questionnaire in google forms					X	C/P		
Prepare observation sheet			X	X	X		C/P	
Do observations in school environment			X	X	X		C/P	
Set home survey	X	X	X	X	X/P	C/P		
Prepare poster	X	X	X	X	X	C/P		C/P
Prepare Brochure	X	X	X	X	X	C/P		C/P
Coordinate the overall implementation of the project				X	X	X		

Letter	Role
X	Executes work
P	Controls progress
C	Should be consulted
I	Should be informed

Stakeholders Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Directly involved in the project (yes/no)	Served or Affected by the Project	Likely to be user of the results of the project
Parents	yes	yes	yes
School community	yes	yes	yes
School management	no	yes	yes
Municipality	no	yes	yes
Residents' association	no	yes	yes
Primary healthcare center and Hospital	no	yes	yes
National Directorate for Education	yes	yes	yes
Ministry of Health	yes	no	no

Stakeholders Management Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Who they are and why should be involved in the project	Why the project is relevant for them	Strategies to obtain support
Parents	Students' families should be involved in the survey to collect the relevant responses. Their involvement also maximizes the impact of the project in terms of global literacy.	Due to their interest in pupils' education and school health and well being	Present the school project in parents meeting
School community	The school community should be involved in the survey and observations to be done by students in school environment. Their involvement also maximizes the impact of the project in terms of global literacy.	Due to their School	Present the school project in a school community meeting
School management	The school management assures relevant resources for students' projects and should be involved in the survey Their involvement also maximizes the impact of the project in terms of global literacy.	Due to their interest in students' education and school health and wellbeing. Also due to their interest in demonstrating the interest of school in contributing to community health (to be a health promotion school).	Present the school project in parents meeting.
Municipality	The municipality should be involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to municipality interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project). .
Residents' association	Residents' associations should be involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to residents' associations interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project). .

Stakeholder name	Who they are and why should be involved in the project	Why the project is relevant for them	Strategies to obtain support
Primary healthcare center and Hospital	The Primary healthcare center and Hospital should be involved in the open schooling event where students share the results of their projects and communicate recommendations.	Due to their interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project). .
National Directorate for Education	The National Directorate for Education is supporting the project and interested in the results in terms of students' learnings.	Due to their interest in novel methodologies for STEM education and role in policy making.	Invitation to participate in the open schooling event.
Ministry of Health	Ministry of Health is supporting the project and interested in the results in terms of students' and community learnings.	Due to their interest in students' health	Invitation to participate in the open schooling event.

9. Plan: Plan Communication

   a. Assure the right information to the right people, at the right time, in a useful format
   b. Assure effective project meetings
   c. Build the communications plan

Communications plan
(filled with examples, these may change according to your project organisation)

Organized by (from)	Participants (to)	What	When	How/Where	Purpose
Professor 1	Team	Kick-off meeting	10 september	Laboratory	Provide a complete description of the project and what the end product will be.
Professor 1	Team	Team meeting	Every week (day to be defined	IT classroom	- Overall plan for the project - Discuss project developments and plan next stage - Instruct team on how to - Provide updates on the progress of the project and if there are any issues with completion
Professor 1	Team and Parents	Meeting	Before the project starts (date to be defined)	School meeting room	Explain the project and invite for participation in the survey
Professor 1 and Team	Parents	Meeting	Before the project starts (date to be defined)	Virtual meeting	Explain the project and invite for participation in the survey and open schooling event.
Professor 1, Team, School management	School community Municipality Residents' association Primary healthcare center and Hospital National Directorate for Education Ministry of Health	Invitations to stakeholders participation in open schooling event	Before the open schooling event (date to be defined)	By email	Explain the project and invite for participation in the open schooling event.

10. Plan: Finish the project planning by building the Charter

1.0 Project identification	
Name	Childhood Obesity: Challenges and Solutions
Summary description	Students have to investigate and answer the following research questions: What are the possible causes, health risks and possible solutions related to childhood obesity? What is individuals' and governments' responsibility for reducing childhood obesity? What are the community's perceptions and knowledge concerning childhood obesity? The project is based on guided research about Healthy Eating and Childhood Obesity The five lessons will be supervised by the teachers and developed by the students, with scheduled moments for checking the work development.
Project owner	Identify the owner of the project (school)
Project manager	Teacher 1 (Biology teacher)
Stakeholders	Biology Inspector (interest in novel methodologies for STEM education and role in policy making) Parents (interest in pupils' education and school health and well being) School community (interest in students' education and school health and well being) Ministry of Health (interest in students' and community's health and well being)
Team and roles	Student: Conducting school project ICT teacher: Supporting students for development of digital questionnaire, poster and brochure Science Teacher: Organizing, coordinating, motivating, giving feedback and rewarding the students' team School manager: Assuring relevant resources for students' projects

2.0 Needs that support the project
Approval for implementation of the school project by the Cyprus Ministry of Education

3.0 Project goals
Examples Project completed – December 22 Open schooling event – February 23

4.0 Project scope
Students will be able to: 1. develop digital skills (e.g., finding, reviewing, organising and sharing information effectively, handling data appropriately, using different online resources and tools to study) 2. understand the multiplicity of factors leading to obesity 3. mapping causes, health risks and solutions of childhood obesity 4. design and carry out a prediction model for childhood obesity 5. investigate health risks of being obese 6. investigate economic and societal costs of being obese 7. investigate individual and social responsibilities and solutions to childhood obesity 8. investigate community's perceptions and knowledge concerning childhood obesity 9. develop responsible citizenship and critical health literacy

5.0 Key Deliverables
Questionnaire Interview Guide Observations Gride Concept map Prediction model for childhood obesity Poster Infographic Brochures Digital Presentation

6.0 Milestones and dates
Survey concluded - December 2022 Digital presentation for survey concluded February 2023 Scientific Poster concluded February 2023 Informative brochure concluded February 2023 Open schooling event prepared February 2023

7.0 Constraints

Budget 100 € (limit)
Project should be finished in 15 December (limit)

8.0 Risks and opportunities

Modest number of responses to the survey
Modest number of people that accepted invitation to attend the open schooling event

9.0 Project success criteria

Project completed before Christmas period
Open schooling event in a community setting with the participation of the school community, parents, and local stakeholders.

10.0 Project success factors

Appropriate engagement of students and parents.
Interest of teachers in project-based learning.

2. Project management resource and inquiry instruments on the topic "Looking out for my community, Vaccines development and the science that responds to hesitancy"

Overview

The main goal of this unit is to promote students' understanding on the relationships between infectious diseases and microbes, the human defence mechanisms against pathogens and the role of vaccines, as well as the impact that infectious diseases had and still have on societies and public health, and how to prevent infections. Another goal of this unit is to promote nature of science understanding and high order thinking skills, communication and collaboration skills and critical health literacy.

The unit begins by engaging the students by presenting the impact of infectious diseases from historical and current perspective. It continues with introduction to microbes, the different protective natural barriers that the human body has against microbes, the role of immune system, immunity, and vaccines. At the end of the unit, students will use their new knowledge of infectious diseases, microbes, and vaccines to make an inquiry-based investigation on a socioscientific topic: *Should a low efficacy vaccine be released to the public?*

A socioscientific topic related to microbes and vaccine provides the scenario for the inquiry-based question of this unit related to the learning topic Vaccines development and the science that responds to hesitancy. The understanding of nature of science is also very essential.

School Research Project

Topics:
- Infectious diseases
- Epidemic
- Pandemic
- Immunity
- Vaccines
- Vaccination
- Nature of science
--Consensus in science
- Public health
- Misinformation
 -Disinformation
- Nature of science
- Critical health literacy
- Responsible citizenship

Research Questions:
- How do vaccines influence the progress of an epidemic and a pandemic?
- Should a low efficacy vaccine be released to the public?
- What are the community's perceptions and knowledge concerning immunity and vaccination?

Development process:
The project is based on guided research about *Vaccines development and the science that responds to hesitancy*. The six (6) lessons will be supervised by the teachers and developed by the students, with scheduled moments for checking the work development.

Teaching-learning process milestones:
Students will be able to:
1. develop digital skills (e.g., finding, reviewing, organizing and sharing information effectively, handling data appropriately, using different online resources and tools to study)
2. explain how vaccines work against pathogens
3. understand the multiplicity of factors leading to vaccine challenges
4. nature of Science Understanding
5. develop the ability to construct different types of arguments, counterarguments and rebuttals in order to make a decision on the socio-scientific question: *Should a low efficacy vaccine be released to the public?*
6. develop the ability to construct an assessment criteria for arguments, counterarguments and rebuttals evaluation.

7. develop the ability to create a rubric for evaluation of public debate
8. investigate community's perceptions and knowledge concerning vaccination
9. develop responsible citizenship and critical health literacy

Teaching-learning process for school project (summary):
1. Collection of information (data, articles, pictures).
2. Evaluation of information based on criteria and selection of the relevant and non-biased information.
3. Design criteria for arguments evaluation.
4. Design rubric for evaluation of public debate.
5. Design a questionnaire.
6. Design an agenda for open schooling event.
7. Create a brochure related to vaccination and distribute it in open schooling event.

Organization of the open schooling event:
1. Each project output (public debate, a post-debate discussion, results of investigation, brochure, etc.) is presented by the students in a community setting.
2. Students hold a public debate entitled *Should a low efficacy vaccine be released to the public?* Students communicate their research outcomes related to community's perceptions and knowledge concerning vaccination.
3. Students emphasize that health literacy and health promotion is a responsibility of all, not only of the ministry of health or healthcare providers.
4. Additionally, students explain the importance of critical health literacy, which mainly consists of understanding the nature of science, the critical evaluation of health information, the comprehension of the interconnection between health and society (in particular the notion of social determinants of health), and the participation in civic collective actions for the promotion of public health.

Data Analysis and Reporting

1. Content analysis
2. Questionnaire results analysis
3. Report writing with most important findings
4. Organize a public debate
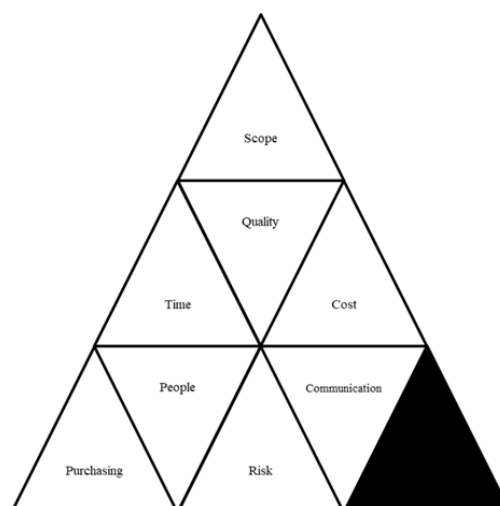5. Create a health brochure and final presentation

Target Audience for Recommendations
Parents, science teachers, local community – public.
Public Health Authorities and other stakeholders (organisation for family orientation, organisation of doctors and health advisers).

Main Partner responsible: UCY (University of Cyprus)

Project Management Framework and Instruments

1. Plan: Determine How to Do the Project

a.   What is the scope of the project? i.e., what are you investigating?
b.   Set the timeline for this project, i.e., how long will it take?
c.   How the project should proceed to achieve the desired quality,
        i.e., regular inspections/reviews of reports/trial runs etc.
d.   Determine the costs of overheads etc.
e.   Purchasing of what is required to conduct the project.
f.   Identify the people involved and their assigned tasks.
g.   Identify the risks associated with the project and ways
        of mitigating these.
h.   Communication and dissemination of the results of
        the project.

2. Plan: Define Project Scope

- What are the outputs?
Open schooling event, scientific presentation of the school project, scientific poster, brochure for vaccines and vaccination

- What are the requirements of project outputs?
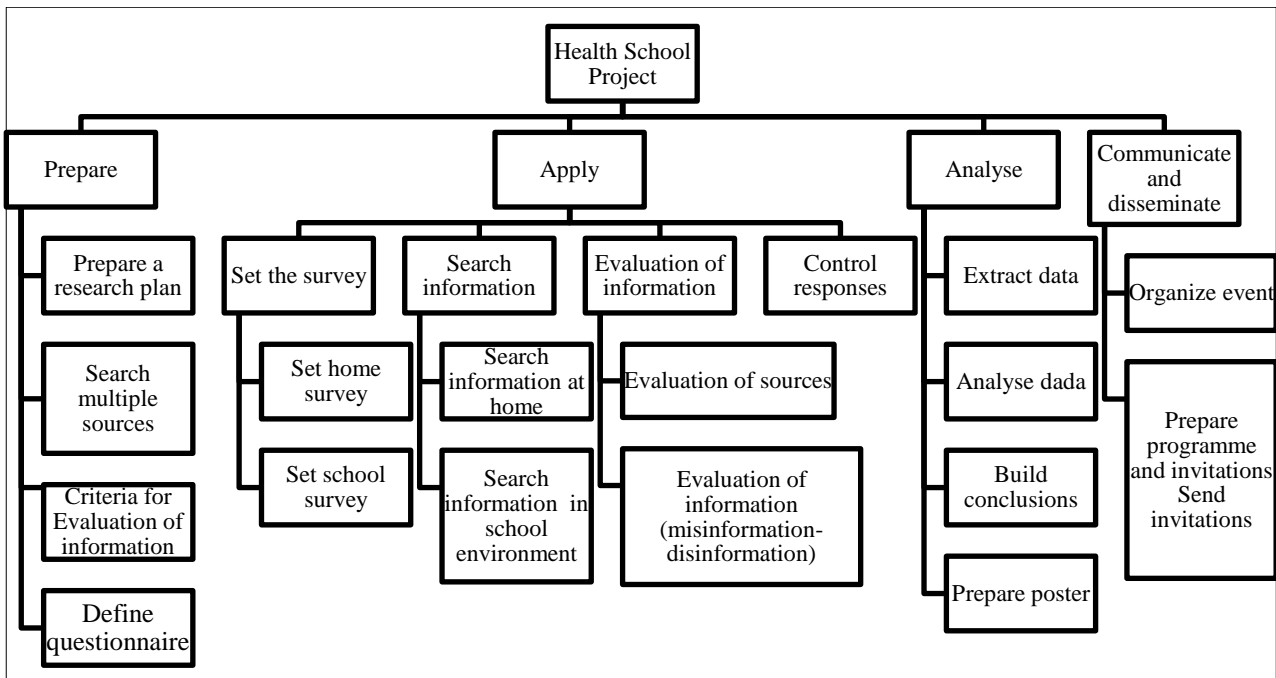Project outputs: Introduction, goals, methods, results, conclusions, recommendations.

- Are there any constraints to produce the project outputs?
The approval by the ministry of education for the implementation of the project is delayed

- Define the tasks to produce the outputs – build the Work Breakdown Structure

Work Breakdown Structure
(filled with examples, these may change according to your project organisation)

3. Plan: Determine Project Time

a.   Define the detailed activities for each WBS element
b.   Put the activities in sequence
c.   Estimate the resources (human and acquisitions) for each activity
d.   Estimate the calendar time (days or weeks) for each activity
e.   Create the Gantt Chart

Resource Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources
Make assumptions	15 min	paper
Determine multiple sources	15 min	Paper and tablet
Search for information	30 min	Tablet
Evaluate information	15min	Paper and tablet
Discussion with an expert	30min	
Define the questionnaire	1 hour	paper
Parameterize the questionnaire in google forms	15 minutes	laptop
Set home survey	15 minutes	laptop or mobile phone
Prepare poster and brochure	3 hours	laptop

Gantt Chart
(filled with examples, these may change according to your project organisation)

Activity	Week 1	Week 2	Week 3	Week 4	Week 5
Define the questionnaire	■				
Parameterize the questionnaire in google forms		■			
Prepare observation sheet	■				
Do observations in school environment			■		
Set home survey			■	■	■
Prepare poster and brochure					■

4. Plan: Determine Project Cost

a. Estimate how much each activity will cost
Note: include the cost for Labor, Supplies, overhead (like office space and equipment)

b. Add the estimates to determine the total cost of your project

Cost Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources	Human Resource Cost	Other Resources Cost (supplies)
Define the questionnaire	1 hour	paper	XX euros	n.a
Parameterize the questionnaire in google forms	15 minutes	laptop	XX euros	n.a
Prepare observation sheet	1 hour	paper	XX euros	n.a
Do observations in school environment	3 hours	paper or laptop	XX euros	n.a
Set home survey	15 minutes	laptop or mobile phone	XX euros	n.a
Prepare poster and brochure	5 hours	laptop	XX euros	XX euros
Total	10h30	-	XXX €	-

5. Plan: Determine Project Quality

    a.   Ensure your project produces quality outputs
    b.   Plan what quality means to your project
    c.   Determine how you will ensure quality

Quality Breakdown Structure
(filled with examples, these may change according to your project organisation)

Requirement	Quality planning	Quality assurance	Quality control
1.1	Minimum number of responses to the survey	Minimum number of responses to the survey: 10	Monitor the number of responses to the survey on a weekly basis

Requirement	Quality planning	Quality assurance	Quality control
1.2	Minimum number of observations	Minimum number of observations: 5	Monitor the number of observations on a daily basis
1.3	Minimum number of interviews:	Minimum number of interviews: 5	Monitor the number of interviews on a daily basis
1.4	Poster template with five sections and brochure with 1 section	Poster with five sections: introduction, goals, methods, results, conclusions, recommendations. Brochure with one section: healthy promotion	Monitor the developments of students' poster

6. Plan: Determine Project Risks

a. Identify the two types of risks (uncertain future events that can affect your project): threats have a negative impact on your project; opportunities have a positive impact on your project

Risk Breakdown Structure
(filled with examples, these may change according to your project organisation)

Risk	Probability (How likely is it to happen)	Impact (How big of an effect will it have)	Owner (who takes care about the risk)	Action Plan (initiatives to reduce threats and increase opportunities)
Modest number of responses to the survey	High	High	Students: – Biology Teachers – Researcher	–Identification of other potential target groups –Invitations and re–invitations
Modest number of people that accepted invitation to attend the open schooling event	Medium	Medium	Biology teachers Students:	- Re–invitations by email - Telephone calls

7. Plan: Plan Procurement Processes

a. Determine what goods and services you need
b. Have what you need at the time that you need it

Supplies Breakdown Structure
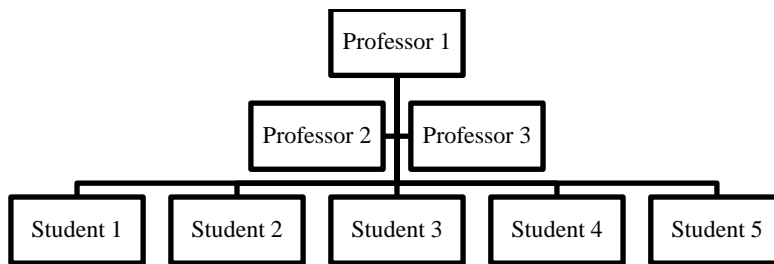*(filled with examples, these may change according to your project organisation)*

Supply	Supply Cost (supplies)	When to be available	How to be available
Paper	XX euros	In the beginning of the project	Commitment of school top management
Printer	XX euros	In the beginning of the project	Commitment of school top management
Mobile laptop	XXX euros	In the beginning of the project	Commitment of school top management
Printed post	XX euros	Before the open schooling event	Poster printing in Stapples Office Center

8. Plan: Plan People

a. Acquire the project team
b. Map the project team in the Organization Breakdown Structure
c. Assign the project team members to roles
d. Assign the project team members to activities
e. Train the project team
f. Determine how you will motivate and reward the team
g. Map Stakeholders – people or groups interested in the project
h. Determine how you will engage stakeholders in the project

Organization Breakdown Structure
(filled with examples, these may change according to your project organisation)

Responsibility assignment matrix
(filled with examples, these may change according to your project organisation)

Activity	Team members							
	Student 1	Student 2	Student 3	Student 4	Student 5	Professor1 (Science)	Professor2 (Science)	Professor3 (ICT)
Define the questionnaire	X	X	X			C/P		
Parameterize the questionnaire in google forms					X	C/P		
Prepare observation sheet			X	X	X		C/P	
Do observations in school environment			X	X	X		C/P	
Set home survey	X	X	X	X	X/P	C/P		
Prepare poster	X	X	X	X	X	C/P		C/P
Prepare Brochure	X	X	X	X	X	C/P		C/P
Coordinate the overall implementation of the project				X	X	X		

Letter	Role
X	Executes work
P	Controls progress
C	Should be consulted
I	Should be informed

Stakeholders Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Directly involved in the project (yes/no)	Served or Affected by the Project	Likely to be user of the results of the project
Parents	yes	yes	yes
School community	yes	yes	yes
School management	no	yes	yes
Municipality	no	yes	yes
Residents' association	no	yes	yes
Primary healthcare center and Hospital	no	yes	yes
National Directorate for Education	yes	yes	yes
Ministry of Health	yes	no	no

Stakeholders Management Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Who they are and why should be involved in the project	Why the project is relevant for them	Strategies to obtain support
Parents	Students' families should be involved in the survey to collect the relevant responses. Their involvement also maximizes the impact of the project in terms of global literacy.	Due to their interest in pupils' education and school health and well being	Present the school project in parents meeting
School community	The school community should be involved in the survey and observations to be done by students in school environment. Their involvement also maximizes the impact of the project in terms of global literacy.	Due to their School	Present the school project in a school community meeting
School management	The school management assures relevant resources for students' projects and should be involved in the survey Their involvement also maximizes the impact of the project in terms of global literacy.	Due to their interest in students' education and school health and wellbeing. Also due to their interest in demonstrating the interest of school in contributing to community health (to be a health promotion school).	Present the school project in parents meeting.
Municipality	The municipality should be involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to municipality interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project). .
Residents' association	Residents' associations should be involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to residents' associations interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project). .
Primary healthcare center and Hospital	The Primary healthcare center and Hospital should be involved in the open schooling event where students share the results of their projects and communicate recommendations.	Due to their interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project). .
National Directorate for Education	The National Directorate for Education is supporting the project and interested in the results in terms of students' learnings.	Due to their interest in novel methodologies for STEM education and role in policy making.	Invitation to participate in the open schooling event.
Ministry of Health	Ministry of Health is supporting the project and interested in the results in terms of students' and community learnings.	Due to their interest in students' health	Invitation to participate in the open schooling event.

9. Plan: Plan Communication

 a. Assure the right information to the right people, at the right time, in a useful format
 b. Assure effective project meetings
 c. Build the communications plan

Communications plan
(filled with examples, these may change according to your project organisation)

Organized by (from)	Participants (to)	What	When	How/Where	Purpose
Professor 1	Team	Kick-off meeting	10 September	Laboratory	Provide a complete description of the project and what the end product will be.
Professor 1	Team	Team meeting	Every week (day to be defined	IT classroom	- Overall plan for the project - Discuss project developments and plan next stage - Instruct team on how to - Provide updates on the progress of the project and if there are any issues with completion
Professor 1	Team and Parents	Meeting	Before the project starts (date to be defined)	School meeting room	Explain the project and invite for participation in the survey
Professor 1 and Team	Parents	Meeting	Before the project starts (date to be defined)	Virtual meeting	Explain the project and invite for participation in the survey and open schooling event.
Professor 1, Team, School management	School community Municipality Residents' association Primary healthcare center and Hospital National Directorate for Education Ministry of Health	Invitations to stakeholders participation in open schooling event	Before the open schooling event (date to be defined)	By email	Explain the project and invite for participation in the open schooling event.

10. Plan: Finish the project planning by building the Charter

1.0 Project identification	
Name	Vaccines development and the science that responds to hesitancy
Summary description	Students have to investigate and answer the following research questions: 1. How do vaccines influence the progress of an epidemic and a pandemic? 2. Should a low efficacy vaccine be released to the public? 3. What are the community's perceptions and knowledge concerning immunity and vaccination? Development process: The project is based on guided research about Vaccines development and the science that responds to hesitancy. The six (6) lessons will be supervised by the teachers and developed by the students, with scheduled moments for checking the work development.
Project owner	Identify the owner of the project (school)
Project manager	Teacher 1 (Biology teacher)
Stakeholders	Biology Inspector (interest in novel methodologies for STEM education and role in policy making) Parents (interest in pupils' education and school health and well being) School community (interest in students' education and school health and well being) Ministry of Health (interest in students' and community's health and well being)
Team and roles	Student: Conducting school project ICT teacher: Supporting students for development of digital questionnaire, poster and brochure Science Teacher: Organizing, coordinating motivating, giving feedback and rewarding the students' team School manager: Assuring relevant resources for students' projects

2.0 Needs that support the project

Approval for implementation of the school project by the Cyprus Ministry of Education

3.0 Project goals

Examples
Project completed – December 22
Open schooling event – February 23

4.0 Project scope

Students will be able to:
1. develop digital skills (e.g., finding, reviewing, organising and sharing information effectively, handling data appropriately, using different online resources and tools to study)
2. Understanding nature of science
3. understand the multiplicity of factors leading to vaccines hesitancy
4. mapping causes, health risks and solutions of vaccines hesitancy
5. design and carry out a prediction model for vaccines hesitancy
6. investigate health risks of being against vaccines
7. investigate individual and social responsibilities and solutions to of vaccines hesitancy
8. investigate community's perceptions and knowledge concerning of vaccines hesitancy
9. develop responsible citizenship and critical health literacy

5.0 Key Deliverables

Questionnaire
Interview Guide
Observations Gride
Concept map
Prediction model for of vaccines hesitancy
Poster
Infographic
Brochures
Digital Presentation

6.0 Milestones and dates

Survey concluded - December 2022
Digital presentation for survey concluded February 2023
Scientific Poster concluded February 2023
Informative brochure concluded February 2023
Open schooling event prepared February 2023

7.0 Constraints

Budget XXX € (limit)
Project should be finished in 15 December (limit)

8.0 Risks and opportunities

Modest number of responses to the survey
Modest number of people that accepted invitation to attend the open schooling event

9.0 Project success criteria

Project completed before Christmas period
Open schooling event in a community setting with the participation of the school community, parents, and local stakeholders.

10.0 Project success factors

Appropriate engagement of students and parents.
Interest of teachers in project-based learning.

3. Project management resource and inquiry instruments on the topic "Looking after myself and others – Tobacco"

Overview

Currently tobacco products are estimated to be responsible for 3 million deaths annually worldwide, or about 6% of all deaths. But by the early 2030s, it is expected to cause 10.9% of all deaths in developing countries and 17.7% of those in developed countries, more than any single disease. The statistics of tobacco-related mortality worldwide are devastating. Tobacco is a known or probable cause of about 25 diseases; hence its impact on global disease is tremendous, if not yet fully appreciated (WHO, 2016).

The main goal of this unit is to promote students' understanding on the structure and function of the human respiratory system, the health effects of tobacco smoking, the biological, social, cultural and economic dimensions of smoking, as well as challenges of stopping smoking. Understanding human respiratory system's function is critical to keeping human body healthy and responsive to situations and medical problems that could be encountered. Another goal of this unit is to promote students' epistemological understanding, high order thinking skills and communication and collaboration skills.

A socioscientific topic related to biological, social, cultural, and economic dimensions of tobacco smoking provides the scenario for the inquiry-based primary questions of this unit related to the learning topic: *Looking after myself and others: Tobacco*.

School Research Project

Topics:
- Human respiratory system
- Aerobic respiration and anaerobic respiration, cellular respiration
- Gas exchange process in lungs,
- Lung diseases,
- Cigarettes' chemicals
- Tobacco use and health risks
- Public health
- Nature of Science
- Evaluation of information (misinformation, disinformation)
- Critical health literacy
- Responsible citizenship

Research Questions:
What are the different dimensions of tobacco smoking?
What are the main reasons 9th grade students in our school give for tobacco smoking?

Development process:
The project is based on guided research about *Tobacco smoking, and suggestions for tackling the use of tobacco products* The four (4) lessons will be supervised by the teachers and developed by the students, with scheduled moments for checking the work development.

Teaching-learning process milestones:
Students will be able to:
1. develop digital skills (e.g., finding, reviewing, organising and sharing information effectively, handling data appropriately, using different online resources and tools to study)
2. understanding nature of science
3. investigate chemicals in tobacco that can be harmful to human health
4. investigate health risks of tobacco use
5. read and interpret images related to common diseases of the human respiratory system
6. explain the effects of tobacco smoking on the respiratory system and others organic systems
7. understand the multiplicity of factors leading to tobacco smoking
8. investigate individual and social responsibilities for tobacco smoking
9. investigate reasons 9th grade students give for tobacco smoking
10. develop responsible citizenship and critical health literacy

11. acquire the ability to analyse a public health issue and potential solutions from the perspectives of different stakeholders
12. acquire the ability to identify potential sources of bias that may influence information or the presentation of information about a socioscientific issue related to public health or potential solutions
13. acquire the ability to determine how scientific knowledge and processes may contribute to the resolution of a socioscientific issue related to public health and to recognize dimensions of the issue that cannot be addressed by science

Teaching-learning process for school project (summary):
1. Collection of evidence (data, articles, pictures).
2. Evaluation of the evidence based on criteria and selection of the relevant and non-biased information.
3. Write a scientific report concerning the results of a research question.
4. Design a questionnaire
5. Create a poster and present this in open schooling event.
6. Create a health brochure and distribute it in open schooling event.

Organization of the open schooling event:
1. Each project output (poster and health brochure) is presented by the students in a community setting.
2. Students will communicate their research project outcomes. Students emphasize that health literacy and health promotion is a responsibility of all, not only of the ministry of health or healthcare providers.
3. Additionally, students explain the importance of critical health literacy, which mainly consists of the critical evaluation of health information, the comprehension of the interconnection between health and society (in particular the notion of social determinants of health), and the importance to recognize the possibilities and limitations of science.

Data Analysis and Reporting

1. Content analysis
2. Questionnaire results analysis
3. Report writing with most important findings
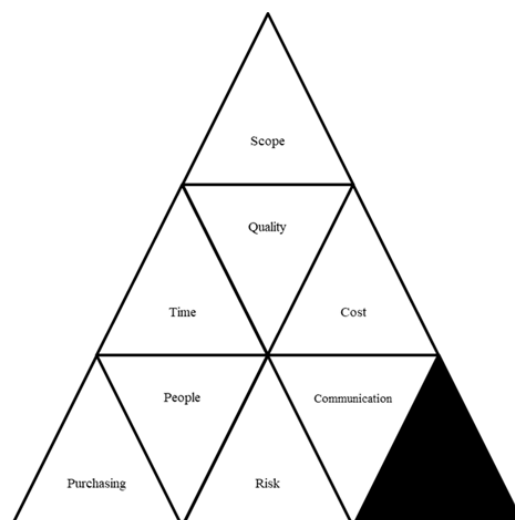4. Development of poster, health brochure and final presentation

Target Audience for Recommendations

Parents, science teachers, local community – public.
Public Health Authorities and other stakeholders (organisation for family orientation, organisation of doctors and health advisers).

Main Partner responsible: UCY (University of Cyprus)

Project Management Framework and Instruments

1. Plan: Determine How to Do the Project

a. What is the scope of the project? i.e., what are you investigating?
b. Set the timeline for this project, i.e., how long will it take?
c. the project should proceed to achieve the desired quality, i.e., regular inspections/reviews of reports/trial runs etc.
d. Determine the costs of overheads etc.
e. Purchasing of what is required to conduct the project.
f. Identify the people involved and their assigned tasks.
g. Identify the risks associated with the project and ways of mitigating these.
h. Communication and dissemination of the results of the project.

2. Plan: Define Project Scope

- What are the outputs?
Example: scientific poster, PowerPoint presentation, open schooling event, publication of Scientific Project, report to local education newspaper.

-What are the requirements of project outputs?
Example: A3 format, Color, 7-sections (including introduction, goals, methods, results, conclusions, discussion, recommendations).

- Are there any constraints to produce the project outputs?
Example: work should be completed in two weeks

- Define the tasks to produce the outputs – build the Work Breakdown Structure

Work Breakdown Structure
(filled with examples, these may change according to your project organisation)

3. Plan: Determine Project Time

a. Define the detailed activities for each WBS element
b. Put the activities in sequence
c. Estimate the resources (human and acquisitions) for each activity
d. Estimate the calendar time (days or weeks) for each activity
e. Create the Gantt Chart

Resource Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources
Make assumptions	15 min	paper
Determine multiple sources	15 min	Paper and tablet
Search for information	30 min	Tablet
Evaluate information	15min	Paper and tablet
Discussion with an expert	30min	
Define the questionnaire	1 hour	paper
Parameterize the questionnaire in google forms	15 minutes	laptop
Set home survey	15 minutes	laptop or mobile phone
Prepare poster and brochure	3 hours	laptop

Gantt Chart
(filled with examples, these may change according to your project organisation)

Activity	Week 1	Week 2	Week 3	Week 4	Week 5
Define the questionnaire	■				
Parameterize the questionnaire in google forms		■			
Prepare observation sheet	■				
Do observations in school environment			■		
Set home survey			■	■	
Prepare poster and brochure					■

4. Plan: Determine Project Cost

    a.   Estimate how much each activity will cost
Note: include the cost for Labor, Supplies, overhead (like office space and equipment)

    b.   Add the estimates to determine the total cost of your project

Cost Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources	Human Resource Cost	Other Resources Cost (supplies)
Define the questionnaire	1 hour	paper	XX euros	n.a
Parameterize the questionnaire in google forms	15 minutes	laptop	XX euros	n.a
Prepare observation sheet	1 hour	paper		n.a
Do observations in school environment	3 hours	paper or laptop	XX euros	n.a
Set home survey	15 minutes	laptop or mobile phone	XX euros	n.a
Prepare poster and brochure	5 hours	laptop	XX euros	XX euros
Total	10h30	-	XXX€	-

5. Plan: Determine Project Quality

    a.   Ensure your project produces quality outputs
    b.   Plan what quality means to your project
    c.   Determine how you will ensure quality

Quality Breakdown Structure
(filled with examples, these may change according to your project organisation)

Requirement	Quality planning	Quality assurance	Quality control
1.1	Minimum number of responses to the survey	Minimum number of responses to the survey: 10	Monitor the number of responses to the survey on a weekly basis
1.2	Minimum number of observations	Minimum number of observations: 5	Monitor the number of observations on a daily basis
1.3	Minimum number of interviews:	Minimum number of interviews: 5	Monitor the number of interviews on a daily basis
1.4	Poster template with five sections and brochure with 1 section	Poster with five sections: introduction, goals, methods, results, conclusions, recommendations. Brochure with one section: healthy promotion	Monitor the developments of students' poster

6. Plan: Determine Project Risks

    a.   Identify the two types of risks (uncertain future events that can affect your project): threats have a negative impact on your project; opportunities have a positive impact on your project.

Risk Breakdown Structure
(filled with examples, these may change according to your project organisation)

Risk	Probability (How likely is it to happen)	Impact (How big of an effect will it have)	Owner (who takes care about the risk)	Action Plan (initiatives to reduce threats and increase opportunities)
Modest number of responses to the survey	High	High	Students: – Biology Teachers – Researcher	–Identification of other potential target groups –Invitations and re–invitations
Modest number of people that accepted invitation to attend the open schooling event	Medium	Medium	Biology teachers Students:	- Re–invitations by email - Telephone calls

7. Plan: Plan Procurement Processes

    a.   Determine what goods and services you need
    b.   -Have what you need at the time that you need it

Supplies Breakdown Structure
(filled with examples, these may change according to your project organisation)
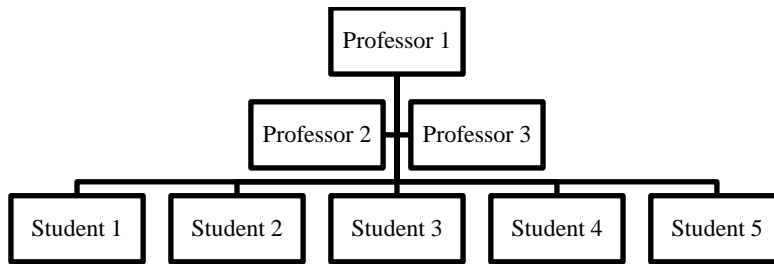
Supply	Supply Cost (supplies)	When to be available	How to be available
Paper	XX euros	In the beginning of the project	Commitment of school top management
Printer	XX euros	In the beginning of the project	Commitment of school top management
Mobile laptop	XXX euros	In the beginning of the project	Commitment of school top management
Printed post	XX euros	Before the open schooling event	Poster printing in Stapples Office Center

8. Plan: Plan People

    a.   Acquire the project team
    b.   Map the project team in the Organization Breakdown Structure
    c.   Assign the project team members to roles
    d.   Assign the project team members to activities
    e.   Train the project team
    f.   Determine how you will motivate and reward the team
    g.   Map Stakeholders – people or groups interested in the project
    h.   Determine how you will engage stakeholders in the project

Organization Breakdown Structure
(filled with examples, these may change according to your project organisation)

Responsibility assignment matrix
(filled with examples, these may change according to your project organisation)

Activity	Team members							
	Student 1	Student 2	Student 3	Student 4	Student 5	Professor1 (Science)	Professor2 (Science)	Professor3 (ICT)
Define the questionnaire	X	X	X			C/P		
Parameterize the questionnaire in google forms					X	C/P		
Prepare observation sheet			X	X	X		C/P	
Do observations in school environment			X	X	X		C/P	
Set home survey	X	X	X	X	X/P	C/P		
Prepare poster	X	X	X	X	X	C/P		C/P
Prepare Brochure	X	X	X	X	X	C/P		C/P
Coordinate the overall implementation of the project				X	X	X		

Letter	Role
X	Executes work
P	Controls progress
C	Should be consulted
I	Should be informed

Stakeholders Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Directly involved in the project (yes/no)	Served or Affected by the Project	Likely to be user of the results of the project
Parents	yes	yes	yes
School community	yes	yes	yes
School management	no	yes	yes
Municipality	no	yes	yes
Residents' association	no	yes	yes
Primary healthcare center and Hospital	no	yes	yes
National Directorate for Education	yes	yes	yes
Ministry of Health	yes	no	no

Stakeholders Management Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Who they are and why should be involved in the project	Why the project is relevant for them	Strategies to obtain support
Parents	Students' families should be involved in the survey to collect the relevant responses. Their involvement also maximizes the impact of the project in terms of global literacy.	Due to their interest in pupils' education and school health and well being	Present the school project in parents meeting
School community	The school community should be involved in the survey and observations to be done by students in school environment. Their involvement also maximizes the impact of the project in terms of global literacy.	Due to their School	Present the school project in a school community meeting
School management	The school management assures relevant resources for students' projects and should be involved in the survey Their involvement also maximizes the impact of the project in terms of global literacy.	Due to their interest in students' education and school health and wellbeing. Also due to their interest in demonstrating the interest of school in contributing to community health (to be a health promotion school).	Present the school project in parents meeting.
Municipality	The municipality should be involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to municipality interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project). .
Residents' association	Residents' associations should be involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to residents' associations interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project). .
Primary healthcare center and Hospital	The Primary healthcare center and Hospital should be involved in the open schooling event where students share the results of their projects and communicate recommendations.	Due to their interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project). .
National Directorate for Education	The National Directorate for Education is supporting the project and interested in the results in terms of students' learnings.	Due to their interest in novel methodologies for STEM education and role in policy making.	Invitation to participate in the open schooling event.
Ministry of Health	Ministry of Health is supporting the project and interested in the results in terms of students' and community learnings.	Due to their interest in students' health	Invitation to participate in the open schooling event.

9. Plan: Plan Communication

a. Assure the right information to the right people, at the right time, in a useful format
b. Assure effective project meetings
c. Build the communications plan

Communications plan
(filled with examples, these may change according to your project organisation)

Organized by (from)	Participants (to)	What	When	How/Where	Purpose
Professor 1	Team	Kick-off meeting	XX september	Laboratory	Provide a complete description of the project and what the end product will be.
Professor 1	Team	Team meeting	Every week (day to be defined	IT classroom	- Overall plan for the project - Discuss project developments and plan next stage - Instruct team on how to - Provide updates on the progress of the project and if there are any issues with completion
Professor 1	Team and Parents	Meeting	Before the project starts (date to be defined)	School meeting room	Explain the project and invite for participation in the survey
Professor 1 and Team	Parents	Meeting	Before the project starts (date to be defined)	Virtual meeting	Explain the project and invite for participation in the survey and open schooling event.
Professor 1, Team, School management	School community Municipality Residents' association Primary healthcare center and Hospital National Directorate for Education Ministry of Health	Invitations to stakeholders' participation in open schooling event	Before the open schooling event (date to be defined)	By email	Explain the project and invite for participation in the open schooling event.

10. Plan: Finish the project planning by building the Charter

1.0 Project identification	
Name	Looking after myself and others – Tobacco"
Summary description	Students have to investigate and answer the following research questions: What are the different dimensions of tobacco smoking? What are the main reasons 9th grade students in our school give for tobacco smoking? Development process: The project is based on guided research about Tobacco smoking, and suggestions for tackling the use of tobacco products The four (4) lessons will be supervised by the teachers and developed by the students, with scheduled moments for checking the work development.
Project owner	Identify the owner of the project (school)
Project manager	Teacher 1 (Biology teacher)
Stakeholders	Biology Inspector (interest in novel methodologies for STEM education and role in policy making) Parents. (interest in pupils' education and school health and wellbeing) School community (interest in students' education and school health and wellbeing) Ministry of Health (interest in students' and community's health and wellbeing)
Team and roles	Student: Conducting school project ICT teacher: Supporting students for development of digital questionnaire, poster and brochure Science Teacher: Organizing, coordinating, motivating, giving feedback, and rewarding the students' team School manager: Assuring relevant resources for students' projects

2.0 Needs that support the project

Approval for implementation of the school project by the Cyprus Ministry of Education

3.0 Project goals

Examples
Project completed – March 23
Open schooling event – April 23

4.0 Project scope

Students will be able to:
1. develop digital skills (e.g., finding, reviewing, organising and sharing information effectively, handling data appropriately, using different online resources and tools to study)
2. understanding nature of science
3. understand the multiplicity of factors leading to tobacco smoking
4. mapping causes, health risks and solutions of tobacco smoking
5. design and carry out a prediction model for tabacco smoking
6. investigate health risks of tobacco smoking
7. investigate economic and societal costs of tobacco smoking
8. investigate community's perceptions and knowledge concerning tobacco smoking
9. develop responsible citizenship and critical health literacy

5.0 Key Deliverables

Questionnaire
Interview Guide
Observations Gride
Concept map
Prediction model for tobacco smoking
Poster
Infographic
Brochures
Digital Presentation

6.0 Milestones and dates

Survey concluded March 2022
Digital presentation for survey concluded April 2023
Scientific Poster concluded April 2023
Informative brochure concluded April2023
Open schooling event prepared 8 April 2023

7.0 Constraints

Budget XXX € (limit)5 April (limit)

8.0 Risks and opportunities

Modest number of responses to the survey
Modest number of people that accepted invitation to attend the open schooling event

9.0 Project success criteria

Project completed before Eastern period
Open schooling event in a community setting with the participation of the school community, parents, and local stakeholders.

10.0 Project success factors

Appropriate engagement of students and parents.
Interest of teachers in project-based learning.

4. Project management resource and inquiry instruments on the topic "History of pandemics: what do we know about powerful viruses and their impact?"

Overview

This inquiry-based project will investigate the historical virus-related pandemics, shedding light on the existing knowledge that we have on powerful viruses, and their impact on the aspect of health, society, economy, and governance. Students of the age range 12-16 years old (preferably students of 15 to 16 years of age) will be given the opportunity to expand their knowledge by learning about different classes of viral pathogens, in terms of their size, morphology, ways of invading the human immune system and causing disease, and how these may develop into new variants to re-emerge years after and cause reoccurrence of disease. Students will also be presented with a timeline of historically documented pandemics, all related to virus causative agents. Using differentiated instruction to teach challenging immunological concepts related to infection and disease, to a diverse group of learners, of various ages, provides a comprehensive learning module designed to expose high school students to concepts related to infectious causative agents of epidemics and possible pandemics, by using active hands-on and minds-on teaching strategies. This educational scenario promotes the development of:

➢ an understanding of the meaning of the terms epidemic and pandemic and the difference between them, providing an overview in past pandemics of the current and previous centuries,
➢ an overview of present and newly emerging viral pathogens, classifying these in terms of their size and morphology, and understanding how such pathogens emerged in the first place,
➢ an understanding of the different ways by which viruses evade human defence mechanisms and cause disease, and how these may develop into new variants to re-emerge years after and cause recurrent epidemics and possible pandemics,
➢ different remediation approaches that have/can be used to mitigate the occurrence of future virus-related pandemics.

The project is based on the pedagogical approach of inquiry and project-based learning, where students are encouraged to ask questions and complete research while learning and understanding various concepts of basic virology and immunology. In this way, individual learners acquire the skills necessary to develop their own ideas, as well as question themselves and their group members in a constructive way.

Estimated duration

After initial socioscientific and technical background on the topic in classroom environment, there are 4 main supplementary learning activities within this scenario including the School Research Project. Activities 1, 2 and 3 will required approximately 5 to 6 in-school teaching periods of 45 to 50-minutes long. The School Research Project requires approximately 5 to 6 in-school teaching periods of 45-50-minutes and some additional 4 to 5 periods of 45 to 50-minutes from the students own personal time.

School Research Project

Overview. The final Research School Project is based on available scientific evidence from extended research performed and involving highly infectious viral agents and their contribution to communicable disease and comes to conclude on the sequence of all supplementary learning activities proposed within the educational scenario. Students will acquire the use of transferable skills and develop abilities such as critical thinking, problem solving, analysis, reasoning, interpretation, adaptive learning, creativity, continuous learning, self-direction, responsibility, perseverance, self-regulation (metacognition, forethought, and reflection), integrity, self-monitoring, self-evaluation, self-reinforcement, and apply all these to their everyday life within their community. Initially, students will be introduced to the investigative question:

"What could be a proposed strategy for better dealing with a future virus pandemic, bearing in mind both positive and negative impact on the human population, at local (school) community, at national and international level".

They will then be introduced to the goals of the School Research Project, understand the principles of scientific investigation and methodology of data collection, with the use of appropriate tools/instruments, and ways of

analysis of the collected data, allowing them to discuss finding amongst themselves, arriving to their own conclusion.

Relevance. Along the centuries, novel strains of viruses have been the causative agents of global pandemics. Knowledge of past pandemics has been constantly ignored and not utilized in ways that would benefit humankind, resulting in repeated failure of attempts to prevent emerging infectious diseases, with the most recent event being the SARS-CoV-2 outbreak. Students being involved in the implementation of this educational scenario will have the opportunity to explore, research, learn, reflect and peer teach concepts related to the general knowledge of virus pathogens, the general mechanisms viruses use to evade the immune system, and how viruses can be the cause of seasonal epidemics and sometimes pandemics. Additionally, they will be able to develop their own strategy for better dealing with future virus pandemics, by measuring the impact that the current strategies related to COVID-19 had on their community, following implementation during the years 2020-2022.

Estimated duration. The School Research Project will begin following the completion of all supplementary activities and will have a duration of 5 to 6 in-school teaching periods of 45 to 50-minutes long. Additionally, students are expected to allocate approximately 4 to 5 periods of 45 to 50-minute periods of their own personal time if required.

Development process.

Introduction to the School Research Project (1-2 Teaching Periods, 90-100-minutes):

- Period 1 – The educator reviews the background introduction of the educational scenario, as well as the objectives and outcomes of all supplementary previous activities and presents a summary of all learning outcomes to their students. They then present students with the investigative question asking them to develop a strategy for better dealing with a future viral pandemic, following investigation of the impact to their community, of the previous implicated strategies during the COVID-19 pandemic.

- Period 2: Students are introduced to how to conduct a scientific investigation and given an overview on how to construct a scientific report in terms of:
  a. Project title: i.e., "Investigating the impact, following implementation, of COVID-19 related strategies on our local school community"
  b. Abstract: Summary of the project
  c. Introduction: includes a review on the topic (performed by the students) and the scientific question posed
  d. Project Goals: i.e., what is the relevance of project?
  e. Methods, research tools and materials: include the development of a strategy on how to conduct the research (i.e., instigative question and the preparation of questionnaires), identify the target groups (i.e., school community including parents, students, teachers, other school staff, etc.), identify the required number of responses (i.e., how many people should be questioned to ensure reliability and validity), establish a timeline for collecting the responses (duration of questionnaire procedure), identification of risk factors that can constrain the collection of data, establish control procedures for the tracking of results.
  f. Results: i.e., analysis and presentation of the collected data in various forms including graphical, tabulated, etc.
  g. Discussion amongst peers and experts leading to final conclusions.

Based on this, the teacher will have to emphasise on the importance of students setting clear project goals and developing methods and research tools that will allow for their investigation being successful.

Development of Research tools (1-2 Teaching Period, 90-100-minutes):

- Period 3/4 – The educator organises students into 3 groups asking them to perform a survey to assess the impact of the previous implemented strategies during the COVID-19 pandemic, on their school community. They are to investigate the impact on:
  o Social / Emotional behaviour
  o Academic / Occupational performance
  o Personal Attitudes / views

Each group of students will have to investigate one given area, by developing related investigative questions that can be used to measure/assess the impact of the previous COVID-19 strategy on their local school community. A useful scale that could be used includes the following, however, students can also develop their own:

1- strongly disagree; 2 – disagree; 3- not disagree, not agree 4- agree; 5 – strongly agree
2- definitely false; 2 – false; 3 – not false, not true; 4 – true; 5-definitely true
3- extremely unlikely; 2 – unlikely; 3 – not unlikely, not likely; 4 – likely; 5-extremely likely.
1 – yes; 2 – no

Examples of questions that can be asked are given below. However, students are encouraged to produce their own questions for the development of their questionnaires:

A. Social / Emotional behaviour

Were you concerned about the measures imposed during the COVID-19 pandemic?
1 – yes; 2 – no
Have the proposed measures resulted:
a. in you having to reduce the physical time spent with people outside your immediate family.
   1- strongly disagree; 2 – disagree; 3- not disagree, not agree 4- agree; 5 – strongly agree
b. in affecting the relationships with your relatives and immediate family members during the period of COVID-19 pandemic?
c. in affecting the relationships with your <u>student peers</u> / <u>coworkers</u> during the period of COVID-19 pandemic?
d. in affecting the relationships with your <u>schoolteachers</u> / <u>superiors at work</u> during the period of COVID-19 pandemic?
e. in affecting your social life during the period of COVID-19?
f. in affecting the academic competition with your peers?
g. in decrease of your communication skills?
h. in you receiving reduced / inadequate social support.
i. ….

B. Academic / Occupational Performance

Have the proposed measures resulted in:
a. affecting your <u>academic studying</u> / <u>performance at work</u> during the period of COVID-19 pandemic?
b. increasing your fear in failing your <u>exams</u> / <u>assigned work tasks</u>?
c. inconsistent feedback from your <u>teachers</u> / <u>manager and/or employer (seniors)</u>?
d. fear not being able to catch up if fallen behind?
e. decreasing the quality of teaching at school?
f. the lack of time to complete assigned work.
g. receiving criticism about your performance <u>in school</u> / at work?
h. increasing insecurity concerning <u>academic</u> / <u>professional</u> future?
i. increasing the amount of <u>internal exams</u> / <u>professional assessment</u>?
j. ….

C. Personal Attitudes / views

What is your view on the proposed measure listed below and used for dealing with the COVID-19 pandemic?

a. The use of face masks at all times.
b. The use of face masks at public open and closed spaces.
c. The use of face masks at public closed spaces only.
d. The use of antiseptic spray on skin.
e. The use of antiseptic spray on all surfaces.
f. The implementation of social distancing (applying minimum number of individuals in each area).
g. Compulsory vaccination and booster vaccination.
h. The use of safe pass for entering closed public areas.
i. The requirement of frequent testing.
j. ….

The surveys developed by the student groups are to be given out to their school community (student peers, parents, teachers, local community, etc). Questionnaires can be prepared in electronic form (i.e., using google forms / lime survey), or these could be printed out and given to all subjects that are to be taking part in the research project survey. Part of this section of the research project could be performed at the students' outside-school time.

Data Analysis (1-2 Teaching Periods, 90-100-minutes):

Period 5/6: Following completion of their survey and collecting the minimum number of responses, an Excel file may be downloaded from google forms or lime survey. Alternatively, if the questionnaire was hand out in paper form, students will have to prepare their own Excel file with all the questions and distribution of collected responses. Students are reminded about the relevance of the research project and are given their teachers support in preparing tables, graphics, diagrams etc., from better presenting the collected data.

This section of the project could be performed in class or could also be performed at the students' outside-school time.

Results presentation and discussion (1 Period, 45-50-minutes):

- Period 7: All groups of Students present their individual data analysis to their teacher and discuss which is the best way to present the collected data. Additionally, they discuss and propose a future strategy that could be used to better deal with a viral pandemic crisis, taking into consideration the results of their survey.

Open Schooling Event:

- Students will hold an Open Schooling event where they are to present their research project outcome to their local school community and propose their own designed strategy for better dealing with a future viral pandemic. The presentation of their project could include posters presenting the tabulated results and graphical representation of their data, as well as an oral PowerPoint presentation given by a selected representative group of students comprised of members from all the groups that took part in the research investigation.
- Poster presentations, following the format proposed in the introduction to the school project, including the main title of the research project and the subtitle of the part investigated by each student group, a summary/abstract, and separate sections of results, analysis, conclusion, and discussion, will provide useful optical means for students to communicating the results of their investigation.
- Oral presentation of the research project, by the students to their local community, will allow for the communication of the students' evidence-based proposed strategy, for better dealing with a future viral pandemic.
- Open schooling attendees including students, teachers, parents, local community, stakeholders, and external collaborators to the students' project, will get a better understanding about the history of dealing with viral pandemics, and how information extracted from history and population studies can help in the development and design of improved strategies for dealing with communicable diseases in the future.

Project Management Framework and Instruments
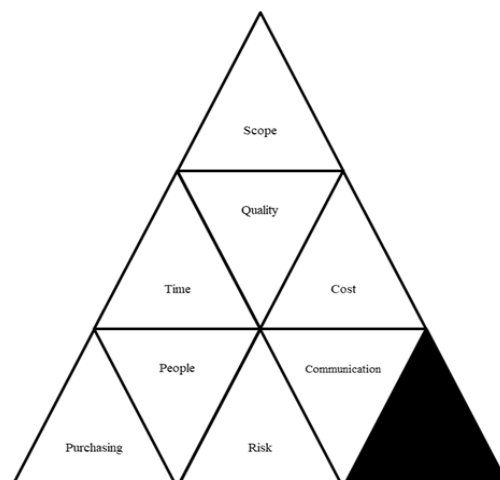
1. Plan: Determine How to Do the Project

a. What is the scope of the project? i.e., what are you investigating?
a. Set the timeline for this project, i.e., how long will it take?
b. How the project should proceed to achieve the desired quality, i.e., regular inspections/reviews of reports/trial runs etc.
c. Determine the costs of overheads etc.
d. Purchasing of what is required to conduct the project.
e. Identify the people involved and their assigned tasks.
f. Identify the risks associated with the project and ways of mitigating these.
g. Communication and dissemination of the results of the project.

2. Plan: Define Project Scope

- What are the outputs?
Example: scientific poster, PowerPoint presentation, open schooling event, publication of Scientific Project Report to local education newspaper.

- What are the requirements of project outputs?
Example: A3 format, Color, 7-sections (including introduction, goals, methods, results, conclusions, discussion, recommendations).

- Are there any constraints to produce the project outputs?
Example: work should be completed in two weeks

- Define the tasks to produce the outputs – build the Work Breakdown Structure

Work Breakdown Structure
(filled with examples, these may change according to your project organisation)

3. Plan: Determine Project Time

a. Define the detailed activities for each WBS element
b. Put the activities in sequence
c. Estimate the resources (human and acquisitions) for each activity
d. Estimate the calendar time (days or weeks) for each activity
e. Create the Gantt-Chart

Resource Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources
Define the questionnaire	1 hour	Paper
Parameterize the questionnaire in google forms /lime survey	15 minutes	Laptop
Prepare observation sheet	1 hour	Paper
Do observations in school environment	3 hours	paper or laptop
Set home survey	15 minutes	laptop or mobile phone
Prepare poster	3 hours	Laptop or paper
Prepare PowerPoint presentation	4 hours	Laptop

Gantt-Chart
(filled with examples, these may change according to your project organisation)

Activity	Week 1	Week 2	Week 3	Week 4	Week 5
Define the questionnaire	■				
Parameterize the questionnaire in google forms		■			
Prepare observation sheet	■				
Do observations in school environment			■		
Set home survey			■	■	■
Prepare poster / PowerPoint presentation					■

4. Plan: Determine Project Cost

a. Estimate how much each activity will cost (i.e., include the cost for Supplies, overheads like office space, equipment, material to be used)
b. Add the estimates to determine the total cost of your project.

Cost Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resources	Other Resources	Human Resource Cost (in euros)	Other Resources Cost (supplies)
Define the questionnaire	1 hour	paper	xxx euros	n.a
Parameterize the questionnaire in google forms/limesurvey	15 minutes	laptop	xxx euros	n.a
Prepare observation sheet	1 hour	paper	xxx euros	n.a
Do observations in school environment	3 hours	paper or laptop	xxx euros	n.a
Set home survey	15 minutes	laptop or mobile phone	xxx euros	n.a
Prepare poster	3 hours	laptop	xxx euros	xxx euros
Prepare PowerPoint presentation	4 hours	laptop	xxx euros	
Total	i.e., 12h30	-	xxx cost euro	xxx cost euro

5. Plan: Determine Project Quality

a. Ensure your project produces quality outputs
b. Plan what quality means to your project
c. Determine how you will ensure quality

Quality Breakdown Structure
(filled with examples, these may change according to your project organisation)

Requirement	Quality planning	Quality assurance	Quality control
1.1	Minimum number of responses to the survey	Minimum number of responses to the survey: 50	Monitor the number of responses to the survey on a weekly basis
1.2	Minimum number of observations	Minimum number of observations: 5	Monitor the number of observations on a daily basis
1.3	Minimum number of interviews:	Minimum number of interviews: 10	Monitor the number of interviews on a daily basis
1.4	Poster template with five sections	Poster with five sections: introduction, goals, methods, results, conclusions, recommendations.	Monitor the developments of students' poster

6. Plan: Determine Project Risks

   a. Identify the two types of risks (uncertain future events that can affect your project): threats have a negative impact on your project; opportunities have a positive impact on your project.

Risk Breakdown Structure
(filled with examples, these may change according to your project organisation)

Risk	Probability (How likely is it to happen)	Impact (How big of an effect will it have)	Owner (Who takes care about the risk)	Action Plan (Initiatives to reduce threats and increase opportunities)
Modest number of responses to the survey	High	High	Student 1 Student 2 Student 3	–Identification of other potential target groups –Invitations and re–invitations
Modest number of people that accepted invitation to attend the open schooling event	Medium	Medium	Senior Science Teacher Student 4 Student 5	- Re–invitations by email - text notifications, etc.

7. Plan: Plan Procurement Processes

   a. Determine what goods and services you need
   b. Have what you need at the time that you need it.

Supplies Breakdown Structure
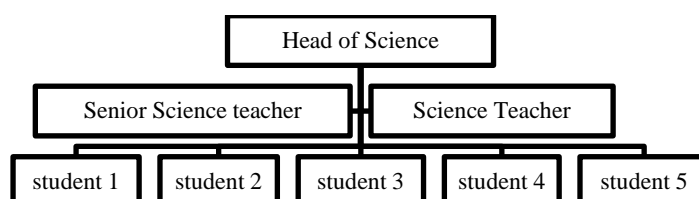*(filled with examples, these may change according to your project organisation)*

Supply	Supply Cost (supplies)	When to be available	How to be available
Paper	xxx euros	In the beginning of the project	Commitment of school top management
Printer	xxx euros	In the beginning of the project	Commitment of school top management
Mobile/laptop	xxx euros	In the beginning of the project	Commitment of school top management
Printed post	xxx euros	Before the open schooling event	Poster printing in Stapples Office Center

8. Plan: Plan People

   a. Assemble the project team
   b. Map the project team in the Organization Breakdown Structure
   c. Assign the project team members to roles
   d. Assign the project team members to activities
   e. Train the project team
   f. Determine how you will motivate and reward the team
   g. Map Stakeholders – people or groups interested in the project (Science specialists, i.e., virologist, immunologist, epidemiologist etc.)
   h. Determine how you will engage stakeholders in the project (i.e., request short presentations to students)

Organization Breakdown Structure
(filled with examples, these may change according to your project organisation)

Responsibility assignment matrix
(filled with examples, these may change according to your project organisation)

Activity	Team members							
	Student 1	Student 2	Student 3	Student 4	Student 5	Senior Science Teacher	Science Teacher	ITC Teacher
Define the questionnaire	X	X	X			C/P		
Parameterize the questionnaire in google forms/lime survey					X	C/P		
Prepare observation sheet			X	X	X		C/P	
Do observations in school environment			X	X/P	X		C/P	
Set home survey	X	X	X	X	X/P	C/P		
Prepare poster	X	X	X	X	X			C/P
PowerPoint Presentation	X	X	X	X	X/P			C/P
Coordinate the overall implementation of the project					X	X		

Letter	Role
X	Executes work
P	Controls progress
C	Should be consulted
I	Should be informed

Stakeholders Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Directly involved in the project (yes/no)	Served or Affected by the Project	Likely to be user of the results of the project
Parents	yes	yes	yes
School community	yes	yes	yes
School management	no	yes	yes
Municipality	no	yes	yes
Residents' association	no	yes	yes
Local Primary healthcare center/ Hospital/ clinic	no	yes	yes
Ministry of Education	yes	yes	yes
Ministry of Health	yes	no	no

Stakeholders Management Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Who they are and why should be involved in the project	Why the project is relevant for them	Strategies to obtain support
Parents	Students' families should be involved in the survey to collect the relevant responses. Their involvement also maximizes the impact of the project in terms of global literacy.	Due to their interest in pupils' education and school health and well-being.	Present the school project in parents meeting/send letter home/send out related email.
School community	The school community should be involved in the survey and observations to be done by students in school environment. Their involvement also maximizes the impact of the project in terms of global literacy.	Due to their interest in students' education and school health and well-being.	Present the school project in a school community meeting/send out a related email.

Stakeholder name	Who they are and why should be involved in the project	Why the project is relevant for them	Strategies to obtain support
School management	The school management assures relevant resources for students' projects and should be involved in the survey Their involvement also maximizes the impact of the project in terms of global literacy.	Due to their interest in students' education and school health and well-being. Also due to their interest in demonstrating the interest of school in contributing to community health (health promoting school).	Present the school project in formal meeting/an informative email to be send out to all members.
Municipality	The municipality should be involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to municipality interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project).
Parents' association	Parents' associations should be involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to parents' associations interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project).
Primary healthcare center/ Local Hospital & Clinic/Ministry of Health	These entities should be involved in the open schooling event where students share the results of their projects and communicate recommendations.	Due to their interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project).
National Directorate for Education (Ministry of Education)	The Ministry of Education is supporting the project and interested in the results in terms of students' learnings.	Due to their interest in novel methodologies for STEM education and role in policy making.	Invitation to participate in the open schooling event.

9. Plan: Plan Communication

a. Assure the right information to the right people, at the right time, in a useful format
b. Assure effective project meetings
c. Build the communications plan

Communications plan
(filled with examples, these may change according to your project organisation)

Organized by (from)	Participants (to)	What	When	How/Where	Purpose
Science Teacher	Team	Kick-off meeting	xxx month	Laboratory	- Provide a complete description of the project and the end product.
Science Teacher	Team	Team meeting	Weekly (i.e., every Wednesday)	IT classroom	- Overall plan for the project - Discuss project developments and plan next stage - Instruct team on their roles - Provide updates on the progress of the project and if there are any issues with completion
Science Teacher	Team and Parents	Meeting	Before the project starts (date to be defined)	School meeting room	- Explain the project and invite for participation in the survey

Organized by (from)	Participants (to)	What	When	How/Where	Purpose
Science Teacher Team	Parents	Meeting	Before the project starts (date to be defined)	Virtual meeting	- Explain the project and invite for participation in the survey and open schooling event.
Science Teacher Team School management	-School community -Municipality -Parents' association -Primary healthcare center/Hospital/clinic -Ministry of Education -Ministry of Health	Invitations sent to stakeholders for participation in open schooling event	Before the open schooling event (date to be defined)	Via email	- Explain the project and invite for participation in the open schooling event.

10. Finish the project planning by building the Charter

1.0 Project identification	
Name	Describe the project name and project acronym
Summary description	Describe the project in one paragraph
Project owner	Identify the owner of the project (e.g.: school X)
Project manager	Identify the project manager
Stakeholders	Identify the stakeholders and briefly describe why they are interested parties
Team and roles	Identify the team and summarize the role of each resource in the project (e.g: student, ICT teacher, Science Teacher, School manager, designer, software developer…)

2.0 Needs that support the project
Which pain? Which need not solved by the current state-of-the-art? Which solution (s) are you going to deliver?

3.0 Project goals
Describe what you want to achieve in the short-term, medium term and long term. Follow SMART principles.

Examples
Project completed – March 22
Open schooling event – April 22 |

4.0 Project scope
Identify the tasks of the project

5.0 Key Deliverables
Identify goods or services produced as a result of the project. A deliverable could be a report, a document, a software product, a server upgrade or any other building block of an overall project.

Examples
Questionnaire
Interview Guide
Observations Gride
Book
Poster
Infographic
System map
Brochures |

6.0 Milestones and dates
Identify the principal landmarks of project execution stablished according to what is described in the project scope.

Examples
Survey concluded |

Interviews concluded
Open schooling event prepared

7.0 Constraints

Identify the principal project constraints (cost, technical, other)

Examples
Budget 200 € (limit)
Project should be finished in 15 December (limit)

8.0 Risks and opportunities

Identify issues that may emerge in the future and influence project implementation

Examples
Modest number of responses to the survey
Modest number of people that accepted invitation to attend the open schooling event

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9.0 Project success criteria

Identify the criteria or measures of success. These are the project acceptance criteria.

Examples
Project completed before Christmas period
Open schooling event in a community setting with the participation of the entire school community, parents, and local stakeholders.

10.0 Project success factors

Identify the factors that you will manage in order to positively influence the success of the project.

Examples
Appropriate engagement of students and parents.
Interest of teachers in project-based learning.

Suggested complementary Digital Educational Resources (DER) for teachers:

➢ DER1: https://youtu.be/B7ivFcGbFJM
➢ DER2: https://trinitonian.com/2020/09/10/a-history-of-sports-and-diseases/
➢ DER3: http://news.sciencemag.org/biology/2015/08/universal-flu-vaccine-horizon
➢ DER4: www.medscape.com/viewarticle/812621

Teaching – learning process for school project (summary):

▪ Preparation of Research tool (questionnaire) by the students
▪ Collection of evidence/data
▪ Analysis of collected data
▪ Presentation of analysed data in appropriate presentation formats (i.e., tables, graphs, charts, etc.)
▪ Dissemination of the results of the research project (Scientific poster / PowerPoint presentation)
▪ Presentation of the results of the research project at the open schooling event / publication of research project report at local community media / local educational website etc.

Expected outcomes of the teaching – learning process (summary):

Students will be able to:
➢ develop their own research tools to collect the required data in order to conduct their own scientific investigation
➢ evaluable and consider the advantages and limitations to the process of collecting data from their local community
➢ improve their collaboration and communication skills by working with their peers
➢ develop their critical thinking by applying acquired and existing knowledge
➢ design and propose their own strategic planning and identify and communicate evidence-based measures for solving socio-scientific problems that trouble their local community

Target Audience for Recommendations

Local school community including students, parents, teachers, local community (health providers, local enterprises etc.)
Local Stakeholders

Public Debate and Recommendations (based on research results)

Presentation of the research project results by students in a community setting (i.e., school or municipality premises) and dissemination of evidence recommendations via social, community and conventional media.

Main Partner responsible: UCY

5. Project management resource and inquiry instruments on the topic "Workings and malfunctions of human Immunological memory"

Overview

This topic sheds light onto the concepts of long-lasting immunological memory and protective immunity, to simplify and improve the understanding of a challenging subject such as Immunology. Educators and students of ages 12 to 16 years old (preferably 15 to 16 years of age), are therefore given the opportunity to expand their knowledge by learning about important concepts in Immunology, such as the innate and adaptive arms of the human immune system and the cellular components involved in the establishment of immune memory and the interactions that bring about protective immunity and preventing re-infections. An insight is also given on how immune memory is independent of the frequency or persistence of re-infection, being a long-lasting feature involving both specialised cells of the adaptive and innate immune systems, but also depending on all the rest of the cells of the human body.

Using differentiated instructions to teach immunological concepts related to immunity against infections to a diverse group of learners, of various ages, provides a comprehensive learning module designed to expose high school students to concepts related to immune memory mechanisms. Such mechanisms are in place to minimise and preventing the spreading of disease by pathogens that could be the cause of epidemics and possible pandemics. The educational scenario uses active hands- and minds-on teaching strategies, and promotes the development of:

➢ Understanding of the two arms of the immune system: innate immune responses that are non-specific and general against groups of pathogens, and adaptive immune responses that are highly specific against given structural motifs of a given pathogen.
➢ Knowledge of the cellular and molecular components of each arm of the immune system, including cells and molecules involved in innate and adaptive responses.
➢ Understanding of the interactions between the immune cells and molecules, including chemical and molecular interactions of cell-signalling, cell-activation, cell-proliferation, cell-differentiation processes, to trigger immune memory mechanisms to ensure protection against re-infection.
➢ Understanding of the problems arising from malfunctions in immune memory, that may lead to lack of protection, trigger of autoimmune disease, (i.e., the immune system recognises its own cells and molecules as being foreign).

The educational scenario also promotes the development and use of transferable skills such as critical thinking, problem solving, analysis, reasoning, interpretation, adaptive learning, creativity, continuous learning, self-direction, responsibility, perseverance, self-regulation (metacognition, forethought, and reflection), integrity, self-monitoring, self-evaluation, self-reinforcement.

Estimated duration

After initial socioscientific and technical background on the topic in classroom environment, there are 3 main supplementary learning activities and a School Research Project, included within this educational scenario. Activities 1, 2 and 3 will required approximately 4 to 5 in-school teaching periods of 45 to 50-minutes long. The School Research Project requires approximately 5 to 6 in-school teaching periods of 45 to 50 minutes and some additional 4 to 5 periods of 45 to 50-minutes from the students own personal time.

School Research Project

Overview. The final Research School Project is based on available scientific evidence from extended research performed and investigates the concepts of long-lasting immunological memory and protective immunity to all past but also newly emerging invaders.

A range of different pedagogical methods are implemented through the School Research Project, catering for a broad range of different learners and based on approaches such as inquiry-based learning, where students are encouraged to ask questions and complete research while learning various concepts of basic immunology associated with immunological memory. In this way, students will acquire the skills necessary to develop their own understanding, as well as question themselves and group members in a constructive way.

As part of the School Research Project, students will be introduced to the investigative question:

"Does long-lasting immunological memory provide protective immunity, following subsequent virus reinfection".

The students will then be introduced to the goals of the School Research Project, understand the principles of scientific investigation and methodology of data collection, with the use of appropriate tools/instruments, and ways of analysis of the collected data, and arriving to conclusion through constructive discussion amongst them, their teachers, and specialists in the field of immunology.

Relevance. The establishment of immunological memory is based on the fundamental and classical features of adaptive immunity and has served as the guiding principle of empirical vaccine development. Students being involved in the implementation of this School Research Project will have the opportunity to explore, research, learn, reflect and peer teach concepts related to the general knowledge of basic protective mechanisms of the innate and adaptive immune system, leading to long lasting immunological memory. They will investigate the establishment of immunological memory withing their school and close community by conducting their own research on individuals that have undergone COVID-19.

Estimated duration. The School Research Project will begin following the completion of all supplementary activities and will have a duration of 5-6 in-school teaching periods of 45-50 minutes long. Additionally, students are expected to allocate approximately 4-5 periods of 45–50-minute periods of their own personal time if required.

Development process:

Introduction to the School Research Project (1-2 Teaching Periods, 90-100-minutes):

- Period 1 – The educator reviews the background introduction of the educational scenario, as well as the objectives and outcomes of all supplementary previous activities and presents a summary of all learning outcomes to their students. They then present students with the investigative question asking them to develop a plan that will allow them to indirectly measure the establishment of immunological memory against SARS-Cov-19 virus. The teacher will guid their students on a discussion on how to collect data and the possible development of a questionnaire that will allow them to collect information regarding vaccinations and vaccination boosters, incidences of conducting SARS-Cov-19, and a range of symptoms from their peers and teachers composing their local school community, their family members etc.

- Period 2: Students are introduced to how to conduct a scientific investigation and given an overview on how to construct a scientific report in terms of:
  a. Project title: i.e., "Investigating the impact, following implementation, of COVID-19 related strategies on our local school community"
  b. Abstract: Summary of the project
  c. Introduction: includes a review on the topic (performed by the students) and the scientific question posed
  d. Project Goals: i.e., what is the relevance of project?
  e. Methods, research tools and materials: include the development of a strategy on how to conduct the research (i.e., instigative question and the preparation of questionnaires), identify the target groups (i.e., school community including parents, students, teachers, other school staff, etc.), identify the required number of responses (i.e., how many people should be questioned to ensure reliability and validity), establish a timeline for collecting the responses (duration of questionnaire procedure), identification of risk factors that can constrain the collection of data, establish control procedures for the tracking of results.
  f. Results: i.e., analysis and presentation of the collected data in various forms including graphical, tabulated, etc.
  g. Discussion amongst peers and experts leading to final conclusions.

Based on this the teacher will have to emphasise on the importance of students setting clear project goals and developing methods and research tools that will allow for their investigation being successful.

Development of Research tools (1-2 Teaching Period, 90-100-minutes):

- Period 3/4 – The teacher organises students into groups asking them to perform a survey in order to assess the establishment of immunological memory against SARS-Cov-19 virus. They are to investigate the following parameters:
  A. Personal health status and incidences of infection with SARS-Cov-19 virus
  B. Information on Vaccination
  C. Symptoms experienced that could allow determination of severity of COVID-19.

Each group of students will have to investigate one given group of individuals (i.e., student peers, teachers, school supplementary staff, parents) by developing related investigative questions that can be used to measure/assess the establishment of immunological memory to SARS-Cov-19 virus within their school and close community. A useful scale that could be used includes the following, however, students can also develop their own:

1- strongly disagree; 2 – disagree; 3- not disagree, not agree 4- agree; 5 – strongly agree
2- definitely false; 2 – false; 3 – not false, not true; 4 – true; 5-definitely true
3- extremely unlikely; 2 – unlikely; 3 – not unlikely, not likely; 4 – likely; 5-extremely likely.
1 – yes; 2 – no

Examples of questions that can be asked are given below. However, students are encouraged to produce their own questions for the development of their questionnaires:

A. Personal health status and incidences of infection with SARS-Cov-19 virus
  ▪ Were you concerned about becoming infected with SARS-Cov-19 virus?

    1- strongly disagree; 2 – disagree; 3- not disagree, not agree 4- agree; 5 – strongly agree

  ▪ Indicate by placing an x in the box representing your age range:

    12 – 15 • ; 16-19 • ; 20-30 • ; 31-59 • ; 60-70 • ; 71 and above •

  ▪ Indicate by placing an x in the box, how many times you exercise per week:

    I don't exercise • ; 2 – 1 to 2 • ; 3 – 2 to 3 • ; 4 – 3 to 4 • ; 5 – 4 to 5 •

  ▪ Do you suffer from any of the following conditions? Please indicate by placing x in the box:

    Asthma • ; Respiratory problems • ; Diabetes • ; Autoimmunity • ; Immunosuppressed •

  ▪ I often get seriously sick with a cold during the year.

    1- strongly disagree; 2 – disagree; 3- not disagree, not agree 4- agree; 5 – strongly agree

  ▪ It takes me on average more than one full week (7-days) to feel better after a cold.
    1- strongly disagree; 2 – disagree; 3- not disagree, not agree 4- agree; 5 – strongly agree

B. Information on Vaccination
  ▪ How many doses of the COVID-19 vaccine have you received? Indicate as appropriate by placing an x in the box:

    0 - • ; 1 - • ; 2 - • ; 3 - • ; 4 - • ; 5 - •

  ▪ Have you ever conducted COVID-19?

    1 – yes; 2 – no

  ▪ If your answer to the previous question was yes, how many times you have conducted COVID-19 during the years 2021 to 2022.

    1 – once; 2 – 2 to 3 times; 3 – 4 to 5 times; 4 – 6 to 7 times; 5 – more than 7 times

C. Symptoms experienced that could allow determination of severity of COVID-19.
  ▪ During the **first time** you have conducted COVID-19 you experienced:

1. *Asymptomatic or pre-symptomatic infection*: (a person who has tested positive for SARS-CoV-19 using a virologic test, i.e., a rapid test and/or PCR test, but have no symptoms that are consistent with COVID-19).
2. *Mild illness:* (a person who has any of the various signs and symptoms of COVID-19 i.e., fever, cough, sore throat, malaise, headache, muscle pain, nausea, vomiting, diarrhea, loss of taste and smell) but who do not have shortness of breath, dyspnea, or abnormal chest imaging.
3. *Moderate illness:* (a person who show evidence of lower respiratory disease during clinical assessment or imaging and who have an oxygen saturation measured by pulse oximetry (SpO_2) ≥94%).
4. *Severe illness:* (a person who has SpO_2 <94%, a respiratory rate >30 breaths/min, or lung infiltrates).
5. *Critical illness:* (a person who has respiratory failure, septic shock, and/or multiple organ dysfunction and acquires hospitalisation).

- During the **second time** you have conducted COVID-19 you took no more than a week (5-days) to fully recover:

  1- strongly disagree; 2 – disagree; 3- not disagree, not agree 4- agree; 5 – strongly agree

- During the **second time** you have conducted COVID-19 you experienced:

  1. *Asymptomatic or pre-symptomatic infection*: (a person who has tested positive for SARS-CoV-19 using a virologic test, i.e., a rapid test and/or PCR test, but have no symptoms that are consistent with COVID-19).
  2. *Mild illness:* (a person who has any of the various signs and symptoms of COVID-19 i.e., fever, cough, sore throat, malaise, headache, muscle pain, nausea, vomiting, diarrhea, loss of taste and smell) but who do not have shortness of breath, dyspnea, or abnormal chest imaging.
  3. *Moderate illness:* (a person who show evidence of lower respiratory disease during clinical assessment or imaging and who have an oxygen saturation measured by pulse oximetry (SpO_2) ≥94%).
  4. *Severe illness:* (a person who has SpO_2 <94%, a respiratory rate >30 breaths/min, or lung infiltrates).
  5. *Critical illness:* (a person who has respiratory failure, septic shock, and/or multiple organ dysfunction and acquires hospitalisation).

- During the **third time** you have conducted COVID-19 your recovery took no more than a few days (1-3 days maximum)

  1- strongly disagree; 2 – disagree; 3- not disagree, not agree 4- agree; 5 – strongly agree

The surveys developed by the student groups are to be given out to their school community (student peers, parents, teachers, other members of their local community, etc). Questionnaires can be prepared in electronic form (i.e., using google forms / limesurvey), or these could be printed out and given to all subjects that are to be taking part in the research project survey.

Part of this section of the research project could be performed at the students' outside-school time.

Data Analysis (1-2 Teaching Periods, 90-100-minutes):

- Period 5/6: Following completion of their survey and collecting the minimum number of responses, an Excel file may be downloaded from google forms or limesurvey. Alternatively, if the questionnaire was hand out in paper form, students will have to prepare their own Excel file with all the questions and distribution of collected responses. Students are reminded about the relevance of the research project and are given their teachers support in preparing tables, graphics, diagrams etc., from better presenting the collected data.

This section of the project could be performed in class or could also be performed at the students' outside-school time.

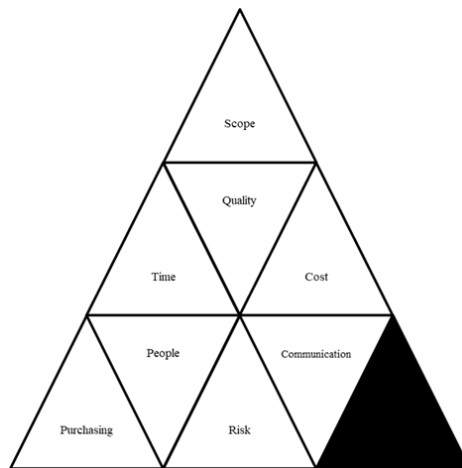**Results presentation and discussion (1 Teaching Period, 45-50-minutes):**

- Period 7: All groups of Students present their data analysis to their teacher and discuss which is the best way to combine and present the collected data. Additionally, they discuss their conclusion from their data analysis, on whether there is evidence of established immunological memory against SARS-Cov-19 within their local community.

Open Schooling Event

Students are to hold an Open Schooling event where they are to present their research project outcome to their local school community and debate on the establishment of immunological memory to SARS-Cov-19 amongst the members of the community. The presentation of their project could include posters presenting the tabulated results and graphical representation of their data, as well as an oral PowerPoint presentation given by a selected representative group of students comprised of members from all the groups of students that took part in the research investigation.

a. Poster presentations, following the format proposed in Section I, including the main title of the research project and the subtitle of the part investigated by each student group, a summary/abstract, and separate sections of results, analysis, conclusion, and discussion, will provide useful optical means for students to communicating the results of their investigation.
b. Oral presentation of the research project, by the students to their local community, will allow for the communication of the students' evidence-based conclusion on the establishment on immunological memory against SARS-Cov-19 virus within their local community, and probable national and global community.
c. Open schooling attendees including students, teachers, parents, local community, stakeholders, and external collaborators to the students' School Research Project, will get a better understanding about how immunological memory works and how this brings about protection to a community via the establishment of herd-immunity.

Project Management Framework and Instruments

1. Plan: Determine How to Do the Project

a. What is the scope of the project? i.e., what are you investigating?
b. Set the timeline for this project, i.e., how long will it take?
c. How the project should proceed to achieve the desired quality, i.e., regular inspections/reviews of reports/trial runs etc.
d. Determine the costs of overheads etc.
e. Purchasing of what is required to conduct the project.
f. Identify the people involved and their assigned tasks.
g. Identify the risks associated with the project and ways of mitigating these.
h. Communication and dissemination of the results of the project.

2. Plan: Define Project Scope

- What are the outputs?

Example: scientific poster, PowerPoint presentation, open schooling event, publication of Scientific Project Report to local education newspaper.

- What are the requirements of project outputs?

Example: A3 format, Color, 7-sections (including introduction, goals, methods, results, conclusions, discussion, recommendations).

- Are there any constraints to produce the project outputs?

Example: work should be completed in two weeks

- Define the tasks to produce the outputs – build the Work Breakdown Structure

Work Breakdown Structure
(filled with examples, these may change according to your project organisation)

3. Plan: Determine Project Time

- a. Define the detailed activities for each WBS element
- b. Put the activities in sequence
- c. Estimate the resources (human and acquisitions) for each activity
- d. Estimate the calendar time (days or weeks) for each activity
- e. Create the Gantt-Chart

Resource Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources
Define the questionnaire	1 hour	Paper
Parameterize the questionnaire in google forms /limesurvey	15 minutes	Laptop
Prepare observation sheet	1 hour	Paper
Do observations in school environment	3 hours	paper or laptop
Set home survey	15 minutes	laptop or mobile phone
Prepare poster	3 hours	Laptop or paper
Prepare PowerPoint presentation	4 hours	Laptop

Gantt Chart
(filled with examples, these may change according to your project organisation)

Activity	Week 1	Week 2	Week 3	Week 4	Week 5
Define the questionnaire	■				
Parameterize the questionnaire in google forms		■			
Prepare observation sheet	■	■			
Do observations in school environment			■	■	
Set home survey			■	■	
Prepare poster / PowerPoint presentation					■

4. Plan: Determine Project Cost

a. Estimate how much each activity will cost (i.e., include the cost for Supplies, overheads like office space, equipment, material to be used)
b. Add the estimates to determine the total cost of your project.

Cost Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resourses	Other Resources	Human Resource Cost (in euros)	Other Resources Cost (supplies)
Define the questionnaire	1 hour	paper	xxx euros	n.a
Parameterize the questionnaire in google forms/limesurvey	15 minutes	laptop	xxx euros	n.a
Prepare observation sheet	1 hour	paper	xxx euros	n.a
Do observations in school environment	3 hours	paper or laptop	xxx euros	n.a
Set home survey	15 minutes	laptop or mobile phone	xxx euros	n.a
Prepare poster	3 hours	laptop	xxx euros	xxx euros
Prepare PowerPoint presentation	4 hours	laptop	xxx euros	
Total	i.e., 12h30	-	xxx cost euro	xxx cost euro

5. Plan: Determine Project Quality

a. Ensure your project produces quality outputs
b. Plan what quality means to your project
c. Determine how you will ensure quality

Quality Breakdown Structure
(filled with examples, these may change according to your project organisation)

Requirement	Quality planning	Quality assurance	Quality control
1.1	Minimum number of responses to the survey	Minimum number of responses to the survey: 50	Monitor the number of responses to the survey on a weekly basis
1.2	Minimum number of observations	Minimum number of observations: 5	Monitor the number of observations on a daily basis
1.3	Minimum number of interviews:	Minimum number of interviews: 10	Monitor the number of interviews on a daily basis
1.4	Poster template with five sections	Poster with five sections: introduction, goals, methods, results, conclusions, recommendations.	Monitor the developments of students' poster

6. Plan: Determine Project Risks

a. Identify the two types of risks (uncertain future events that can affect your project): threats have a negative impact on your project; opportunities have a positive impact on your project.

Risk Breakdown Structure
(filled with examples, these may change according to your project organisation)

Risk	Probability (How likely is it to happen)	Impact (How big of an effect will it have)	Owner (Who takes care about the risk)	Action Plan (Initiatives to reduce threats and increase opportunities)
Modest number of responses to the survey	High	High	Student 1 Student 2 Student 3	–Identification of other potential target groups –Invitations and re–invitations
Modest number of people that accepted invitation to attend the open schooling event	Medium	Medium	Senior Science Teacher Student 4 Student 5	- Re–invitations by email - text notifications, etc.

7. Plan: Plan Procurement Processes

  a. Determine what goods and services you need
  b. Have what you need at the time that you need it.

Supplies Breakdown Structure
(filled with examples, these may change according to your project organisation)

Supply	Supply Cost (supplies)	When to be available	How to be available
Paper	xxx euros	In the beginning of the project	Commitment of school top management
Printer	xxx euros	In the beginning of the project	Commitment of school top management
Mobile/laptop	xxx euros	In the beginning of the project	Commitment of school top management
Printed post	xxx euros	Before the open schooling event	Poster printing in Stapples Office Center

8. Plan: Plan People
(instructions to the teacher)

  a. Assemble the project team
  b. Map the project team in the Organization Breakdown Structure
  c. Assign the project team members to roles
  d. Assign the project team members to activities
  e. Train the project team
  f. Determine how you will motivate and reward the team
  g. Map Stakeholders – people or groups interested in the project (Science specialists, i.e., virologist, immunologist, epidemiologist etc.)
  h. Determine how you will engage stakeholders in the project (i.e., request short presentations to students)

Organization Breakdown Structure
(filled with examples, these may change according to your project organisation)

Responsibility assignment matrix
(filled with examples, these may change according to your project organisation)

Activity	Team members							
	Student 1	Student 2	Student 3	Student 4	Student 5	Senior Science Teacher	Science Teacher	ITC Teacher
Define the questionnaire	X	X	X			C/P		
Parameterize the questionnaire in google forms/limesurvey					X	C/P		
Prepare observation sheet			X	X	X		C/P	
Do observations in school environment			X	X/P	X		C/P	
Set home survey	X	X	X	X	X/P	C/P		
Prepare poster	X	X	X	X	X			C/P
PowerPoint Presentation	X	X	X	X	X/P			C/P
Coordinate the overall implementation of the project					X	X		

Letter	Role
X	Executes work
P	Controls progress
C	Should be consulted
I	Should be informed

Stakeholders Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Directly involved in the project (yes/no)	Served or Affected by the Project	Likely to be user of the results of the project
Parents	yes	yes	yes
School community	yes	yes	yes
School management	no	yes	yes
Municipality	no	yes	yes
Residents' association	no	yes	yes
Local Primary healthcare center/ Hospital/ clinic	no	yes	yes
Ministry of Education	yes	yes	yes
Ministry of Health	yes	no	no

Stakeholders Management Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Who they are and why should be involved in the project	Why the project is relevant for them	Strategies to obtain support
Parents	Students' families should be involved in the survey to collect the relevant responses. Their involvement also maximizes the impact of the project in terms of global literacy.	Due to their interest in pupils' education and school health and well-being.	Present the school project in parents meeting/send letter home/send out related email.
School community	The school community should be involved in the survey and observations to be done by students in school environment. Their involvement also maximizes the impact of the project in terms of global literacy.	Due to their interest in students' education and school health and well-being.	Present the school project in a school community meeting/send out a related email.

Stakeholder name	Who they are and why should be involved in the project	Why the project is relevant for them	Strategies to obtain support
School management	The school management assures relevant resources for students' projects and should be involved in the survey Their involvement also maximizes the impact of the project in terms of global literacy.	Due to their interest in students' education and school health and well-being. Also due to their interest in demonstrating the interest of school in contributing to community health (health promoting school).	Present the school project in formal meeting/an informative email to be send out to all members.
Municipality	The municipality should be involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to municipality interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project).
Parents' association	Parents' associations should be involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to parents' associations interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project).
Primary healthcare center/ Local Hospital & Clinic/Ministry of Health	These entities should be involved in the open schooling event where students share the results of their projects and communicate recommendations.	Due to their interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project).
National Directorate for Education (Ministry of Education)	The Ministry of Education is supporting the project and interested in the results in terms of students' learnings.	Due to their interest in novel methodologies for STEM education and role in policy making.	Invitation to participate in the open schooling event.

9. Plan: Plan Communication

a. Assure the right information to the right people, at the right time, in a useful format
b. Assure effective project meetings
c. Build the communications plan

Communications plan
(filled with examples, these may change according to your project organisation)

Organized by (from)	Participants (to)	What	When	How/Where	Purpose
Science Teacher	Team	Kick-off meeting	xxx month	Laboratory	- Provide a complete description of the project and the end product.
Science Teacher	Team	Team meeting	Weekly (i.e., every Wednesday)	IT classroom	- Overall plan for the project - Discuss project developments and plan next stage - Instruct team on their roles - Provide updates on the progress of the project and if there are any issues with completion
Science Teacher	Team and Parents	Meeting	Before the project starts (date to be defined)	School meeting room	- Explain the project and invite for participation in the survey

Organized by (from)	Participants (to)	What	When	How/Where	Purpose
Science Teacher Team	Parents	Meeting	Before the project starts (date to be defined)	Virtual meeting	- Explain the project and invite for participation in the survey and open schooling event.
Science Teacher Team School management	-School community -Municipality -Parents' association -Primary healthcare center/Hospital/clinic -Ministry of Education -Ministry of Health	Invitations sent to stakeholders for participation in open schooling event	Before the open schooling event (date to be defined)	Via email	- Explain the project and invite for participation in the open schooling event.

10. Finish the project planning by building the Charter

1.0 Project identification	
Name	Describe the project name and project acronym
Summary description	Describe the project in one paragraph
Project owner	Identify the owner of the project (e.g.: school X)
Project manager	Identify the project manager
Stakeholders	Identify the stakeholders and briefly describe why they are interested parties
Team and roles	Identify the team and sumarize the role of each resource in the project (e.g: student, ICT teacher, Science Teacher, School manager, designer, software developer…)

2.0 Needs that support the project
Which pain? Which need not solved by the current state-of-the-art? Which solution (s) are you going to deliver?

3.0 Project goals
Describe what you want to achieve in the short-term, medium term and long term. Follow SMART principles. *Examples* Project completed – March 22 Open schooling event – April 22

4.0 Project scope
Identify the tasks of the project

5.0 Key Deliverables
Identify goods or services produced as a result of the project. A deliverable could be a report, a document, a software product, a server upgrade or any other building block of an overall project. *Examples* Questionnaire Interview Guide Observations Gride Book Poster Infographic System map Brochures

6.0 Milestones and dates
Identify the principal landmarks of project execution stablished according to what is described in the project scope. *Examples* Survey concluded

Interviews concluded
Open schooling event prepared

7.0 Constraints

Identify the principal project constraints (cost, technical, other)

Examples
Budget 200 € (limit)
Project should be finished in 15 December (limit)

8.0 Risks and opportunities

Identify issues that may emerge in the future and influence project implementation
Examples
Modest number of responses to the survey
Modest number of people that accepted invitation to attend the open schooling event

9.0 Project success criteria

Identify the criteria or measures of success. These are the project acceptance criteria.
Examples
Project completed before Christmas period
Open schooling event in a community setting with the participation of the entire school community, parents, and local stakeholders.

10.0 Project success factors

Identify the factors that you will manage in order to positively influence the success of the project.

Examples
Appropriate engagement of students and parents.
Interest of teachers in project-based learning.

Suggested complementary Digital Educational Resources (DER) for teachers:
DER5: https://www.exploratorium.edu/audio/drama-immune-system
DER6: https://www.youtube.com/watch?v=g_RZWDBFJjI
DER7: https://www.youtube.com/watch?v=IUEWqHAbAGE
DER8: https://www.youtube.com/wtach?v=kN0WROnxaCg
DER9: https://www.khanacademy.org/science/high-school-biology/hs-human-body-systems/hs-the-immune-system/a/into-to-viruses
DER10: https://www.exploratorum.edu/search/immunity
DER11: https://youtu.be/HUSDvSknIgI
DER12: https://www.immunology.org/sites/default/files/Immune%20Encounters.pdf

Teaching – learning process for school project (summary):

- Preparation of Research tool (questionnaire) by the students
- Collection of evidence/data
- Analysis of collected data
- Presentation of analysed data in appropriate presentation formats (i.e., tables, graphs, charts, etc.)
- Dissemination of the results of the research project (Scientific poster / PowerPoint presentation)
- Presentation of the results of the research project at the open schooling event / publication of research project report at local community media / local educational website etc.

Expected outcomes of the teaching – learning process (summary):
Students will be able to:
- develop their own research tools to collect the required data in order to conduct their own scientific investigation
- evaluable and consider the advantages and limitations to the process of collecting data from their local community
- improve their collaboration and communication skills by working with their peers
- develop their critical thinking by applying acquired and existing knowledge

➢ design and propose their own planning on how to conduct their research and identify and communicate evidence-based findings on the establishment of immunological tolerance against SARS-Cov-19 infections in their own community.

Target Audience for Recommendations

Peers, teachers, parents, local school community and selected specialists in the field of immunology and/or epidemiology.

Main Partner responsible: UCY (University of Cyprus)

6. Project management resource and inquiry instruments on the topic of "The mathematical representation of an epidemic: the case of SIR (Susceptible, Infectious, or Recovered) modeling"

Overview

This educational scenario focuses on the mathematical modelling of an epidemic - the SIR modelling in particular - and the importance of non-pharmaceutical interventions for the promotion of public health. Students are initially introduced to the distinction between communicable and non-communicable diseases and express their conceptions about the function and importance of certain non-pharmaceutical interventions. Afterwards, they are concerned with various transmission routes and the way they affect the needed interventions. Through interactive maps and timelines students study the spatial and temporal evolution of endemic, epidemic and pandemic diseases in the past twenty years. Then, students are involved in successive inquiry processes, with a lot of scaffolding at answering the assigned questions at the beginning, but with complete independence in the end. During their inquiries students use three SIR simulations from the simplest to the more realistic one, and they study questions concerning the effect of epidemiological parameters (e.g. infectivity, incubation period, mortality, asymptomatics persentage), societal structure (existence of central locations, travelling and transport, healthcare system capacity) and non-pharmaceutical interventions (social distancing, quarantining, mask use, distance education) on the epidemic curve. Students, then, work in small groups and carry out a three-part school project. The first part is the design of a viable plan for the management of an epidemic outbreak by using the SIR models and authentic epidemic data. The second part concerns the input of authentic COVID-19 data to the SIR models and the comparison between the model outputs and the real COVID-19 values. The third is the making of a short-scale informative material targeting the general public, regarding the importance of applying non-pharmaceutical interventions during an epidemic. Student groups present their work and findings to one another and discuss about them.

Estimated duration

After initial socioscientific and technical background on the topic in classroom environment (5-6 sessions), 14 teaching hours organized in continuous two-hour sessions if possible.

School Research Project

Topics:

How could an epidemic outbreak be represented in a quantitative way?
To what degree could a scientific model be efficient in representing precisely and confronting an epidemic?
How do the characteristics of a communicable disease, citizen behavior and social organization features influence the progress of an epidemic?
What non-pharmaceutical interventions would you choose to restrict an epidemic outbreak?
Why are non-pharmaceutical interventions beneficial for public health?

Development process:

The school project subject is the SIR modeling of an epidemic and the use of non-pharmaceutical interventions. The entire school project is organized in seven two-hour teaching sessions during which students get firstly familiarized with various interactive SIR modelling environments and then apply their gained knowledge and skills in order to autonomously carry out the main part of the school project in small groups.

During sessions 1-4 students actively handle three different educational SIR environments –as well as some other educational resources- in groups of two under the supervision of their teacher. They participate in inquiry-based learning activities and they get convinient at handling the digital SIR simulations, that they are going to use throughout the project, at understanding the meaning of SIR graphs, at using the SIR models to test research hypotheses, at handling and distinguishing independent and dependent variables when testing hypotheses, at gathering and analyzing data, at designing experimental tests and at interpreting the data from the models to real world contexts. Moreover, they see how certain non-pharmaceutical interventions like quarantining, social distancing, restriction of travelling, distance working, distance schooling and using face masks can downsize the burden of an epidemic, 'flatten the curve' and come along with capacity of the healthcare system. All these skills and pieces of knowledge are prerequisite for the appropriate conduct of the school project.

During sessions 5-6 students form their main project four-or-five-member groups and carry out the main part of the project. Each team is responsible for a three-part school project, which includes a) the designing of a management plan of a hypothetical epidemic, by making a detailed plan or list of measures to-be-enforced, with the aid of SIR models and databases, b) the testing of the precision of SIR models by inputting authentic COVID-19 epidemic data retrieved from databases and testing the model predictions to the authentic data recorded in the databases, as well as interpreting the differences, and c) the design of a short informative campaign for the general public arguing on the importance of non-pharmaceutical interventions by making use of the various resources they have used during the learning sequence. The final outputs of the student projects are a detailed report or a diagram for the management of an epidemic, a report of the test of the models' precision and a digital presentation on the importance of non-pharmaceutical interventions. The teacher is constantly scaffolding the teams for all their work.

During session 7 student groups present their work to one another and receive feedback from the other groups and the teacher. After the presentations and the discussion following them, they present their project at a school festival to the teachers, students and parents attending and they could also send some of their project outputs to the local media or to municipal, health or educational infrastructures of the local society.

Project Management Framework and Instruments:

1. Plan: Determine How to Do It
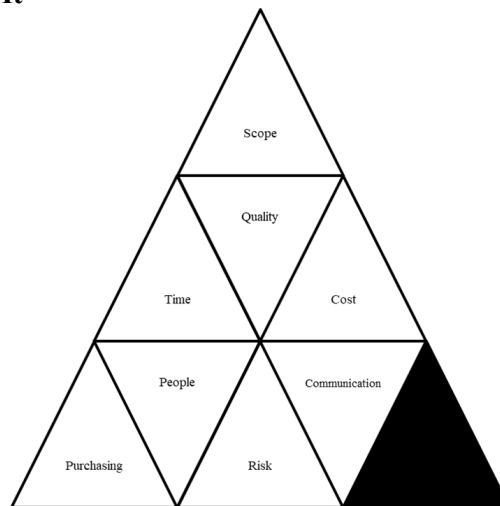
2. Plan: Define Project Scope

- What are the outputs?
Detailed list of measures to-be-enforced with arguments or relevant flow-chart (management report)
Detailed scientific report on the precision of models with certain parts (e.g. Tested model, Location and time tested, Data inputted, Modifications made, Model outputs, Authentic epidemic data, Conclusion, Discussion and test restrictions)
Informative 5-slide presentation about the importance of non-pharmaceutical interventions

-What are the requirements of project outputs?
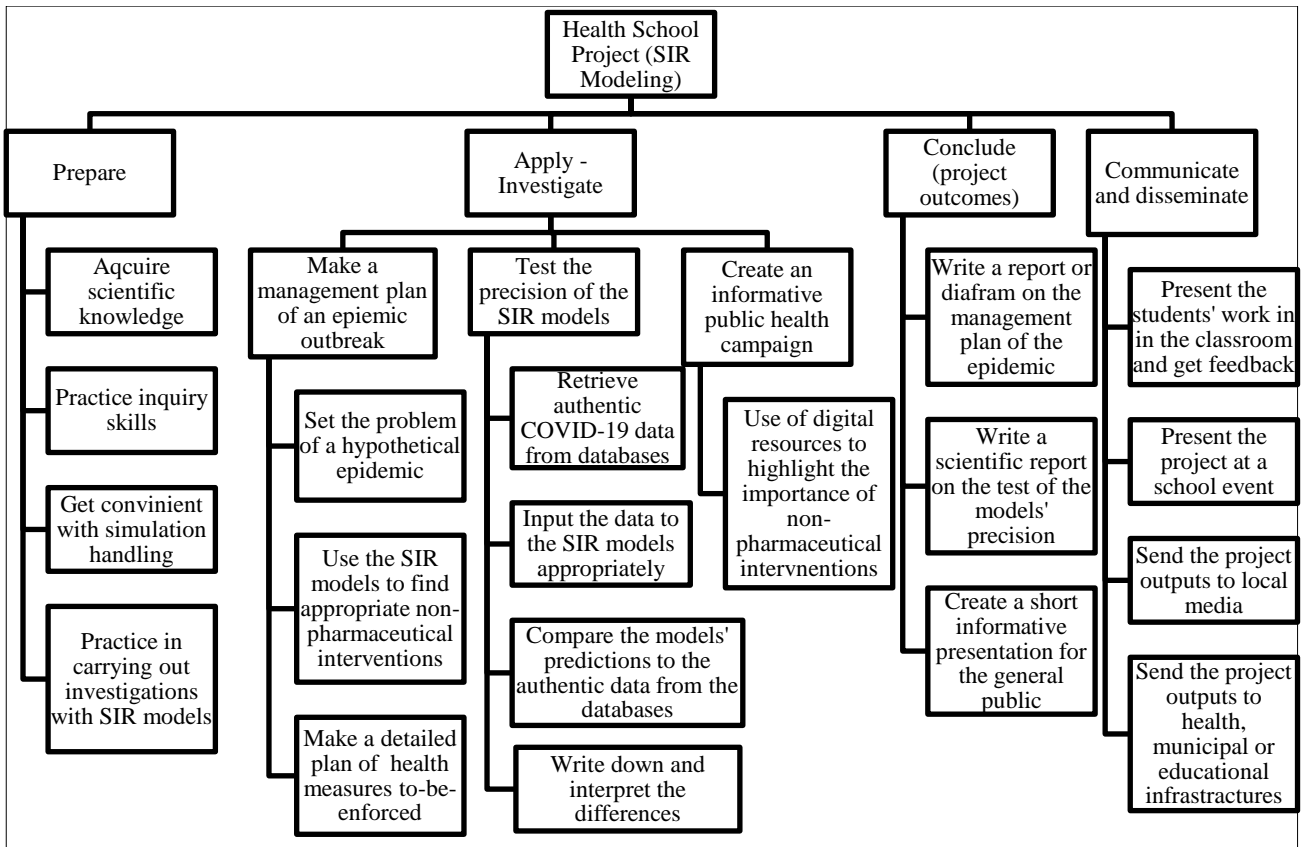A3 papers, computers with software for presentation development

- Are there any constraints to produce the project outputs?
The limitation of time (2 sessions of main project work)
Possible lack of interest on part of students

Work Breakdown Structure
(filled with examples, these may change according to your project organisation)

Health School Project (SIR Modeling)

- **Prepare**
  - Aqcuire scientific knowledge
  - Practice inquiry skills
  - Get convinient with simulation handling
  - Practice in carrying out investigations with SIR models
- **Apply - Investigate**
  - Make a management plan of an epiemic outbreak
    - Set the problem of a hypothetical epidemic
    - Use the SIR models to find appropriate non-pharmaceutical interventions
    - Make a detailed plan of health measures to-be-enforced
  - Test the precision of the SIR models
    - Retrieve authentic COVID-19 data from databases
    - Input the data to the SIR models appropriately
    - Compare the models' predictions to the authentic data from the databases
    - Write down and interpret the differences
  - Create an informative public health campaign
    - Use of digital resources to highlight the importance of non-pharmaceutical intervnentions
- **Conclude (project outcomes)**
  - Write a report or diafram on the management plan of the epidemic
  - Write a scientific report on the test of the models' precision
  - Create a short informative presentation for the general public
- **Communicate and disseminate**
  - Present the students' work in in the classroom and get feedback
  - Present the project at a school event
  - Send the project outputs to local media
  - Send the project outputs to health, municipal or educational infrastructures

3. Plan: Determine Project Time

  a. Define the detailed activities for each WBS element
  b. Put the activities in sequence
  c. Estimate the resources (human and acquisitions) for each activity
  d. Estimate the calendar time (days or weeks) for each activity
  e. Create the Gantt Chart

Resource Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources
Acquire knowledge, practice inquiry skills, handle digital simulations	8 hours	laptop or tablet, paper
Design a management plan of an epidemic	3 hours	laptop or tablet, paper
Study SIR models' precision	2 hours (overlapping with above)	laptop or tablet, paper
Write reports on the management plan and the models' precision study	1 hour (overlapping with above)	paper
Create digital presentation (campaign)	1 hour	laptop
Present the projects' outputs	2 hours	-

Gantt Chart
(filled with examples, these may change according to your project organisation)

Activity	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7
Acquire knowledge, practice inquiry skills, handle digital simulations	■	■	■	■			
Design a management plan of an epidemic					■	■	
Study SIR models' precision					■	■	
Write reports on the management plan and the models' precision study						■	
Create digital presentation (campaign)						■	
Present the projects' outputs							■

4. Plan: Determine Project Cost

    a.   Estimate how much each activity will cost

Note: include the cost for Labor, Supplies, overhead (like office space and equipment)

    b.   Add the estimates to determine the total cost of your project

Cost Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources	Human Resource Cost*	Other Resources Cost (supplies)
Acquire knowledge, practice inquiry skills, handle digital simulations	8 hours	laptop or tablet, paper	160 €	n.a
Design a management plan of an epidemic	3 hours	laptop or tablet, paper	60 €	n.a
Study SIR models' precision	2 hours (overlapping with above)	laptop or tablet, paper	40 €	n.a
Write reports on the management plan and the models' precision study	1 hour (overlapping with above)	paper	20 €	n.a
Create digital presentation (campaign)	1 hour	laptop	20 €	n.a
Present the projects' outputs	2 hours	-	40 €	n.a
Total	17h (some overlapping with each other)	-	340 €	-

* Example on how to calculate resources and budget, without connection to the PAFSE real context

5. Plan: Determine Project Quality

    a.   Ensure your project produces quality outputs
    b.   Plan what quality means to your project
    c.   Determine how you will ensure quality
    d.   Ensure your project produces quality outputs
    e.   Plan what quality means to your project
    f.   Determine how you will ensure quality

Quality Breakdown Structure
(filled with examples, these may change according to your project organisation)

Requirement	Quality planning	Quality assurance	Quality control
1.1	Minimum number of different issues incorporated in the epidemic management plan	Minimum number of different issues incorporated in the epidemic management plan: 6 (e.g. quarantining, social distancing, face masks, distance working etc)	Monitor the development of students' plans
1.2	Scientific report template on the test of the models' precision	Scientific report on the test of the models' precision with seven sections: time and place examined, data inputted, modifications made, models' predictions, authentic data, conclusions on models' precision, explaining the differences	Monitor the development of students' tests
1.3	Minimum number of slides per presentation	Minimum number of slides per presentation: 5	Monitor the development of students' presentations
1.4	Assessment rubric for project outputs	Assessment rubric with four criteria: scientific accuracy, methodological accuracy, effectiveness to its goals, proper presentation	Assess the project final outputs

6. Plan: Determine Project Risks
a. Identify the two types of risks (uncertain future events that can affect your project): threats have a negative impact on your project; opportunities have a positive impact on your project

Risk Breakdown Structure
(filled with examples, these may change according to your project organisation)

Risk	Probability (How likely is it to happen)	Impact (How big of an effect will it have)	Owner (who takes care about the risk)	Action Plan (initiatives to reduce threats and increase opportunities)
Emergence of a larger load of ideas by the students for the project than expected	Medium	High	Students: – Peter – Helen – Nicole	–Modification of the project outputs so as to fit the students' desires -Assignment of a part of the project as an optional homework task
Too large number of people that accepted invitation to attend the open schooling event	Low	Low	School Principal Luke Professor Anne	-Moving of the schooling event to a larger venue -Split of the school event to two successive repetitions of the events
Modest number of people that accepted invitation to attend the open schooling event	Medium	Medium	School Principal Luke Professor Anne Students: - John - Nick	- Invitations to the broader local community - More persistent invitations to students' friends and families -Grouping of different school events together to a bigger school event
Modest students' interest for the school project	Medium	High	Professor Michael	-Give motives to the students (e.g., presenting at the school event, project as an alternative assessment tool instead of tests) -Scaffold students who face difficulties

7. Plan: Plan Procurement Processes

a. Determine what goods and services you need
b. Have what you need at the time that you need it

Acquisitions Breakdown Structure
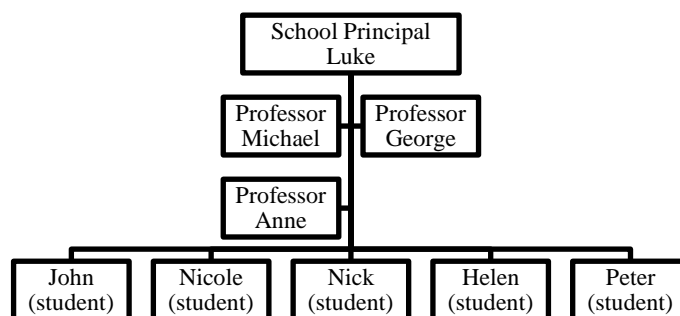*(filled with examples, these may change according to your project organisation)*

Supply	Supply Cost (supplies)	When to be available	How to be available
Paper	20 euros	In the beginning of the project	Commitment of school top management
Printer	50 euros	In the beginning of the project	Commitment of school top management
Laptop	700 euros	In the beginning of the project	Commitment of school top management

8. Plan: Plan People

a. Acquire the project team
b. Map the project team in the Organization Breakdown Structure
c. Assign the project team members to roles
d. Assign the project team members to activities
e. Train the project team
f. Determine how you will motivate and reward the team
g. Map Stakeholders – people or groups interested in the project
h. Determine how you will engage stakeholders in the project

Organization Breakdown Structure
(filled with examples, these may change according to your project organisation)

Responsibility assignment matrix
(filled with examples, these may change according to your project organisation)

Activity	Team members								
	John (student)	**Nicole** (student)	**Nick** (student)	**Helen** (student)	**Peter** (student)	**Professor Anne (Science)**	**Professor Michael (Maths)**	**Professor George (ICT)**	**School Principal Luke**
Acquire knowledge, practice inquiry skills, handle digital simulations	X	X	X	X	X	C/P	C/P		
Design a management plan of an epidemic			X	X	X/P	C/P		C/P	
Study SIR models' precision	X	X			X/P		C/P	C/P	
Write reports on the management plan and the models' precision study	X		X		X/P	C/P	C/P		
Create digital presentation (campaign)		X		X	X/P	C/P	C/P	C/P	
Present the projects' outputs	X	X	X	X	X	P	P	P	
Coordinate the overall implementation of the project						X	X	X	I
Coordinate the school event						X	X	X	I
Attend the school event and present their work	X	X	X	X	X	X	C/P	C/P	

Letter	Role
X	Executes work
P	Controls progress
C	Should be consulted
I	Should be informed

Stakeholders Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Directly involved in the project (yes/no)	Served or Affected by the Project	Likely to be user of the results of the project
Parents	yes	yes	yes
School community	yes	yes	yes
School management	yes	yes	yes
Municipality	no	yes	yes
Residents' association	no	yes	yes
Local Health Infrastructures	no	yes	yes
National Associations of Science and ICT teachers	no	no	yes
National Directorate for Education	no	no	yes
National Directorate For Health	no	no	yes
Local media	no	no	yes

Stakeholders Management Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Who they are and why should be involved in the project	Why the project is relevant for them	Strategies to obtain support
Parents	Students' families should attend the school event during which students will present their projects. The students' families will maximize their appreciation of the educational procedure and outputs as a result of the students' cooperation. They are also going to get informed on issues concerning public health literacy.	Due to their interest in their children's education and school well-being.	Attend the school project presentation in a school event.
School community	The school community should attend the school event during which students will present their projects. The school community will maximize their appreciation of the educational procedure and outputs as a result of the students' cooperation. The students might get inspired by the work of their classmates and the teachers might appreciate the educational procedure and be willing to get involved in the PAFSE consortium during the following years. They are also going to get informed on issues concerning public health literacy.	Due to their interest in students' education and school well-being, and the teachers' intention to be professionally developed.	Attend the school project presentation in a school event.
School management	The school Principal should promote the school project the educational and local community, in order to be enforced during the following years.	Due to their interest in the high quality of educational services provided by the school.	Attend the school project presentation in a school event.
Municipality	The municipality should be involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to municipality interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project).
Residents' association	Residents' associations should be involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to residents' associations interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project).

Local Health Infrastructures	Local Health Infrastructures should be involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to their interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project).
National Associations of Science and ICT teachers	National Scientific Associations of Science, ICT and Health Education should be shared with the material and the procedure of the project, as an example of novel instructive approaches with significant educational and scientific value.	Due to their interest in high-quality and state-of-the-art educational approaches in terms of Science, ICT and Health education.	Presentation of the school project in scientific conferences.
National Directorate for Education	The National Directorate for Education is supporting the project and interested in the results in terms of students' learning.	Due to their interest in novel methodologies for STEM and inquiry-based education, and active citizenship.	Invitation to participate in the open schooling event. Sharing of a sample of the project material (along with a summary of the project) to the people of the Directorate, responsible for the communication and school initiatives.
National Directorate For Health	The National Directorate for Health is supporting the project and interested in the results in terms of effective health education and awareness.	Due to their interest in effective methodologies for public health education and awareness in the school environment, having the recent experience of the COVID-19 pandemic.	Invitation to participate in the open schooling event. Sharing of a sample of the project material (along with a summary of the project) to the people of the Directorate, responsible for the communication and school initiatives.
Local media	The Local Media should be shared with some of the school project descriptions, outputs and students' experiences in terms of exceptional students' work from the local community.	Due to their interest in exceptional pieces of work by members of the local community.	Invitation to participate in the open schooling event. Sharing a description of the project procedure, outputs and students' experiences with the local media

9. Plan: Plan Communication

a. Assure the right information to the right people, at the right time, in a useful format
b. Assure effective project meetings
c. Build the communications plan

Communications plan
(filled with examples, these may change according to your project organisation)

Organized by (from)	**Participants** (to)	**What**	**When**	**How/Where**	**Purpose**
Professor Anne	Team	Kick-off meeting	Before the project starts (date to be defined)	Laboratory	Provide a complete description of the project and what the end product will be.
Professors George, Michael and Anne	Parents	Meeting	Before the project starts (date to be defined)	ICT classroom or virtual meating	Explain the project, ask for support and cooperation when needed and invite for participation in the open schooling event.

Organized by (from)	Participants (to)	What	When	How/Where	Purpose
Professor George	Team	Team meeting	Every week (e.g. Wednesday)	IT classroom	- Overall plan for the project - Discuss project developments and plan next stage - Instruct team on how to carry out the following steps - Monitor the progress of the project and if there are any issues with completion
Professor George	Team	Professors Meeting	Every two weeks	Virtual meating	-Monitor the general progress of the project -Discuss any difficulties found during the project depth and find ways to overcome them -Discuss alternative options for the enactment of the educational scenarios
Professors George, Michael and Anne	Parents	Invitation to parents' participation in open schooling event	One or two weeks before the open schooling event	By email	Explain the project and invite for participation in the open schooling event.
Professors George, Michael and Anne	School community, Municipality, Residents' association Local Health Infrastructures, Directorate for Education, Directorate for Health, Local media	Invitations to stakeholders' participation in open schooling event	Before the open schooling event (date to be defined)	By email	Explain the project and invite for participation in the open schooling event.
Professors George, Michael and Anne	Parents, School Principal, School community, Municipality, Residents' association Local Health Infrastructures, Directorate for Education, Directorate for Health, Local media	Open schooling event	Date to be defined	Open schooling venue	-Present an overview of the program -Have the students present their work during the school projects -Have the students share their experiences -Offer the participants proposals for dissemination activities in order to expand the outreach of the project.
Professor George	School Principal	After-open-schooling-event meeting	Two days after the open schooling event	Principal's office	-Present the School Principal an overview of the school projects -Present the School Principal an overview of the open schooling event -Ask the principal if they would be willing to make clusters with other schools in order to support even more expanded school networks working in similar projects in the future.
Professor Anne	Team	Final team meeting	One week after the open schooling event	Laboratory	-Make a retrospect of the project -Discuss whether they are going to support similar activities in the future -Discuss ideas for further dissemination of the student project.

10. Plan: Finish the project planning by building the Charter

1.0 Project identification	
Name	Partnerships for Science Education – Greece [PAFSE-GR]
Summary description	Students participate in active-based learning activities and carry out their own prototype research and material design in terms of STEM education and public health. In particular, they are engaged in the study of SIR models as a means of mathematical description of an epidemic and in the importance of non-pharmaceutical interventions. Students carry out a three-part project which includes the design of a management plan of a hypothetical epidemic, the test of the precision of SIR models and the design of health communication material about the importance of non-pharmaceutical interventions.
Project owner	2nd Model Junior High School of Athens (example)
Project manager	Professor Anne
Stakeholders	Parents (Interest in their children's high-quality education) School Community (Interest in achievements of other members of the school community) School Management (Interest of high-quality educational services provided by the school) Municipality (Interest in school work in their area) Residents' Association (Interest in students' work from the local society) Local Health Infrastructures (Interest from public health education project by schools from the local society) National Associations of Science and ICT Education (Interest in innovative educational actions in the fields of STEM, ICT and Health Education) National Directorate for Education (Interest in innovative school educational projects) National Directorate for Health (Interest in school public health educational projects) Local media (Interest in achievements by schools of the local community)
Team and roles	Professor Anne (Science Professor) Professor Michael (Maths Professor) Professor George (ICT Professor) School Principal Luke (School Principal) Nick (Student) Nicole (Student) Helen (Student) Peter (Student) John (Student)

2.0 Needs that support the project
-The need for active and experiential school education which is not supported by the largest part of the Curriculum, yet boosts students' learning outputs, soft skills and interest in learning. The current state of education lacks active learning, inquiry-based learning, project-based learning and other modern educational approaches which serve several educational benefits to students. -The need for more effective STEM education which both provides all students with fundamental STEM skills for their everyday decision-making, and makes more students more intensely interested in STEM fields, even follow STEM careers in the future. Few students have a love for STEM subjects and even fewer have an aspiration to follow STEM related professional careers. This STEM educational projects hopes to bring more students in touch to the real essence of STEM theory and practice and make them love this field. -The need for more effective Public Health Education. Public Health is a major health issue which is often undermined in Health Education. As the COVID-19 pandemic highlighted, personal health-related decisions affect the society and the way the society behaves affects every person in particular. Moreover, communicable diseases pose a constant threat for Public Health for every country in the world. The project aims to offer high-quality Public Health Education to students. -The need for Education with a view to active citizenship. During this project students study the interrelations between science and the everyday social context, and realize the importance of informed decision-making for science topics in everyday lives. Connection to social issues often lacks from science and STEM education. This project aims to give students the opportunity to understand the close entanglements of science and society and be active citizens in the future.

3.0 Project goals
Teachers' professional workshop on the project completed – October 15 Project initiated – March 15 Project completed – April 20 Open schooling event – April 30

4.0 Project scope
The scope of the project is to engage students in an inquiry- and project-based learning process on topics regarding public health (SIR modeling, in particular) with a final dissemination of the project in an open schooling event.

5.0 Key Deliverables

Worksheets from students' educational activities
Report or diagram on the management of an epidemic
Scientific report on the study of the precision of SIR models
Informative digital presentation on the importance of non-pharmaceutical interventions

6.0 Milestones and dates

Introductory work for the main project of students done
Final report on the epidemic management written
Final report on the models' precision testing written
Presentation on the importance of non-pharmaceutical interventions made
Students' presentations among one another in the classroom done
Open schooling event prepared
Open schooling event done

7.0 Constraints

Participation of at least 12 students in the project (limit)
Participation of at least 70 people in the open schooling event (limit)
Project should be finished on 30 April (limit)

8.0 Risks and opportunities

Modest number of people that accepted invitation to attend the open schooling event
Too many people that accepted invitation to attend the open schooling event
Larger load of idea emerging by students
Modest interest of students for the lesson

9.0 Project success criteria

Project completed before Easter period.
High-quality project outputs according to the assessment rubrics
High students' interest and participation in the project and the open schooling event
Open schooling event with the participation of the entire school community, parents, and local stakeholders.

10.0 Project success factors

Appropriate engagement of students and parents.
Appropriate time management during the lessons
Interest of teachers in the school project pillars (open schooling, inquiry-based learning, socioscientific issues).
Adequate attendance of stakeholders in the open schooling event

Teaching-learning process milestones:

1. Students will be able to describe SIR graphs and handle SIR simulations
2. Students will be able to use SIR simulations to explain SIR simulation to explain why non-pharmaceutical interventions are important
3. Students will be able to use SIR simulations to make decisions on measures to-be-enforced during a hypothetical epidemic and argue on their choces
4. Students will be able to suggest some possible reasons for the differences between an SIR simulation and a real society during an epidemic
5. Students will be able to use scientific arguments to explain why non-pharmaceutical interventions are crucial in fighting an epidemic.

Teaching-learning process for school project (summary):

1. Background education and practice on SIR models and the effect of non-pharmaceutical interventions
2. Preparation of a draft plan on the management of a hypothetical epidemic, with the aid of the SIR models
3. Test of the precision of SIR models by comparing them to authentic COVID-19 data from online databases
4. Writing the final reports for tasks 2. and 3.
5. Preparation of a health communication digital presentation about the importance of non-pharmaceutical interventions, with material from digital resources
6. Presentation of teams' work to one another in the school classroom
7. Presentation of the whole project and the students' work in an open schooling event

Organization of the open schooling event:

1. The team leader of the projects gives a short introduction and description to the attendants about the identity, the scope and the processes of the school project.
2. Each project output (reports, presentations with the aid of tablets) is presented by the students in a community setting (e.g., exposition center, garden, museum, science fair).
3. Students will communicate their work by using science-based argumentation. Students appeal to the action of all in health of the community, providing great understanding that health literacy and health promotion is a responsibility of all, not only of the ministry of health or healthcare providers. They also make notions on their understandings of scientific models, their use in science and policy making.
4. Students present their alternative management plans of epidemics and scientifically argue about the options they made. They can use the SIR models in tablets or laptops to ground their arguments. They also communicate the mini-research they made about the precision of scientific models and explain their conclusions. They show, moreover, their health communication presentations regarding the importance of non-pharmaceutical interventions and communicate the need to enforce hygiene measures such as hand-washing, quarantining and social distancing.
5. Students, parents, school community and relevant local stakeholders attend the event and understand how SIR models work, how they help us make policy measures and predict the evolution of an epidemic, and how non-pharmaceutical interventions can protect as for the maximization or even the outbreak of new epidemics.

Data Analysis and Reporting

Use of educational SIR simulations for testing how effective various public health interventions would be, by changing the simulation variables.

Input of authentic data from databases into the SIR models and comparison between model outputs and the authentic epidemiological data.

Creation of a short informative presentation for the general public, arguing for the importance of non-pharmaceutical interventions for the promotion of public health.

Preparation of a short, written report reviewing the project conclusions and presentation of the conclusion and the material produced to the rest of the class.

Target Audience for Recommendations

The rest of the class, maybe teachers and students of the entire school providing the project is presented at a school event. The parents of the students or even local authorities could also attend the event.

Some of the highest-quality informative material made by the students could be distributed to members of the local community (e.g., health structures, municipal authorities). Some of the informative material and the students' proposed action plan could be communicated via local media (printed or online press), and if the quality of the study of the model precision, or the overall project in general, is high, it could be presented in a student conference.

Public Debate and Recommendations (based on research results)

Presentation of the project outputs within a school event. If the quality of the project outputs is high, they could be communicated through the local media, in health structures, through local governmental, municipal or educational authorities, or in student conferences.

Main partner responsible: UOI

7. Project management resource and inquiry instruments on the topic of "Social determinants of health during an epidemic/pandemic outbreak"

Overview

This educational scenario focuses firstly on the social determinants of health during an epidemic, and secondly on some environmental issues concerning communicable diseases, with emphasis on the recent COVID-19 pandemic. Initially, students express their views and attitudes towards the social and environmental determinants of communicable diseases via filling in a short questionnaire and constructing a graphic organizer (concept or mind map). A first discussion on students' initial ideas follows. Afterwards, they study the origin of communicable diseases, with emphasis on recent epidemics and pandemics. They realise their animal origin and correlate it to our modern lifestyle. Then, students critically read some selected information sources (texts, videos and infographics) and study the ways in which social inequities lead to health inequities. Students adopt the role of a citizen with specific personal and societal features (e.g. gender, age, profession, educational level etc.) in a role game, in which they apply what they have learnt during the previous teaching phases. The roles that students adopt will probably be quite distant from themselves. They have to describe the role's personal experience of an epidemic, make health decisions and put values in a scale according to the role's experience of the epidemic. Students put the values in a scale according to their personal criteria, as well. Then, they move on to the school project phase, during which they design a questionnaire and conduct a short social research via the Internet on the effect the COVID-19 pandemic had on the local society. They try to bring the citizens' personal experiences of the pandemic to the surface, and especially the way the pandemic affected their way of living. Students design the questionnaire, collect and handle quantitative or qualitative data by using proper techniques and present the project findings in a school festival or even communicate them to the local society.

Estimated duration

After initial socioscientific and technical background on the topic in classroom environment (5-6 sessions), 12 teaching hours organized in continuous two-hour sessions if possible.

School Research Project

Topics:

How did people of my society experience the COVID-19 pandemic?
How can an epidemic crisis affect various social groups?
How did the COVID-19 pandemic affect social groups in the local society?

Development process:

The school project subject is the social determinants of health during an epidemic or pandemic. The entire school project is organized in six two-hour teaching sessions during which students get firstly familiarized with the notions of social determinants of health and health disparities in the context of the COVID-19 pandemic and then apply their gained knowledge and skills in order to autonomously carry out the main part of the school project in small groups.

During sessions 1-3 students are actively engaged with the issue of social determinants of health during the COVID-19 pandemic and the way social disparities were magnified and lead to health disparities. Firstly, they critically read texts and infographics and watch videos shedding light to different aspects of health disparities during the COVID-19 pandemic (e.g. differential hospitalization and mortality rates, differential exposure risks, differential access to health-related information and different health literacy levels) which were all the result of social disparities, e.g. concerning gender, profession, socioeconomical status, educational level, ethnic descent, digital literacy etc. Then, students attempt to approach the experience of the COVID-19 pandemic that felt different social groups and how this experience affected their decision making and values hierarchy. These activities constitute a prerequisite background in order to attempt to investigate the personal experience of the COVID-19 pandemic and the health disparities that emerged, during their research project.

During session 4 students form their main project four-or-five-member groups and begin their school project. The school project is an investigation of how the local society has experienced the COVID-19 pandemic, and whether some health disparities can be identified. The social research is going to be done with questionnaires developed by the students, and then the results are going to be analyzed. During session 4 students agree on the sections of the entire questionnaire and each student group is responsible for one section. Each section stands for a research question. Each student team is responsible for formulating questions for a section of the

questionnaire according to some guidelines given. Afterwards, each team is given the questions of another team to give feedback and cross-check them, and the classroom agrees on the final form of the questionnaire. The questionnaire is distributed on the Internet and gets completed by members of the students' families, the school and the local community. During session 5 students receive the completed questionnaires and analyze them. Each team is responsible for analyzing the part of the questionnaire which they had formulated questions for. Students handle the gathered data with appropriate ways depending on whether they are quantitative or qualitative. They group similar answers together, stand out some characteristic answers, calculate statistical measures (e.g. mean, median, range, frequency, frequency %) for quantitative and qualitative data, and depict them graphically (e.g. bar chart, histogram, pie chart, scatterplot). They draw a short conclusion driven from the data analysis and suggest some possible complementary research approaches. The session ends with the students completing the intermediate 'data analysis' reports.

During session 6 all the students teams discuss their findings and see what they agree and what they disagree on. Then, they go on to write the final report of the entire research with the structure of a typical academic paper (Introduction, Methodology, Results, Conclusion). Each group writes 2-3 sentences in the part of the results, and they formulate together what total conclusions they have driven to.

Project Management Framework and Instruments

1. Plan: Determine How to Do It
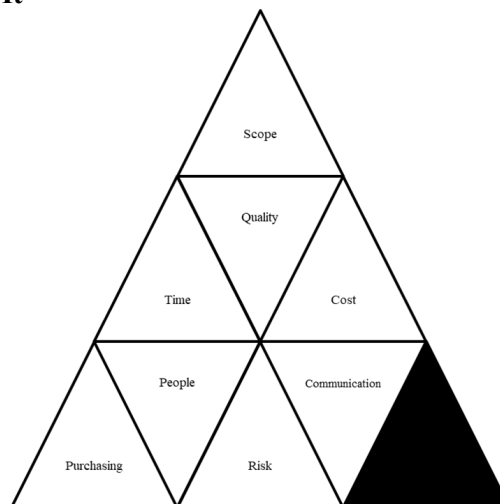
2. Plan: Define Project Scope

- What are the outputs?
Questionnaires for social school research
Intermediate reports on data analysis
Final scientific report on the research project

-What are the requirements of project outputs?
A3 papers, computers with software for questionnaire development and distribution, and fundamental statistical analysis (graphs)
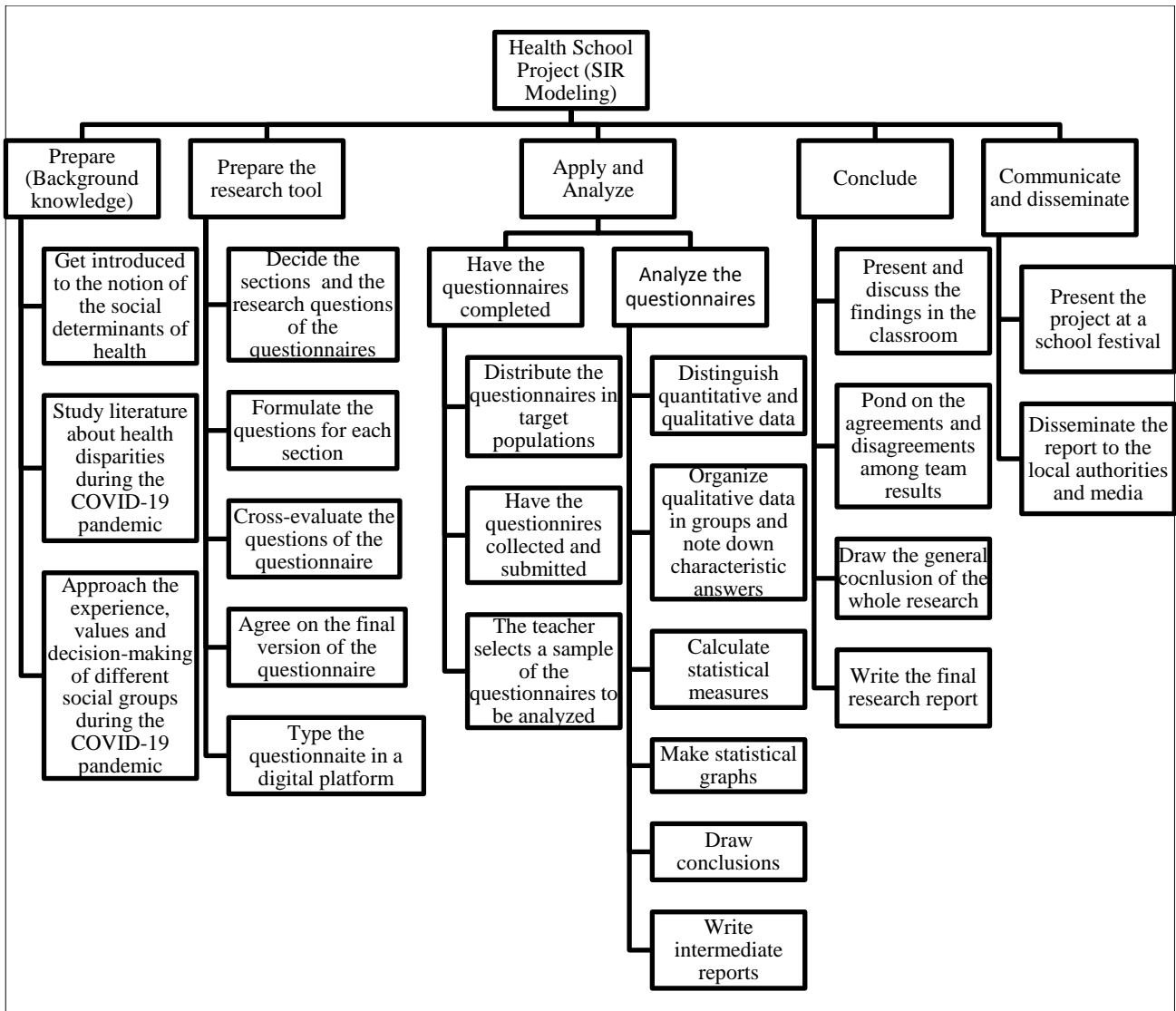
- Are there any constraints to produce the project outputs?
The limitation of time (3 sessions of main project work)
Possible lack of interest on part of students

Work Breakdown Structure
(filled with examples, these may change according to your project organisation)

```
                          Health School
                          Project (SIR
                            Modeling)

  Prepare          Prepare the      Apply and          Conclude      Communicate
 (Background        research tool     Analyze                       and disseminate
  knowledge)

Get introduced    Decide the      Have the         Distinguish    Present and
to the notion of  sections and the questionnaires   quantitative and discuss the
the social        research questions completed      qualitative data findings in the   Present the
determinants of   of the                                            classroom        project at a
health            questionnaires                                                      school festival

Study literature  Formulate the   Distribute the   Organize        Pond on the
about health      questions for    questionnaires in qualitative data agreements and  Disseminate the
disparities       each section     target           in groups and   disagreements    report to the
during the                        populations      note down       among team        local authorities
COVID-19                                            characteristic  results           and media
pandemic          Cross-evaluate                    answers
                  the questions of Have the
Approach the      the              questionnires    Calculate       Draw the general
experience,       questionnaire    collected and    statistical     cocnlusion of the
values and                        submitted        measures        whole research
decision-making   Agree on the final
of different      version of the   The teacher      Make statistical Write the final
social groups     questionnaire    selects a sample graphs          research report
during the                        of the
COVID-19          Type the         questionnaires to Draw
pandemic          questionnaite in be analyzed     conclusions
                  a digital platform
                                                    Write
                                                    intermediate
                                                    reports
```

3. Plan: Determine Project Time

a. Define the detailed activities for each WBS element
b. Put the activities in sequence
c. Estimate the resources (human and acquisitions) for each activity
d. Estimate the calendar time (days or weeks) for each activity
e. Create the Gantt Chart

Resource Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources
Prepare the background knowledge on social determinants of health and health disparities during the COVID-19 pandemic	6 hours	laptop or tablet, paper
Prepare the research tool (questionnaire)	2 hours	laptop, paper
Distribute the questionnaires and have the questionnaires completed	1 hour	laptop or tablet
Analyze the results of the questionnaires	2 hours	laptop, paper
Draw conclusions and write the final research report	2 hours	laptop, paper

Gantt Chart
(filled with examples, these may change according to your project organisation)

Activity	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
Prepare the background knowledge on social determinants of health and health disparities during the COVID-19 pandemic	■	■	■			
Prepare the research tool (questionnaire)				■		
Distribute the questionnaires and have the questionnaires completed				■	■	
Analyze the results of the questionnaires					■	
Draw conclusions and write the final research report						■

4. Plan: Determine Project Cost

   a. Estimate how much each activity will cost

Note: include the cost for Labor, Supplies, overhead (like office space and equipment)

   b. Add the estimates to determine the total cost of your project

Cost Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources	Human Resource Cost*	Other Resources Cost (supplies)
Prepare the background knowledge on social determinants of health and health disparities during the COVID-19 pandemic	6 hours	laptop or tablet, paper	120 €	n.a
Prepare the research tool (questionnaire)	2 hours	laptop, paper	40 €	n.a
Distribute the questionnaires and have the questionnaires completed	1 hour	laptop or tablet	20 €	n.a
Analyze the results of the questionnaires	2 hours	laptop, paper	40 €	n.a
Draw conclusions and write the final research report	2 hour	laptop, paper	40 €	n.a
Total	13 h	-	260 €	-

* Example on how to calculate resources and budget, without connection to the PAFSE real context

5. Plan: Determine Project Quality

   a. Ensure your project produces quality outputs
   b. Plan what quality means to your project
   c. Determine how you will ensure quality
   d. Ensure your project produces quality outputs
   e. Plan what quality means to your project
   f. Determine how you will ensure quality

Quality Breakdown Structure
(filled with examples, these may change according to your project organisation)

Requirement	Quality planning	Quality assurance	Quality control
1.1	Minimum number of sections in the questionnaires	Minimum number of sections in the questionnaire: 4	Monitor the questionnaire development
1.2	Minimum number of questions per questionnaire sections	Minimum number of questions per questionnaire section: 5	Monitor the questionnaire development
1.3	Minimum number of questionnaires analyzed	Minimum number of questionnaires analyzed: 12	Monitor the questionnaire distribution, completion and analysis
1.4	Intermediate data analysis report template	Intermediate data analysis report with as many sections as the questions (min. 5), plus one more for the overall conclusion: Each question must include written summary of results, numerical statistical measure(s), statistical graph(s).	Monitor the data analysis, Assess of the data analysis report

Requirement	Quality planning	Quality assurance	Quality control
1.5	Final research report template	Final research report with four sections: Introduction, Methodology, Results, Conclusion	Monitor the report writing
1.6	Assessment rubric for the final project output (research report)	Assessment rubric with four criteria: scientific accuracy, methodological accuracy, effectiveness to its goals, proper presentation	Assess the project outputs

6. Plan: Determine Project Risks

a. Identify the two types of risks (uncertain future events that can affect your project): threats have a negative impact on your project; opportunities have a positive impact on your project

Risk Breakdown Structure
(filled with examples, these may change according to your project organisation)

Risk	Probability (How likely is it to happen)	Impact (How big of an effect will it have)	Owner (who takes care about the risk)	Action Plan (initiatives to reduce threats and increase opportunities)
Emergence of a larger load of ideas by the students for the project than expected	Medium	High	Students: – Peter – Helen – Nicole	–Modification of the project outputs so as to fit the students' desires -Assignment of a part of the project as an optional homework task
Too large number of people that accepted invitation to attend the open schooling event	Low	Low	School Prinipical Luke Professor Anne	-Moving of the schooling event to a larger venue -Split of the school event to two successive repetitions of the events
Modest number of people that accepted invitation to attend the open schooling event	Medium	Medium	School Principal Luke Professor Anne Students: - John - Nick	- Invitations to the broader local community - More persistent invitations to students' friends and families -Grouping of different school events together to a bigger school event
Modest students' interest for the school project	Medium	High	Professor Michael	-Give motives to the students (e.g., presenting at the school event, project as an alternative assessment tool instead of tests) -Scaffold students who face difficulties

7. Plan: Plan Procurement Processes

a. Determine what goods and services you need
b. Have what you need at the time that you need it

Acquisitions Breakdown Structure
(filled with examples, these may change according to your project organisation)

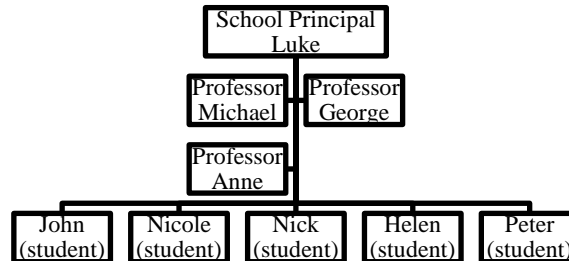| Supply	Supply Cost (supplies)	When to be available	How to be available
Paper	20 euros	In the beginning of the project	Commitment of school top management
Printer	50 euros	In the beginning of the project	Commitment of school top management
Laptop	700 euros	In the beginning of the project	Commitment of school top management

8. Plan: Plan People

a. Acquire the project team
b. Map the project team in the Organization Breakdown Structure
c. Assign the project team members to roles

d. Assign the project team members to activities
e. Train the project team
f. Determine how you will motivate and reward the team
g. Map Stakeholders – people or groups interested in the project
h. Determine how you will engage stakeholders in the project

Organization Breakdown Structure
(filled with examples, these may change according to your project organisation)

Responsibility assignment matrix
(filled with examples, these may change according to your project organisation)

Activity	Team members								School Principal Luke
	John (student)	**Nicole** (student)	**Nick** (student)	**Helen** (student)	**Peter** (student)	**Professor Anne (Social Sciences)**	**Professor Michael (Science)**	**Professor George (ICT)**	
Prepare the background knowledge on social determinants of health and health disparities during the COVID-19 pandemic	X	X	X	X	X	C/P	C/P		
Prepare the research tool (questionnaire)	X	X	X	X	X/P	C/P		C/P	
Distribute the questionnaires and have the questionnaires completed	X		X		X	C/P	C/P	C/P	
Analyze the results of the questionnaires	X	X	X	X	X/P	C/P	C/P	C/P	
Draw conclusions and write the final research report	X	X	X	X	X/P	C/P	C/P	C/P	
Coordinate the overall implementation of the project						X	X	X	I
Coordinate the school event						X	X	X	I
Attend the school event and present their work	X	X	X	X	X	X	C/P	C/P	

Letter	Role
X	Executes work
P	Controls progress
C	Should be consulted
I	Should be informed

Stakeholders Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Directly involved in the project (yes/no)	Served or Affected by the Project	Likely to be user of the results of the project
Parents	yes	yes	yes
School community	yes	yes	yes
School management	yes	yes	yes
Municipality	no	yes	yes
Residents' association	no	yes	yes
Local Health Infrastructures	no	yes	yes
National Associations of Science and ICT teachers	no	no	yes
National Directorate for Education	no	no	yes
National Directorate For Health	no	no	yes
Local media	no	no	yes

Stakeholders Management Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Who they are and why should be involved in the project	Why the project is relevant for them	Strategies to obtain support
Parents	Students' families should attend the school event during which students will present their projects. The students' families will maximize their appreciation of the educational procedure and outputs as a result of the students' cooperation. They are also going to get informed on issues concerning public health literacy.	Due to their interest in their children's education and school well-being.	Attend the school project presentation in a school event.
School community	The school community should attend the school event during which students will present their projects. The school community will maximize their appreciation of the educational procedure and outputs as a result of the students' cooperation. The students might get inspired by the work of their classmates and the teachers might appreciate the educational procedure and be willing to get involved in the PAFSE consortium during the following years. They are also going to get informed on issues concerning public health literacy.	Due to their interest in students' education and school well-being, and the teachers' intention to be professionally developed.	Attend the school project presentation in a school event.
School management	The school Principal should promote the school project the educational and local community, in order to be enforced during the following years.	Due to their interest in the high quality of educational services provided by the school.	Attend the school project presentation in a school event.

Stakeholder name	Who they are and why should be involved in the project	Why the project is relevant for them	Strategies to obtain support
Municipality	The municipality should be involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to municipality interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project).
Residents' association	Residents' associations should be involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to residents' associations interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project).
Local Health Infrastructures	Local Health Infrastructures should be involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to their interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project).
National Associations of Science and ICT teachers	National Scientific Associations of Science, ICT and Health Education should be shared with the material and the procedure of the project, as an example of novel instructive approaches with significant educational and scientific value.	Due to their interest in high-quality and state-of-the-art educational approaches in terms of Science, ICT and Health education.	Presentation of the school project in scientific conferences.
National Directorate for Education	The National Directorate for Education is supporting the project and interested in the results in terms of students' learning.	Due to their interest in novel methodologies for STEM and inquiry-based education, and active citizenship.	Invitation to participate in the open schooling event. Sharing of a sample of the project material (along with a summary of the project) to the people of the Directorate, responsible for the communication and school initiatives.
National Directorate For Health	The National Directorate for Health is supporting the project and interested in the results in terms of effective health education and awareness.	Due to their interest in effective methodologies for public health education and awareness in the school environment, having the recent experience of the COVID-19 pandemic.	Invitation to participate in the open schooling event. Sharing of a sample of the project material (along with a summary of the project) to the people of the Directorate, responsible for the communication and school initiatives.
Local media	The Local Media should be shared with some of the school project descriptions, outputs and students' experiences in terms of exceptional students' work from the local community.	Due to their interest in exceptional pieces of work by members of the local community.	Invitation to participate in the open schooling event. Sharing a description of the project procedure, outputs and students' experiences with the local media

9. Plan: Plan Communication

    a.   Assure the right information to the right people, at the right time, in a useful format
    b.   Assure effective project meetings
    c.   Build the communications plan

Communications plan
(filled with examples, these may change according to your project organisation)

Organized by (from)	Participants (to)	What	When	How/Where	Purpose
Professor Anne	Team	Kick-off meeting	Before the project starts (date to be defined)	Laboratory	Provide a complete description of the project and what the end product will be.
Professors George, Michael and Anne	Parents	Meeting	Before the project starts (date to be defined)	ICT classroom or virtual meating	Explain the project, ask for support and cooperation when needed for the distribution and completion of the questionnaires, and invite them to participate in the open schooling event.
Professor George	Team	Team meeting	Every week (e.g. Wednesday)	IT classroom	- Overall plan for the project - Discuss project developments and plan next stage - Instruct team on how to carry out the following steps - Monitor the progress of the project and if there are any issues with completion
Professor George	Team	Professors Meeting	Every two weeks	Virtual meating	-Monitor the general progress of the project -Discuss any difficulties found during the project depth and find ways to overcome them -Discuss alternative options for the enactment of the educational scenarios
Professor Michael	Parents, School community	Invitation to participate in the school research	When the questionnaires are ready	By email	-Inform the parents and the members of the school community about the phase of the school project -Ask them to fill in and submit the questionnaires anonymously -Ask them to further send the questionnaires to friends, relatives or business partners to expand the network
Professor Michael	Team	Questionnaire first-reading meeting	When questionnaires are collected	Virtual meeting or IT classroom	-Have a quick look to the questionnaires that have been collected -Exclude the questionnaires that have not been filled in properly -Select the sample of e.g., 20 questionnaires that students are going to analyze.
Professors George, Michael and Anne	Parents	Invitation to parents' participation in open schooling event	One or two weeks before the open schooling event	By email	Explain the project and invite for participation in the open schooling event.
Professors George, Michael and Anne	School community, Municipality, Residents' association	Invitations to stakeholders' participation in open schooling event	Before the open schooling event (date to be defined)	By email	Explain the project and invite for participation in the open schooling event.

Organized by (from)	Participants (to)	What	When	How/Where	Purpose
	Local Health Infrastructures, Directorate for Education, Directorate for Health, Local media				
Professors George, Michael and Anne	Parents, School Principal, School community, Municipality, Residents' association Local Health Infrastructures, Directorate for Education, Directorate for Health, Local media	Open schooling event	Date to be defined	Open schooling venue	-Present an overview of the program -Have the students present their work during the school projects -Have the students share their experiences -Offer the participants proposals for dissemination activities in order to expand the outreach of the project.
Professor George	School Principal	After-open-schooling-event meeting	Two days after the open schooling event	Principal's office	-Present the School Principal an overview of the school projects -Present the School Principal an overview of the open schooling event -Ask the principal if they would be willing to make clusters with other schools in order to support even more expanded school networks working in similar projects in the future.
Professor Anne	Team	Final team meeting	One week after the open schooling event	Laboratory	-Make a retrospect of the project -Discuss whether they are going to support similar activities in the future -Discuss ideas for further dissemination of the student project.

10. Plan: Finish the project planning by building the Charter

1.0 Project identification	
Name	Partnerships for Science Education – Greece [PAFSE-GR]
Summary description	Students participate in active-based learning activities and carry out their own prototype research and material design in terms of STEM education and public health. In particular, they are engaged in the study of the social determinants of health and health disparities during an epidemic or pandemic. Students carry out an authentic empirical research with questionnaires in order to study the impact of the COVID-19 pandemic in their local society. They develop the questionnaire, analyze the answers, draw conclusions and write a research report on their project
Project owner	2nd Model Junior High School of Athens (example)
Project manager	Professor Anne
Stakeholders	Parents (Interest in their children's high-quality education) School Community (Interest in achievements of other members of the school community) School Management (Interest of high-quality educational services provided by the school) Municipality (Interest in school work in their area) Residents' Association (Interest in students' work from the local society) Local Health Infrastructures (Interest from public health education project by schools from the local society)

	National Associations of Science and ICT Education (Interest in innovative educational actions in the fields of STEM, ICT and Health Education) National Directorate for Education (Interest in innovative school educational projects) National Directorate for Health (Interest in school public health educational projects) Local media (Interest in achievements by schools of the local community)
Team and roles	Professor Anne (Social Sciences Professor) Professor Michael (Science Professor) Professor George (ICT Professor) School Principal Luke (School Principal) Nick (Student) Nicole (Student) Helen (Student) Peter (Student) John (Student)

2.0 Needs that support the project

-The need for active and experiential school education which is not supported by the largest part of the Curriculum, yet boosts students' learning outputs, soft skills and interest in learning. The current state of education lacks active learning, inquiry-based learning, project-based learning and other modern educational approaches which serve several educational benefits to students.
-The need for more effective STEM education which both provides all students with fundamental STEM skills for their everyday decision-making, and makes more students more intensely interested in STEM fields, even follow STEM careers in the future. Few students have a love for STEM subjects and even fewer have an aspiration to follow STEM related professional careers. This STEM educational projects hopes to bring more students in touch to the real essence of STEM theory and practice and make them love this field.
-The need for more effective Public Health Education. Public Health is a major health issue which is often undermined in Health Education. As the COVID-19 pandemic highlighted, personal health-related decisions affect the society and the way the society behaves affects every person in particular. Moreover, communicable diseases pose a constant threat for Public Health for every country in the world. The project aims to offer high-quality Public Health Education to students.
-The need for Education with a view to active citizenship. During this project students study the interrelations between science and the everyday social context and realize the importance of informed decision-making for science topics in everyday lives. Connection to social issues often lacks from science and STEM education. This project aims to give students the opportunity to understand the close entanglements of science and society and be active citizens in the future.

3.0 Project goals

Teachers' professional workshop on the project completed – October 15
Project initiated – March 15
Project completed – April 20
Open schooling event – April 30

4.0 Project scope

The scope of the project is to engage students in an inquiry- and project-based learning process on topics regarding public health (social determinants of health, in particular) with a final dissemination of the project in an open schooling event.

5.0 Key Deliverables

Worksheets from students' educational activities
Questionnaires
Intermediate report on data analysis
Final research report on the overall project

6.0 Milestones and dates

Introductory work for the main project of students done
Final questionnaire approved
Questionnaires distributed
Completed questionnaires collected
Intermediated data analysis reports written
Classroom discussion on the research findings done
Final research report written
Open schooling event prepared
Open schooling event done

7.0 Constraints

Participation of at least 12 students in the project (limit)
Participation of at least 70 people in the open schooling event (limit)

Completion of at least 25 questionnaires (limit)
Project should be finished in 30 April (limit)

8.0 Risks and opportunities

Modest number of people that accepted invitation to attend the open schooling event
Too many people that accepted invitation to attend the open schooling event
Larger load of idea emerging by students
Modest interest of students for the lesson

9.0 Project success criteria

Project completed before Easter period.
High-quality project outputs according to the assessment rubrics
High students' interest and participation in the project and the open schooling event
Open schooling event with the participation of the entire school community, parents, and local stakeholders.

10.0 Project success factors

Appropriate engagement of students and parents.
Appropriate time management during the lessons
Interest of teachers in the school project pillars (open schooling, inquiry-based learning, socioscientific issues).
Adequate attendance of stakeholders in the open schooling event

Teaching-learning process milestones:
1. Students will be able to give examples of health disparities during the COVID-19 pandemic.
2. Students will be able to explain how social disparities lead to health disparities as well.
3. Students will be able to describe the stages of a social empirical research.
4. Students will be able to describe the process of the research they have done.
5. Students will be able to formulate questions appropriate for a questionnaire.
6. Students will be able to analyze qualitative and quantitative data from questionnaires.
7. Students will be able to write a scientific research report.

Teaching-learning process for school project (summary):

1. Background education on the social determinants of health and health disparities during the COVID-19 pandemic, including study of relevant literature
2. Preparation of the research tool (questionnaire) for the school research project
3. Online distribution of the questionnaire
4. Analysis of the data from the questionnaire and writing of the data analysis report
5. Discussion on research findings and writing of the final research report
6. Presentation of the project and the students' work in an open schooling event

Organization of the open schooling event:
1. The team leader of the projects gives a short introduction and description to the attendants about the identity, the scope and the processes of the school project.
2. Each project output (final report, questionnaires, data analysis reports and graphs) is presented by the students in a community setting (e.g., exposition center, garden, museum, science fair).
3. Students will communicate their work by using science-based argumentation. Students appeal to the action of all in health of the community, providing great understanding that health literacy and health promotion is a responsibility of all, not only of the ministry of health or healthcare providers. They also make notions on their understandings of health disparities and the social determinants of health.
4. Students present their research work about the impact of the COVID-19 pandemic on the society. They summarize they phases and the ways of their work, they present their questionnaires and some of their key findings and conclude on the findings and interpretations of their research. Furthermore, they could make suggestions for expansion of their research to teachers and students that would like to do so in the following years.
5. Students, parents, school community and relevant local stakeholders attend the event and understand how health disparities occur, how they affect the experience of an epidemic and, also, how authentic social research is done.

Data Analysis and Reporting

Data collection and handling by using proper techniques from the field of descriptive statistics.
Different data handling depending on the data type (qualitative or quantitative).
Calculation of simple descriptive measures for quantitative data, such as mean, median and range.
Grouping of qualitative data into categories and calculation of simple descriptive measures, such as frequencies and relative frequencies.
Depiction of data by simple graphs, such as histograms, bar charts and pie charts.

Target Audience for Recommendations

The rest of the class, maybe teachers and students of the entire school provided the project is presented at a school event. The parents of the students or even local authorities could also attend the event.
Maybe the local society if local media are available (e.g., an informative website for local issues). The outcome of the school research (final report and results) could also be communicated to local authorities (e.g., the municipal section for education or educational structures) or a non-governmental organization, particularly if they have cooperated with the school at during educational visit or a discussion-with-experts event.
If the project quality is high and students would like to, it could be communicated in a student research conference or in a student research journal.

Public Debate and Recommendations (based on research results)

Presentation of the project outcomes within a school event or in local media. They could also be distributed to the local authorities on to non-governmental organisations. They could be optionally presented at a student conference or in a student journal.

Main partner responsible: UOI

8. Project management resource and inquiry instruments on the topic of "Cognitive and social determinants of health during an epidemic/pandemic outbreak for students with Intellectual Disabilities"

Overview

Scientific literacy development and social skills improvement regarding an epidemic/pandemic outbreak are crucial for students with intellectual disabilities (ID), for them to participate equally in school and society. The current scenario concerns a cognitive approach that used a structured inquiry model with supplemental elements of task analysis, time delay and prompting for small group of students. All the phases of inquiry are applied through a single subject design (baseline, intervention, maintenance, generalization) which is supported through digital educational resources and digital learning objects. Students with ID are introduced in scientific oriented questions regarding infectious diseases. Dynamic simulations contribute to the improvement of students understanding about viruses and vaccination. In addition, students apply social and decision-making skills in a problem-solving experience designed on an educational game. Completing the learning process, students conduct a guided project and produce an infographic presenting and communicate new knowledge and skills.

Estimated duration

After initial socioscientific and technical background on the topic in classroom environment, at least 2 sessions of 40-45 minutes for supplementary learning activities and school project (sessions 5-6). The sessions can be extended in more lessons depending on students' individualized profile and the availability of lessons at school.

Supplementary learning activities

During the school project is organized at least one of the following activities:

I. Video watching and discussion
It is suggested to enrich the previous learning activities with two videos in line with the description of viruses, their structure and reproduction. This section could be conducted within the generalization phase of the intervention, after the completion of the designed sessions and during the school project. The teachers in cooperation with special educators could present to the students the two videos:
SER V: https://www.youtube.com/watch?v=GFm45J8d7HI
SER VI: https://www.youtube.com/watch?v=oCelMyMtRCk
regarding the viruses and their microscopic function.
A short discussion based on adaptations would facilitate the students to understand the educational supplements and extend their new knowledge.

II. Handcrafting
Some hand-work activities (drawing, creating through handcrafting, etc.) could take place within the context of this learning sequence. In this way students with mild intellectual disabilities would improve their skills in social and practical domain, too, as they usually demonstrate high interest and motivation on hand working activities.

School research project

Topics

Main topic: What is an infectious disease?
Specific research questions:
6. What is a virus?
7. What are the measures of protection against an infectious disease?
8. Which are the symptoms and the ways of transmission of an infectious disease?
9. How does a social behaviour affect an epidemic outbreak?

Development process of the School Research Project
This section concerns the maintenance and the generalization phases of the acquired knowledge of students with ID. Completing the third column named *What I learned* of the graphic organizer, students are asked to use their knowledge and new skills about infectious diseases and relevant determinants (what is an infectious

disease, how is it transmitted, which are its symptoms, which are the measures we can take) through a research project, which reaches the production of an infographic.

Students develop an accessible, relevant, and curiosity-driven action with guidance, which frames the flow of the initial proposed idea to termination, keeping in view all the phases of the previous sessions. The teacher coordinates, explains, facilitates, cooperates, and encourages.

The project is based on structured inquiry research about infectious diseases and its structure follows the typical phases of an inquiry-based project with the main topic of infectious diseases and the particular focus on COVID-19. To address the challenge proposed in this project, students bring the ideas from the first lessons and supplementary educational activities. Students understand the importance of progressing on the awareness of infectious diseases and propose actions for the school community that supports health literacy and social determinants.

Students are separated in groups and each group adresses one of the categories: characteristics of a virus, virus' symptoms, virus' transmission, measures of prevention. They collaborate and justify the inquiry task, including the phases of engagement/orientation, conceptualizing, main inquiry, and conclusions. Students are expected to apply inquiry skills, such as questions' formulation and hypotheses, description of the thinking process, data analysis and interpetetion, evaluation of the outcomes in relation to the research questions and hypotheses. Finally, they can communicate their knowledge in the schooling event.

The specific DLOs, namely

DLO I (http://photodentro.pafse.eu/handle/8586/40),

DLO II (http://photodentro.pafse.eu/handle/8586/41),

DLO III (http://photodentro.pafse.eu/handle/8586/42) and

DLO IV (http://photodentro.pafse.eu/handle/8586/43) help students to build and present a static infographic about infectious diseases and relevant determinants.

The students create the poster, which describes the whole project and presents the outcomes.

Open Schooling Event

Students present the conclusions of their research to the public. Discussions among students and other engaged groups which attend the open schooling event (teachers, parents, caregivers, community members) contribute to knowledge diffusion towards the school and community.

To address the topic, students are asked to perform inquiry-based activities (interviews, workshops) in the community based on the following:

- Interviews

Virus	Measures of prevention	Transmission / symptoms
What is an infectious disease? What is a virus? Why cannot we see a virus? How can you see a virus? How is the virus called when it can cause a disease?	What can you do to stay safe longer? What are the precautionary measures? How can everyone take decisions to prevent the spread of an infection? What does it mean that it is my social responsibility to spread the pandemic? What does social distancing mean? During a pandemic can you mention prevention measures? What is quarantine?	How can a virus be transmitted? How the situation in which a virus has infected too many people around the world is called? How can you protect yourself from being infected with a virus (e.g., coronavirus?) What are the symptoms of an infectious disease?

- Workshop

During the discussion, some groups of the public could try to use the dynamic infographic COVID-19 (http://photodentro.pafse.eu/handle/8586/43) that concerns the measures taken to slow the transmission of infectious diseases and especially the coronavirus COVID-19. The goal of the workshop is to engage the public with a decision-making process during a pandemic outbreak and share personal experience.

Summary
Each project output (poster) is presented by the students in a community setting.

Students will communicate policy measures using science-based argumentation. Students appeal to action of all in the health of the community, providing understanding that health literacy and health promotion is a responsibility of all.

Students, parents, school community and relevant local stakeholders attend the event and understand how social behaviors can affect an epidemic crisis. They also get high-level understanding on strategies to minimize such phenomena and how they may have an influence on the relevant settings (e.g., home, school, workplace, public space at the community).

Students will be developing inquiry skills (e.g., making observations, asking questions, searching information) and improve communication and social skills, too. At the end of the teaching-learning sequence, students will have developed skills regarding scientific literacy and practices may contribute to the resolution of a socioscientific issue related to public health.

Project Management Framework and Instruments
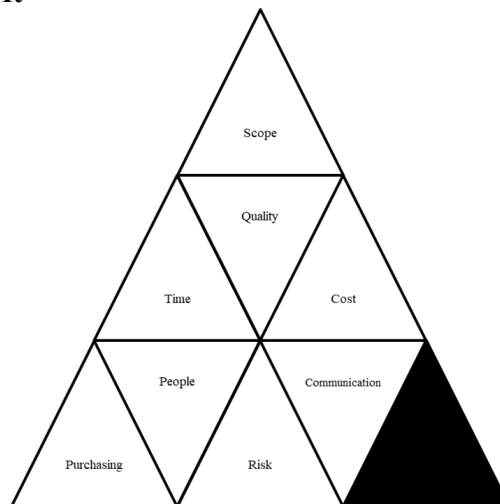
1. Plan: Determine How to Do It

2. Plan: Define Project Scope

- What are the outputs?
Example: scientific poster

-What are the requirements of project outputs?
Example: A3 format, Color, 5 sections (introduction, goals, methods, results, conclusions, discussion).

- Are there any constraints to produce the project outputs?
Example: work will be completed in two weeks

- Define the tasks to produce the outputs – build the Work Breakdown Structure (WBS)

Work Breakdown Structure
(filled with examples, these may change according to your project organisation)

```
                          Health School
                            Project
     ┌──────────────┬────────────────────┬──────────────────────┐
  Prepare          Apply              Analyse          Communicate and
                                                        disseminate
     │          ┌────────┬────────┐       │          ┌──────────┐
the infographic  do interviews  workshops  Extract data   Organize event

the interview    Set interviews  apply workshops  Analyse dada   Prepare and send
guide            in school       in school                       invitations
                 environment     environment

the workshops                              Build conclusions

                                           Prepare poster
```

3. Plan: Determine Project Time

    a. Define the detailed activities for each WBS element
    b. Put the activities in sequence
    c. Estimate the resources (human and acquisitions) for each activity
    d. Estimate the calendar time (days or weeks) for each activity
    e. Create the Gantt Chart

Resource Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources
Collect data based on DLOs	30 minutes	laptop
Video watching	15 minutes	laptop
Handcrafting	30 minutes	
Prepare scientific poster/infographic	45 minutes	laptop

Gantt Chart
(filled with examples, these may change according to your project organisation)

Activity	Week 1	Week 2	Week 3	Week 4	Week 5
Collect data	■				
Video watching		■			
Handcrafting			■	■	
Prepare scientific poster				■	■

4. Plan: Determine Project Cost

    a. Estimate how much each activity will cost
Note: include the cost for Labor, Supplies, overhead (like office space and equipment)

    b. Add the estimates to determine the total cost of your project

Cost Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources	Human Resource Cost*	Other Resources Cost (supplies)
Collect data based on DLOs	30 minutes	laptop, paper	5€	5€
Video watching	15 minutes	laptop		
Handcrafting	30 minutes	paper	5€	5€
Prepare scientific poster	45 minutes	laptop		
Total	2 hours	-		

5. Plan: Determine Project Quality

    a.   Ensure your project produces quality outputs
    b.   Plan what quality means to your project
    c.   Determine how you will assure quality

Quality Breakdown Structure
(filled with examples, these may change according to your project organisation)

Requirement	Quality planning	Quality assurance	Quality control
1.1	Minimum number of observations	Minimum number of observations: 5	Monitor the number of observations on a daily basis
1.2	Minimum number of interviews	Minimum number of interviews: 5	Monitor the number of interviews on a daily basis
1.3	Infographic template with five sections	Infographic with five sections: introduction, goals, methods, results, conclusions, recommendations.	Monitor the developments of students' infographic

6. Plan: Determine Project Risks

    a.   Identify the two types of risks (uncertain future events that can affect your project): threats have a negative impact on your project; opportunities have a positive impact on your project.

Risk Breakdown Structure
(filled with examples, these may change according to your project organisation)

Risk	Probability (How likely is it to happen)	Impact (How big of an effect will it have)	Owner (who takes care about the risk)	Action Plan (initiatives to reduce threats and increase opportunities)
Modest number of responses to the interviews	High	High	Students: – Mary – Peter – John	–Identification of other potential target groups –Invitations and re–invitations
Modest number of people that accepted invitation to attend the open schooling event	Medium	Medium	Professor Francis Students: - Sophia - Caroline	- Re–invitations by email - Telephone calls

7. Plan: Plan Procurement Processes

    a.   Determine what goods and services you need
    b.   Have what you need at the time that you need it

Acquisitions Breakdown Structure
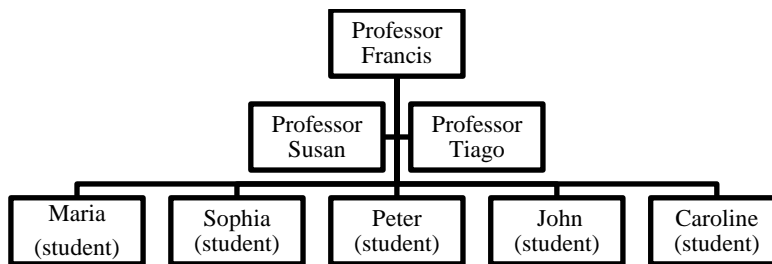*(filled with examples, these may change according to your project organisation)*

Supply	Supply Cost (supplies)	When to be available	How to be available
Paper	20 euros	In the beginning of the project	Commitment of school top management
Printer	50 euros	In the beginning of the project	Commitment of school top management
Mobile laptop	700 euros	In the beginning of the project	Commitment of school top management
Printed post	40 euros	Before the open schooling event	Poster printing in Stapples Office Center

8. Plan: Plan People

a. Acquire the project team
b. Map the project team in the Organization Breakdown Structure
c. Assign the project team members to roles
d. Assign the project team members to activities
e. Train the project team
f. Determine how you will motivate and reward the team
g. Map Stakeholders – people or groups interested in the project
h. Determine how you will engage stakeholders in the project

Organization Breakdown Structure
(filled with examples, these may change according to your project organisation)

Responsibility assignment matrix
(filled with examples, these may change according to your project organisation)

Activity	Team members							
	Mary (student)	**Sophia (student)**	**Peter (student)**	**John (student)**	**Caroline (student)**	**Professor Francis (Science)**	**Professor Susan (Science)**	**Professor Tiago (ICT)**
Bibliographic research	X	X	X			C/P		
Parameterize observation sheet					X	C/P		
Conduct interviews	X	X	X	X	X/P	C/P		
Analyze data							C/P	
Prepare infographic	X	X	X	X	X			C/P
Coordinate the overall implementation of the project					X	X		

Letter	Role
X	Executes work
P	Controls progress
C	Should be consulted
I	Should be informed

Stakeholders Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Directly involved in the project (yes/no)	Served or Affected by the Project	Likely to be user of the results of the project
Parents	yes	yes	yes
School community	yes	yes	yes
School management	no	yes	yes
Municipality	no	yes	yes
Residents' association	no	yes	yes

Stakeholders Management Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Who they are and why should be involved in the project	Why the project is relevant for them	Strategies to obtain support
Parents/caregivers	Students' families should be involved in the interviews to collect the relevant responses. Their involvement also maximizes the impact of the project in terms of global literacy.	Due to their interest in pupils' education and school health and well-being.	Present the school project in parents meeting.
School community (teachers, students)	The school community should be involved in the interviews and workshops to be done by students in school environment. Their involvement also maximizes the impact of the project in terms of global literacy.	Due to their interest in students' education and school health and well-being.	Present the school project in a school community meeting.
School management	The school management assures relevant resources for students' projects and should be involved in the interviews and workshops. Their involvement also maximizes the impact of the project in terms of global literacy.	Due to their interest in students' education and school health. Also due to their interest in demonstrating the interest of school in contributing to community health (to be a health promotion school).	Present the school project in parents meeting.
Municipality/local agency	The municipality should be involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to municipality interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project).
Residents' (e.g., intellectual disabilities) associations	Disabilities associations should be involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to residents' associations interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project).

9. Plan: Plan Communication

a. Assure the right information to the right people, at the right time, in a useful format
b. Assure effective project meetings
c. Build the communications plan

Communications plan
(filled with examples, these may change according to your project organisation)

Organized by (from)	Participants (to)	What	When	How/Where	Purpose
Professor Francis	Team	Kick-off meeting	10 september	Laboratory	Provide a complete description of the project and what the end product will be.
Professor Francis	Team	Team meeting	Every week (Wednesday, 14h)	IT classroom	- Overall plan for the project - Discuss project developments and plan next stage - Instruct team on how to - Provide updates on the progress of the project and if there are any issues with completion

Organized by (from)	Participants (to)	What	When	How/Where	Purpose
Professor Francis	Team and Parents	Meeting	Before the project starts (date to be defined)	School meeting room	Explain the project and invite for participation in the interviews
Professor Francis and Team	Parents	Meeting	Before the project starts (date to be defined)	Virtual meeting	Explain the project and invite for participation in the interviews and open schooling event.
Professor Francis, Team, School management	School community Municipality Residents' association	Invitations to stakeholders participation in open schooling event	Before the open schooling event (date to be defined)	By email	Explain the project and invite for participation in the open schooling event.

10. Plan: Finish the project planning by building the Charter

1.0 Project identification	
Name	Describe the project name and project acronym
Summary description	Describe the project in one paragraph
Project owner	Identify the owner of the project (e.g.: school X)
Project manager	Identify the project manager
Stakeholders	Identify the stakeholders and briefly describe why they are interested parties
Team and roles	Identify the team and summarize the role of each resource in the project (e.g: student, ICT teacher, Science Teacher, School manager, designer, software developer…)

2.0 Needs that support the project

Which aim? Which need not solved by the current state-of-the-art? Which solution (s) are you going to deliver?

3.0 Project goals

Describe what you want to achieve in the short-term, medium term and long term. Follow SMART principles (Specific, Measurable, Achievable, Realistic, and Timely).

Examples
Project completed – March
Open schooling event – April 15

4.0 Project scope

Identify the tasks of the project

5.0 Key Deliverables

Identify goods or services produced as a result of the project. A deliverable could be a report, a document, a software product, a server upgrade or any other building block of an overall project.

Examples
Questionnaire
Interview Guide
Poster
Infographic
Concept map

6.0 Milestones and dates

Identify the principal landmarks of project execution stablished according to what is described in the project scope.

Examples
Each task research concluded
Open schooling event prepared

7.0 Constraints

Identify the principal project constraints (cost, technical, other)

Examples
Budget 200 € (limit)
Project should be finished in 15 April (limit)

8.0 Risks and opportunities

Identify issues that may emerge in the future and influence project implementation

Examples
Modest number of students that participated in the project preparation
Modest number of people that accepted invitation to attend the open schooling event

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9.0 Project success criteria

Identify the criteria or measures of success. These are the project acceptance criteria.

Examples
Project completed before Easter period
Open schooling event in a community setting with the participation of the entire school community, parents, and local stakeholders.

10.0 Project success factors

Identify the factors that you will manage in order to positively influence the success of the project.
Examples
Appropriate engagement of students and parents.
Interest of teachers in project-based learning.

Additional information

- Students and teachers should use the resources introduced in the lessons, as well at the complementary resources SER of the supplementary learning activities. These resources contain a variety of materials including videos, DLOs, posters. It is also suggested that teachers and students watch the videos.
- With the support of the teacher, students prepare their scientific poster and subsequentially work on it using MS Power Point).

Teaching-learning process milestones:

1. Students will be able to incorporate evidence in their infographic coming from the data of intervention to support their ideas and communicate science literacy.
2. Students will be able to communicate the merits and limitations of various choices regarding the prevention measures and social distancing.
3. Students will be able to identify and communicate the symptoms of an infectious disease, such as COVID-19.
4. Students will be able to identify and communicate the transmission measures that effects in communities and social distancing.
5. Students will be able to use new skills (academic and social skills) to solve a problem around of an infectious disease.

Teaching-learning process for school project (summary):

1. Collection of evidence (data based on the intervention, articles, pictures).
2. Evaluation of the evidence based on criteria and selection of the relevant information.
3. Identify effective presentation formats.
4. Produce the infographic which is
5. Present the infographic in an open schooling event.

Organization of the open schooling event:

1. Each project output (infographic) is presented by the students with the support of the special educators in an open schooling event.

2. Students will communicate scientific knowledge regarding infectious diseases, policy measures and practices using science-based argumentation. Students appeal to the action of all in health of the community, providing understanding that health literacy and health promotion is a responsibility of all, not only of the ministry of health or healthcare providers.

3. Students, parents, school community and relevant local stakeholders attend the event, recognize a situation of a pandemic (share experience concerning COVID-19) and understand how it is influenced by a set of social factors. They also get high-level understanding on strategies to minimize the phenomena and how they may have an influence on the relevant settings (e.g., home, school, workplace, community).

Data Analysis and Reporting

Infographic based on acquired knowledge and skills.

Report writing with most important findings adapted in Easy-to-Read language and visual representation supporting in line with inclusion.

Development of presentation based on the model of inquiry, task analysis and Easy-to-Read language.

Target Audience for Recommendations

Other students, teachers, parents, caregivers, local agency, community members, intellectual disabilities associations.

Public Debate and Recommendations (based on research results)

Presentation of the infographic by students in a community setting and dissemination of evidence recommendations via social, community and conventional media.

Release of initial draft report and preliminary recommendations for feedback.

Discussion and feedback.

Release of revised report and recommendations for public consultation.

Evidence-based recommendations that follow the ONE HEALTH approach.

Main partner responsible: UOI (University of Ioannina)

9. Project management resource and inquiry instruments on the topic of "Function of vaccines, vaccination hesitancy and misinformation"

Overview

This educational scenario focuses on vaccination and particularly on the topics of the mechanism by which vaccines work, the types of vaccines, herd immunity, the eradication of infectious diseases and the misinformation about vaccines. Students are initially shown some facts concerning vaccination and its importance aiming at their more effective engagement in the learning process. Students' initial conceptions are detected with a questionnaire and they express, then, their expectations from the learning sequence. For the following two hours students are given the necessary conceptual background regarding microorganism biology and immune response mechanisms so that a meaningful conceptualisation of vaccination is feasible. For this reason, students make use of a great variety of digital educational resources with emphasis on the visualisation of the phenomena examined. Afterwards, students are familiarised with the mechanism with which vaccines function and the different types of vaccines used. They are assigned to match pathogen cases to the more appropriate vaccine types. For the next hours, students are concerned with the importance of vaccination for public health through the phenomenon of herd immunity. Students actively handle simulations by testing parameters that affect the achievement of herd immunity (disease transmissibility, vaccination coverage and vaccine efficacy) and find the critical vaccination coverage point for herd immunity for authentic disease cases. They also study the mechanism with which the application of mass vaccination programs on children can lead to the eradication of a disease, and the case of smallpox eradication is mentioned, as well as the reemergence of measles due to reduction in vaccination coverage. Students compare the harshness and the frequency of severe adverse affects of the vaccine with those that are caused by the disease itself and argue whether the vaccine adverse effects are a sufficient reason not to vaccinate. Afterwards, students are trained to recognise and discern medical misinformation texts from scientific texts. Students work in small groups to conduct a mini project. Each group can choose to take over either the making of a short informative guide regarding how one could detect misinformation texts about vaccines, or to prepare the launching of a short informative campaign for the general public, concerning vaccination necessity. The groups present the prepared material to the class and a self-reflective discussion concerning the learning sequence takes place.

Estimated duration

After initial socioscientific and technical background on the topic in classroom environment, 14 teaching hours organized in continuous two-hour sessions if possible.

School Research Project

Topics:
How do vaccines protect me from infectious diseases?
How does vaccination protect public health?
How can I identify a text of medical misinformation?
How would I launch an informative campaign in favor of vaccination and against misinformation?

Development process:
The subject of the school project is vaccination and relevant sub-topics such as the types of vaccines, herd immunity and vaccine misinformation. The entire school project is organized in seven two-hour teaching sessions during which students actively handle several digital resources in order to get introduced to some core concepts concerning vaccination, and then apply their gained knowledge and skills to autonomously carry out the main part of the school project in small groups.

During sessions 1-4 students actively handle various digital resources in order to gain the prerequisite knowledge and skills to be able to carry out their project. At first, they are introduced to some fundamental issues of microbiology and immunology, and then they explore the function of vaccines and the different types of vaccines which are available today, made with the aid of both traditional and modern biomedical technology. Afterwards, they focus on the benifit that vaccination has to the common could, by testing how different parameters affect the achievment of herd immunity in a society, and contextualize the notion of herd immunity to the programs of children vaccination, the eradication and re-emergence of diseases. They, also, focus on the issue of worries about the adverse effects of vaccines and through cases of authentic vaccines they counter the

benefits and costs they offer. Furthermore, they are practised in detecting texts of medical misinformation and distinguishing them from trustworthy medical sources. All these topics consistute knowledge and skills which are going to be applied in the main part of the project.

During session 5 students form their main project four-or-five-member groups and initiate to develop their project. Each team can choose a project alternative between two options. The first option is to prepare a digital pro-vaccination presentation (about 8-10 slides) in which, they are going to explain with the aid of scientific arguments and data, and the inclusion of resources which were used during the lesson. The presentation aims to the general public and should explain why vaccines are beneficial for both personal and public health, how they have managed to eradicate diseases and whether worries about the safety of vaccines have a scientific basis. The second option is to prepare a short guide (about 3-5 pages) in order to counter-fight medical misinformation about vaccines. They should address the guide to the general public and include clearly stated indications that might reveal that a text carries medical misinformation, and highlight each one of these indications with authentic cases of medical misinformation found in the Internet. They should also include 2 or 3 common anti-vaccination arguments and then debunk them with scientific arguments based on the information they came across during the lesson, or they found after mini bibliographic research. At the end of session 5 student teams should have a first version of their work ready.

During sessions 6-7 the student teams present their work to their classmates and the teacher and get feedback. They note down the strengths and weaknesses of their work, as well as suggestions for improvement. Then, they return to their work in order to improve it and submit the final version of the project output (presentation or guide) to the teacher.

Project Management Framework and Instruments

1. Plan: Determine How to Do It
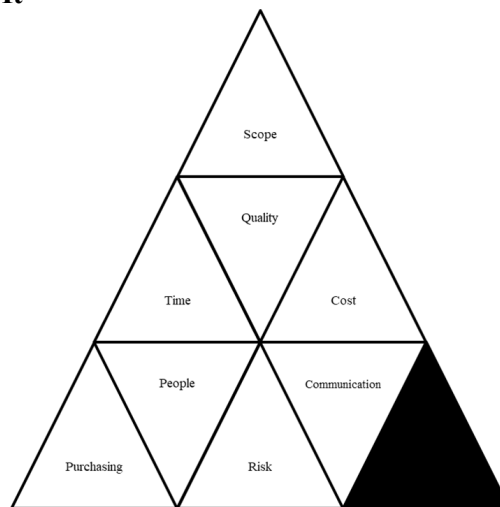
2. Plan: Define Project Scope

- What are the outputs?
Short guide against medical misinformation for the general public (about 3-5 pages)
Short informative presentation about the need for vaccination for the general public (about 8-10 slides)

-What are the requirements of project outputs?
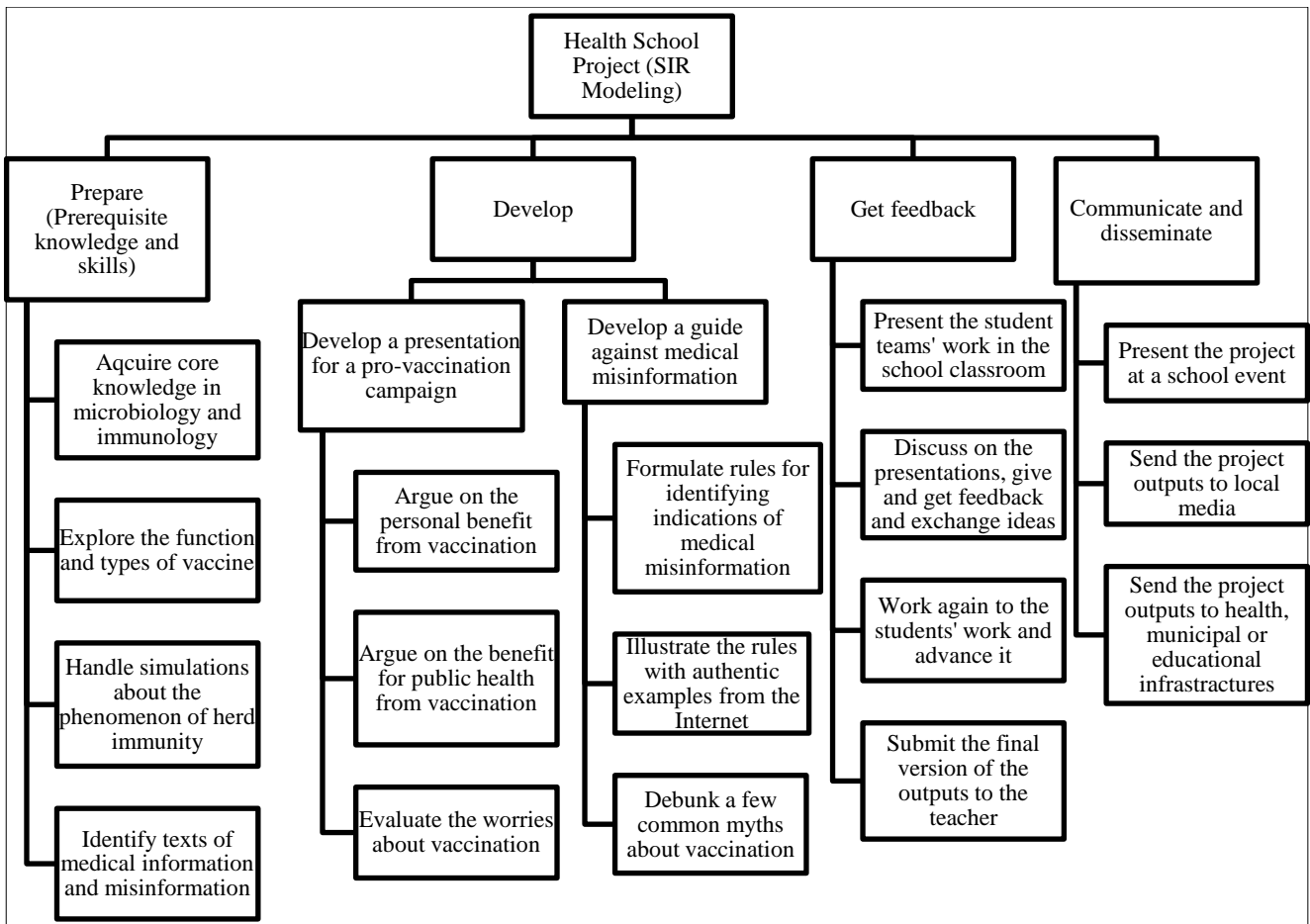A3 papers, computers with software for digital presentation and guide development

- Are there any constraints to produce the project outputs?
The limitation of time (3 sessions of main project work)
Possible lack of interest on part of students

Work Breakdown Structure
(filled with examples, these may change according to your project organisation)

3. Plan: Determine Project Time

a. Define the detailed activities for each WBS element
b. Put the activities in sequence
c. Estimate the resources (human and acquisitions) for each activity
d. Estimate the calendar time (days or weeks) for each activity
e. Create the Gantt Chart

Resource Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources
Prepare (prerequisite knowledge and skills)	8 hours	laptop or tablet, paper
Develop (pro-vaccination campaign)	2 hours	laptop, paper
Develop (guide against medical misinformation)	2 hours (overlapping with above)	laptop, paper
Present to the classroom and get feedback	2 hours	laptop or tablet, paper
Work to the final version of the outputs	2 hours	laptop, paper

Gantt Chart
(filled with examples, these may change according to your project organisation)

Activity	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7
Prepare (prerequisite knowledge and skills)	■	■	■	■			
Develop (pro-vaccination campaign)					■		
Develop (guide against medical misinformation)					■		
Present to the classroom and get feedback						■	
Work to the final version of the outputs							■

4. Plan: Determine Project Cost

    a.   Estimate how much each activity will cost

Note: include the cost for Labor, Supplies, overhead (like office space and equipment)

    b.   Add the estimates to determine the total cost of your project

Cost Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources	Human Resource Cost*	Other Resources Cost (supplies)
Prepare (prerequisite knowledge and skills)	8 hours	laptop or tablet, paper	160 €	n.a
Develop (pro-vaccination campaign)	2 hours	laptop, paper	40 €	n.a
Develop (guide against medical misinformation)	2 hours (overlapping with above)	laptop, paper	40 €	n.a
Present to the classroom and get feedback	2 hours	laptop or tablet, paper	40 €	n.a
Work to the final version of the outputs	2 hours	laptop, paper	40 €	n.a
Total	16h (some overlapping with each other)	-	320 €	-

* Example on how to calculate resources and budget, without connection to the PAFSE real context

5. Plan: Determine Project Quality

    a.   Ensure your project produces quality outputs
    b.   Plan what quality means to your project
    c.   Determine how you will ensure quality

Quality Breakdown Structure
(filled with examples, these may change according to your project organisation)

Requirement	Quality planning	Quality assurance	Quality control
1.1	Minimum number of pages per guide	Minimum number of pages per guide: 3	Monitor the development of students' anti-misinformation guides
1.2	Minimum number of myths to debunk per guide	Minimum number of myths to debunk per guide: 2	Monitor the development of students' anti-misinformation guides
1.3	Minimum number of slides per presentation	Minimum number of slides per presentation: 8	Monitor the development of students' pro-vaccination presentations
1.4	Minimum number of topics to include in the presentation	Minimum number of different issues incorporated in the presentation: 4 (e.g., personal health, herd immunity, eradication of diseases, rareness of adverse effects)	Monitor the development of students' pro-vaccination presentations
1.5	Assessment rubric for project outputs	Assessment rubric with four criteria: scientific accuracy, methodological accuracy, effectiveness to its goals, proper presentation	Assess the project final outputs

6. Plan: Determine Project Risks

    a.   Identify the two types of risks (uncertain future events that can affect your project): threats have a negative impact on your project; opportunities have a positive impact on your project

Risk Breakdown Structure
(filled with examples, these may change according to your project organisation)

Risk	Probability (How likely is it to happen)	Impact (How big of an effect will it have)	Owner (who takes care about the risk)	Action Plan (initiatives to reduce threats and increase opportunities)
Emergence of a larger load of ideas by the students for the project than expected	Medium	High	Students: – Peter – Helen – Nicole	–Modification of the project outputs so as to fit the students' desires -Assignment of a part of the project as an optional homework task
Too large number of people that accepted invitation to attend the open schooling event	Low	Low	School Principal Luke Professor Anne	-Moving of the schooling event to a larger venue -Split of the school event to two successive repetitions of the events
Modest number of people that accepted invitation to attend the open schooling event	Medium	Medium	School Principal Luke Professor Anne Students: - John - Nick	- Invitations to the broader local community - More persistent invitations to students' friends and families -Grouping of different school events together to a bigger school event
Modest students' interest for the school project	Medium	High	Professor Michael	-Give motives to the students (e.g., presenting at the school event, project as an alternative assessment tool instead of tests) -Scaffold students who face difficulties

7. Plan: Plan Procurement Processes

    a.   Determine what goods and services you need
    b.   Have what you need at the time that you need it.

Acquisitions Breakdown Structure
(filled with examples, these may change according to your project organisation)

Supply	Supply Cost (supplies)	When to be available	How to be available
Paper	20 euros	In the beginning of the project	Commitment of school top management
Printer	50 euros	In the beginning of the project	Commitment of school top management
Laptop	700 euros	In the beginning of the project	Commitment of school top management

8. Plan: Plan People

    a.   Acquire the project team
    b.   Map the project team in the Organization Breakdown Structure
    c.   Assign the project team members to roles
    d.   Assign the project team members to activities
    e.   Train the project team
    f.   Determine how you will motivate and reward the team
    g.   Map Stakeholders – people or groups interested in the project
    h.   Determine how you will engage stakeholders in the project

Organization Breakdown Structure
(filled with examples, these may change according to your project organisation)

Responsibility assignment matrix
(filled with examples, these may change according to your project organisation)

Activity	Team members								
	John (student)	**Nicole** (student)	**Nick** (student)	**Helen** (student)	**Peter** (student)	**Professor Anne (Science)**	**Professor Michael (Science)**	**Professor George (ICT)**	**School Principal Luke**
Prepare (prerequisite knowledge and skills)	X	X	X	X	X	C/P	C/P		
Develop (pro-vaccination campaign)		X		X	X/P	C/P		C/P	
Develop (guide against medical misinformation)	X		X		X/P		C/P	C/P	
Present to the classroom and get feedback	X	X	X	X	X/P	C/P	C/P	C/P	
Work to the final version of the outputs	X	X	X	X	X/P	C/P	C/P	C/P	
Coordinate the overall implementation of the project						X	X	X	I
Coordinate the school event						X	X	X	I
Attend the school event and present their work	X	X	X	X	X	X	C/P	C/P	

Letter	Role
X	Executes work
P	Controls progress
C	Should be consulted
I	Should be informed

Stakeholders Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Directly involved in the project (yes/no)	Served or Affected by the Project	Likely to be user of the results of the project
Parents	yes	yes	yes
School community	yes	yes	yes
School management	yes	yes	yes

Stakeholder name	Directly involved in the project (yes/no)	Served or Affected by the Project	Likely to be user of the results of the project
Municipality	no	yes	yes
Residents' association	no	yes	yes
Local Health Infrastructures	no	yes	yes
National Associations of Science and ICT teachers	no	no	yes
National Directorate for Education	no	no	yes
National Directorate For Health	no	no	yes
Local media	no	no	yes

Stakeholders Management Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Who they are and why should be involved in the project	Why the project is relevant for them	Strategies to obtain support
Parents	Students' families should attend the school event during which students will present their projects. The students' families will maximize their appreciation of the educational procedure and outputs as a result of the students' cooperation. They are also going to get informed on issues concerning public health literacy.	Due to their interest in their children's education and school well-being.	Attend the school project presentation in a school event.
School community	The school community should attend the school event during which students will present their projects. The school community will maximize their appreciation of the educational procedure and outputs as a result of the students' cooperation. The students might get inspired by the work of their classmates and the teachers might appreciate the educational procedure and be willing to get involved in the PAFSE consortium during the following years. They are also going to get informed on issues concerning public health literacy.	Due to their interest in students' education and school well-being, and the teachers' intention to be professionally developed.	Attend the school project presentation in a school event.
School management	The school Principal should promote the school project the educational and local community, in order to be enforced during the following years.	Due to their interest in the high quality of educational services provided by the school.	Attend the school project presentation in a school event.
Municipality	The municipality should be involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to municipality interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project).
Residents' association	Residents' associations should be involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to residents' associations interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project).

Stakeholder name	Who they are and why should be involved in the project	Why the project is relevant for them	Strategies to obtain support
Local Health Infrastructures	Local Health Infrastructures should be involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to their interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project).
National Associations of Science and ICT teachers	National Scientific Associations of Science, ICT and Health Education should be shared with the material and the procedure of the project, as an example of novel instructive approaches with significant educational and scientific value.	Due to their interest in high-quality and state-of-the-art educational approaches in terms of Science, ICT and Health education.	Presentation of the school project in scientific conferences.
National Directorate for Education	The National Directorate for Education is supporting the project and interested in the results in terms of students' learning.	Due to their interest in novel methodologies for STEM and inquiry-based education, and active citizenship.	Invitation to participate in the open schooling event. Sharing of a sample of the project material (along with a summary of the project) to the people of the Directorate, responsible for the communication and school initiatives.
National Directorate For Health	The National Directorate for Health is supporting the project and interested in the results in terms of effective health education and awareness.	Due to their interest in effective methodologies for public health education and awareness in the school environment, having the recent experience of the COVID-19 pandemic.	Invitation to participate in the open schooling event. Sharing of a sample of the project material (along with a summary of the project) to the people of the Directorate, responsible for the communication and school initiatives.
Local media	The Local Media should be shared with some of the school project descriptions, outputs and students' experiences in terms of exceptional students' work from the local community.	Due to their interest in exceptional pieces of work by members of the local community.	Invitation to participate in the open schooling event. Sharing a description of the project procedure, outputs and students' experiences with the local media

9. Plan: Plan Communication

a. Assure the right information to the right people, at the right time, in a useful format
b. Assure effective project meetings
c. Build the communications plan

Communications plan
(filled with examples, these may change according to your project organisation)

Organized by (from)	Participants (to)	What	When	How/Where	Purpose
Professor Anne	Team	Kick-off meeting	Before the project starts (date to be defined)	Laboratory	Provide a complete description of the project and what the end product will be.
Professors George, Michael and Anne	Parents	Meeting	Before the project starts (date to be defined)	ICT classroom or virtual meating	Explain the project, ask for support and cooperation when needed and invite for participation in the open schooling event.

Organized by (from)	Participants (to)	What	When	How/Where	Purpose
Professor George	Team	Team meeting	Every week (e.g. Wednesday)	IT classroom	- Overall plan for the project - Discuss project developments and plan next stage - Instruct team on how to carry out the following steps - Monitor the progress of the project and if there are any issues with completion
Professor George	Team	Professors Meeting	Every two weeks	Virtual meating	-Monitor the general progress of the project -Discuss any difficulties found during the project depth and find ways to overcome them -Discuss alternative options for the enactment of the educational scenarios
Professors George, Michael and Anne	Parents	Invitation to parents' participation in open schooling event	One or two weeks before the open schooling event	By email	Explain the project and invite for participation in the open schooling event.
Professors George, Michael and Anne	School community, Municipality, Residents' association Local Health Infrastructures, Directorate for Education, Directorate for Health, Local media	Invitations to stakeholders' participation in open schooling event	Before the open schooling event (date to be defined)	By email	Explain the project and invite for participation in the open schooling event.
Professors George, Michael and Anne	Parents, School Principal, School community, Municipality, Residents' association Local Health Infrastructures, Directorate for Education, Directorate for Health, Local media	Open schooling event	Date to be defined	Open schooling venue	-Present an overview of the program -Have the students present their work during the school projects -Have the students share their experiences -Offer the participants proposals for dissemination activities in order to expand the outreach of the project.
Professor George	School Principal	After-open-schooling-event meeting	Two days after the open schooling event	Principal's office	-Present the School Principal an overview of the school projects -Present the School Principal an overview of the open schooling event -Ask the principal if they would be willing to make clusters with other schools in order to support even more expanded school networks working in similar projects in the future.

Organized by (from)	Participants (to)	What	When	How/Where	Purpose
Professor Anne	Team	Final team meeting	One week after the open schooling event	Laboratory	-Make a retrospect of the project -Discuss whether they are going to support similar activities in the future -Discuss ideas for further dissemination of the student project.

10. Plan: Finish the project planning by building the Charter

1.0 Project identification	
Name	Partnerships for Science Education – Greece [PAFSE-GR]
Summary description	Students participate in active-based learning activities and carry out their own prototype research and material design in terms of STEM education and public health. In particular, they are engaged in the study vaccination, and more particularly in the different types of vaccines, in the notion of herd immunity and medical misinformation. They create their own material to disseminate the gained knowledge and increase public health awareness by developing a short guide against medical misinformation and a short informative presentation about the benefits of vaccination, both aiming to the general public
Project owner	2nd Model Junior High School of Athens (example)
Project manager	Professor Anne
Stakeholders	Parents (Interest in their children's high-quality education) School Community (Interest in achievements of other members of the school community) School Management (Interest of high-quality educational services provided by the school) Municipality (Interest in school work in their area) Residents' Association (Interest in students' work from the local society) Local Health Infrastructures (Interest from public health education project by schools from the local society) National Associations of Science and ICT Education (Interest in innovative educational actions in the fields of STEM, ICT and Health Education) National Directorate for Education (Interest in innovative school educational projects) National Directorate for Health (Interest in school public health educational projects) Local media (Interest in achievements by schools of the local community)
Team and roles	Professor Anne (Science Professor) Professor Michael (Science Professor) Professor George (ICT Professor) School Principal Luke (School Principal) Nick (Student) Nicole (Student) Helen (Student) Peter (Student) John (Student)

2.0 Needs that support the project
-The need for active and experiential school education which is not supported by the largest part of the Curriculum, yet boosts students' learning outputs, soft skills and interest in learning. The current state of education lacks active learning, inquiry-based learning, project-based learning and other modern educational approaches which serve several educational benefits to students. -The need for more effective STEM education which both provides all students with fundamental STEM skills for their everyday decision-making, and makes more students more intensely interested in STEM fields, even follow STEM careers in the future. Few students have a love for STEM subjects and even fewer have an aspiration to follow STEM related professional careers. This STEM educational projects hopes to bring more students in touch to the real essence of STEM theory and practice and make them love this field. -The need for more effective Public Health Education. Public Health is a major health issue which is often undermined in Health Education. As the COVID-19 pandemic highlighted, personal health-related decisions affect the society and the way the society behaves affects every person in particular. Moreover, communicable diseases pose a constant threat for Public Health for every country in the world. The project aims to offer high-quality Public Health Education to students. -The need for Education with a view to active citizenship. During this project students study the interrelations between science and the everyday social context, and realize the importance of informed decision-making for science topics in everyday lives.

Connection to social issues often lacks from science and STEM education. This project aims to give students the opportunity to understand the close entanglements of science and society and be active citizens in the future.

3.0 Project goals

Teachers' professional workshop on the project completed – October 15
Project initiated – March 15
Project completed – April 20
Open schooling event – April 30

4.0 Project scope

The scope of the project is to engage students in an inquiry- and project-based learning process on topics regarding public health (vaccination and vaccine hesitancy, in particular) with a final dissemination of the project in an open schooling event.

5.0 Key Deliverables

Worksheets from students' educational activities
Short guide against medical misinformation (Intermediate version)
Short guide against medical misinformation (Final version)
Informative digital presentation on the importance of vaccination (Intermediate version)
Informative digital presentation on the importance of vaccination (Final version)

6.0 Milestones and dates

Introductory work for the main project of students done
Intermediate version of the pro-vaccination presentation completed
Intermediate version of the anti-misinformation guide completed
Presentation of the intermediate versions of students' work made
Final version of the pro-vaccination presentation submitted
Final version of the anti-misinformation guide submitted
Students' presentations among one another in the classroom done
Open schooling event prepared
Open schooling event done

7.0 Constraints

Participation of at least 12 students in the project (limit)
Participation of at least 70 people in the open schooling event (limit)
Project should be finished in 30 April (limit)

8.0 Risks and opportunities

Modest number of people that accepted invitation to attend the open schooling event
Too many people that accepted invitation to attend the open schooling event
Larger load of idea emerging by students
Modest interest of students for the lesson

9.0 Project success criteria

Project completed before Easter period.
High-quality project outputs according to the assessment rubrics
High students' interest and participation in the project and the open schooling event
Open schooling event with the participation of the entire school community, parents, and local stakeholders.

10.0 Project success factors

Appropriate engagement of students and parents.
Appropriate time management during the lessons
Interest of teachers in the school project pillars (open schooling, inquiry-based learning, socioscientific issues).
Adequate attendance of stakeholders in the open schooling event

Teaching-learning process milestones:
1. Students will be able to describe the types and function of vaccines
2. Students will be able to explain what herd immunity is and how vaccination can protect even unvaccinated people

3. Students will be able to identify features in e text, which imply medical misinformation
4. Students will be able to use scientific arguments to explain the benefit from vaccination
5. Students will be able to give advice on how to recognize medical misinformation

Teaching-learning process for school project (summary):

1. Background education and practice core topics concerning vaccination (function and types of vaccines, herd immunity, medical misinformation)
2. Preparation of a presentation for pro-vaccination campaign
3. Preparation of a short guide against medical misinformation
4. Presentation of some first versions of 2. and 3. in the classroom and relevant discussion about them
5. Advancement of the first versions of 2. and 3.
6. Submission of the final versions of 2. and 3. to the teacher.
7. Presentation of the whole project and the students' work in an open schooling event

Organization of the open schooling event:

1. The team leader of the projects gives a short introduction and description to the attendants about the identity, the scope and the processes of the school project.
2. Each project output (guides, presentations with the aid of tablets) is presented by the students in a community setting (e.g., exposition center, garden, museum, science fair).
3. Students will communicate their work by using science-based argumentation. Students appeal to the action of all in health of the community, providing great understanding that health literacy and health promotion is a responsibility of all, not only of the ministry of health or healthcare providers. They also make notions on their understandings of scientific models, their use in science and policy making.
4. Students present their presentations about the importance and need for vaccination and explain with scientific arguments and data how much progress has been done and is being done thanks to vaccination, how vaccination protects the entire society due to herd immunity and how few the adverse effects of vaccines are. They, also, present common features of a text of medical misinformation illustrated with relevant examples and give advice on how to recognize a text of medical misinformation. This event might be quite useful for people who are vaccine-hesitant because of a low level of health and scientific literacy.
5. Students, parents, school community and relevant local stakeholders attend the event and understand how vaccines work, how they help ourselves and the society, prevent from epidemics and even eradicate diseases, and how medical misinformation can be detected in everyday texts.

Data Analysis and Reporting

Composition of scientific facts, data and arguments concerning the necessity of vaccination, with the aid of the DLOs and the SERs used during the learning sequence.

Detection and reconstruction of common cases of vaccination misinformation found on the Internet.

Design of a guide for the general public, concerning the detection of cases of medical misinformation illustrated by authentic misinformation cases.

Design of a pro-vaccination campaign for the general public, by making use of persuasive scientific arguments and facts, targeting specifically to people who are hesitant toward vaccination.

Target Audience for Recommendations

The rest of the class, maybe teachers and students at the entire school provided that the project is presented at a school event. The parents of the students or even local authorities could also attend the event.

Some of the highest-quality informative material made by the students could be distributed to members of the local community (e.g., health infrastructures, municipal authorities) or be communicated via local media (printed or online press).

Public Debate and Recommendations (based on research results)

Presentation of the project outcomes within the context of a school event. If the quality of the produced material is high, it can be distributed to the local society via the local media, structures of local government, authorities of educational administration, non formal education organizations, health system structures, etc.

Main partner responsible: UOI

10. Project management resource and inquiry instruments on the topic of "Sustainable Mobility"

Overview

There has been a crescent interest in the environmental crisis in the last decades, and the concept of "sustainability" has become the keystone and the reason for the development of environmental education, increasing the relevance in changing individual behavior. Not only has "sustainability" gained attention, but mobility has also become a very important issue for people. The goal should conciliate both concepts, delivering mobility with minimal effect on human health and the environment.

The development of transportation and with-it mobility in the last century became an essential factor in the globalisation of modern civilization. Today we are more mobile than we have ever been, the success of a particular society is also reflected in its mobility. The more mobile it is, the more a society is economically developed and prosperous. Although the development of mobility has also had its dark side. Humans in the 20th century changed the world's ecosystem more than ever, and the consequences are global. Virtually all economic and other activities have had an impact on the environment and nature, though mobility has been particularly significant since it is embedded in practically all human activities. Today transport produces around a third of emissions which cause an increase in the greenhouse effect.

One of the major challenges of the 21st century is thus how to make global transport systems sustainable. The development of technology is an important element of this transition, though we believe that education on the importance of sustainable mobility is no less an important element, since it bolsters demand for the development of sustainable (unfortunately sometimes still referred to as alternative) forms of transport. We are aware that only long-term and systematic education about the benefits of sustainable mobility compared to conventional transportation can lead to a shift in people's mindset that will cause a shift in behaviour, understanding and actions. This scenario hopes to support the efforts to shift the pattern of mobility towards greater sustainability.

Stating the SDGs of the United Nations (UN, 2015), "Rethinking Environment "and thus an ecological transformation of society presupposes Education for Sustainable Development (ESD) at schools. Schools focus mainly on traditional road safety education, rarely approaching the field of mobility and related concerns. It is of utmost importance to have a more comprehensive mobility education – with a look at human-environment interactions and one's behavior.

Children and young people are the most affected by the negative impacts associated with traffic. Lack of active mobility choices and a high rate of traffic accidents result in an unsafe road environment for school children. If we want children to continue to live well in a society where traffic plays a vital role, it is of prime importance that adults, in particular those in direct contact with children, are aware of their prominent mobility behavior.

Sustainable mobility in schools aims to promote the health of students through their movement, reduce the presence of cars in front of schools, and promote sociality and autonomy. Promoting more sustainable mobility patterns for young people, trying to focus on the importance of designing and reorganizing daily routes from home to school. The main objective is to improve air quality and reduce pollution, reducing health risks for citizens, especially the youngest, who are among the most at risk.

Therefore, this learning activities aim not only to contribute to how an educational concept for schools in sustainable mobility needs to be designed to initiate and change students' ways of thinking and acting but also to show that pedagogical activities need to be oriented toward sustainable mobility as a tool to guarantee a better future for younger generations.

Estimated Duration

After initial socioscientific and technical background on the topic in classroom environment, 6 sessions of 40-45 minutes for supplementary learning activities and school project (lesson 6 – lesson 11)

School Research Project

Overview. The project is based on guided research about Sustainable Mobility and the data obtained through the mobility patterns questionnaire. To address this challenge, students can draw their first thoughts from the lessons discussed in the classroom in this scenario and the supplementary educational activities. In a second phase, students are asked to share their points of view with each other, and ask others about their own

experiences and investigation process, sharing ideas. This will help them to think again about their initial thoughts and the path taken so far, possibly generating new perspectives that may enhance their final project. For example, this may be accomplished through a debate between groups of students about the five main topics (sustainable mobility, energy sustainability, social and economic dimension, environmental protection, quality of life and road safety).

Students perform inquiry-based activities, administer the data collection instruments, analyse results, extract conclusions, and propose priorities for action. They will create a poster/infographic that identifies community mobility patterns and its impacts on environment, health and road safety. In the end they present the findings to the community (students, residents, organisations, policy makers), aware for importance of sustainable mobility and the associated risks in traffic and propose measures to promote the sustainable mobility and to improve road safety in the community.

Estimated duration. The school research project starts after lesson 5 and has an estimated duration of 6 sessions of 40-45 minutes for supplementary learning activities and school project (lesson 6 – lesson 11)

Session 1-2: research administration

The teacher starts the lesson by recalling the topics of previous lessons on Sustainable Mobility. Students are asked to share their points of view with each other and ask others about their own experiences and investigation process, sharing ideas. The teacher promotes a debate between groups of students about the five main topics (sustainable mobility, energy sustainability, social and economic dimension, environmental protection, quality of life and road safety). Each group is responsible for one of the topics and should write down their strengths and weaknesses and then present them for debate. One of the students will be the moderator of the debate.

After understanding the importance of adopting sustainable modes of transportation, students collect reliable data and real-life cases to propose measures. Students will advocate for actions that promote a more sustainable and safer mobility in their route from home to school. To address the mobility patterns indicators, students will build a questionnaire to apply in the community.

Examples of questions:

1. What is the distance between your school and your home?
2. Usually, what is your way of moving between home-school-home? (walking, cycling, car with parents, public transport, other...)
3. How long does it take approximately to get to school, by type of transport?
4. If you're going to school by car, you'll point out the top three reasons (list a number of possible reasons, such as distance, habit, bad weather, risks of walking in traffic, other hazards, other reasons...)
5. When you use the car to go to school, do you always wear your seatbelt? Or do you put it halfway? Do you always put your seatbelt on when you travel in the back seat of the car? Do you only put your seatbelt on when you travel in the front seat?
6. If you travel by bike to school, mark the main reasons (list a set of personal and collective reasons, such as: it is good for health, it is more economical, faster, less polluting, other reasons)
7. If you travel by bike to school, do you always put on your helmet, or do you never wear it or depends on how far you go?
8. During your usual school journey, what dangers do you encounter most often in traffic? (mark the dangers and situations, such as: narrow rides, cars parked on sidewalks, lack of crosswalks, lots of traffic, speeding; absence of signals, others ...)
9. How do you rate your journey to school? (Tick the option on a scale: very safe, safe, unsafe and very unsafe)
10. What measures would make it easier for you to get to school, on foot or by bike? (mark those you consider more and less important, such as: pedestrian walks, more walkways, pedestrian areas, lanes for cyclists, spaces to park bicycles at school, less traffic, others...)

Students build a questionnaire using the examples provided in **New DLO (Research by survey)**, which also includes information needed to perform the data research project through a survey. After building the questionnaire it is suggested that each group use a laptop to build an online questionnaire (online form with Microsoft forms, Google forms, or other).

To conclude the preparation of the survey the teacher supports students in:

- ✓ writing the introductory text (HEADER)
  - o Project title/Project acronym
  - o Summary description of the project
  - o Why is the project relevant/project goals
  - o Who is implementing the project and where.
- ✓ identifying the target group (WHO)
- ✓ defining a strategy and activities to achieve the target (HOW)
- ✓ defining the minimum number of responses from the target (EXPECTED RESULTS)
- ✓ stablish a timeline for collecting the responses (WHEN)
- ✓ which events may constraint data collection (RISKS)
- ✓ which strategy to track results (CONTROL procedures)

Session 3-5: data analysis and reporting

After administering the survey and collecting the minimum number of responses, an Excel file may be downloaded from the online survey (Google forms, Lime Survey, Microsoft forms, …). Alternatively, if the questionnaire is administered in paper, students prepare a dataset file with the questions and distribution of responses. The teacher supports the students in preparing tables, graphics and then promotes a debate around the results. **New DLO (Research by survey)** can be used to guide the students in organizing the data, calculating the indicators, and building tables and graphs with the results. Then, students build the outputs (poster/infographic), which should describe the research questions, methodology, results, conclusions, and recommendations arising from the survey carried out.

Session 6: open schooling event planning

Teacher discusses with the students the format and the planning of the open schooling day to share the findings of their research with the community.
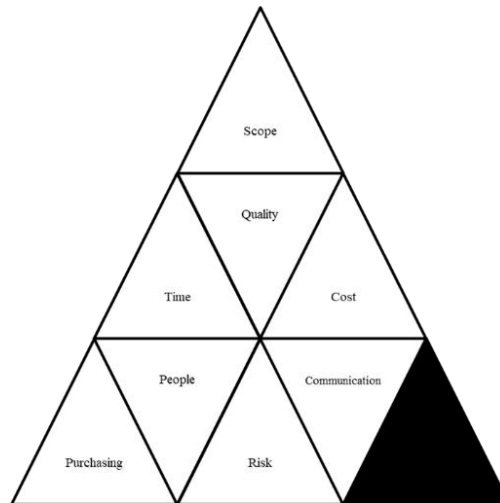
Open schooling event

Based on collected reliable data and real-life cases to propose measures, students will advocate for action that promote sustainable mobility and to improve road safety in the community by organizing at school the Road Safety Day where each group will present the research project results through infographics. Local community, experts, researchers and parents are inverted for a broad discussion about how to promote sustainable mobility and improve road safety at community level.

1. Each project output (poster/infographic) is presented by the students to the community and debate the need to change to a more sustainable and safer mobility and its environmental, health and road safety impacts on the community.
2. Students will communicate policy measures using science-based argumentation. Students appeal to the action of all in health and safety of the community, providing great understanding that health, environmental and road safety literacy and promotion are a responsibility of all.

Students, families, school community and relevant local stakeholders attend the event and understand how important is to change behaviour related to mobility patterns. They also get high-level understanding on strategies that minimize disease, environmental hazards and road safety impacts - and how they may have an influence on the relevant settings (e.g., home, school, workplace, public space at the community level).

Project Management Framework and Instruments

1. Plan: Determine How to Do the Project

2. Plan: Define Project Scope

- What are the outputs?
Example: scientific poster, open schooling event

-What are the requirements of project outputs?
Example: A3 format, Color, 5 sections (introduction, goals, methods, results, conclusions, recommendations).
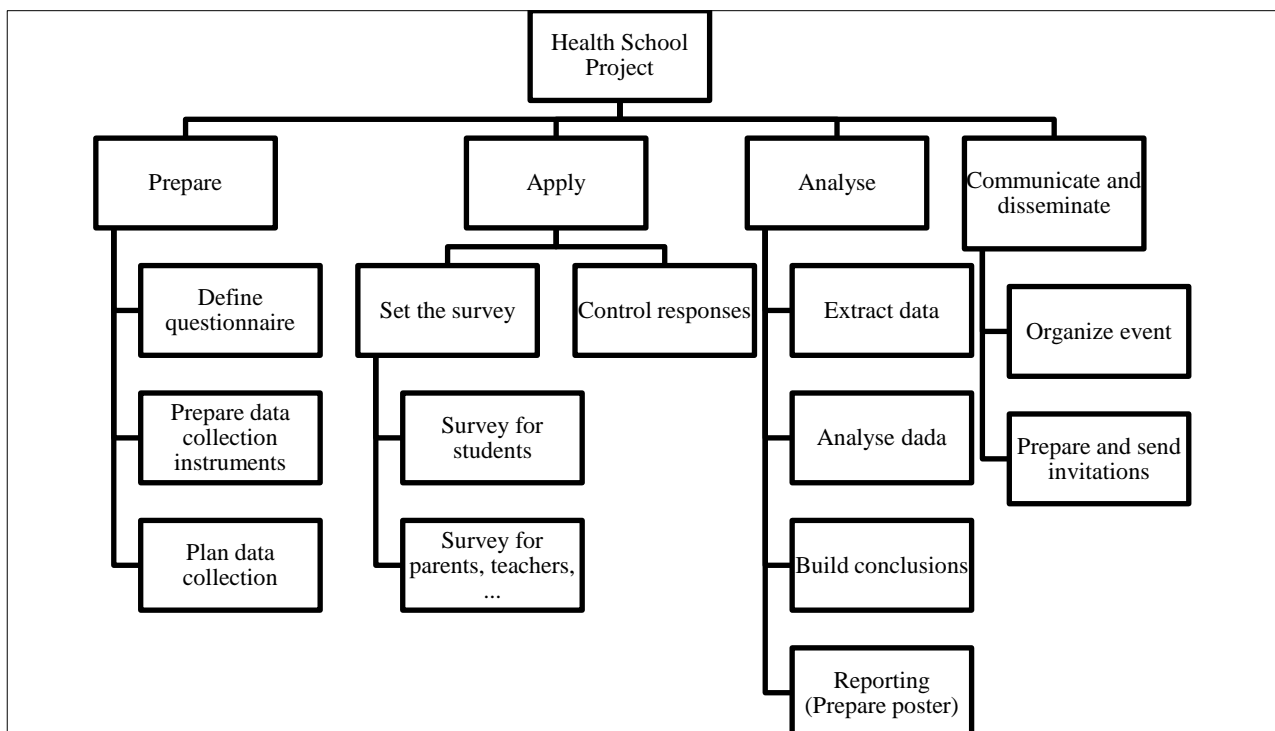
- Are there any constraints to produce the project outputs?
Example: work should be completed in two weeks

- Define the tasks to produce the outputs – build the Work Breakdown Structure

Work Breakdown Structure
(filled with examples, these may change according to your project organisation)

3. Plan: Determine Project Time

    a. Define the detailed activities for each WBS element
    b. Put the activities in sequence

c.   Estimate the resources (human and acquisitions) for each activity
d.   Estimate the calendar time (days or weeks) for each activity
e.   Create the Gantt Chart

Resource Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources
Define the questionnaire	1 hour	paper
Build online questionnaire	15 minutes	laptop
Apply the questionnaires	1 hour	paper
Data analysis	3 hours	paper or laptop
Outputs (poster/infographic)	15 minutes	laptop or mobile phone
Open schooling event	3 hours	laptop

Gantt Chart
(filled with examples, these may change according to your project organisation)

Activity	Week 1	Week 2	Week 3	Week 4	Week 5
Define the questionnaire	■				
Build online questionnaire		■			
Apply the questionnaires		■			
Data analysis			■		
Outputs (poster/infographic)			■		
Open schooling event					■

4. Plan: Determine Project Cost

a.   Estimate how much each activity will cost
Note: include the cost for Labor, Supplies, overhead (like office space and equipment)

b.   Add the estimates to determine the total cost of your project

Cost Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources	Human Resource Cost	Other Resources Cost (supplies)
Define the questionnaire	1 hour	paper	20 euros	n.a
Build online questionnaire	15 minutes	laptop	5 euros	n.a
Apply the questionnaires	1 hour	paper	20 euros	n.a
Data analysis	3 hours	paper or laptop	60 euros	n.a
Outputs (poster/ infographic)	15 minutes	laptop or mobile phone	5 euros	n.a
Open schooling event	3 hours	laptop	60 euros	40 euros
Total	8h30	-	170 €	-

Note: these are just examples of rubric costs, without real application to PAFSE

5. Plan: Determine Project Quality

a.   Ensure your project produces quality outputs
b.   Plan what quality means to your project
c.   Determine how you will ensure quality

Quality Breakdown Structure
(filled with examples, these may change according to your project organisation)

Requirement	Quality planning	Quality assurance	Quality control
1.1	Minimum number of responses to the surveys for students	Minimum number of responses to the survey: 100	Monitor the number of responses to the survey on a weekly basis

| 1.2 | Minimum number of responses to the surveys for parents/teachers | Minimum number of observations: 100 | Monitor the number of responses to the survey on a weekly basis |
| 1.3 | Outputs: posters /infographics | Methodology, results, conclusions, recommendations | Monitor the developments of students' outputs |

6. Plan: Determine Project Risks

    a.   Identify the two types of risks (uncertain future events that can affect your project): threats have a negative impact on your project; opportunities have a positive impact on your project

Risk Breakdown Structure
(filled with examples, these may change according to your project organisation)

Risk	Probability (How likely is it to happen)	Impact (How big of an effect will it have)	Owner (who takes care about the risk)	Action Plan (initiatives to reduce threats and increase opportunities)
Modest number of responses to the survey	High	High	Students: – Mary – Peter – John	–Identification of other potential target groups –Invitations and re–invitations
Modest number of people that accepted invitation to attend the open schooling event	Medium	Medium	Professor Francis Students: - Sophia - Caroline	- Re–invitations by email - Telephone calls - New invitations - More dissemination

7. Plan: Plan Procurement Processes

    a.   Determine what goods and services you need
    b.   Have what you need at the time that you need it.

Supplies Breakdown Structure
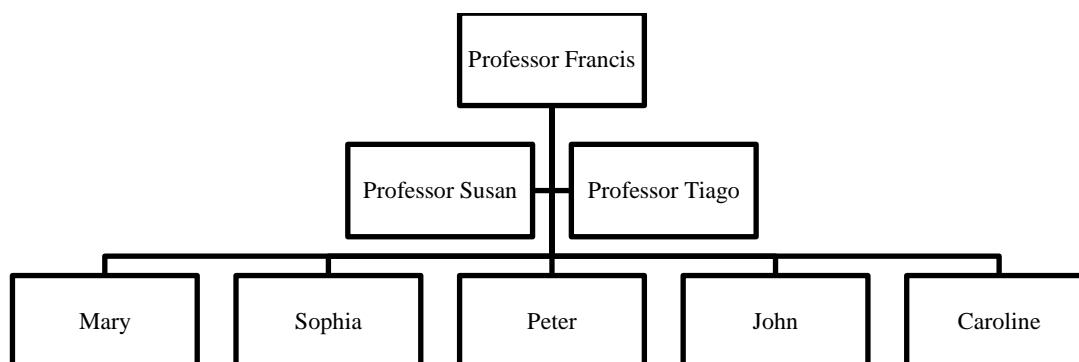*(filled with examples, these may change according to your project organisation)*

Supply	Supply Cost (supplies)	When to be available	How to be available
Paper	20 euros	In the beginning of the project	Commitment of school top management
Printer	50 euros	In the beginning of the project	Commitment of school top management
Mobile laptop	700 euros	In the beginning of the project	Commitment of school top management
Printed post	40 euros	Before the open schooling event	Poster printing in Stapples Office Center

8. Plan: Plan People

    a.   Acquire the project team
    b.   Map the project team in the Organization Breakdown Structure
    c.   Assign the project team members to roles
    d.   Assign the project team members to activities
    e.   Train the project team
    f.   Determine how you will motivate and reward the team
    g.   Map Stakeholders – people or groups interested in the project
    h.   Determine how you will engage stakeholders in the project

Organization Breakdown Structure
(filled with examples, these may change according to your project organisation)

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                        ┌─────────────────────┐
                        │  Professor Francis  │
                        └─────────────────────┘
                  ┌──────────────────┬──────────────────┐
          ┌─────────────────┐  ┌─────────────────┐
          │ Professor Susan │  │ Professor Tiago │
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│ Mary │ │ Sophia │ │ Peter │ │ John  │ │ Caroline │
└──────┘ └────────┘ └───────┘ └───────┘ └──────────┘
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Responsibility assignment matrix
(filled with examples, these may change according to your project organisation)

Activity	Team members							
	Mary	**Sophia**	**Peter**	**John**	**Caroline**	**Professor Francis (Science)**	**Professor Susan (Science)**	**Professor Tiago (ICT)**
Define the questionnaire	X	X	X			C/P		
Build the data collection instruments					X	C/P		
Data collection			X	X	X		C/P	
Data analysis			X	X/P	X		C/P	
Build outputs	X	X	X	X	X/P	C/P		
Coordinate the overall implementation of the project	X	X	X	X	X			C/P
Coordinate the open schooling event					X	X		

Letter	Role
X	Executes work
P	Controls progress
C	Should be consulted
I	Should be informed

Stakeholders Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Directly involved in the project (yes/no)	Served or Affected by the Project	Likely to be user of the results of the project
Parents	yes	yes	yes
School community	yes	yes	yes
School management	no	yes	yes
Municipality	no	yes	yes
Residents' association	no	yes	yes
National Directorate for Education	yes	yes	yes
Portuguese Road Safety Association	yes	no	no
National Directorate For Health	no	yes	yes
Municipality	no	yes	yes

Stakeholders Management Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Who they are and why should be involved in the project	Why the project is relevant for them	Strategies to obtain support
Parents	Students' families should be involved in the survey to collect the relevant responses. Their involvement also maximizes the impact of the project in terms of global literacy.	Due to their interest in pupils' education and school health and well being	Present the school project in parents meeting
School community	The school community should be involved in the survey and observations to be done by students in school environment. Their involvement also maximizes the impact of the project in terms of global literacy.	Due to their interest in students' education and school health and well being	Present the school project in a school community meeting
School management	The school management assures relevant resources for students' projects and should be involved in the survey Their involvement also maximizes the impact of the project in terms of global literacy.	Due to their interest in students' education and school health and wellbeing. Also due to their interest in demonstrating the interest of school in contributing to community health (to be a health promotion school).	Present the school project to school management.
Municipality	The municipality should be involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to municipality interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project).
Residents' association	Residents' associations should be involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to residents' associations interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project). .
National Directorate for Education	The National Directorate for Education is supporting the project and interested in the results in terms of students' learnings.	Due to their interest in novel methodologies for STEM education and role in policy making.	Invitation to participate in the open schooling event.

9. Plan: Plan Communication

   a. Assure the right information to the right people, at the right time, in a useful format
   b. Assure effective project meetings
   c. Build the communications plan

Communications plan
(filled with examples, these may change according to your project organisation)

Organized by (from)	Participants (to)	What	When	How/Where	Purpose
Professor Francis	Team	Kick-off meeting	10 september	Laboratory	Provide a complete description of the project and what the end product will be.

Organized by (from)	Participants (to)	What	When	How/Where	Purpose
Professor Francis	Team	Team meeting	Every week (Wednesday, 14h)	IT classroom	- Overall plan for the project - Discuss project developments and plan next stage - Instruct team on how to - Provide updates on the progress of the project and if there are any issues with completion
Professor Francis	Team and Parents	Meeting	Before the project starts (date to be defined)	School meeting room	Explain the project and invite for participation in the survey
Professor Francis and Team	Parents	Meeting	Before the project starts (date to be defined)	Virtual meeting	Explain the project and invite for participation in the survey and open schooling event.
Professor Francis, Team, School management	School community; Municipality; Residents' association; National Directorate for Education; Portuguese Road Safety Association; National Directorate for Health	Invitations to stakeholders participation in open schooling event	Before the open schooling event (date to be defined)	By email	Explain the project and invite for participation in the open schooling event.

10. Plan: Finish the project planning by building the Charter

1.0 Project identification	
Name	Sustainable Mobility
Summary description	Students perform inquiry-based activities, administer the data collection instruments, analyse results, extract conclusions, and propose priorities for action. They will create a poster/infographic that identifies community mobility patterns and its impacts on environment, health and road safety. In the end they present the findings to the community (students, residents, organisations, policy makers), aware for importance of sustainable mobility and the associated risks in traffic, and propose measures to promote the sustainable mobility and to improve road safety in the community.
Project owner	Identify the owner of the project (e.g.: school X)
Project manager	Identify the project manager
Stakeholders	Identify the stakeholders and briefly describe why they are interested parties
Team and roles	Identify the team and summarize the role of each resource in the project (e.g: student, ICT teacher, Science Teacher, School manager, designer, software developer…)

2.0 Needs that support the project
The learning activities aim not only to contribute to how an educational concept for schools in sustainable mobility needs to be designed to initiate and change students' ways of thinking and acting but also to show that pedagogical activities need to be oriented toward sustainable mobility as a tool to guarantee a better future for younger generations.

3.0 Project goals
Describe what you want to achieve in the short-term, medium term and long term. Follow SMART principles. *Examples* Project completed – March 22 Open schooling event – April 22

4.0 Project scope

Identify the tasks of the project

5.0 Key Deliverables

Identify goods or services produced as a result of the project. A deliverable could be a report, a document, a software product, a server upgrade or any other building block of an overall project.
Examples
Data collection instruments
Poster, Infographic

6.0 Milestones and dates

Identify the principal landmarks of project execution stablished according to what is described in the project scope.
Examples
Survey concluded
Interviews concluded
Open schooling event prepared

7.0 Constraints

Identify the principal project constraints (cost, technical, other)
Examples
Budget 200 € (limit)
Project should be finished in 15 December (limit)

8.0 Risks and opportunities

Identify issues that may emerge in the future and influence project implementation
Examples
Modest number of responses to the survey
Modest number of people that accepted invitation to attend the open schooling event

9.0 Project success criteria

Identify the criteria or measures of success. These are the project acceptance criteria.
Examples
Project completed before Christmas period
Open schooling event in a community setting with the participation of the entire school community, parents, and local stakeholders.

10.0 Project success factors

Identify the factors that you will manage in order to positively influence the success of the project.
Examples
Appropriate engagement of students and parents.
Interest of teachers in project based learning.

Teaching-learning process for school project (summary):

1. Collection of evidence (data, information, reports, case studies).
2. Evaluation of the evidence based on criteria and selection of the relevant and non-biased information.
3. Identify effective presentation formats.
4. Produce the posters/infographics.
5. Present the poster/infographic in open schooling event and debate the need to change to a more sustainable and safer mobility and its impacts on the community.

Expected outcomes of the teaching-learning process (summary):

▪ Students will be able to incorporate evidence in their poster/infographic coming from reputable data sources to support their ideas and show media literacy.
▪ Students will be able to analyze quantitative evidence on the importance of a sustainable and safer mobility and their progress, to support their recommendations of strategies.
▪ Students will be able to identify and communicate evidence-based policy measures that promote sustainable and safer mobility and produce positive outcomes in the school and community settings.

- Students will be able to suggest and advocate for action by different stakeholders, though data and scientific evidence.

Target Audience for Recommendations

School community and local stakeholders: students, parents, municipalities, healthcare providers, local enterprises.

Public Debate and Recommendations (based on research results)

Public presentation of the results by students in a community setting and dissemination of evidence-based recommendations via social, community and conventional media.

Main partner responsible: PRP

11. Project management resource and inquiry instruments on the topic of "Road traffic crashes – a public health issue"

Overview

Road traffic crashes cause approximately 1.3 million deaths and 20 to 50 million non-fatal injuries worldwide every year. More than half of all road traffic deaths and injuries involve vulnerable road users, such as pedestrians, cyclists, motorcyclists, and their passengers. Young people are particularly vulnerable in the world roads – road traffic injuries are the leading cause of death for children and young adults aged 5-29 (WHO, 2018). The teaching-learning activities support 7th to 9th grade teachers in exploring road traffic crashes as a public health challenge. It is expected that the learning experience leads the young students to understand that road traffic crashes are major public health threats, the influencing variables and how to move to less risky patterns of behaviour in the road, and reach high-level comprehension on how STEM (Science, Technology, Engineering, Mathematics) may contribute to address these issues, contribute to evidence-based personal decision-making, and public policy. The scenario aims to address the Sustainable Development Goals (SDGs), not only by contributing to the quality of education (SDG 4), but also by improving road safety and making the cities safer, especially for vulnerable road users (SDGs 3 and 11, targets 3.6, 11.2, 3.D). The scenario empowers students to adopt safe behaviours in traffic by creating awareness on risky behaviours, social influences, and modifiable risk factors, supports their participation in civic society initiatives and in the design of local responses for the issue, while providing significant interactions with the community (researchers, public health specialists, municipalities, policy makers, enterprises).

Estimated Duration

After initial socioscientific and technical background on the topic in classroom environment, 8-10 sessions of 40-45 minutes for supplementary learning activities and school project (lesson 6 - lesson 15)

School Research Project

Overview. The project is based on guided research to aware for risky behaviours in traffic. To address this challenge, students are asked to measure risky behaviors in traffic in the community through roadside observations. Students will plan, design, and carry out a roadside observation survey to calculate road safety indicators through roadside observations (observed behaviours) for risky behaviours as a pedestrian, cyclist, motorcyclists/moped rider, car passengers, and/or car driver. The data collected will be used to aware for risky behaviour in traffic and to make recommendations to improve road safety in the community.

In a first stage, students will be elaborating with the teacher on the principal research questions, goals, data collection methods and instruments, following the steps of the scientific method. The decision of the risky behaviours to assess (road users to include pedestrians, cyclists, motorcyclists/moped riders, car passengers, car drivers) is decided based on the dynamics of the community (e.g. if the bicycle it is not a common transport mode in the community, the topic "cyclist" should not be included).

Then students perform the roadside observations, analyse the data collected, extract conclusions and build a poster/infographic/report with the main findings. In the end they present the findings to the community (students, residents, organisations, policy makers), aware for risky behaviours in traffic, and propose measures to improve road safety in the community.

Estimated duration. The school research project starts after lesson 5 and has an estimated duration of 8-10 sessions of 45 minutes.

Session 1-2: research administration

The teacher starts the lesson by recalling the topics of previous lessons: risky behaviours in traffic and how to measure those behaviours. A brainstorming of possible risky behaviours in traffic that could be assessed in the surroundings of the school is promoted. After the discussion, students are challenged to explore **DLO_2 (Roadside observation research)**, which includes possible behaviours to measure and how to carry out a roadside observation research.

Possible road users/risky behaviours:

- Pedestrians: using a mobile phone while crossing the road; crossing the road outside the crosswalk.
- Cyclists: wearing a helmet; using retroreflective material.
- E-scooter riders: wearing a helmet; using retroreflective material.
- Motorcyclists/ moped riders: wearing a helmet.
- Car drivers: using a mobile phone while driving; using the seat belt.
- Car passengers: using the seat belt in the front seat; using the seat belt in the back seat.

Then, the class decide the road users/risky behaviours to include in the research and the class is organized in groups – each group addresses one type of road user/topic.

In the next step, each group prepares the data collection, using the **DLO_2 (Roadside observation research)** as a guidance:

1. Defines the risky behaviours to assess.
2. Defines the observation places, the moments of observation, and the sample size.
3. Builds the instruments for data collection: record sheets or online forms (if possible, online forms should be used – e.g.: Google Forms, Microsoft Forms, …).

Session 3-5: data collection

The data collection can be carried out during the moments of the lessons or in other moments. The time for data collection will depend on the number of observations and the traffic volume on the observation places. **DLO_2 (Roadside observation research)** includes guidelines for the observation places, the number of locations, the sample size, and the observation process.

Session 6-8: data analysis and reporting

After the data collection, students organize the datasets, calculate the indicators, and build the outputs (poster/infographic/report). **DLO_2 (Roadside observation research)** can be used to guide the students in organizing the dataset, calculating the indicators, and presenting the results. The outputs should describe the research question, methodology, results, conclusions, and recommendations arising from the roadside observation survey carried out.

Session 9-10: open schooling event planning

Teacher discusses with the students the format and the planning of the open schooling day to share the findings of their research with the community.
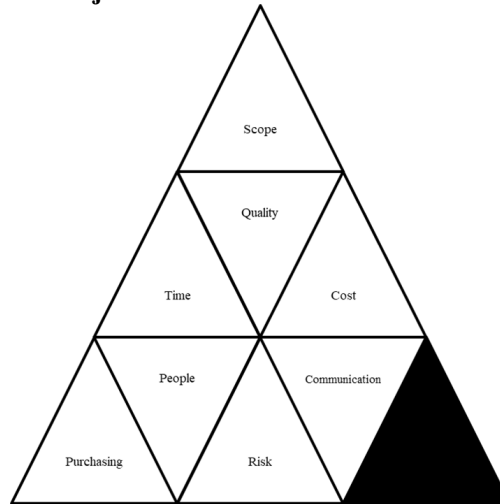
Open schooling event:

Students will be holding a community event to share the results of their research with the participation of students, teachers, parents, social partners of the local community. Each group will be presenting their evidence and informing the public about the questions they have addressed in the project while improving communication skills and developing responsible citizenship.

1. Each project output (poster/infographic) is presented by the students in a community setting (e.g., exposition center, municipality, garden, museum, science fair).
2. Students will communicate policy measures using science-based argumentation. Students appeal to the action of all in health and safety of the community, providing great understanding that road safety promotion is a responsibility of all.
3. Students, families, school community and relevant local stakeholders attend the event and understand how important is to change behaviours in traffic. They also get high-level understanding on strategies to improve road safety - and how they may have an influence on the relevant settings (e.g., home, school, workplace, public space at the community level).

Project Management Framework and Instruments

1. Plan: Determine How to Do the Project

2. Plan: Define Project Scope

- What are the outputs?
Example: scientific poster, open schooling event

-What are the requirements of project outputs?
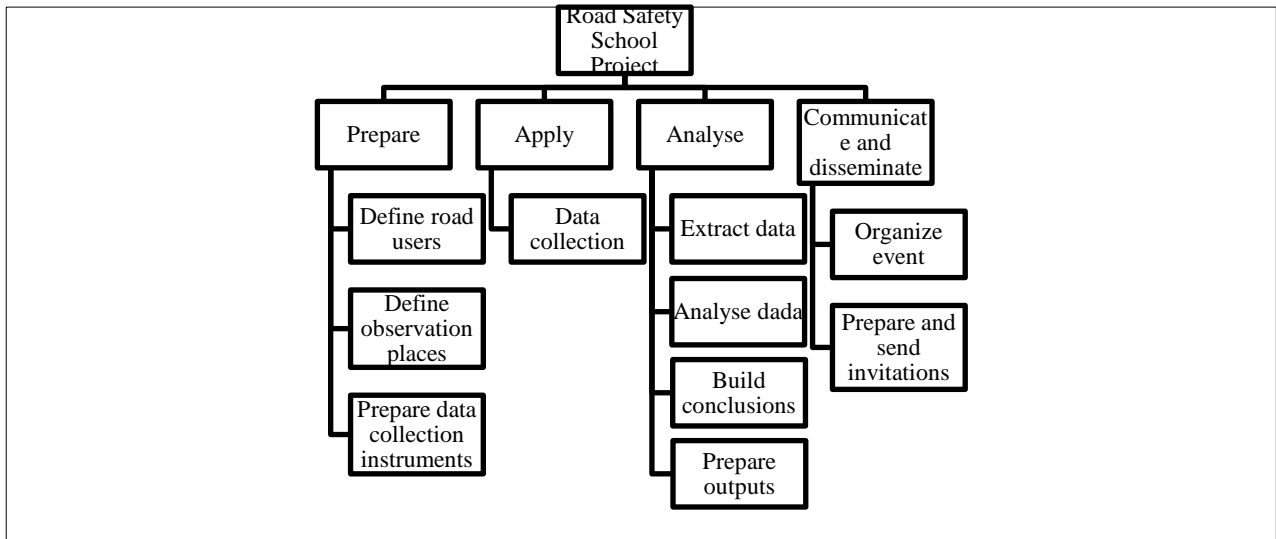Example: A3 format, Color, 5 sections (introduction, goals, methods, results, conclusions, recommendations).

- Are there any constraints to produce the project outputs?
Example: work should be completed in two weeks

- Define the tasks to produce the outputs – build the Work Breakdown Structure

Work Breakdown Structure
(filled with examples, these may change according to your project organisation)

3. Plan: Determine Project Time

a. Define the detailed activities for each WBS element
b. Put the activities in sequence
c. Estimate the resources (human and acquisitions) for each activity
d. Estimate the calendar time (days or weeks) for each activity
e. Create the Gantt Chart

Resource Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources
Project planning	1 hour	paper
Data collection instruments	15 minutes	laptop
Data collection	1 hour	paper
Data analysis	3 hours	paper or laptop
Outputs (poster/infographic/report)	15 minutes	laptop or mobile phone
Open schooling event	3 hours	laptop

Gantt Chart
(filled with examples, these may change according to your project organisation)

Activity	Week 1	Week 2	Week 3	Week 4	Week 5
Project planning	■				
Data collection instruments		■			
Data collection		■			
Data analysis			■	■	
Outputs (poster/infographic/report)			■	■	
Open schooling event					■

4. Plan: Determine Project Cost

    a.   Estimate how much each activity will cost

Note: include the cost for Labor, Supplies, overhead (like office space and equipment)

    b.   Add the estimates to determine the total cost of your project

Cost Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources	Human Resource Cost	Other Resources Cost (supplies)
Define the questionnaire	1 hour	paper	20 euros	n.a
Build online questionnaire	15 minutes	laptop	5 euros	n.a
Apply the questionnaires	1 hour	paper	20 euros	n.a
Data analysis	3 hours	paper or laptop	60 euros	n.a
Outputs (poster/ infographic/ report)	15 minutes	laptop or mobile phone	5 euros	n.a
Open schooling event	3 hours	laptop	60 euros	40 euros
Total	8h30	-	170 €	-

Note: these are just examples of rubric costs, without real application to PAFSE

5. Plan: Determine Project Quality

    a.   Ensure your project produces quality outputs
    b.   Plan what quality means to your project
    c.   Determine how you will ensure quality

Quality Breakdown Structure
(filled with examples, these may change according to your project organisation)

Requirement	Quality planning	Quality assurance	Quality control
1.1	Minimum number of roadside observations	Minimum number of observations: 100	Monitor the number of observations on a weekly basis
1.2	Minimum number of locations	Minimum number of observations: 3	Monitor the number of locations on a weekly basis
1.3	Outputs: posters /infographics /reports	Methodology, results, conclusions, recommendations	Monitor the developments of students' outputs

6. Plan: Determine Project Risks

    a. Identify the two types of risks (uncertain future events that can affect your project): threats have a negative impact on your project; opportunities have a positive impact on your project

Risk Breakdown Structure
(filled with examples, these may change according to your project organisation)

Risk	Probability (How likely is it to happen)	Impact (How big of an effect will it have)	Owner (who takes care about the risk)	Action Plan (initiatives to reduce threats and increase opportunities)
Modest number of roadside observations	Medium	Medium	Students: – Mary – Peter – John	Carry out more roadside observations at different places
Modest number of people that accepted invitation to attend the open schooling event	Medium	Medium	Professor Francis Students: - Sophia - Caroline	- Re–invitations by email - Telephone calls - New invitations - More dissemination

7. Plan: Plan Procurement Processes

    a. Determine what goods and services you need
    b. Have what you need at the time that you need it.

Supplies Breakdown Structure
(filled with examples, these may change according to your project organisation)

Supply	Supply Cost (supplies)	When to be available	How to be available
Paper	20 euros	In the beginning of the project	Commitment of school top management
Printer	50 euros	In the beginning of the project	Commitment of school top management
Mobile laptop	700 euros	In the beginning of the project	Commitment of school top management
Printed post	40 euros	Before the open schooling event	Poster printing in Stapples Office Center

8. Plan: Plan People

    a. Acquire the project team
    b. Map the project team in the Organization Breakdown Structure
    c. Assign the project team members to roles
    d. Assign the project team members to activities
    e. Train the project team
    f. Determine how you will motivate and reward the team
    g. Map Stakeholders – people or groups interested in the project
    h. Determine how you will engage stakeholders in the project

Organization Breakdown Structure
(filled with examples, these may change according to your project organisation)

Responsibility assignment matrix
(filled with examples, these may change according to your project organisation)

Activity	Team members							
	Mary	**Sophia**	**Peter**	**John**	**Caroline**	**Professor Francis (Science)**	**Professor Susan (Science)**	**Professor Tiago (ICT)**
Plan the study	X	X	X			C/P		
Build the data collection instruments					X	C/P		
Data collection			X	X	X		C/P	
Data analysis			X	X/P	X		C/P	
Build outputs	X	X	X	X	X			C/P
Coordinate the overall implementation of the project					X	X		
Coordinate the open schooling event					X	X		

Letter	Role
X	Executes work
P	Controls progress
C	Should be consulted
I	Should be informed

Stakeholders Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Directly involved in the project (yes/no)	Served or Affected by the Project	Likely to be user of the results of the project
Parents	yes	yes	yes
School community	yes	yes	yes
School management	no	yes	yes
Municipality	no	yes	yes
Residents' association	no	yes	yes
National Directorate for Education	yes	yes	yes
Portuguese Road Safety Association	yes	no	no
National Directorate For Health	yes	no	no
Municipality	no	yes	yes
Civil Engineering National Laboratory	no	yes	yes

Stakeholders Management Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Who they are and why should be involved in the project	Why the project is relevant for them	Strategies to obtain support
Parents	Students' families should be involvement as it maximizes the impact of the project in terms improvement of road safety.	Due to their interest in pupils' education and school health and well being	Present the school project in parents meeting
School community	The school community should be involvement as it maximizes the impact of the project in terms improvement of road safety.	Due to their interest in students' education and school health and well being	Present the school project in a school community meeting

Stakeholder name	Who they are and why should be involved in the project	Why the project is relevant for them	Strategies to obtain support
School management	The school management assures relevant resources for students' projects and should be involved in the survey Their involvement also maximizes the impact of the project in terms of global literacy.	Due to their interest in students' education and school health and wellbeing. Also due to their interest in demonstrating the interest of school in contributing to community health (to be a health promotion school).	Present the school project in school.
Municipality	The municipality should be involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to municipality interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project). .
Residents' association	Residents' associations should be involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to residents' associations interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project). .
National Directorate for Education	The National Directorate for Education is supporting the project and interested in the results in terms of students' learnings.	Due to their interest in novel methodologies for STEM education and role in policy making.	Invitation to participate in the open schooling event.

9. Plan: Plan Communication

a. Assure the right information to the right people, at the right time, in a useful format
b. Assure effective project meetings
c. Build the communications plan

Communications plan
(filled with examples, these may change according to your project organisation)

Organized by (from)	Participants (to)	What	When	How/Where	Purpose
Professor Francis	Team	Kick-off meeting	10 september	Laboratory	Provide a complete description of the project and what the end product will be.
Professor Francis	Team	Team meeting	Every week (Wednesday, 14h)	IT classroom	- Overall plan for the project - Discuss project developments and plan next stage - Instruct team on how to - Provide updates on the progress of the project and if there are any issues with completion
Professor Francis	Team and Parents	Meeting	Before the project starts (date to be defined)	School meeting room	Explain the project and invite for participation in the survey
Professor Francis and Team	Parents	Meeting	Before the project starts (date to be defined)	Virtual meeting	Explain the project and invite for participation in the survey and open schooling event.

Organized by (from)	Participants (to)	What	When	How/Where	Purpose
Professor Francis, Team, School management	School community; Municipality; Residents' association; National Directorate for Education; Portuguese Road Safety Association; National Directorate For Health Municipality	Invitations to stakeholders participation in open schooling event	Before the open schooling event (date to be defined)	By email	Explain the project and invite for participation in the open schooling event.

10. Plan: Finish the project planning by building the Charter

1.0 Project identification	
Name	Road traffic crashes
Summary description	The project is based on guided research to aware for risky behaviours in traffic. To address this challenge, students are asked to measure risky behaviors in traffic in the community through roadside observations. Students will plan, design, and carry out a roadside observation survey to calculate road safety indicators through roadside observations (observed behaviours) for risky behaviours as a pedestrian, cyclist, motorcyclists/moped rider, car passengers, and/or car driver. The data collected will be used to aware for risky behaviour in traffic and to make recommendations to improve road safety in the community.
Project owner	Identify the owner of the project (e.g.: school X)
Project manager	Identify the project manager
Stakeholders	Identify the stakeholders and briefly describe why they are interested parties
Team and roles	Identify the team and sumarize the role of each resource in the project.

2.0 Needs that support the project
Road traffic crashes cause approximately 1.3 million deaths and 20 to 50 million non-fatal injuries worldwide every year. More than half of all road traffic deaths and injuries involve vulnerable road users, such as pedestrians, cyclists, motorcyclists, and their passengers. Young people are particularly vulnerable in the world roads – road traffic injuries are the leading cause of death for children and young adults aged 5-29 (WHO, 2018).

3.0 Project goals
Describe what you want to achieve in the short-term, medium term and long term. Follow SMART principles.   *Examples*   Project completed – March 22   Open schooling event – April 22

4.0 Project scope
Identify the tasks of the project.

5.0 Key Deliverables
Identify goods or services produced as a result of the project. A deliverable could be a report, a document, a software product, a server upgrade or any other building block of an overall project.   *Examples*   Data collection instruments   Report, Poster, Infographic

6.0 Milestones and dates

Identify the principal landmarks of project execution stablished according to what is described in the project scope.

Examples
Data collection concluded
Data analysed
Outputs (poster/infographic/report) concluded
Open schooling event prepared

7.0 Constraints

Identify the principal project constraints (cost, technical, other)

Examples
Budget 200 € (limit)
Project should be finished in 15 December (limit)

8.0 Risks and opportunities

Identify issues that may emerge in the future and influence project implementation

Examples
Modest number of roadside observations carried out
Modest number of people that accepted invitation to attend the open schooling event

9.0 Project success criteria

Identify the criteria or measures of success. These are the project acceptance criteria.

Examples
Project completed before Christmas period
Open schooling event in a community setting with the participation of the entire school community, parents, and local stakeholders.

10.0 Project success factors

Identify the factors that you will manage in order to positively influence the success of the project.

Examples
Appropriate engagement of students and parents.
Interest of teachers in project based learning.

Teaching-learning process for school project (summary):

1. Planning: define the topics to include in the project (pedestrian, cyclist, motorcyclists/moped rider, car passengers, and/or car drivers); build the instruments for data collection with the selected indicators; define the observation places, the sample size, and other details of the data collection process.
2. Data collection: carrying out the roadside observations.
3. Data analysis: organizing the data and calculating the road safety indicators.
4. Produce the posters/infographics with the main findings.
5. Present the poster/infographic in open schooling event.

Expected outcomes of the teaching-learning process (summary):

▪ Students will be able to carry out a roadside observation survey in the community.
▪ Students will be able to aware for risky behaviours in traffic and to propose policy measures to increase the road safety in the community.
▪ Students will be able to incorporate evidence in their poster/infographic coming from a roadside observation survey to support their ideas and show media literacy.
▪ Students will be able to identify and communicate evidence-based policy measures to help promoting road safety in the school and community settings.
▪ Students will be able to suggest and advocate for actions by different stakeholders, though scientific-based data and information.

Target Audience for Recommendations

School community and local stakeholders: students, parents, municipalities, healthcare providers, local enterprises.

Public Debate and Recommendations (based on research results)

Public presentation of the results by students in a community setting and dissemination of evidence-based recommendations via social, community and conventional media.

Main partner responsible: PRP (Portuguese Road Safety Association)

12. Project management resource and inquiry instruments on the topic of "Road traffic crash risk factors"

Overview

Road traffic crashes cause approximately 1.3 million deaths, and 20 to 50 million non-fatal injuries worldwide every year. Injuries caused from these, are the leading cause of death for children and young adults aged 5 to 29 (source: World Health Organization). The scenario supports teachers in exploring with students the factors contributing to outcomes in terms of injury, severity and fatality. The learning activities prepare students to follow a data-driven approach in addressing and mitigating risks, and so contribute to the reduction of burden from road traffic accidents at the community level. The scenario also creates awareness on the Global Goals, namely SDG target 3.6 (halving the number of road deaths by 2030).

To European Commission defined the goal to move to close to zero deaths on the EU roads by 2050 ("Vision Zero") and to halve the number of serious injuries by 2030 from a 2020 baseline. To reach these goals, the European Commission based its road safety policy framework for the decade 2021 to 2030 on the Safe System approach, whose core elements are ensuring safe vehicles, safe infrastructure, safe road use (speed, sober driving, wearing safety belts and helmets) and better post-crash care. The EC also stated that the mindset of "Vision Zero" needs to take hold both among policy makers and in the society (European Commission, 2020). The traffic safety and mobility education play an important role in strengthening and/or changing attitudes and intrinsic motivations towards risk awareness, personal safety and the safety of other road users in order to contribute towards a safety-minded culture. It is considered an essential part of an integrated approach to traffic safety, as education provides the possibility for people to learn how to participate in traffic safely. The aim of traffic safety and mobility education is to positively influence behaviour patterns that result in safer traffic. The transfer of knowledge and gaining an understanding of traffic rules and situations are the basis of traffic safety and mobility education (ETSC, 2020).

The scenario aims to contribute towards a safety-minded culture in traffic. Its content endorses teachers to play a key role in developing knowledge and skills for incorporating road safety as a central topic in their classes and in teaching public health science using high-level methods, high-quality learning objects, and updated evidence. It also challenges them to have a contribution for the community road safety by engaging families in educational activities and reaching the local community with inquiry- based projects and open schooling events leaded by students. The scenario also contributes to increase the interest in STEM (Science, Technology, Engineering, Mathematics) by providing an opportunity to develop a real-world research project in which students will develop and apply knowledge and skills learned in classes. The project also involves data collection, data manipulation, data analysis and communicating/discussing results based in scientific evidence

Estimated Duration

5-6 sessions of 40-45 minutes for supplementary learning activities and school project (lesson 7 – lesson 12)

School Research Project

Overview. The project is based on guided research on road traffic crash risk factors and data obtained through a questionnaire. To address this challenge, students can draw their first ideas about topics to explore from the lessons discussed in the classroom in this scenario and the supplementary educational activities. After understanding the importance of adopting safe behaviours in traffic, students will be invited to brainstorm about how they can contribute to improving road safety levels in the school community and what steps they should follow. With the teacher's support, students will conclude that to improve road safety and identify specific road safety countermeasures, they first need to identify and understand the problem.

In a first stage, students will be elaborating with the teacher on the principal research questions, goals, data collection methods and instruments, following the steps of the scientific method. The decision of the road traffic crash risk factors to assess (speed, safety equipment; distraction, fatigue, alcohol, drugs) in the scholar community is discussed in the class.

Then students perform inquiry-based activities, administer the data collection instruments, analyse results, extract conclusions, and propose priorities for action. They will create a poster/infographic that identifies the main self-declared risky behaviours in traffic in the scholar community, the attitudes towards the risky behaviours in traffic and/or the risk perceptions of unsafe behaviours in traffic. In the end they present the

findings to the community (students, residents, organisations, policy makers), aware for risky behaviours in traffic, and propose measures to improve road safety in the community.

<u>Estimated duration.</u> The school research project starts after lesson 6 and has an estimated duration of 5-6 sessions of 40-45.

<u>Session 1-2: research administration</u>

The teacher starts the lesson by recalling the topics of previous lessons: road traffic crash risk factors (speed, safety equipment; distraction, fatigue, alcohol, drugs). Students will be invited to explore and identify what are the phases of a research project. They will present and debate their findings and teacher will compare student´s contributions with the **New DLO (Research by survey)**, which includes all the information needed for the different phases of the project development:

- the steps of the scientific method.
- definitions and examples of population, sample, sample size, and associated margin of error.
- examples of surveys: online forms (if possible, online forms should be used – e.g.: Google Forms, Microsoft Forms, …).
- examples of questions for several road users (pedestrians, cyclists, e-scooter riders, car drivers, car passengers, motorcyclists/moped riders);
- discuss the limitations of scientific evidence obtained with the survey.

After exploring the examples and definitions, students are organized in groups. Each group must choose a traffic crash risk factor (speed, distraction, safety equipment, alcohol, etc) and carry out the following tasks:

- *First task:* select questions about opinions, attitudes and behaviours concerning road traffic crash risk factors exploring the **New DLO - Research by survey** and the following website https://www.esranet.eu/
- *Second task*: define a population, a sample, and the sample size.
- *Third task*: build the questionnaire.

Examples of questions to include in the survey (available in **New DLO - Research by survey**)

- Over the last 30 days, how often did you, as a car passenger, travel without wearing your seatbelt in the back seat?
- Over the last 30 days, how often did you, as a cyclist, cycle without a helmet?
- How acceptable do you think that is to use the mobile phone while driving?
- How risky do you think it is for a pedestrian to cross the road outside the crosswalk?

Teacher together with students and supported by the **New DLO (Research by survey)** will complete and close the questionnaire. Teacher should encourage students to include in the questionnaire questions regarding accessibility, disability and equity.

Is suggested that each group use laptop to build an online questionnaire (online form with Microsoft forms, Google forms, or other). To conclude the preparation of the survey the teacher supports students in:
- ✓ writing the introductory text (HEADER)
  - o Project title/Project acronym
  - o Summary description of the project
  - o Why is the project relevant/project goals
  - o Who is implementing the project and where.
- ✓ configure the questions (WHAT)
  - o turning questions into sentences
  - o defining a scale for responses options
- ✓ identifying the target group (WHO)
- ✓ defining a strategy and activities to achieve the target (HOW)
- ✓ defining the minimum number of responses from the target (EXPECTED RESULTS)
- ✓ stablish a timeline for collecting the responses (WHEN)
- ✓ which events may constraint data collection (RISKS)
- ✓ which strategy to track results (CONTROL procedures)

Session 3-5: data analysis and reporting

After administering the survey and collecting the minimum number of responses, an Excel file may be downloaded from the online survey (Google forms, Microsoft forms, …). Alternatively, if the questionnaire is administered in paper, students prepare a dataset file with the questions and distribution of responses. The teacher supports the students in preparing tables, graphics and then promotes a debate around the results. **New DLO (Research by survey)** can be used to guide the students in organizing the data, calculating the indicators, and building tables and graphs with the results.

Then, the students build the outputs (poster/infographic/report), which should describe the research questions, methodology, results, conclusions, and recommendations arising from the survey carried out.

During this phase they are invited to explore https://www.roadsafety-dss.eu/#/. "The SafetyCube DSS is the European Road Safety Decision Support System, which has been produced within the European research project SafetyCube, funded within the Horizons 2020 Programme of the European Commission, aiming to support evidence-based policy making. The SafetyCube Decision Support System provides detailed interactive information on a large list of road accident risk factors and related road safety countermeasures."

Session 6: open schooling event planning

Teacher discusses with the students the format and the planning of the open schooling day to share the findings of their research with the community.

Open schooling event:

Based on collected reliable data and real-life cases to propose measures, students will advocate for action that promote safe behaviours in the school community by organizing at school the Road Safety Day where each group will present the research project results by topic through infographics inviting local community, experts, researchers and parents for a broad discussion about how to improve road safety at community level.

Each group will be presenting their evidence and informing the public about the questions they have addressed in the project while improving communication skills and developing responsible citizenship.

1. Each project output (poster/infographic) is presented by students in a community setting (e.g., open schooling, exposition center, municipality, garden, museum, science fair).
2. Students will communicate policy measures using science-based argumentation. Students will appeal to the action of all on behalf of the health and safety of the community, providing great understanding that road safety promotion is a responsibility of all.
3. Students, families, school communities and relevant local stakeholders attend the event and understand how important it is to change behaviour in traffic. They also get high-level understanding on strategies to improve road safety - and how they may have an influence on the relevant settings (e.g., home, school, workplace, public space at the community level).

Project Management Framework and Instruments

1. Plan: Determine How to Do the Project

2. Plan: Define Project Scope

- What are the outputs?
Example: scientific poster, open schooling event

-What are the requirements of project outputs?
Example: A3 format, Color, 5 sections (introduction, goals, methods, results, conclusions, recommendations).
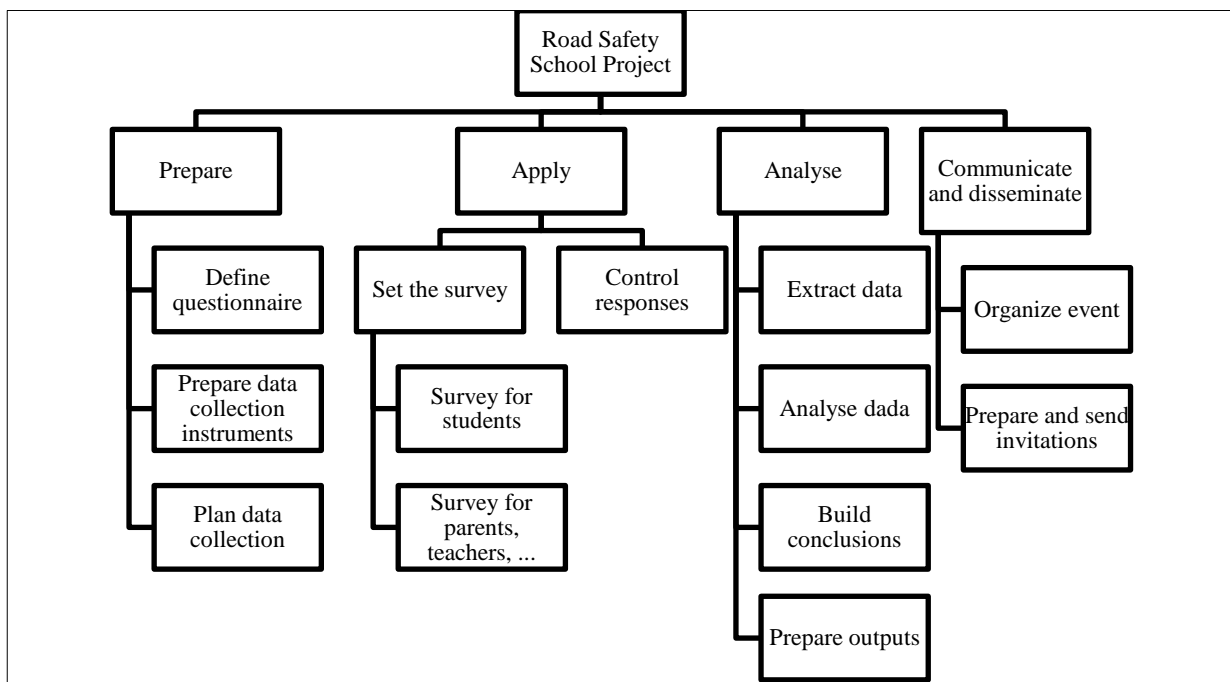
- Are there any constraints to produce the project outputs?
Example: work should be completed in two weeks

- Define the tasks to produce the outputs – build the Work Breakdown Structure

Work Breakdown Structure
(filled with examples, these may change according to your project organisation)

3. Plan: Determine Project Time

a.   Define the detailed activities for each WBS element
b.   Put the activities in sequence
c.   Estimate the resources (human and acquisitions) for each activity
d.   Estimate the calendar time (days or weeks) for each activity
e.   Create the Gantt Chart

Resource Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources
Define the questionnaire	1 hour	paper
Build online questionnaire	15 minutes	laptop
Apply the questionnaires	1 hour	paper
Data analysis	3 hours	paper or laptop
Outputs (poster/infographic/report)	15 minutes	laptop or mobile phone
Open schooling event	3 hours	laptop

Gantt Chart
(filled with examples, these may change according to your project organisation)

Activity	Week 1	Week 2	Week 3	Week 4	Week 5
Define the questionnaire	■				
Build online questionnaire		■			
Apply the questionnaires		■			
Data analysis			■		
Outputs (poster/infographic/report)			■	■	
Open schooling event				■	■

4. Plan: Determine Project Cost

    a.   Estimate how much each activity will cost

Note: include the cost for Labor, Supplies, overhead (like office space and equipment)

    b.   Add the estimates to determine the total cost of your project

Cost Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources	Human Resource Cost	Other Resources Cost (supplies)
Define the questionnaire	1 hour	paper	20 euros	n.a
Build online questionnaire	15 minutes	laptop	5 euros	n.a
Apply the questionnaires	1 hour	paper	20 euros	n.a
Data analysis	3 hours	paper or laptop	60 euros	n.a
Outputs (poster/ infographic/report)	15 minutes	laptop or mobile phone	5 euros	n.a
Open schooling event	3 hours	laptop	60 euros	40 euros
Total	8h30	-	170 €	-

5. Plan: Determine Project Quality

    a.   Ensure your project produces quality outputs
    b.   Plan what quality means to your project
    c.   Determine how you will ensure quality

Quality Breakdown Structure
(filled with examples, these may change according to your project organisation)

Requirement	Quality planning	Quality assurance	Quality control
1.1	Minimum number of responses to the surveys for students	Minimum number of responses to the survey: 100	Monitor the number of responses to the survey on a weekly basis
1.2	Minimum number of responses to the surveys for parents/teachers	Minimum number of observations: 100	Monitor the number of responses to the survey on a weekly basis
1.3	Outputs: posters /infographics /reports	Methodology, results, conclusions, recommendations	Monitor the developments of students' outputs

6. Plan: Determine Project Risks

    a.   Identify the two types of risks (uncertain future events that can affect your project): threats have a negative impact on your project; opportunities have a positive impact on your project

Risk Breakdown Structure
(filled with examples, these may change according to your project organisation)

Risk	Probability (How likely is it to happen)	Impact (How big of an effect will it have)	Owner (who takes care about the risk)	Action Plan (initiatives to reduce threats and increase opportunities)
Modest number of responses to the survey	High	High	Students: – Mary – Peter – John	–Identification of other potential target groups –Invitations and re–invitations
Modest number of people that accepted invitation to attend the open schooling event	Medium	Medium	Professor Francis Students: - Sophia - Caroline	- Re–invitations by email - Telephone calls - New invitations - More dissemination

7. Plan: Plan Procurement Processes

    a. Determine what goods and services you need
    b. Have what you need at the time that you need it.

Supplies Breakdown Structure
(filled with examples, these may change according to your project organisation)

Supply	Supply Cost (supplies)	When to be available	How to be available
Paper	20 euros	In the beginning of the project	Commitment of school top management
Printer	50 euros	In the beginning of the project	Commitment of school top management
Mobile laptop	700 euros	In the beginning of the project	Commitment of school top management
Printed post	40 euros	Before the open schooling event	Poster printing in Stapples Office Center

8. Plan: Plan People

    a. Acquire the project team
    b. Map the project team in the Organization Breakdown Structure
    c. Assign the project team members to roles
    d. Assign the project team members to activities
    e. Train the project team
    f. Determine how you will motivate and reward the team
    g. Map Stakeholders – people or groups interested in the project
    h. Determine how you will engage stakeholders in the project

Organization Breakdown Structure
(filled with examples, these may change according to your project organisation)

Responsibility assignment matrix
(filled with examples, these may change according to your project organisation)

Activity	Team members							
	Mary	**Sophia**	**Peter**	**John**	**Caroline**	**Professor Francis (Science)**	**Professor Susan (Science)**	**Professor Tiago (ICT)**
Define the questionnaire	X	X	X			C/P		
Build the data collection instruments					X	C/P		
Data collection			X	X	X		C/P	
Data analysis	X	X	X	X	X/P	C/P		
Build outputs	X	X	X	X	X			C/P
Coordinate the overall implementation of the project					X	X		
Coordinate the open schooling event					X	X		

Letter	Role
X	Executes work
P	Controls progress
C	Should be consulted
I	Should be informed

Stakeholders Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Directly involved in the project (yes/no)	Served or Affected by the Project	Likely to be user of the results of the project
Parents	yes	yes	yes
School community	yes	yes	yes
School management	no	yes	yes
Municipality	no	yes	yes
Residents' association	no	yes	yes
National Directorate for Education	no	yes	yes
Portuguese Road Safety Association	yes	yes	yes
National Directorate For Health	yes	no	no
Municipality	no	yes	yes
Civil Engineering National Laboratory	no	yes	yes

Stakeholders Management Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Who they are and why should be involved in the project	Why the project is relevant for them	Strategies to obtain support
Parents	Students' families should be involved in the survey to collect the relevant responses. Their involvement also maximizes the impact of the project in terms of global literacy.	Due to their interest in pupils' education and school health and well being	Present the school project in parents meeting
School community	The school community should be involved in the survey and observations to be done by students in school environment. Their involvement also maximizes the impact of the project in terms of global literacy.	Due to their interest in students' education and school health and well being	Present the school project in a school community meeting

Stakeholder name	Who they are and why should be involved in the project	Why the project is relevant for them	Strategies to obtain support
School management	The school management assures relevant resources for students' projects and should be involved in the survey Their involvement also maximizes the impact of the project in terms of global literacy.	Due to their interest in students' education and school health and wellbeing. Also due to their interest in demonstrating the interest of school in contributing to community health (to be a health promotion school).	Present the school project in school.
Municipality	The municipality should be involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to municipality interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project). .
Residents' association	Residents' associations should be involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to residents' associations interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project). .
National Directorate for Education	The National Directorate for Education is supporting the project and interested in the results in terms of students' learnings.	Due to their interest in novel methodologies for STEM education and role in policy making.	Invitation to participate in the open schooling event.

9. Plan: Plan Communication

a. Assure the right information to the right people, at the right time, in a useful format
b. Assure effective project meetings
c. Build the communications plan

Communications plan
(filled with examples, these may change according to your project organisation)

Organized by (from)	Participants (to)	What	When	How/Where	Purpose
Professor Francis	Team	Kick-off meeting	10 september	Laboratory	Provide a complete description of the project and what the end product will be.
Professor Francis	Team	Team meeting	Every week (Wednesday, 14h)	IT classroom	- Overall plan for the project - Discuss project developments and plan next stage - Instruct team on how to - Provide updates on the progress of the project and if there are any issues with completion
Professor Francis	Team and Parents	Meeting	Before the project starts (date to be defined)	School meeting room	Explain the project and invite for participation in the survey
Professor Francis and Team	Parents	Meeting	Before the project starts (date to be defined)	Virtual meeting	Explain the project and invite for participation in the survey and open schooling event.

Organized by (from)	Participants (to)	What	When	How/Where	Purpose
Professor Francis, Team, School management	School community; Municipality; Residents' association; National Directorate for Education; Portuguese Road Safety Association; National Directorate For Health	Invitations to stakeholders participation in open schooling event	Before the open schooling event (date to be defined)	By email	Explain the project and invite for participation in the open schooling event.

10. Plan: Finish the project planning by building the Charter

1.0 Project identification	
Name	Road traffic crashes
Summary description	The project is based on guided research on road traffic crash risk factors and data obtained through a questionnaire. To address this challenge, students can draw their first ideas about topics to explore from the lessons discussed in the classroom in this scenario and the supplementary educational activities. After understanding the importance of adopting safe behaviours in traffic, students will be invited to brainstorm about how they can contribute to improving road safety levels in the school community and what steps they should follow. With the teacher's support, students will conclude that to improve road safety and identify specific road safety countermeasures, they first need to identify and understand the problem.
Project owner	Identify the owner of the project (e.g.: school X)
Project manager	Identify the project manager
Stakeholders	Identify the stakeholders and briefly describe why they are interested parties
Team and roles	Identify the team and summarize the role of each resource in the project.

2.0 Needs that support the project
Road traffic crashes cause approximately 1.3 million deaths, and 20 to 50 million non-fatal injuries worldwide every year. Injuries caused from these, are the leading cause of death for children and young adults aged 5 to 29 (source: World Health Organization). The scenario supports teachers in exploring with students the factors contributing to outcomes in terms of injury, severity and fatality. The learning activities prepare students to follow a data-driven approach in addressing and mitigating risks, and so contribute to the reduction of burden from road traffic accidents at the community level. The scenario also creates awareness on the Global Goals, namely SDG target 3.6 (halving the number of road deaths by 2030).

3.0 Project goals
Describe what you want to achieve in the short-term, medium term and long term. Follow SMART principles. *Examples* Project completed – March 22 Open schooling event – April 22

4.0 Project scope
Identify the tasks of the project

5.0 Key Deliverables
Identify goods or services produced as a result of the project. A deliverable could be a report, a document, a software product, a server upgrade or any other building block of an overall project. *Examples* Data collection instruments Report, Poster, Infographic

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6.0 Milestones and dates

Identify the principal landmarks of project execution stablished according to what is described in the project scope.

Examples
Survey concluded
Data analysed
Outputs (poster/infographic/report) concluded
Open schooling event prepared

7.0 Constraints

Identify the principal project constraints (cost, technical, other)

Examples
Budget 200 € (limit)
Project should be finished in 15 December (limit)

8.0 Risks and opportunities

Identify issues that may emerge in the future and influence project implementation

Examples
Modest number of responses to the survey
Modest number of people that accepted invitation to attend the open schooling event

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9.0 Project success criteria

Identify the criteria or measures of success. These are the project acceptance criteria.

Examples
Project completed before Christmas period
Open schooling event in a community setting with the participation of the entire school community, parents, and local stakeholders.

10.0 Project success factors

Identify the factors that you will manage in order to positively influence the success of the project.

Examples
Appropriate engagement of students and parents.
Interest of teachers in project based learning.

Teaching-learning process for school project (summary):

1. Planning: define topics concerning road traffic crash risk factors to include in the project (speed, safety equipment, distraction, fatigue, alcohol, drugs); build the instruments for data collection with the selected indicators; define population, the sample size, and other details of the data collection process.
2. Data collection: carrying out the survey.
3. Data analysis: organizing the data and calculating road safety indicators.
4. Produce posters/infographics with main findings.
5. Present the poster/infographic in open schooling event.

Expected outcomes of the teaching-learning process (summary):

- Students will be able to carry out a data-driven science study through surveying the community.
- Students will take awareness and analyze quantitative evidence on risky behaviours in traffic and propose policy measures to increase road safety in the community.
- Students will be able to incorporate evidence in their poster/infographic coming from a data-driven science study to support their ideas and show media literacy.
- Students will be able to identify and communicate evidence-based policy measures to help promote road safety in both school and community settings.
- Students will be able to suggest and advocate for action by different stakeholders, though scientific-based data and information.

Target Audience for Recommendations

School community and local stakeholders: students, parents, municipalities, healthcare providers, local enterprises, road safety authorities.

Public Debate and Recommendations (based on research results)

Public presentation of the self-declared road safety indicators by students in a community setting and dissemination of evidence-based recommendations via social, community and conventional media.

Main partner responsible: PRP (Portuguese Road Safety Association)

13. Project management resource and inquiry instruments on the topic of "3D modelling to address pandemic challenges"

Overview

As technology continues to evolve, virtual / augmented reality and 3D models are becoming much more common across all industries, particularly healthcare. 3D modelling is getting a more prominent role in rehabilitation and health, from improving surgical training to creating better treatment plans. Indeed, it is used intensively in the design of assistive technologies, e.g., prosthetics, orthosis, or even simpler tools/materials to aid in specific activities. Also, modelling is the first concept to be learned regarding 3D printing. The 3D field is transforming how products are designed, produced, and serviced; and there are many benefits to embrace this field, such as improving an effective and efficient patient care, providing a teaching tool for professionals at all stages of their careers, from students to interdisciplinary teams, planning medical and surgical cases, identifying issues, or demonstrating them to healthcare professionals, improving follow up care, among others. So, how we leverage the potential of 3D modelling to drive innovation is a mandatory topic in science/technology curriculum. The inquiry-based project supports 8th grade science and ICT teachers in exploring 3D environments using updated scientific/technical evidence. The learning experience supports youths in understanding and reaching high-level comprehension on how STEM (science, technology, engineering, mathematics) may contribute to address these issues, contributing to evidence-based personal decision-making, and public policy.

Estimated Duration

After initial socioscientific and technical background on the topic in classroom environment (5-6 sessions), about 4 sessions of 40-45 minutes for supplementary learning activities and 4 sessions for the project (session 8 – session 11).

School Research Project

Topics:

Importance of 3D modelling
Technical features and principles of 3D modelling
Possible applications of 3D modelling in public health

Challenge:

Model a 3D object to address communicable diseases challenges.

Method:

Lesson 8 to 11 will be dedicated to the school research project. Students are organized in groups; each group addresses 1 object based on the daily pandemic challenges lived. The project challenges each group of students to: 1) identify and represent their progress in the form of essay responses and using Likert scales to show their improvement from the first lesson to the last; 2) model and present an object with what they have learned throughout the teaching-learning sequences and the ideas that emerged during the teleconference with experts. A competition and reward for the best 3D objects will take place.

Project Management Framework and Instruments

1. Plan: Determine How to Do the Project
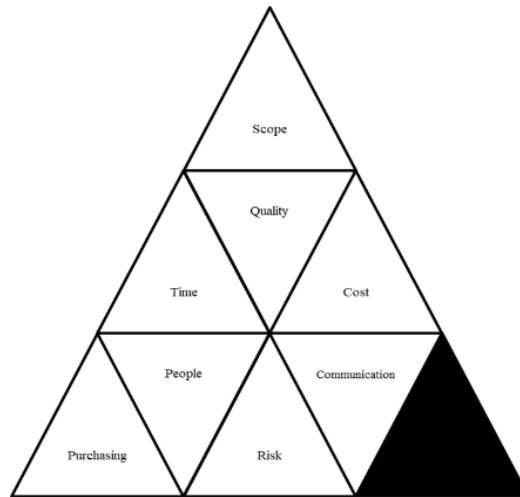
2. Plan: Define Project Scope

- What are the outputs?
3D model, open schooling event.

-What are the requirements of project outputs?
Computers with software for presentation development.

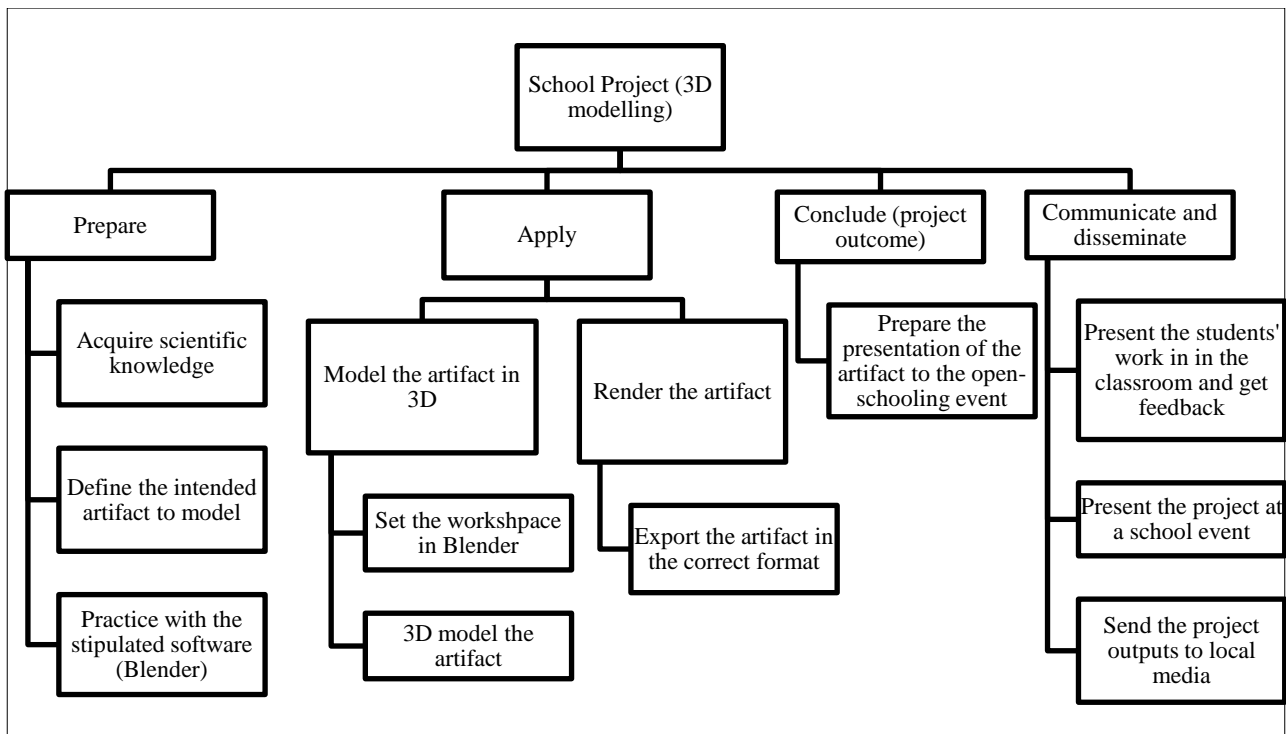- Are there any constraints to produce the project outputs?
The limitation of time to model the 3D object.
Possible lack of interest by the students.

- Define the tasks to produce the outputs – build the Work Breakdown Structure

Work Breakdown Structure
(filled with examples, these may change according to your project organisation)

3. Plan: Determine Project Time

    a.   Define the detailed activities for each WBS element
    b.   Put the activities in sequence
    c.   Estimate the resources (human and acquisitions) for each activity
    d.   Estimate the calendar time (days or weeks) for each activity
    e.   Create the Gantt Chart

Resource Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources
Acquire scientific knowledge and practice skills	1 hours	laptop, paper
Model the artifact	3 hours (overlapping with above)	laptop
Prepare presentation of the artifact	30 minutes	laptop

Gantt Chart
(filled with examples, these may change according to your project organisation)

Activity	Week 1	Week 2	Week 3	Week 4
Acquire scientific knowledge and practice skills	■			
Model the artifact	■	■	■	
Prepare presentation of the artifact				■

4. Plan: Determine Project Cost

    a.   Estimate how much each activity will cost
Note: include the cost for Labor, Supplies, overhead (like office space and equipment)

    b.   Add the estimates to determine the total cost of your project

Cost Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources	Human Resource Cost*	Other Resources Cost (supplies)
Acquire scientific knowledge and practice skills	1 hours	laptop, paper	20 €	n.a
Model the artifact	3 hours (overlapping with above)	laptop	60 €	n.a
Prepare presentation of the artifact	30 minutes	laptop	10 €	n.a
Total	4h30 (some overlapping with each other)	-	90 €	-

5. Plan: Determine Project Quality

    a.   Ensure your project produces quality outputs
    b.   Plan what quality means to your project
    c.   Determine how you will ensure quality
    d.   Ensure your project produces quality outputs
    e.   Plan what quality means to your project
    f.   Determine how you will ensure quality

Quality Breakdown Structure
(filled with examples, these may change according to your project organisation)

Requirement	Quality planning	Quality assurance	Quality control
1.1	Minimum 3D models' precision and accuracy	Report on the specificities of the 3D artifact model (e.g. sense of reality, textures, mesh).	Monitor the development of students' 3D model
1.2	Quality render of the artifacts	Minimum resolution info for the render: Full-HD or 4K images	Monitor the students' 3D renders
1.3	Assessment of the presentation	Assessment of the presentations with five criteria: introduction, scientific accuracy, results, proper presentation, future work.	Assess the project final outputs

6. Plan: Determine Project Risks

    a. Identify the two types of risks (uncertain future events that can affect your project): threats have a negative impact on your project; opportunities have a positive impact on your project

Risk Breakdown Structure
(filled with examples, these may change according to your project organisation)

Risk	Probability (How likely is it to happen)	Impact (How big of an effect will it have)	Owner (who takes care about the risk)	Action Plan (initiatives to reduce threats and increase opportunities)
Too large number of people that accepted invitation to attend the open schooling event	Low	Low	School Principal Richard Professor Clara	- Moving of the schooling event to a larger venue - Split of the school event to two successive repetitions of the events
Modest number of people that accepted invitation to attend the open schooling event	Medium	Medium	School Principal Richard Professor Clara Students: - Mary - Peter	- Identification of other potential target groups - Invitations to the broader local community - More persistent invitations to students' friends and families - Grouping of different school events together to a bigger school event
Modest students' interest for the school project	High	High	Professor John	- Give motives to the students (e.g. presenting at the school event, possibility of being an award-winning project) - Scaffold students who face difficulties

7. Plan: Plan Procurement Processes

    a. Determine what goods and services you need
    b. Have what you need at the time that you need it

Supplies Breakdown Structure
(filled with examples, these may change according to your project organisation)

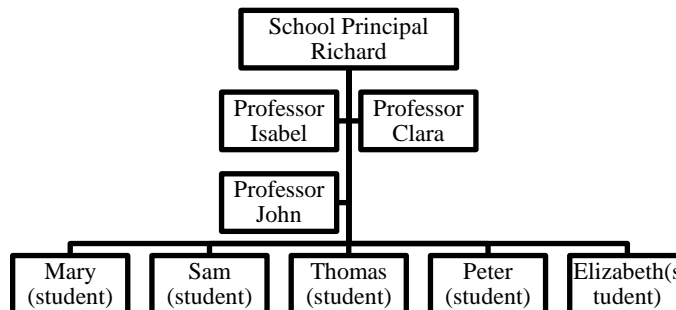| Supply	Supply Cost (supplies)	When to be available	How to be available
Paper	20 euros	In the beginning of the project	Commitment of school top management
Laptop	700 euros	In the beginning of the project	Commitment of school top management

8. Plan: Plan People

    a. Acquire the project team
    b. Map the project team in the Organization Breakdown Structure
    c. Assign the project team members to roles
    d. Assign the project team members to activities
    e. Train the project team

f.   Determine how you will motivate and reward the team
g.   Map Stakeholders – people or groups interested in the project
h.   Determine how you will engage stakeholders in the project

Organization Breakdown Structure
(filled with examples, these may change according to your project organisation)

Responsibility assignment matrix
(filled with examples, these may change according to your project organisation)

Activity	Team members					Professor Isabel (Science)	Professor Clara (Maths)	Professor John (ICT)	School Principal Luke
	Mary (student)	Sam (student)	Thomas (student)	Peter (student)	Elizabeth (student)				
Acquire scientific knowledge and practice skills	X	X	X	X	X	C/P	C/P	C/P	
Model the artifact	X	X	X	X	X/P	C/P	C/P	C/P	
Prepare presentation of the artifact	X	X	X	X	X/P	C/P	C/P	C/P	
Present the projects' outputs	X	X	X	X	X/P	P	P	P	
Coordinate the overall implementation of the project						X	X	X	I
Coordinate the school event						X	X	X	I
Attend the school event and present their work	X	X	X	X	X	X	X	X	

Letter	Role
X	Executes work
P	Controls progress
C	Should be consulted
I	Should be informed

Stakeholders Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Directly involved in the project (yes/no)	Served or Affected by the Project	Likely to be user of the results of the project
Parents	yes	yes	yes
School community	yes	yes	yes
School management	no	yes	yes
Municipality	no	yes	yes

Stakeholder name	Directly involved in the project (yes/no)	Served or Affected by the Project	Likely to be user of the results of the project
Local Health Infrastructures	no	yes	yes
National Directorate for Education	yes	no	yes
Local media	no	no	yes

Stakeholders Management Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Who they are and why should be involved in the project	Why the project is relevant for them	Strategies to obtain support
Parents	Students' families should attend the school event during which students will present their projects. The students' families will maximize their appreciation of the educational procedure and outputs as a result of the students' cooperation. Their involvement also maximizes the impact of the project in terms of global literacy.	Due to their interest in their children's education and school well-being.	Present the school project in parents meeting and attend the school project presentation in a school event.
School community	The school community should attend the school event during which students will present their projects. The school community will maximize their appreciation of the educational procedure and outputs as a result of the students' cooperation. The students might get inspired by the work of their classmates and the teachers might appreciate the educational procedure and be willing to get involved in the PAFSE consortium during the following years. They are also going to get informed on issues concerning public health literacy.	Due to their interest in students' education and school well-being, and the teachers' intention to be professionally developed.	Present the school project in a school community meeting.
School management	The municipality should be involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to municipality interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Attend the school project presentation in a school event.
Municipality	The municipality should be involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to municipality interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project).
Local Health Infrastructures	Local Health Infrastructures should be involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to their interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project).
National Directorate for Education	The National Directorate for Education is supporting the project and interested in the results in terms of students' learnings.	Due to their interest in novel methodologies for STEM education and role in policy making.	Invitation to participate in the open schooling event.
Local media	The Local Media should be shared with some of the school project descriptions, outputs and students' experiences in terms of exceptional students' work from the local community.	Due to their interest in exceptional pieces of work by members of the local community.	Invitation to participate in the open schooling event. Sharing a description of the project procedure, outputs and students' experiences with the local media.

9. Plan: Plan Communication

   a. Assure the right information to the right people, at the right time, in a useful format
   b. Assure effective project meetings
   c. Build the communications plan

Communications plan
(filled with examples, these may change according to your project organisation)

Organized by (from)	Participants (to)	What	When	How/Where	Purpose
Professor Richard	Team	Kick-off meeting	Before the project starts (date to be defined)	Laboratory	Provide a complete description of the project and what the end product will be.
Professor Richard	Team	Team meeting	Every week (e.g. Wednesday)	IT classroom	- Overall plan for the project - Discuss project developments and plan next stage - Instruct team on how to - Provide updates on the progress of the project and if there are any issues with completion
Professor Richard	Team	Professors Meeting	Every two weeks	Virtual meating	- Monitor the general progress of the project - Discuss any difficulties found during the project depth and find ways to overcome them - Discuss alternative options for the enactment of the educational scenarios
Professor Richard	Team and Parents	Meeting	Before the project starts (date to be defined)	School meeting room / Virtual meeting	Explain the project and motivate for the children's participation.
Professor Richard and Team	Parents	Meeting	Before the project starts (date to be defined)	Virtual meeting	Explain the project and invite for participation in open schooling event.
Professor Richard, Clara, Isabel and John	Parents	Invitation to parents participation in open schooling event	Before the open schooling event (date to be defined)	By email	Remember the project and invite for participation in the open schooling event.
Professor Francis, Team, School management	School community Municipality, Local Health Infrastructures, National Directorate for Education, Local Media	Invitations to stakeholders participation in open schooling event	Before the open schooling event (date to be defined)	By email	Explain the project and invite for participation in the open schooling event.
Professor Richard	School Principal	After-open-schooling-event meeting	Two days after the open schooling event	Principal's office	-Present the School Principal an overview of the school projects -Present the School Principal an overview of the open schooling event -Ask the principal if they would be willing to make clusters with other schools in order to support even more expanded school networks working in similar projects in the future.

Professor Clara, Isabel and John	Team	Final team meeting	One week after the open schooling event	Laboratory	-Make a retrospect of the project -Discuss whether they are going to support similar activities in the future -Discuss ideas for further dissemination of the student project.

10. Plan: Finish the project planning by building the Charter

1.0 Project identification	
Name	Partnerships for Science Education – Portugal [PAFSE-PT]
Summary description	Students participate in active-based learning activities and carry out their own prototype research and material design in terms of STEM education and public health. In particular, the development of 3D modelling to address pandemic challenges.
Project owner	Colégio de São Gonçalo
Project manager	Professor Clara
Stakeholders	Parents (Interest in their children's high-quality education) School Community (Interest in achievements of other members of the school community) School Management (Interest of high-quality educational services provided by the school) Municipality (Interest in school work in their area) Local Health Infrastructures (Interest from public health education project by schools from the local society) National Associations of Science and ICT Education (Interest in innovative educational actions in the fields of STEM, ICT and Health Education) National Directorate for Education (Interest in innovative school educational projects) National Directorate for Health (Interest in school public health educational projects) Local media (Interest in achievements by schools of the local community
Team and roles	Professor Isabel (Science Professor) Professor Clara (Maths Professor) Professor John (ICT Professor) School Principal Richard (School Principal) Mary (student) Sam (student) Thomas (student) Peter (student) Elizabeth (student)

2.0 Needs that support the project
-The need for active and experiential school education which is not supported by the largest part of the Curriculum, yet boosts students' learning outputs, soft skills and interest in learning. The current state of education lacks active learning, inquiry-based learning, project-based learning and other modern educational approaches which serve several educational benefits to students. -The need for more effective STEM education which both provides all students with fundamental STEM skills for their everyday decision-making, and makes more students more intensely interested in STEM fields, even follow STEM careers in the future. Few students have a love for STEM subjects and even fewer have an aspiration to follow STEM related professional careers. This STEM educational projects hopes to bring more students in touch to the real essence of STEM theory and practice and make them love this field. -The need for more effective Public Health Education. Public Health is a major health issue which is often undermined in Health Education. As the COVID-19 pandemic highlighted, personal health-related decisions affect the society and the way the society behaves affects every person. Moreover, communicable diseases pose a constant threat for Public Health for every country in the world. The project aims to offer high-quality Public Health Education to students. -The need for Education with a view to active citizenship. During this project students study the interrelations between science and the everyday social context and realize the importance of informed decision-making for science topics in everyday lives. Connection to social issues often lacks from science and STEM education. This project aims to give students the opportunity to understand the close entanglements of science and society and be active citizens in the future.

3.0 Project goals
Teachers' professional workshop on the project completed – November 30th Project initiated – March 15 (predicted date) Project completed – April 20 (predicted date) Open schooling event – April 30 (predicted date)

4.0 Project scope
The scope of the project is to engage students in the 3D modelling of health care artifacts.

5.0 Key Deliverables

3D models of health artifacts
Presentations on the 3D models and their importance

6.0 Milestones and dates

Introductory work for the main project of students done
Final 3D model render
Presentation on the 3D models created
Students' presentations among one another in the classroom done
Open schooling event prepared
Open schooling event done

7.0 Constraints

Participation of at least 12 students in the project (limit)
Participation of at least 70 people in the open schooling event (limit)
Project should be finished on 30 April (predicted limit)

8.0 Risks and opportunities

Modest number of people that accepted invitation to attend the open schooling event
Too many people that accepted invitation to attend the open schooling event
Larger load of idea emerging by students
Modest interest of students for the lesson

9.0 Project success criteria

Project completed before Easter period
High-quality project outputs according to the assessment rubrics
High students' interest and participation in the project and the open schooling event
Open schooling event with the participation of the entire school community, parents, and local stakeholders

10.0 Project success factors

Appropriate engagement of students and parents
Appropriate time management during the lessons
Interest of teachers in the school project pillars (open schooling, inquiry-based learning, socioscientific issues)
Adequate attendance of stakeholders in the open schooling event

Teaching-learning process milestones:

1. Students will be able to propose solutions for 3D modelling basic objects (masks, ventilators…).
2. Students will be able to communicate the findings, motivations and limitations of various 3D elements and shapes considered in the working process.
3. Students will be able to identify and communicate the importance of 3D modelling to address pandemic challenges but also the role of innovation.
4. Students will be able to use technical argumentation to justify policy choices.

Teaching-learning process for school project (summary):

1. Development of materials (videos, tutorials, pictures).
2. 3D modelling objects.
3. Presentation of the 3D objects in an open schooling event.

Organization of the open schooling event:

1. Each project output (3D object) is presented by the students in a community setting (e.g., exposition center, municipality, garden, museum, science fair) in a 3D prepared environment (all apparatus included).
2. Students will prepare a pitch on how 3D modelling can address pandemic challenges. Technical talks to motivate peers regarding new technologies and environments are also implemented.
3. Students, parents, the school community and relevant local stakeholders attend the event and are introduced on the topic on how 3D modelling can be used to address pandemic challenges. Furthermore,

a multidisciplinary approach is also considered, such as the focus on art, design, engineering and mathematics.

Data Analysis and Reporting

Content Analysis.
Presentation formats.
Report writing.
Development of presentation.

Target Audience for Recommendations

School community and local stakeholders: students, parents, municipalities, designers, engineers, and local enterprises. Some of the highest-quality outputs (3D objects) made by the students could be distributed to members of the local community (e.g. health structures, municipal authorities). Some of the outputs (3D objects) could be communicated via local media (printed or online press), and if the quality of the model and overall project in general, is high, it could be presented in a student conference.

Public Debate and Recommendations (based on research results)

Presentation of the 3D printing produced by students in a community setting and dissemination of evidence recommendations via social, community and conventional media.

Main partner responsible: INESC-TEC

Overview

3D animation can be a useful resource to study typical objects that otherwise could not be visually perceived. 3D animations can be a dynamic way of creating a visual explanation of things based on different media (i.e., multimedia contents) that could be difficult for students to understand or build a mental model of, with only text or still imagery content.

The use of 3D animations in medical education is becoming increasingly popular. Indeed, animations are an efficient way to present complex information, reducing time spent reading textbooks. Thus, in the educational contexts, animations can help students learn more efficiently, retain, and better understand information. In addition to improving the learning experience, medical education is a highly important and necessary endeavour, as it can directly affect the lives of patients. These videos can be useful in emergency care instructions and provide information about how to administer CPR to a patient or help in forensic reconstructions; a doctor might explain a medical term to a patient in a friendly way, and they can also help patients understand complex procedures.

Highly engaging educational content is becoming essential to improving the overall learning experience. A plethora of data exists that confirms what many health care professionals know intuitively: that multimedia content, including 3D animation education, is superior to text-based or static image education content. When culturally suitable images and language are added, the efficacy is increased, and the outcomes improve.

This inquiry-based project supports science and ICT teachers in exploring 3D animation. The learning experience supports youths in understanding how Art and Technology may contribute to have high-quality 3D models useful for public health purposes.

Estimated Duration

After initial socioscientific and technical background on the topic in classroom environment, 4 sessions of 40-45 minutes for supplementary learning activities and school project (session 8 – session 11).

School Research Project

Topics:

- Importance of 3D animation.
- Technical features and principles of 3D animation.
- Possible applications of 3D animation in public health topic.

Research management, design and administration

Challenge: To animate an 3D object to address communicable diseases challenges

Method: Lesson 8 to 11 will be dedicated to the school research project. Students are organized in groups; each group addresses 1 object based on the daily pandemic challenges lived. The project challenges each group of students to: 1) identify and represent their progress in the form of essay responses and using Likert scales to show their improvement from the first lesson to the last; 2) animate and present an object with what they have learned throughout the teaching-learning sequences and the ideas that emerged during the teleconference with experts. A competition and reward for the best 3D objects will take place.

Project Management Framework and Instruments

1. Plan: Determine How to Do the Project
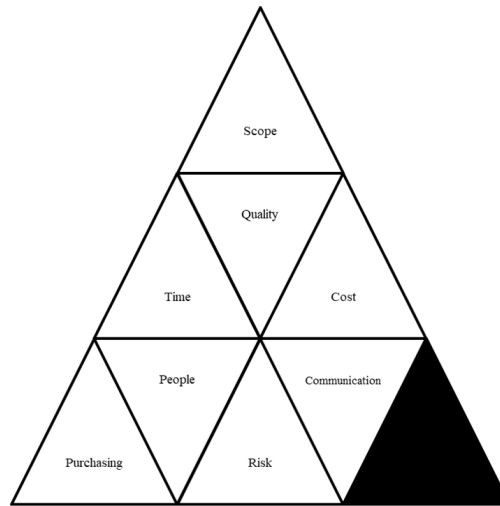
2. Plan: Define Project Scope

- What are the outputs?
3D animation, open schooling event

-What are the requirements of project outputs?
Computers with software for presentation development.

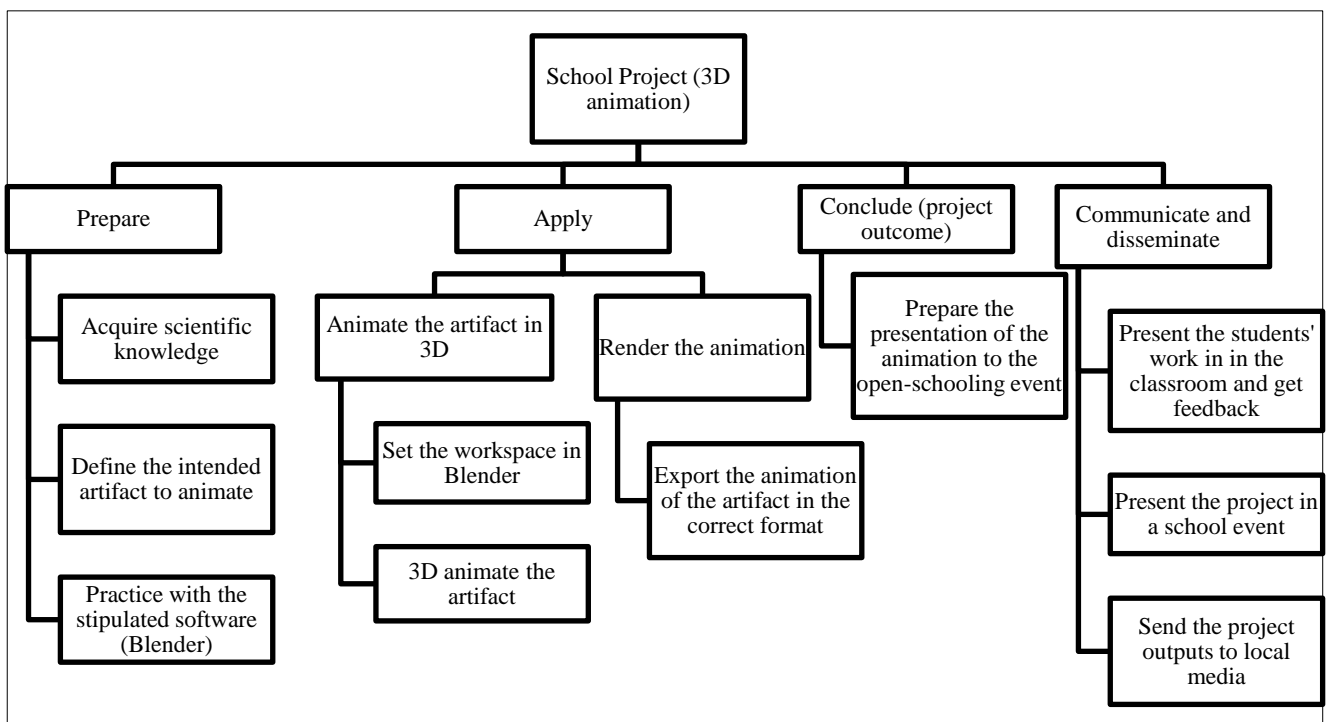- Are there any constraints to produce the project outputs?
The limitation of time to animate the 3D object
Possible lack of interest by the students

- Define the tasks to produce the outputs – build the Work Breakdown Structure

Work Breakdown Structure
(filled with examples, these may change according to your project organisation)

3. Plan: Determine Project Time

a. Define the detailed activities for each WBS element
b. Put the activities in sequence
c. Estimate the resources (human and acquisitions) for each activity
d. Estimate the calendar time (days or weeks) for each activity
e. Create the Gantt Chart

Resource Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources
Acquire scientific knowledge and practice skills	1 hours	laptop, paper
Animate the artifact	3 hours (overlapping with above)	laptop
Prepare presentation of the animation	30 minutes	laptop

Gantt Chart
(filled with examples, these may change according to your project organisation)

Activity	Week 1	Week 2	Week 3	Week 4
Acquire scientific knowledge and practice skills	■			
Animate the artifact	■	■	■	
Prepare presentation of the animation				■

4. Plan: Determine Project Cost

a. Estimate how much each activity will cost

Note: include the cost for Labor, Supplies, overhead (like office space and equipment)

b. Add the estimates to determine the total cost of your project

Cost Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources	Human Resource Cost*	Other Resources Cost (supplies)
Acquire scientific knowledge and practice skills	1 hours	laptop, paper	20 €	n.a
Animate the artifact	3 hours (overlapping with above)	laptop	60 €	n.a
Prepare presentation of the animation	30 minutes	laptop	10 €	n.a
Total	4h30 (some overlapping with each other)	-	90 €	-

5. Plan: Determine Project Quality

a. Ensure your project produces quality outputs
b. Plan what quality means to your project
c. Determine how you will ensure quality

Quality Breakdown Structure
(filled with examples, these may change according to your project organisation)

Requirement	Quality planning	Quality assurance	Quality control
1.1	Minimum 3D animation's precision and accuracy	Report on the specificities of the 3D animation of the artifact (e.g. sense of reality, textures, rigging, environment, lighting, cameras).	Monitor the development of students' 3D animation
1.2	Quality render of the artifacts' animation	Minimum resolution info for the render: Full-HD or 4K videos in MP4 format	Monitor the students' 3D renders
1.3	Assessment of the presentation	Assessment of the presentations with five criteria: introduction, scientific accuracy, results, proper presentation, future work.	Assess the project final outputs

6. Plan: Determine Project Risks

    a. Identify the two types of risks (uncertain future events that can affect your project): threats have a negative impact on your project; opportunities have a positive impact on your project

Risk Breakdown Structure
(filled with examples, these may change according to your project organisation)

Risk	Probability (How likely is it to happen)	Impact (How big of an effect will it have)	Owner (who takes care about the risk)	Action Plan (initiatives to reduce threats and increase opportunities)
Too large number of people that accepted invitation to attend the open schooling event	Low	Low	School Principal Richard Professor Clara	- Moving of the schooling event to a larger venue - Split of the school event to two successive repetitions of the events
Modest number of people that accepted invitation to attend the open schooling event	Medium	Medium	School Principal Richard Professor Clara Students: - Mary - Peter	- Identification of other potential target groups - Invitations to the broader local community - More persistent invitations to students' friends and families - Grouping of different school events together to a bigger school event
Modest students' interest for the school project	High	High	Professor John	- Give motives to the students (e.g. presenting at the school event, possibility of being an award-winning project) - Scaffold students who face difficulties

7. Plan: Plan Procurement Processes

    a. Determine what goods and services you need
    b. Have what you need at the time that you need it.

Acquisitions Breakdown Structure
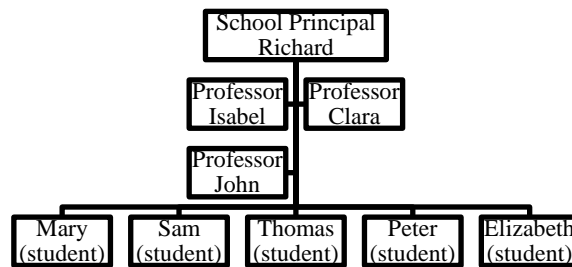*(filled with examples, these may change according to your project organisation)*

Supply	Supply Cost (supplies)	When to be available	How to be available
Paper	20 euros	In the beginning of the project	Commitment of school top management
Laptop	700 euros	In the beginning of the project	Commitment of school top management

8. Plan: Plan People

a. Acquire the project team
b. Map the project team in the Organization Breakdown Structure
c. Assign the project team members to roles
d. Assign the project team members to activities
e. Train the project team
f. Determine how you will motivate and reward the team
g. Map Stakeholders – people or groups interested in the project
h. Determine how you will engage stakeholders in the project

Organization Breakdown Structure
(filled with examples, these may change according to your project organisation)

Responsibility assignment matrix
(filled with examples, these may change according to your project organisation)

Activity	Team members					Professor Isabel (Science)	Professor Clara (Maths)	Professor John (ICT)	School Principal Luke
	Mary (student)	Sam (student)	Thomas (student)	Peter (student)	Elizabeth (student)				
Acquire scientific knowledge and practice skills	X	X	X	X	X	C/P	C/P	C/P	
Animate the artifact	X	X	X	X	X/P	C/P	C/P	C/P	
Prepare presentation of the artifact's animation	X	X	X	X	X/P	C/P	C/P	C/P	
Present the projects' outputs	X	X	X	X	X/P	P	P	P	
Coordinate the overall implementation of the project						X	X	X	I
Coordinate the school event						X	X	X	I
Attend the school event and present their work	X	X	X	X	X	X	X	X	

Letter	Role
X	Executes work
P	Controls progress
C	Should be consulted
I	Should be informed

Stakeholders Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Directly involved in the project (yes/no)	Served or Affected by the Project	Likely to be user of the results of the project
Parents	yes	yes	yes
School community	yes	yes	yes
School management	no	yes	yes
Municipality	no	yes	yes
Local Health Infrastructures	no	yes	yes
National Directorate for Education	yes	no	yes
Local media	no	no	yes

Stakeholders Management Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Who they are and why should be involved in the project	Why the project is relevant for them	Strategies to obtain support
Parents	Students' families should attend the school event during which students will present their projects. The students' families will maximize their appreciation of the educational procedure and outputs as a result of the students' cooperation. Their involvement also maximizes the impact of the project in terms of global literacy.	Due to their interest in their children's education and school well-being.	Present the school project in parents meeting and attend the school project presentation in a school event.
School community	The school community should attend the school event during which students will present their projects. The school community will maximize their appreciation of the educational procedure and outputs as a result of the students' cooperation. The students might get inspired by the work of their classmates and the teachers might appreciate the educational procedure and be willing to get involved in the PAFSE consortium during the following years. They are also going to get informed on issues concerning public health literacy.	Due to their interest in students' education and school well-being, and the teachers' intention to be professionally developed.	Present the school project in a school community meeting.
School management	The municipality should be involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to municipality interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Attend the school project presentation in a school event.
Municipality	The municipality should be involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to municipality interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project).
Local Health Infrastructures	Local Health Infrastructures should be involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to their interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project).

Stakeholder name	Who they are and why should be involved in the project	Why the project is relevant for them	Strategies to obtain support
National Directorate for Education	The National Directorate for Education is supporting the project and interested in the results in terms of students' learnings.	Due to their interest in novel methodologies for STEM education and role in policy making.	Invitation to participate in the open schooling event.
Local media	The Local Media should be shared with some of the school project descriptions, outputs and students' experiences in terms of exceptional students' work from the local community.	Due to their interest in exceptional pieces of work by members of the local community.	Invitation to participate in the open schooling event. Sharing a description of the project procedure, outputs and students' experiences with the local media.

9. Plan: Plan Communication

  a. Assure the right information to the right people, at the right time, in a useful format
  b. Assure effective project meetings
  c. Build the communications plan

Communications plan
(filled with examples, these may change according to your project organisation)

Organized by (from)	Participants (to)	What	When	How/Where	Purpose
Professor Richard	Team	Kick-off meeting	Before the project starts (date to be defined)	Laboratory	Provide a complete description of the project and what the end product will be.
Professor Richard	Team	Team meeting	Every week (e.g. Wednesday)	IT classroom	- Overall plan for the project - Discuss project developments and plan next stage - Instruct team on how to - Provide updates on the progress of the project and if there are any issues with completion
Professor Richard	Team	Professors Meeting	Every two weeks	Virtual meeting	- Monitor the general progress of the project - Discuss any difficulties found during the project depth and find ways to overcome them - Discuss alternative options for the enactment of the educational scenarios
Professor Richard	Team and Parents	Meeting	Before the project starts (date to be defined)	School meeting room / Virtual meeting	Explain the project and motivate for the children's participation.
Professor Richard and Team	Parents	Meeting	Before the project starts (date to be defined)	Virtual meeting	Explain the project and invite for participation in open schooling event.
Professor Richard, Clara, Isabel and John	Parents	Invitation to parents participation in open schooling event	Before the open schooling event (date to be defined)	By email	Remember the project and invite for participation in the open schooling event.

Organized by (from)	Participants (to)	What	When	How/Where	Purpose
Professor Francis, Team, School management	School community Municipality, Local Health Infrastructures, National Directorate for Education, Local Media	Invitations to stakeholders participation in open schooling event	Before the open schooling event (date to be defined)	By email	Explain the project and invite for participation in the open schooling event.
Professor Richard	School Principal	After-open-schooling-event meeting	Two days after the open schooling event	Principal's office	-Present the School Principal an overview of the school projects -Present the School Principal an overview of the open schooling event -Ask the principal if they would be willing to make clusters with other schools in order to support even more expanded school networks working in similar projects in the future.
Professor Clara, Isabel and John	Team	Final team meeting	One week after the open schooling event	Laboratory	-Make a retrospect of the project -Discuss whether they are going to support similar activities in the future -Discuss ideas for further dissemination of the student project.

10. Plan: Finish the project planning by building the Charter

1.0 Project identification	
Name	Partnerships for Science Education – Portugal [PAFSE-PT]
Summary description	Students participate in active-based learning activities and carry out their own prototype research and material design in terms of STEM education and public health. In particular, the development of 3D animation to address pandemic challenges.
Project owner	Colégio de São Gonçalo
Project manager	Professor Clara
Stakeholders	Parents (Interest in their children's high-quality education) School Community (Interest in achievements of other members of the school community) School Management (Interest of high-quality educational services provided by the school) Municipality (Interest in school work in their area) Local Health Infrastructures (Interest from public health education project by schools from the local society) National Associations of Science and ICT Education (Interest in innovative educational actions in the fields of STEM, ICT and Health Education) National Directorate for Education (Interest in innovative school educational projects) National Directorate for Health (Interest in school public health educational projects) Local media (Interest in achievements by schools of the local community
Team and roles	Professor Isabel (Science Professor) Professor Clara (Maths Professor) Professor John (ICT Professor) School Principal Richard (School Principal) Mary (student) Sam (student) Thomas (student) Peter (student) Elizabeth (student)

2.0 Needs that support the project

-The need for active and experiential school education which is not supported by the largest part of the Curriculum, yet boosts students' learning outputs, soft skills and interest in learning. The current state of education lacks active learning, inquiry-based learning, project-based learning and other modern educational approaches which serve several educational benefits to students.
-The need for more effective STEM education which both provides all students with fundamental STEM skills for their everyday decision-making, and makes more students more intensely interested in STEM fields, even follow STEM careers in the future. Few students have a love for STEM subjects and even fewer have an aspiration to follow STEM related professional careers. This STEM educational projects hopes to bring more students in touch to the real essence of STEM theory and practice and make them love this field.
-The need for more effective Public Health Education. Public Health is a major health issue which is often undermined in Health Education. As the COVID-19 pandemic highlighted, personal health-related decisions affect the society and the way the society behaves affects every person in particular. Moreover, communicable diseases pose a constant threat for Public Health for every country in the world. The project aims to offer high-quality Public Health Education to students.
-The need for Education with a view to active citizenship. During this project students study the interrelations between science and the everyday social context, and realize the importance of informed decision-making for science topics in everyday lives. Connection to social issues often lacks from science and STEM education. This project aims to give students the opportunity to understand the close entanglements of science and society and be active citizens in the future.

3.0 Project goals

Teachers' professional workshop on the project completed – November 30th
Project initiated – March 15 (predicted date)
Project completed – April 20 (predicted date)
Open schooling event – April 30 (predicted date)

4.0 Project scope

The scope of the project is to engage students in the 3D animation of health care artifacts.

5.0 Key Deliverables

3D animations of health artifacts
Presentations on the 3D animations and their importance

6.0 Milestones and dates

Introductory work for the main project of students done
Final 3D animation render
Presentation on the 3D animations created
Students' presentations among one another in the classroom done
Open schooling event prepared
Open schooling event done

7.0 Constraints

Participation of at least 12 students in the project (limit)
Participation of at least 70 people in the open schooling event (limit)
Project should be finished in 30 April (predicted limit)

8.0 Risks and opportunities

Modest number of people that accepted invitation to attend the open schooling event
Too many people that accepted invitation to attend the open schooling event
Larger load of idea emerging by students
Modest interest of students for the lesson

9.0 Project success criteria

Project completed before Easter period.
High-quality project outputs according to the assessment rubrics.
High students' interest and participation in the project and the open schooling event.
Open schooling event with the participation of the entire school community, parents, and local stakeholders.

10.0 Project success factors

Appropriate engagement of students and parents.
Appropriate time management during the lessons
Interest of teachers in the school project pillars (open schooling, inquiry-based learning, socioscientific issues).
Adequate attendance of stakeholders in the open schooling event

Teaching-learning process milestones:

1. Students will be able to propose solutions for 3D animation of basic objects.
2. Students will be able to communicate the findings, motivations and limitations of various 3D animations considered in the work process.
3. Students will be able to identify and communicate the importance of 3D animation to address pandemic challenges but also the role Innovation.
4. Students will be able to use technical argumentation to justify policy choices.

Teaching-learning process for school project (summary):

1. Development of materials (videos, tutorials, pictures).
2. 3D animation objects.
3. Presentation of the 3D animations in open schooling event.

Organization of the open schooling event:
1. Each project output (3D animation) is presented by the students in a community setting (e.g., exposition center, municipality, garden, museum, science fair) in a 3D prepared environment (all apparatus included).
2. Students will prepare a pitch on how 3D animation can address pandemic challenges. Technical speeches to motivate peers to new technologies and environments.
3. Students, parents, school community and relevant local stakeholders attend the event and are introduced on the topic on how 3D animation can be used to address pandemic challenges. Furthermore, the scenario has a multidisciplinary approach, such as in art, design, engineering and mathematics.

Data Analysis and Reporting
- Content Analysis.
- Presentation formats.
- Report writing.
- Development of presentation.

Target Audience for Recommendations

School community and local stakeholders: students, parents, municipalities, designers, engineers, and local enterprises.

Public Debate and Recommendations (based on research results)

Presentation of the 3D animations produced by students in a community setting and dissemination of evidence recommendations via social, community and conventional media.

Main Partner responsible: INESC-TEC

15. Project management resource and inquiry instruments on the topic of "3D printing to address pandemic challenges"

Overview

Additive manufacturing (AM), broadly known as 3D printing, is transforming how products are designed, produced, and serviced in public health. "AM enables on-demand production without dedicated equipment or tooling, unlocks digital design tools, and offers breakthrough performance and unparalleled flexibility across industries".

Recent advances on 3D printing in healthcare have led to lighter, stronger and safer products, reduced lead times and lower costs. Also, custom parts and objects can be tailored to each patient and each situation. Medical applications for 3D printing are expanding rapidly and this technology is expected to revolutionize health care. The application of 3D printing in the medical sector can provide several benefits, such as the customization and personalization of medical products or equipment. However, literature refers that knowledge remains one of the greatest barriers to AM's wider adoption. So, how we leverage the potential of AM to drive innovation is a mandatory topic in science/technology curriculum.

The inquiry-based project supports science and ICT teachers in exploring 3D environments using updated scientific/technical evidence. The learning experience supports youths in understanding and reach high-level comprehension on how STEM (science, technology, engineering, mathematics) may contribute to address these issues and contribute to evidence-based personal decision-making.

Estimated Duration

After initial socioscientific and technical background on the topic in classroom environment, 4 sessions of 40-45 minutes for supplementary learning activities and school project (session 8 – session 11). Lesson 8, devoted to the preparation of the school project, includes:

1. Teleconference with STEM professionals (e.g., Engineers, Designers Medical Doctors, or researchers of PAFSE consortium):
Students make questions to experts with a particular focus on: a) future academic choices and career paths; b) identifying new professions in new fields of industry 4.0.

2. Visit to FABLAB:
Students make questions to experts with a particular focus on tools and materials to create 3D scenarios. These activities are relevant for students' connections with possible STEM curriculums and careers. Students are shown the working environment and dynamic of a FABLAB.

School Research Project

Topics

- Importance of 3D printing
- Technical features and principles of 3D printing
- Possible applications of 3D printing in public health

Research management, design and administration

Challenge: To print a 3D object to address communicable diseases challenges

Method: Students are organized in groups; each group addresses 1 object based on the daily pandemic challenges lived. The project challenges each group of students to: 1) identify and represent their progress in the form of essay responses and using Likert scales to show their improvement from the first lesson to the last; 2) print and present an object with what they have learned throughout the teaching-learning sequences and the ideas that emerged during the teleconference with experts. A competition and reward for the best 3D objects will take place.

Project Management Framework and Instruments

1. Plan: Determine How to Do the Project
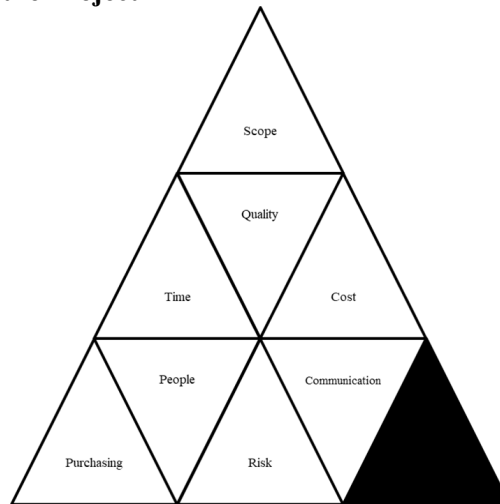
2. Plan: Define Project Scope

- What are the outputs?
3D printed artifact, open schooling event

-What are the requirements of project outputs?
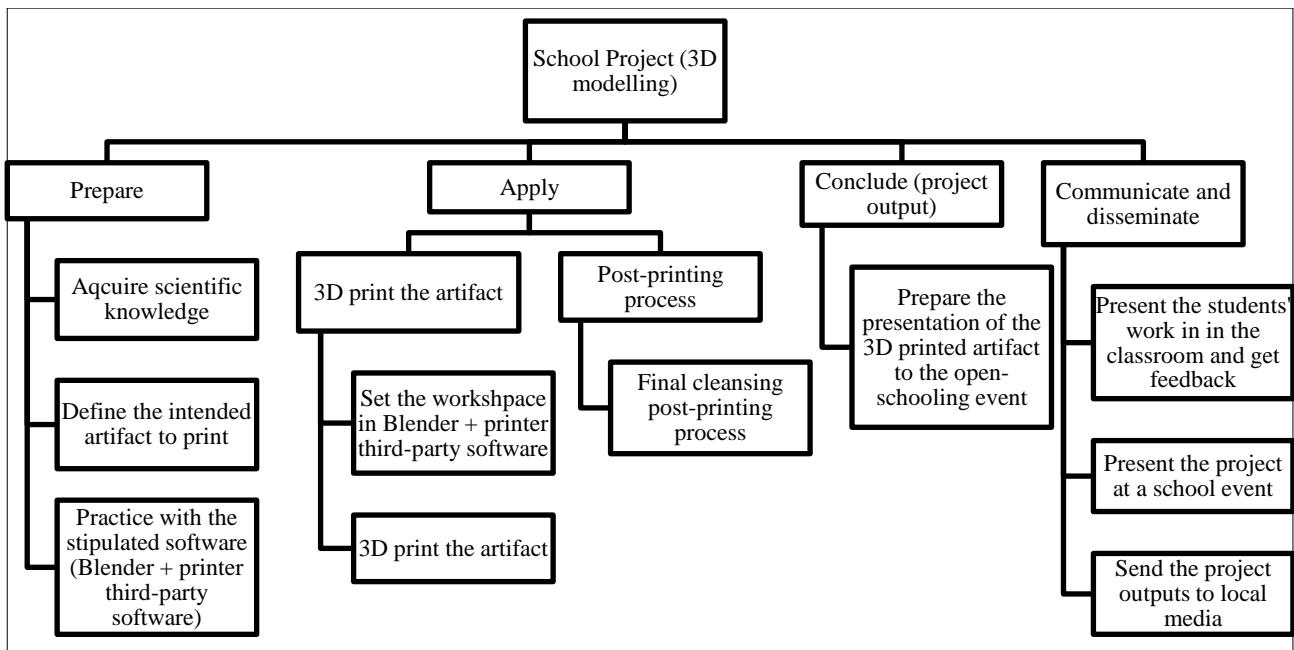Computers with software for presentation development and showcases to exhibit the 3D printed artifacts.

- Are there any constraints to produce the project outputs?
The limitation of time to print the 3D object and type of printer available.
Possible lack of interest by the students.

- Define the tasks to produce the outputs – build the Work Breakdown Structure

Work Breakdown Structure
(filled with examples, these may change according to your project organisation)

3. Plan: Determine Project Time

a. Define the detailed activities for each WBS element
b. Put the activities in sequence
c. Estimate the resources (human and acquisitions) for each activity
d. Estimate the calendar time (days or weeks) for each activity
e. Create the Gantt Chart

Resource Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources
Acquire scientific knowledge and practice skills	1 hours	laptop, paper
3D print the artifact	3 hours (predicted time, as it may take more time to print, depending on the model)	laptop
Prepare presentation of the artifact	30 minutes	laptop

Gantt Chart
(filled with examples, these may change according to your project organisation)

Activity	Week 1	Week 2	Week 3	Week 4
Acquire scientific knowledge and practice skills	████			
Model the artifact	████	████	████	
Prepare presentation of the artifact				████

4. Plan: Determine Project Cost

a. Estimate how much each activity will cost
Note: include the cost for Labor, Supplies, overhead (like office space and equipment)

b. Add the estimates to determine the total cost of your project

Cost Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources	Human Resource Cost*	Other Resources Cost (supplies)
Acquire scientific knowledge and practice skills	1 hours	laptop, paper	20 €	n.a
3D print the artifact	3 hours	laptop	60 €	n.a
Prepare presentation of the artifact	30 minutes	laptop	10 €	n.a
Total	4h30	-	90 €	-

5. Plan: Determine Project Quality

a. Ensure your project produces quality outputs
b. Plan what quality means to your project
c. Determine how you will ensure quality

Quality Breakdown Structure
(filled with examples, these may change according to your project organisation)

Requirement	Quality planning	Quality assurance	Quality control
1.1	Minimum 3D printed artifacts' precision and accuracy	Report on the specificities of the 3D printed artifact (e.g. sense of reality, mesh).	Monitor the development of students' 3D model
1.2	Quality of the printed artifacts	Report on the 3D printed artifacts: details, roughness, trims.	Monitor the students' 3D renders
1.3	Assessment of the presentation	Assessment of the presentations with five criteria: introduction, scientific accuracy, results (photographs), proper presentation, future work.	Assess the project final outputs

6. Plan: Determine Project Risks

a. Identify the two types of risks (uncertain future events that can affect your project): threats have a negative impact on your project; opportunities have a positive impact on your project

Risk Breakdown Structure
(filled with examples, these may change according to your project organisation)

Risk	Probability (How likely is it to happen)	Impact (How big of an effect will it have)	Owner (who takes care about the risk)	Action Plan (initiatives to reduce threats and increase opportunities)
Too large number of people that accepted invitation to attend the open schooling event	Low	Low	School Principal Richard Professor Clara	- Moving of the schooling event to a larger venue - Split of the school event to two successive repetitions of the events
Modest number of people that accepted invitation to attend the open schooling event	Medium	Medium	School Principal Richard Professor Clara Students: - Mary - Peter	- Identification of other potential target groups - Invitations to the broader local community - More persistent invitations to students' friends and families - Grouping of different school events together to a bigger school event
Modest students' interest for the school project	High	High	Professor John	- Give motives to the students (e.g. presenting at the school event, possibility of being an award-winning project) - Scaffold students who face difficulties

7. Plan: Plan Procurement Processes

a. Determine what goods and services you need
b. Have what you need at the time that you need it

Supplies Breakdown Structure
(filled with examples, these may change according to your project organisation)

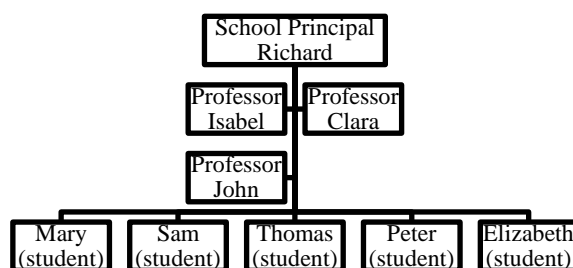| Supply	Supply Cost (supplies)	When to be available	How to be available
Paper	20 euros	In the beginning of the project	Commitment of school top management
Laptop	700 euros	In the beginning of the project	Commitment of school top management
Filament*	120 euros	In the beginning of the project	Commitment of school top management

* Predicted filament needed to print the artifacts: 1,75 mm / 500gr / approximately 170 meters / 20€ per unit

8. Plan: Plan People

a. Acquire the project team
b. Map the project team in the Organization Breakdown Structure
c. Assign the project team members to roles
d. Assign the project team members to activities
e. Train the project team
f. Determine how you will motivate and reward the team
g. Map Stakeholders – people or groups interested in the project
h. Determine how you will engage stakeholders in the project

Organization Breakdown Structure
(filled with examples, these may change according to your project organisation)

Responsibility assignment matrix
(filled with examples, these may change according to your project organisation)

Activity	Team members								
	Mary (student)	**Sam (student)**	**Thomas (student)**	**Peter (student)**	**Elizabeth (student)**	**Professor Isabel (Science)**	**Professor Clara (Maths)**	**Professor John (ICT)**	**School Principal Luke**
Acquire scientific knowledge and practice skills	X	X	X	X	X	C/P	C/P	C/P	
Print the artifact	X	X	X	X	X/P	C/P	C/P	C/P	
Prepare presentation of the 3D printed artifacts	X	X	X	X	X/P	C/P	C/P	C/P	
Present the projects' outputs	X	X	X	X	X/P	P	P	P	
Coordinate the overall implementation of the project						X	X	X	I
Coordinate the school event						X	X	X	I
Attend the school event and present their work	X	X	X	X	X	X	X	X	

Letter	Role
X	Executes work
P	Controls progress
C	Should be consulted
I	Should be informed

Stakeholders Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Directly involved in the project (yes/no)	Served or Affected by the Project	Likely to be user of the results of the project
Parents	Yes	yes	yes
School community	Yes	yes	yes
School management	No	yes	yes
Municipality	No	yes	yes
Local Health Infrastructures	No	yes	yes
National Directorate for Education	Yes	no	yes
Local media	No	no	yes

Stakeholders Management Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Who they are and why should be involved in the project	Why the project is relevant for them	Strategies to obtain support
Parents	Students' families should attend the school event during which students will present their projects. The students' families will maximize their appreciation of the educational procedure and outputs as a result of the students' cooperation. Their involvement also maximizes the impact of the project in terms of global literacy.	Due to their interest in their children's education and school well-being.	Present the school project in parents meeting and attend the school project presentation in a school event.
School community	The school community should attend the school event during which students will present their projects. The school community will maximize their appreciation of the educational procedure and outputs as a result of the students' cooperation. The students might get inspired by the work of their classmates and the teachers might appreciate the educational procedure and be willing to get involved in the PAFSE consortium during the following years. They are also going to get informed on issues concerning public health literacy.	Due to their interest in students' education and school well-being, and the teachers' intention to be professionally developed.	Present the school project in a school community meeting.
School management	The municipality should be involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to municipality interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Attend the school project presentation in a school event.
Municipality	The municipality should be involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to municipality interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project).
Local Health Infrastructures	Local Health Infrastructures should be involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to their interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project).
National Directorate for Education	The National Directorate for Education is supporting the project and interested in the results in terms of students' learnings.	Due to their interest in novel methodologies for STEM education and role in policy making.	Invitation to participate in the open schooling event.
Local media	The Local Media should be shared with some of the school project descriptions, outputs and students' experiences in terms of exceptional students' work from the local community.	Due to their interest in exceptional pieces of work by members of the local community.	Invitation to participate in the open schooling event. Sharing a description of the project procedure, outputs and students' experiences with the local media.

9. Plan: Plan Communication

    a. Assure the right information to the right people, at the right time, in a useful format
    b. Assure effective project meetings
    c. Build the communications plan

Communications plan
(filled with examples, these may change according to your project organisation)

Organized by (from)	Participants (to)	What	When	How/Where	Purpose
Professor Richard	Team	Kick-off meeting	Before the project starts (date to be defined)	Laboratory	Provide a complete description of the project and what the end product will be.
Professor Richard	Team	Team meeting	Every week (e.g. Wednesday)	IT classroom	- Overall plan for the project - Discuss project developments and plan next stage - Instruct team on how to - Provide updates on the progress of the project and if there are any issues with completion
Professor Richard	Team	Professors Meeting	Every two weeks	Virtual meeting	- Monitor the general progress of the project - Discuss any difficulties found during the project depth and find ways to overcome them - Discuss alternative options for the enactment of the educational scenarios
Professor Richard	Team and Parents	Meeting	Before the project starts (date to be defined)	School meeting room / Virtual meeting	Explain the project and motivate for the children's participation.
Professor Richard and Team	Parents	Meeting	Before the project starts (date to be defined)	Virtual meeting	Explain the project and invite for participation in open schooling event.
Professor Richard, Clara, Isabel and John	Parents	Invitation to parents' participation in open schooling event	Before the open schooling event (date to be defined)	By email	Remember the project and invite for participation in the open schooling event.
Professor Francis, Team, School management	School community Municipality, Local Health Infrastructures, National Directorate for Education, Local Media	Invitations to stakeholders' participation in open schooling event	Before the open schooling event (date to be defined)	By email	Explain the project and invite for participation in the open schooling event.
Professor Richard	School Principal	After-open-schooling-event meeting	Two days after the open schooling event	Principal's office	-Present the School Principal an overview of the school projects -Present the School Principal an overview of the open schooling event -Ask the principal if they would be willing to make clusters with other schools in order to support even more expanded school networks working in similar projects in the future.
Professor Clara, Isabel and John	Team	Final team meeting	One week after the open schooling event	Laboratory	-Make a retrospect of the project -Discuss whether they are going to support similar activities in the future -Discuss ideas for further dissemination of the student project.

10. Plan: Finish the project planning by building the Charter

1.0 Project identification	
Name	Partnerships for Science Education – Portugal [PAFSE-PT]
Summary description	Students participate in active-based learning activities and carry out their own prototype research and material design in terms of STEM education and public health. In particular, the development of 3D printed artifacts to address pandemic challenges.
Project owner	Colégio de São Gonçalo
Project manager	Professor Clara
Stakeholders	Parents (Interest in their children's high-quality education) School Community (Interest in achievements of other members of the school community) School Management (Interest of high-quality educational services provided by the school) Municipality (Interest in school work in their area) Local Health Infrastructures (Interest from public health education project by schools from the local society) National Associations of Science and ICT Education (Interest in innovative educational actions in the fields of STEM, ICT and Health Education) National Directorate for Education (Interest in innovative school educational projects) National Directorate for Health (Interest in school public health educational projects) Local media (Interest in achievements by schools of the local community
Team and roles	Professor Isabel (Science Professor) Professor Clara (Maths Professor) Professor John (ICT Professor) School Principal Richard (School Principal) Mary (student) Sam (student) Thomas (student) Peter (student) Elizabeth (student)

2.0 Needs that support the project
-The need for active and experiential school education which is not supported by the largest part of the Curriculum, yet boosts students' learning outputs, soft skills and interest in learning. The current state of education lacks active learning, inquiry-based learning, project-based learning and other modern educational approaches which serve several educational benefits to students. -The need for more effective STEM education which both provides all students with fundamental STEM skills for their everyday decision-making, and makes more students more intensely interested in STEM fields, even follow STEM careers in the future. Few students have a love for STEM subjects and even fewer have an aspiration to follow STEM related professional careers. This STEM educational projects hopes to bring more students in touch to the real essence of STEM theory and practice and make them love this field. -The need for more effective Public Health Education. Public Health is a major health issue which is often undermined in Health Education. As the COVID-19 pandemic highlighted, personal health-related decisions affect the society and the way the society behaves affects every person in particular. Moreover, communicable diseases pose a constant threat for Public Health for every country in the world. The project aims to offer high-quality Public Health Education to students. -The need for Education with a view to active citizenship. During this project students study the interrelations between science and the everyday social context and realize the importance of informed decision-making for science topics in everyday lives. Connection to social issues often lacks from science and STEM education. This project aims to give students the opportunity to understand the close entanglements of science and society and be active citizens in the future.

3.0 Project goals
Teachers' professional workshop on the project completed – November 30th Project initiated – March 15 (predicted date) Project completed – April 20 (predicted date) Open schooling event – April 30 (predicted date)

4.0 Project scope
The scope of the project is to engage students in the 3D printing of health care artifacts.

5.0 Key Deliverables
3D printing of health artifacts Presentations on the 3D printed artifacts and their importance

6.0 Milestones and dates
Introductory work for the main project of students done
Final 3D printed artifact
Presentation on the 3D printed artifacts
Students' presentations among one another in the classroom done
Open schooling event prepared
Open schooling event done

7.0 Constraints
Participation of at least 12 students in the project (limit)
Participation of at least 70 people in the open schooling event (limit)
Project should be finished in 30 April (predicted limit)

8.0 Risks and opportunities
Modest number of people that accepted invitation to attend the open schooling event
Too many people that accepted invitation to attend the open schooling event
Larger load of idea emerging by students
Modest interest of students for the lesson

9.0 Project success criteria
Project completed before Easter period.
High-quality project outputs according to the assessment rubrics.
High students' interest and participation in the project and the open schooling event.
Open schooling event with the participation of the entire school community, parents, and local stakeholders.

10.0 Project success factors
Appropriate engagement of students and parents.
Appropriate time management during the lessons
Interest of teachers in the school project pillars (open schooling, inquiry-based learning, socioscientific issues).
Adequate attendance of stakeholders in the open schooling event

Teaching-learning process milestones:

- Students will be able to propose solutions for 3D printing basic objects (masks, ventilators…).
- Students will be able to communicate the findings, motivations and limitations of various 3D elements and shapes considered in the work process.
- Students will be able to identify and communicate the importance of 3D printing to address pandemic challenges but also the role Innovation.
- Students will be able to use technical argumentation to justify policy choices.

Teaching-learning process for school project (summary):

- Development of materials (videos, tutorials, pictures).
- 3D printing objects.
- Presentation of the physical 3D objects in open schooling event.

Organization of the open schooling event:

- Each project output (physical 3D object) is presented by the students in a community setting (e.g., exposition center, municipality, garden, museum, science fair).
- Students will prepare a pitch on how 3D printing can address pandemic challenges. Technical speeches to motivate peers to new technologies and environments.
- Students, parents, school community and relevant local stakeholders attend the event and are introduced on the topic on how 3D printing can be used to address pandemic challenges. Furthermore, has a multidisciplinary approach, such as in art, design, engineering and mathematics.

Data Analysis and Reporting

Content Analysis.
Presentation formats.
Report writing.

Development of presentation.

Target Audience for Recommendations

School community and local stakeholders: students, parents, municipalities, designers, engineers, and local enterprises.

Public Debate and Recommendations (based on research results)

Presentation of the 3D printing produced by students in a community setting and dissemination of evidence recommendations via social, community and conventional media.

Main partner responsible: INESC TEC

16. Project management resource and inquiry instruments on the topic of "Low-code development environments – level 1 (basic)"

Overview

In a world of immediacy, anything less than digital handiness results in lost opportunities and innovation disregard. In fact, technology is enriching humans' lives, improving access to information, and revolutionizing how people teach, learn and work in the 21st century. Thus, learning how to code is a contribute to the process of developing problem-solving skills central to success in STEM (Science, Technology, Engineering, Mathematics) curricula and careers. It can also aid students in the development of innovative solutions that benefit the health of their community.

Block-based coding or programming is based on a drag-and-drop learning environment, where programmers use coding instruction, called "blocks", to construct animated stories, games and other types of multimedia content. It's an entry-level activity, where students can gain a foundation in computational thinking through visuals as opposed to coding that is based in text, making it more interesting and viable to use as an educational resource.

The educational scenario assists (mainly) ICT teachers in exploring how low-code environments can positively impact education and increase digital and public health literacy. The learning experience supports youths in understanding how STEM may contribute to create new and revolutionizing solutions to the healthcare market, as well as stimulate their creativity, decision-making and problem-solving competences and enhance their technological and communication skills. In the teaching-learning sequence, hygiene habits (e.g.: oral health, sleeping habits) are explored in connection with appropriate tools for multimodal content creation (quizzes, infographics, presentations, etc.) that promote appropriate exposition of this relevant public health topic to other members of the society.

Estimated duration

After initial socioscientific and technical background on the topic in classroom environment, 5-6 sessions of 40-45 minutes for supplementary learning activities and school project (lesson 6 – lesson 12).

School Research Project

Topics:
Importance of digital literacy and real-life implications.
Basic technical features and principles of programming solutions development.
Possible applications of mobile applications in public health (e.g., in the promotion of hygiene habits).

Research management, design and administration:

Challenge: Content exposition creation on one topic involving "hygiene habits", promoting not only technology, but also public health.

Method (*summary*)**:** Lessons 6 to 12 will be dedicated to the school research project. Students are, as usual, organized in groups and each group addresses the practiced programming and technological concepts and connects them to health.

Development process:
The project is based on the use of technology to create scientific artefacts and build digital literacy (e.g., finding, reviewing, organising and sharing information effectively, handling data appropriately, using different online resources and tools to study), with a particular focus on the contribute of low-code for a healthy community and on the general attributes of healthy communities.

The five-six sessions will be supervised by the teachers and developed by the students, with scheduled moments for checking the work development.

Groups of students will be instructed to create an interactive game or tool app that explores the topic of hygiene habits in some way, as well as some other resources (of their choice) that they see fit on the same topic:

During **session 1**, students are presented, not only, with software to use for content creation but also the norms to follow:

1. Each group should have, at least:
    a. 1 sketch of an app (or the app itself using templates) on the theme of healthy habits.
    b. One other multimodal resource on the theme of healthy habits.
        i. It can be a mental/conceptual map, a quizz, a presentation, an interactive resource, an infographic, a story, a video, etc.
    c. A short portfolio with all the created resources.
2. Each group is required to:
    a. brainstorm a project idea, develop drawing(s) of the app/game on paper, creating a storyboard.
    b. meet regularly with the teacher to discuss the feasibility of the app and if necessary make any changes to their plan.
    c. Present a short (5-10 minutes) elevator pitch of your project idea to the class.
3. Create a portfolio (free structure, let the student be creative) write up of your project.
    a. Some useful points:
        i. Names of developers.
        ii. Name of your app and why.
        iii. Identification and justification of the other resources,
        iv. What problem it solves and/or why it is important or useful.
        v. People who would use your app (target audience or market) and why they would use it.
        vi. Describe what each person on your team did.
        vii. Describe how you made decisions together.
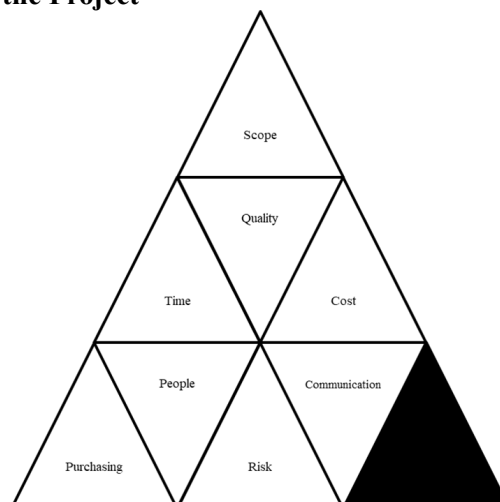   viii. Describe how effectively you worked together as a team.

In the end of session 1, the groups are created and a brainstorm of ideas for the project is undergone.

During session 2, the teacher will collect students' ideas and topics and, if valid, students start working on their project. The teacher will provide support to students and contributes to the development of the project.

From session 3-forward, the students will actively and independently work on their project and are encouraged to exchange ideas with the other groups.

Project Management Framework and Instruments

1. Plan: Determine How to Do the Project

2. Plan: Define Project Scope

- What are the outputs?
Digital-scientific artefacts
Open schooling Event

-What are the requirements of project outputs?
A regular functioning computer (and android device) with internet connection to use MIT App Inventor and content creation tools (infographics, videos, images, podcasts, etc.) and a software for presentation development.

- Are there any constraints to produce the project outputs?
The limitation of time from students/teachers (even on Science Club, there are other projects being developed and not all schools have access to the club all the time)
Possible lack of interest on part of students
Possible lack of equipment/ internet connection

- Define the tasks to produce the outputs

Work Breakdown Structure
(filled with examples, these may change according to your project organisation)

3. Plan: Determine Project Time

   a.   Define the detailed activities for each WBS element
   b.   Put the activities in sequence
   c.   Estimate the resources (human and acquisitions) for each activity
   d.   Estimate the calendar time (days or weeks) for each activity
   e.   Create the Gantt Chart

Resource Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources
Prioritizing (set project goals; gather info)	30 minutes	Computer/tablet, paper
Researching (use information literacy skills; acquire scientific knowledge)	1 hour	Computer/tablet

Activity	Human Resource	Other Resources
Planning (mind mapping; storytelling; pitch and content planning)	3 hours	Computer/tablet, paper
Personalization (Adaptation/Explanation)	1 hour (overlapping with above)	Computer/tablet, paper
Production (presentation/ pitch)	4 hours	Computer/tablet
Communication and dissemination	2-4 hours	Computer/tablet, projector

Gantt Chart
(filled with examples, these may change according to your project organisation)

Activity	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
Prioritizing (set project goals; gather info)	■					
Researching (use information literacy skills; acquire scientific knowledge)	■	■				
Planning (mind mapping; storytelling; pitch and content planning)		■	■			
Personalization (Adaptation/Explanation)		■	■			
Production (presentation/ pitch)		■	■	■	■	
Communication and dissemination						■

4. Plan: Determine Project Cost

    a.   Estimate how much each activity will cost
          Note: include the cost for Labor, Supplies, overhead (like office space and equipment)

    b.   Add the estimates to determine the total cost of your project

Cost Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources	Human Resource Cost*	Other Resources Cost (supplies)
Prioritizing (set project goals; gather info)	30 minutes	Computer/tablet, paper	10€	n.a
Researching (use information literacy skills; acquire scientific knowledge)	1-2 hours	Computer/tablet	20-30€	n.a
Planning (mind mapping; storytelling; pitch and content planning)	3 hours	Computer/tablet, paper	60€	n.a
Personalization (Adaptation/Explanation)	1 hour (overlapping with above)	Computer/tablet, paper	20€	n.a
Production (presentation/ pitch)	4 hours	Computer/tablet	100 €	n.a
Communication and dissemination	2-4 hours	Computer/tablet, projector	50-80€	n.a
Total	10h30-13h30 (some overlapping with each other)	-	260-300€	-

5. Plan: Determine Project Quality

    a.   Ensure your project produces quality outputs
    b.   Plan what quality means to your project
    c.   Determine how you will ensure quality

Quality Breakdown Structure
(filled with examples, these may change according to your project organisation)

Requirement	Quality planning	Quality assurance	Quality control
1.1	Minimum number of created contents per portolio	Minimum number of created content: 2 (app (sketch or functional); portfolio)	Monitor the development of students' plans on a daily

Requirement	Quality planning	Quality assurance	Quality control
1.2	Approaches used	Ability to simply use multimodal mental mapping/storytelling approach	Monitor the development of students' plans on a daily basis
1.3	Assessment rubric for Portfolio	Assessment rubric based on basic guideline following: Introduction; development; conclusions.	Monitor the development of students' outputs on a daily basis
1.4	Assessment rubric for the 5 P's Pitch	Assessment rubric based on the 5P's ("Priorizar" (Prioritize); "Pesquisar" (Research); "Planificar" (Plan); Personalizar (Personalize); Produzir (Produce)	Monitor the development of students' presentations on a daily basis

6. Plan: Determine Project Risks

    a.   Identify the two types of risks (uncertain future events that can affect your project): threats have a negative impact on your project; opportunities have a positive impact on your project.

Risk Breakdown Structure
(filled with examples, these may change according to your project organisation)

Risk	Probability (How likely is it to happen)	Impact (How big of an effect will it have)	Owner (who takes care about the risk)	Action Plan (initiatives to reduce threats and increase opportunities)
Lack of technological equipment/ internet connection	Low	High	School Principal (Paulo) ICT teacher (Rui)	-Prior preparation -Attribute only 1 computer/ android device per small group of students - Encourage students to use their own devices if possible
Lack of time to fully implement the project (due to teachers' teaching hours/ other running projects)	Medium	High	Science Club teacher (Tânia)	- Reorganization of the research project to better fit their needs - Skip small steps/details in the development process that don't majorly affect the project - Reduce the number of deliverables per group of students
Modest number of people that accepted invitation to attend the open schooling event	Medium	Medium	School Principal (Paulo) ICT and Science Club teacher (Ricardo) Students: -Joana -Margarida -Tiago -João -Pedro	- Invitations to the broader local community - More persistent invitations to students' friends and families (Phonecalls, email,etc.)

7. Plan: Plan Procurement Processes

    a.   Determine what goods and services you need
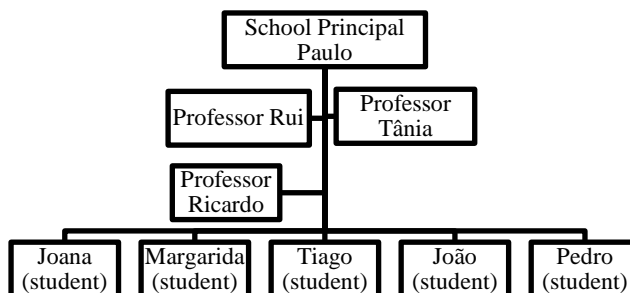   b.   Have what you need at the time that you need it

Supplies Breakdown Structure
(filled with examples, these may change according to your project organisation)

Supply	Supply Cost (supplies)	When to be available	How to be available
Paper	20 euros	During the whole project (Implemented scenarios till the end of the open schooling event)	Commitment of school top management
Printer	50 euros	During the whole project (Implemented scenarios till the end of the open schooling event)	Commitment of school top management
Computer	700 euros	During the whole project (Implemented scenarios till the end of the open schooling event)	Commitment of school top management/ students (if they choose to use their own)

8. Plan: Plan People

Organization Breakdown Structure
(filled with examples, these may change according to your project organisation)

Responsibility assignment matrix
(filled with examples, these may change according to your project organisation)

Activity	Team members								
	Joana (student)	**Margarida (student)**	**Tiago (student)**	**João (student)**	**Pedro (student)**	**Professor Rui (ICT)**	**Professor Tânia (Science)**	**Professor Ricardo (ICT & Science)**	**School Principal Paulo**
Set main project goals	X	X	X	X	X	C/P	C		
Research process	X	X	X	X	X/P	C	C/P	C/P	
Prepare/Create the Pitch		X		X	X/P	C/P	C		
Prepare/Create the outputs	X	X	X	X	X/P	P	P	C/P	
Coordinate the overall implementation of the project						X	X	X	I
Coordinate the school event				X		X	X	X	I
Attend the school event and present their work	X	X	X	X	X	C/P	C/P	X	
Reward attribution (to be attributed through voting)						P	P	P	

Letter	Role
X	Executes work
P	Controls progress
C	Should be consulted
I	Should be informed

Stakeholders Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Directly involved in the project (yes/no)	Served or Affected by the Project	Likely to be user of the results of the project
Families/Friends	yes	yes	yes
School community	yes	yes	yes
School management	no	yes	yes
Municipality	no	yes	yes

Stakeholder name	Directly involved in the project (yes/no)	Served or Affected by the Project	Likely to be user of the results of the project
Residents' association	no	yes	yes
INL (International Iberian Nanotechnology Laboratory)	yes	no	yes
Lúcio Craveiro da Silva Library	yes	yes	yes
General Directorate of Education (DGE)	no	no	yes

Stakeholders Management Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Who they are and why should be involved in the project	Why the project is relevant for them	Strategies to obtain support
Families/Friends	Students' families and friends will be invited to attend the school event during which students will present their projects. They will make the evaluation of this type of initiative a lot easier and provide key research questions for future surveys. Their involvement also maximizes the impact of the project in terms of both digital and health literacy.	Due to their interest in the children's education and school well-being.	Attend the school project presentation in a school event and present it in parents' meeting
School community	The school community should be involved in the survey and observations to be done by students in school environment. They will provide relevant feedback. Their involvement also maximizes the impact of the project in terms of both digital and health literacy.	Due to their interest in students' education and school well-being, and the teachers' intention to professionally upgrade their careers/collect new and useful experiences for further students.	Attend the school project presentation in a school event and present the school project in a school community meeting/ schools' website/social networks
School management	The school management assures relevant resources for students' projects and should be involved in the survey Their involvement also maximizes the impact of the project in terms of both digital and health literacy.	Due to their interest in contributing and integrate open schooling/ active citizenship/ modern ways of teaching and learning.	Attend the school project presentation in a school event and present it in parents' meeting.
Municipality	The municipality should be involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to municipality interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project).
Residents' association	Residents' associations should be involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to residents' associations interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project).
INL (International Iberian Nanotechnology Laboratory)	INL will contribute for the development of students' projects by providing a place for the final presentation/ organize a field trip/ store and show off the outputs/ conduct short talks.	Due to their interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event), as well as on contributing for youths' education in digital and health issues and "hands-on" approaches.	Invitation to participate in the open schooling event (that also provides a summary description of the school project) and availability for them to show the community the importance of their work.

Stakeholder name	Who they are and why should be involved in the project	Why the project is relevant for them	Strategies to obtain support
Lúcio Craveiro da Silva Library	The library will provide all the research material needed/ a space for developing the projects/ store outputs.	Due to their interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event) and interest on encouraging youths' education.	Invitation to participate in the open schooling event (that also provides a summary description of the school project) and availability for them to show the community the importance of their work.
General Directorate of Education (DGE)	DGE acts as an mediator, creating a bridge between the PAFSE project and education. It supports the project and is interested in learning outcomes.	Due to their interest in new educational methodologies and desire for enhancing the educational system.	Invitation to participate in the open schooling event. Sharing of a sample of the project material (along with a summary of the project) to the people of the Directorate, responsible for the communication and school initiatives.

9. Plan: Plan Communication

a. Assure the right information to the right people, at the right time, in a useful format
b. Assure effective project meetings
c. Build the communications plan

Communications plan
(filled with examples, these may change according to your project organisation)

Organized by (from)	Participants (to)	What	When	How/Where	Purpose
Professor Ricardo	Team	Kick-off meeting	September; Before the project starts to summarize responsibilities	Virtual meeting/school meeting room	Provide a complete description of the project and what the end product will be.
Professors Rui, Tânia and Ricardo	Parents	Meeting	Before the project starts (date to be defined)	Virtual meeting/school meeting room / ICT room	Explain the project, ask for support and cooperation when needed and invite for participation in the survey and open schooling event.
Professors Rui, Tânia and Ricardo	Team	Team meeting	Weekly (e.g. Thrusday 6 pm)	IT Virtual meeting/school meeting room / ICT room	- Overall plan for the project - Discuss project developments and plan next stage - Instruct team on how to carry out the following steps - Monitor the progress of the project and if there are any issues with completion
Professor Ricardo	Team	Professors Meeting	Every two weeks	Virtual meeting/school meeting room / ICT room	-Monitor the general progress of the project -Discuss any difficulties found during the project depth and find ways to overcome them -Discuss alternative options for the enactment of the educational scenarios

Organized by (from)	Participants (to)	What	When	How/Where	Purpose
Professors Rui, Tânia and Ricardo	Parents	Invitation to parents' participation in open schooling event	At least 2 weeks before the open schooling event (date to be defined)	By email/ Parents meeting	Remind of the project goals and invite for participation in the open schooling event.
Professors Rui, Tânia and Ricardo, School management	School community, Municipality, Residents' association Directorate for Education, INL, Library	Invitations to stakeholders' participation in open schooling event	At least 2 weeks before the open schooling event (date to be defined)	By email/ Virtual meeting	Explain the project and invite for participation in the open schooling event.

10. Plan: Finish the project planning by building the Charter

1.0 Project identification	
Name	Partnerships for Science Education
Summary description	The project will enable moments of creative freedom, where students apply the programming/ICT/IT concepts learned during previous sessions in a project linked with health topics. Students will participate in "hands-on" and "learn-by-doing" activities and carry out their own research project, fostering not only specific skills but also their soft skills, the so called "21st century skills".
Project owner	Agrupamento de Escolas de Maximinos (for example)
Project manager	Professor Ricardo
Stakeholders	Families/Friends (Interest in their children's high-quality education) School Community (Interest in achievements of other members of the school community) School Management (Interest of high-quality educational services provided by the school) Municipality (Interest in schoolwork in their area) Residents' Association (Interest in students' work from the local society) INL (interest in innovative projects and disseminating communication of science) Library (interest in acquiring learning resources) National Directorate for Education (Interest in innovative school educational projects)
Team and roles	Professor Paulo (Principal) Professor Rui (ICT teacher) Professor Tânia (Science teacher) Professor Ricardo (Science and ICT teacher) Joana (Student) Margarida (Student) Tiago (Student) João (Student) Pedro (Student)

2.0 Needs that support the project
- These types of projects are not normally developed to such extent. Students are rarely asked to directly apply their knowledge and share it with the community or be active and contributor citizens. It is extremely important that they learn how to present important issues to the community, how to communicate science, how to "make the other understand the importance of a certain issue". Communication skill are underrated.   - The current state of education lacks active learning methodologies and student autonomy.   - Promote technological and health awareness. These concepts are key to every other existing sector and is something worth focusing.   - Boost STEM curriculum. Increasingly, students are shifting away from science education. Thus, it is imperative to show them how useful and (even) fun and interesting it can be.

3.0 Project goals
Teachers' professional workshop on the project completed – October 15   S: Reach the majority of the expected stakeholders   M: Regular meetings to track progress; Organizational chart   A: Develop the project in small, controlled steps   R: Be aware of limitations/obstacles and tackle them with feasible solutions   T: Project completed – March 31; Open schooling event – April 30

4.0 Project scope

The scope of the project is to engage students in "hands-on" and "learn-by-doing" activities, fomenting skills they usually don't in traditional teaching, as well as rise their motivation towards STEM, in particular technology.

5.0 Key Deliverables

APP (sketch or real)
Multimodal content (infographic; video; podcast; etc.)
Pitch presentation
Portfolio (Containing all of the above, the storyboard and mind map and a small reflection on their work)

6.0 Milestones and dates

APP (date to be defined)
Multimodal content (date to be defined)
Pitch presentation (date to be defined)
Open schooling event prepared (date to be defined)
Open schooling event done (date to be defined)

7.0 Constraints

Possible lack of equipment
Possible time constraint due to teachers'/ students' schedule
Participation of at least 10 students in the project (limit)
Participation of at least 50 people in the open schooling event (limit)
Project should be finished on 30 April (limit)

8.0 Risks and opportunities

Risks:
Possible lack of equipment
Possible time constraint due to teachers'/ students' schedule
Modest number of people that accepted invitation to attend the open schooling event
Opportunities:
Students interest in technologies
Innovative and interesting methodologies (gamification; storytelling)
Teachers' motivation on the project so that ICT has proven recognition

9.0 Project success criteria

Project completed before the third period.
High-quality project outputs according to the guidelines
High students' interest and participation in the project and the open schooling event
Open schooling event with the participation of the entire school community, parents, and local stakeholders.

10.0 Project success factors

Appropriate engagement of students and parents.
Appropriate time management/methodologies during the lessons
Interest of teachers in the school project main pillars – open schooling; communicating science
Adequate attendance of stakeholders in the open schooling event
Adequate use of the outputs

Teaching-learning process milestones:
1. Students will be able to propose basic programming solutions.
2. Students will be able to communicate the findings, motivations and limitations of various solutions considered in the work process.
3. Students will be able to identify and communicate the importance of digital literacy/end-user development in public health and citizenship.

Teaching-learning process for school project (summary):
1. Development of multimodal materials.
2. Basic Mobile Applications Sketches (or real for the most driven).
3. Presentation of all the resources created in the open schooling event, where students will be advocating better conditions for their community and show their relationship with public health and low-code environments.

Organization of the open schooling event:
1. Each project output (portfolio) is presented by the students in a community setting (e.g., exposition center, municipality, science fair) with appropriate/pre-prepared environment (computer and smartphone with MIT App Inventor installed).
2. Students do a pitch on how mobile solutions can be used to address public health, like the case of good hygiene habits. Technical speeches to motivate peers to new technologies and technological environments. Students will also be advocating better conditions for their community and show their relationship with citizens health.
3. Students, parents, school community and relevant local stakeholders attend the event and recognize that mobile solutions can be used to address real life challenges, public health ones, and others. They also get high-level understanding on strategies to minimize the phenomena and how they may have an influence on the relevant settings (e.g., home, school, workplace, community).

Data Analysis and Reporting

Content Analysis.
Multimodal resources.
Portfolio development.

Target Audience for Recommendations

School community and local stakeholders: students, parents, municipalities, engineers, public health authorities, and local enterprises.

Public Debate and Recommendations (based on research results)

Presentation of the resources produced by students in a community setting and dissemination of evidence recommendations via social, community and conventional media.
Discussion and feedback.
Attribution of the prize of "best app ideas".

Main partner responsible: UM

17. Project management resource and inquiry instruments on the topic of "Low-code development environments – level 2 (Intermediate)"

Overview

The technological revolution of the last decades has contributed to the consolidation of a new social paradigm known as knowledge society or information society. This paradigm is reflected in a globalized and multilingual world, full of economic, commercial, political, social, and cultural relations, where professional specialization is a necessity. Aiming to help achieve this specialization, the project supports ICT teachers in expanding students' skills in a way they are not just passive consumers of technology, but active content creators too. Learning how to code can support students' engagement in the development of innovative solutions that benefit the health of their community, while developing general problem-solving skills central to success in STEM (Science, Technology, Engineering, Mathematics) curricula and careers. By learning how to code students go from being passive users of apps, digital content, and web pages to actively participate in their creation with meaningful purpose.

Particularly, block-based coding or programming is an element of programming where text-based computer commands are groups together in pre-programmed blocks that drag and drop together to build computer programs such as animations and games. Block coding is considered "syntax-free" in that a user does not need to be careful about the order and requisite syntax of commands and punctuation, which need to be memorized in text-based programming. This means it has a tremendous potential to take education to the next level.

The inquiry-based project aims to familiarize students with public health risks and patterns of protective behavior, as well as making them capable of explaining those ideas to others in low-code environments. Several topics related to a main determinant of health - nutrition habits - will be explored while operating in various multimodal content creation tools. The learning experience supports youths in understanding how STEM may contribute to create new and revolutionizing solutions to public health, as well as stimulate their creativity, decision-making and problem-solving skills, while supporting them in the process of becoming tech producers and public health ambassadors.

Estimated duration

After initial socioscientific and technical background on the topic in classroom environment, 5-6 sessions of 40-45 minutes for supplementary learning activities and school project (lesson 6 – lesson 12).

School Research Project

Topics:
Importance of digital literacy and real-life implications.
Basic/Intermediate technical features and principles of programming solutions development.
Possible applications of mobile applications in public health (e.g., in the promotion of nutrition habits).

Research management, design and administration:

Challenge: Content exposition creation on topic "healthy nutrition habits", promoting not only technology, but also health of individuals.

Method (*summary*)**:** Lessons 6 to 12 will be dedicated to the school research project. Students are, as usual, organized in groups and each group addresses the practiced programming and technological concepts and connects them to health.

Development process:

The project is based on the use of technology to create scientific artefacts and build digital literacy (e.g., finding, reviewing, organising and sharing information effectively, handling data appropriately, using different online resources and tools to study), with a particular focus on the contribute of low-code for a healthy community and on the general attributes of healthy communities. The five-six sessions will be lightly supervised by the teachers and developed by the students, with scheduled moments for checking the work development.

Groups of students will be instructed to create an interactive game or tool app that explores the topic of nutrition habits in some way, as well as some other resources (of their choice) that they see fit on the same topic:

During **session 1**, students are presented, not only, with software to use for content creation but also the norms to follow:

1. Each group should have, at least:
    a. 1 app on the theme of healthy habits (they can use existing templates or build from scratch and there is no need to be similar to those they tried, it's full-on creativity)
    b. One other multimodal resource on the theme of healthy habits.
        i. It can be a mental/conceptual map, a quizz, a presentation, an interactive resource, an infographic, a story, a video, etc.
    c. A short portfolio with all the created resources.
2. Each group is required to:
    a. brainstorm a project idea, develop drawing(s) of the app/game on paper, creating a storyboard.
    b. meet regularly with the teacher to discuss the feasibility of the app and if necessary make any changes to their plan.
    c. Present a short (till 10 minutes) elevator pitch of your project idea to the class.
3. Create a portfolio (free structure, let the student be creative) write up of your project.
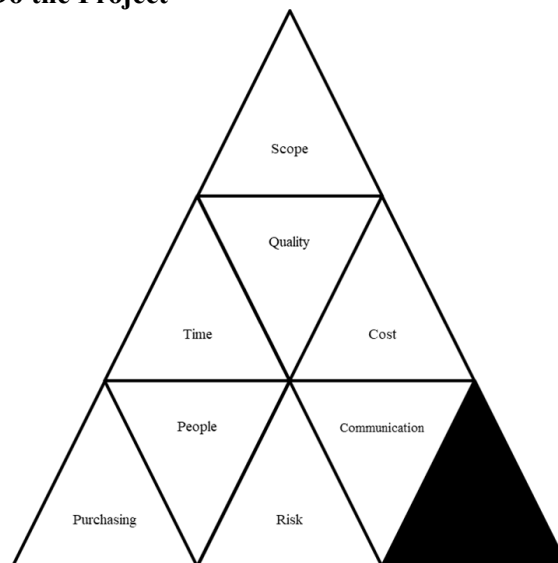
In the end of session 1, the groups are created and a brainstorm of ideas for the project is undergone.

During session 2, the teacher will collect students' ideas and topics and, if valid, students start working on their project. The teacher will provide support to students and contributes to the development of the project.

From session 3-forward, the students will actively and independently work on their project and are encouraged to exchange ideas with the other groups.

Project Management Framework and Instruments

1. Plan: Determine How to Do the Project

2. Plan: Define Project Scope

-What are the outputs?
Digital-scientific artefacts
Open schooling Event

-What are the requirements of project outputs?
A regular functioning computer (and android device) with internet connection to use MIT App Inventor and content creation tools (infographics, videos, images, podcasts, etc.) and a software for presentation development;
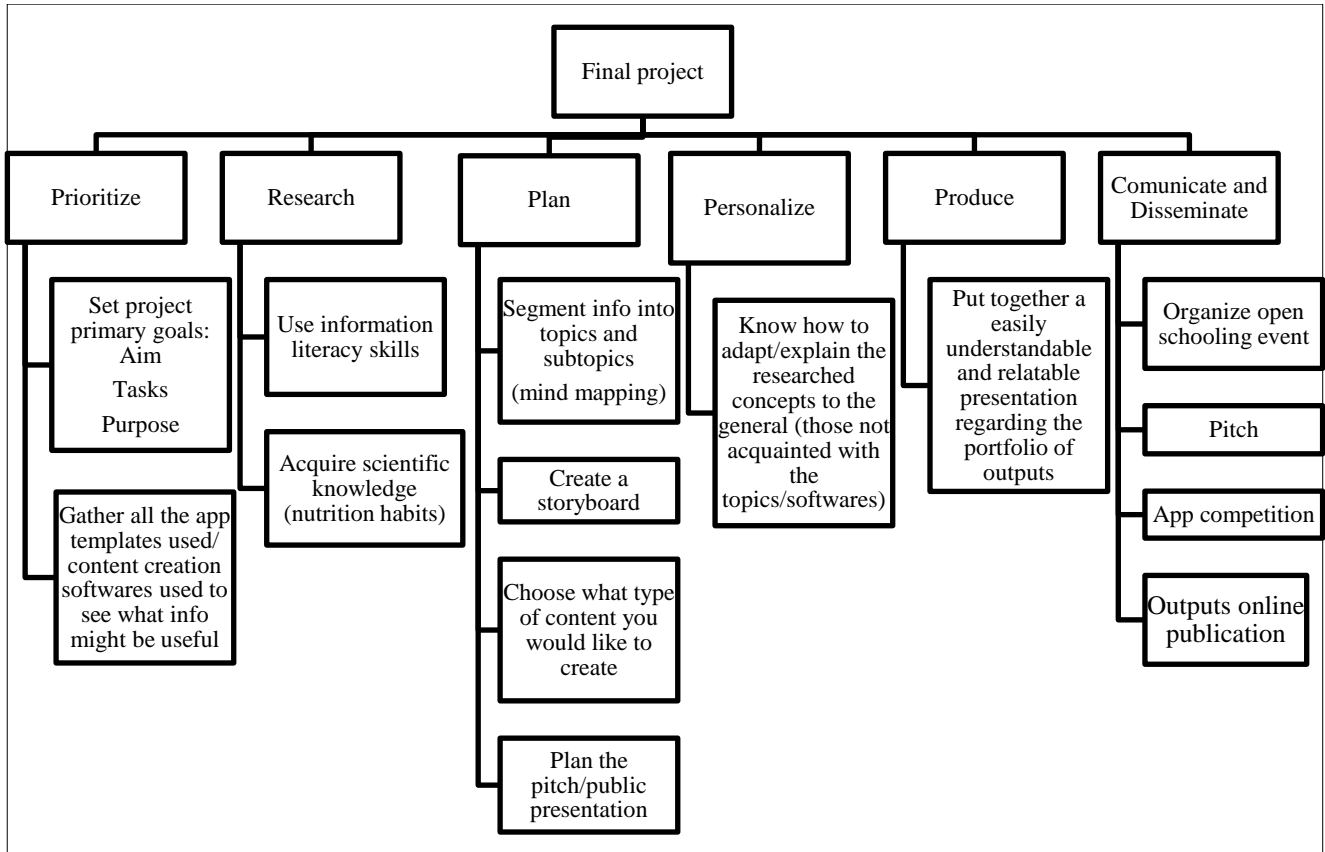
- Are there any constraints to produce the project outputs?

The limitation of time from students/teachers (even on Science Club, there are other projects being developed and not all schools have access to the club all the time)
Possible lack of interest on part of students
Possible lack of equipment/ internet connection

- Define the tasks to produce the outputs

Work Breakdown Structure
(filled with examples, these may change according to your project organisation)

3. Plan: Determine Project Time

   a.   Define the detailed activities for each WBS element
   b.   Put the activities in sequence
   c.   Estimate the resources (human and acquisitions) for each activity
   d.   Estimate the calendar time (days or weeks) for each activity
   e.   Create the Gantt Chart

Resource Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources
Prioritizing (set project goals; gather info)	15 minutes	Computer/tablet
Researching (use information literacy skills; acquire scientific knowledge)	2 hours	Computer/tablet
Planning (mind mapping; storytelling; pitch and content planning)	4 hours	Computer/tablet
Personalization (Adaptation/Explanation)	1 hour (overlapping with above)	Computer/tablet
Production (presentation/ pitch)	4 hours	Computer/tablet
Communication and dissemination	2-4 hours	Computer/tablet, projector

Gantt Chart
(filled with examples, these may change according to your project organisation)

Activity	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
Prioritizing (set project goals; gather info)	■					
Researching (use information literacy skills; acquire scientific knowledge)	■	■	■			
Planning (mind mapping; storytelling; pitch and content planning)		■	■	■		
Personalization (Adaptation/Explanation)		■	■	■	■	
Production (presentation/ pitch)		■	■	■	■	
Communication and dissemination						■

4. Plan: Determine Project Cost

a. Estimate how much each activity will cost
   Note: include the cost for Labor, Supplies, overhead (like office space and equipment)

b. Add the estimates to determine the total cost of your project

Cost Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources	Human Resource Cost*	Other Resources Cost (supplies)
Prioritizing (set project goals; gather info)	15 minutes	Computer/tablet	10€	n.a
Researching (use information literacy skills; acquire scientific knowledge)	2 hours	Computer/tablet	40€	n.a
Planning (mind mapping; storytelling; pitch and content planning)	3 hours	Computer/tablet	70€	n.a
Personalization (Adaptation/Explanation)	1 hour (overlapping with above)	Computer/tablet	30€	n.a
Production (presentation/ pitch)	4 hours	Computer/tablet	120€	n.a
Communication and dissemination	2-4 hours	Computer/tablet, projector	60-90€	n.a
Total	10h30-13h30 (some overlapping with each other)	-	330-360€	-

5. Plan: Determine Project Quality

a. Ensure your project produces quality outputs
b. Plan what quality means to your project
c. Determine how you will ensure quality

Quality Breakdown Structure
(filled with examples, these may change according to your project organisation)

Requirement	Quality planning	Quality assurance	Quality control
1.1	Minimum number of created contents per portfolio	Minimum number of created contents: 3 (app; multimodal digital artefact; portfolio)	Monitor the development of students' plans on a weekly basis
1.2	Approaches used	Ability to use multimodal mental mapping/storytelling approach	Monitor the development of students' plans on a weekly basis
1.3	Assessment rubric for Portfolio	Assessment rubric based on scientific accuracy, methodological accuracy, effectiveness to its goals, proper presentation	Monitor the development of students' outputs on a weekly basis
1.4	Assessment rubric for the 5 P's Pitch	Assessment rubric based on the 5P's ("Priorizar" (Prioritize); "Pesquisar" (Research); "Planificar" (Plan); Personalizar (Personalize); Produzir (Produce)	Monitor the development of students' presentations on a weekly basis

6. Plan: Determine Project Risks

a. Identify the two types of risks (uncertain future events that can affect your project): threats have a negative impact on your project; opportunities have a positive impact on your project.

Risk Breakdown Structure
(filled with examples, these may change according to your project organisation)

Risk	Probability (How likely is it to happen)	Impact (How big of an effect will it have)	Owner (who takes care about the risk)	Action Plan (initiatives to reduce threats and increase opportunities)
Lack of technological equipment/ internet connection	Low	High	School Principal (Céu) ICT teacher (Marina)	-Prior preparation -Attribute only 1 computer/ android device per small group of students - Encourage students to use their own devices if possible
Lack of time to fully implement the project (due to teachers' teaching hours/ other running projects)	Medium	High	Science Club teacher (Paulo)	- Reorganization of the research project to better fit their needs - Skip small steps/details in the development process that don't majorly affect the project - Reduce the number of deliverables per group of students
Modest number of people that accepted invitation to attend the open schooling event	Medium	Medium	School Prinipical (Céu) ICT and Science teachers (Marina & Paulo) Students: -Carla -Bruno -Sofia -Fernando -Luísa	- Invitations to the broader local community - More persistent invitations to students' friends and families (Phonecalls, email,etc.)

7. Plan: Plan Procurement Processes

a. Determine what goods and services you need
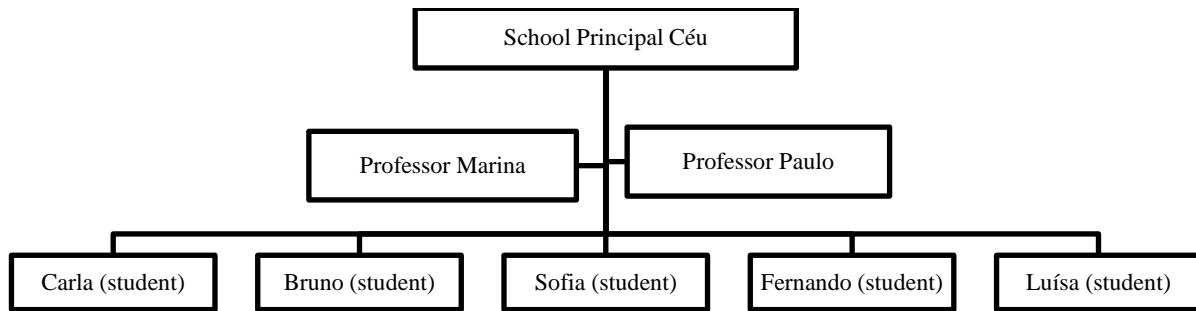b. Have what you need at the time that you need it.

Supplies Breakdown Structure
(filled with examples, these may change according to your project organisation)

Supply	Supply Cost (supplies)	When to be available	How to be available
Computer	700 euros	During the whole project (Implemented scenarios till the end of the open schooling event)	Commitment of school top management/ students (if they choose to use their own)

8. Plan: Plan People

a. Acquire the project team
b. Map the project team in the Organization Breakdown Structure
c. Assign the project team members to roles
d. Assign the project team members to activities
e. Train the project team
f. Determine how you will motivate and reward the team
g. Map Stakeholders – people or groups interested in the project
h. Determine how you will engage stakeholders in the project

Organization Breakdown Structure
(filled with examples, these may change according to your project organisation)

Responsibility assignment matrix
(filled with examples, these may change according to your project organisation)

Activity	Team members							
	Carla (student)	**Bruno** (student)	**Sofia** (student)	**Fernando** (student)	**Luísa** (student)	**Professor Marina (ICT)**	**Professor Paulo (Science)**	**School Principal Céu**
Set main project goals	X/P			X		P	P	
Research process		X	X		X	C	C	
Mind map the concepts	P	X		X		C	C	
Create storyboard for the app	P		X		X	C	C	
Prepare/Create the Pitch	X/P	X	X	X	X	P	P	
Prepare/Create the outputs	X/P	X	X	X	X	P	P	
Coordinate the overall implementation of the project						X	X	I
Coordinate the school event	X					X	X	I
Attend the school event and present their work	X	X	X	X	X	C/P	C/P	
Reward attribution (to be attributed through voting)						P	P	

Letter	Role
X	Executes work
P	Controls progress
C	Should be consulted
I	Should be informed

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    a.   Assure the right information to the right people, at the right time, in a useful format
    b.   Assure effective project meetings
    c.   Build the communications plan

Communications plan
(filled with examples, these may change according to your project organisation)

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Professors Marina and Paulo	Parents	Meeting	Before the project starts (date to be defined)	Virtual meeting/school meeting room / ICT room	Explain the project, ask for support and cooperation when needed and invite for participation in the survey and open schooling event.
Professors Marina and Paulo	Team	Team meeting	Weekly (e.g. Thursday 6 pm)	IT Virtual meeting/school meeting room / ICT room	- Overall plan for the project - Discuss project developments and plan next stage - Instruct team on how to carry out the following steps - Monitor the progress of the project and if there are any issues with completion
Professor Marina	Team	Professors Meeting	Every two weeks	Virtual meeting/school meeting room / ICT room	-Monitor the general progress of the project -Discuss any difficulties found during the project depth and find ways to overcome them -Discuss alternative options for the enactment of the educational scenarios
Professors Marina and Paulo	Parents	Invitation to parents' participation in open schooling event	At least 2 weeks before the open schooling event (date to be defined)	By email/ Parents meeting	Remind of the project goals and invite for participation in the open schooling event.
Professors Marina and Paulo, School management	School community, Municipality, Residents' association Directorate for Education, INL, Library	Invitations to stakeholders participation in open schooling event	At least 2 weeks before the open schooling event (date to be defined)	By email/ Virtual meeting	Explain the project and invite for participation in the open schooling event.

10. Plan: Finish the project planning by building the Charter

1.0 Project identification

Name	Partnerships for Science Education – Uminho
Summary description	The project will enable moments of creative freedom, where students apply the programming/ICT/IT concepts learned during previous sessions in a project linked with health topics. Students will participate in "hands-on" and "learn-by-doing" activities and carry out their own research project, fostering not only specific skills but also their soft skills, the so called "21st century skills".
Project owner	Agrupamento de Escolas Alberto Sampaio (for example)
Project manager	Professor Marina
Stakeholders	Families/Friends (Interest in their children's high-quality education) School Community (Interest in achievements of other members of the school community) School Management (Interest of high-quality educational services provided by the school) Municipality (Interest in schoolwork in their area) Residents' Association (Interest in students' work from the local society) INL (interest in innovative projects and disseminating communication of science) Library (interest in acquiring learning resources) National Directorate for Education (Interest in innovative school educational projects)
Team and roles	Professor Céu (Principal) Professor Marina (ICT teacher) Professor Paulo (Science teacher) Carla (Student) Sofia (Student) Bruno (Student) Fernando (Student) Luísa (Student)

2.0 Needs that support the project

- These types of projects are not normally developed to such extent. Students are rarely asked to directly apply their knowledge and share it with the community or be active and contributor citizens. It is extremely important that they learn how to present important issues to the community, how to communicate science, how to "make the other understand the importance of a certain issue". Communication skill are underrated.
- The current state of education lacks active learning methodologies and student autonomy.
- Promote technological and health awareness. These concepts are key to every other existing sector and is something worth focusing.
- Boost STEM curriculum. Increasingly, students are shifting away from science education. Thus, it is imperative to show them how useful and (even) fun and interesting it can be.

3.0 Project goals

Teachers' professional workshop on the project completed – October 15
S: Reach the majority of the expected stakeholders
M: Regular meetings to track progress; Organizational chart
A: Develop the project in small, controlled steps
R: Be aware of limitations/obstacles and tackle them with feasible solutions
T: Project completed – March 31; Open schooling event – April 30

4.0 Project scope

The scope of the project is to engage students in "hands-on" and "learn-by-doing" activities, fomenting skills they usually don't in traditional teaching, as well as rise their motivation towards STEM, in particular technology.

5.0 Key Deliverables

APP
Multimodal content (infographic; video; podcast; etc.)
Pitch presentation
Portfolio (Containing all of the above, the storyboard and mind map and a small reflection on their work)

6.0 Milestones and dates

Storyboard (date to be defined)
Mind map (date to be defined)
APP (date to be defined)
Multimodal content (date to be defined)
Pitch presentation (date to be defined)
Open schooling event prepared (date to be defined)
Open schooling event done (date to be defined)

7.0 Constraints
Possible lack of equipment
Possible time constraint due to teachers'/ students' schedule
Participation of at least 10 students in the project (limit)
Participation of at least 50 people in the open schooling event (limit)
Project should be finished on 30 April (limit)

8.0 Risks and opportunities
Risks:
Possible lack of equipment
Possible time constraint due to teachers'/ students' schedule
Modest number of people that accepted invitation to attend the open schooling event
Opportunities:
Students interest in technologies
Innovative and interesting methodologies (gamification; storytelling, mind mapping)
Teachers' motivation on the project so that ICT has proven recognition

9.0 Project success criteria
Project completed before the third period.
High-quality project outputs according to the guidelines
High students' interest and participation in the project and the open schooling event
Open schooling event with the participation of the entire school community, parents, and local stakeholders.

10.0 Project success factors
Appropriate engagement of students and parents.
Appropriate time management/methodologies during the lessons
Interest of teachers in the school project main pillars – open schooling; communicating science
Adequate attendance of stakeholders in the open schooling event
Adequate use of the outputs

Teaching-learning process milestones:
1. Students will be able to propose basic/intermediate programming solutions.
2. Students will be able to communicate the findings, motivations and limitations of various solutions considered in the work process.
3. Students will be able to identify and communicate the importance of digital literacy/end-user development in public health and citizenship.

Teaching-learning process for school project (summary):
1. Development of multimodal materials.
2. Mobile Applications development.
3. Presentation of all the resources created in the open schooling event, where students will be advocating better conditions for their community and show their relationship with public health and low-code environments.

Organization of the open schooling event:
1. Each project output (portfolio) is presented by the students in a community setting (e.g., exposition center, municipality, science fair) with appropriate/pre-prepared environment (computer and smartphone with the MIT App Inventor installed).
2. Students do a pitch on how mobile solutions can be used to address public health, like the case of good nutrition habits. Technical speeches to motivate peers to new technologies and technological environments. Students will also be advocating better conditions for their community and show their relationship with citizens health.
3. Students, parents, school community and relevant local stakeholders attend the event and recognize that mobile solutions can be used to address real life challenges, public health ones, and others. They also get high-level understanding on strategies to minimize the phenomena and how they may have an influence on the relevant settings (e.g., home, school, workplace, community).

Data Analysis and Reporting

Content Analysis.
Multimodal resources.
Portfolio development.

Target Audience for Recommendations

School community and local stakeholders: students, parents, municipalities, engineers, public health authorities, and local enterprises.

Public Debate and Recommendations (based on research results)

Presentation of the resources produced by students in a community setting and dissemination of evidence recommendations via social, community and conventional media.
Discussion and feedback.
Attribution of the prize of "best app".

Main partner responsible: UM

Overview

Every year, experts convened by the World Economic Forum and Scientific American make predictions about the emerging technologies expected to have major social, economic, and environmental impacts worldwide. While some of these technologies have been catapulted into public consciousness and are fully integrated into our lives, others have been slower to gain momentum, which is the case of low-code environments and that's the reason why it needs to be brought directly to the world's future, schools. In addition, there is clear evidence that early technology literacy (e.g., meaningful use of low-code platforms) is linked with better disposition and ability to follow STEM (Science, Technology, Engineering, Mathematics) curricula and careers.

Particularly, block-based coding or programming is an element of programming where text-based computer commands are groups together in pre-programmed blocks that drag and drop together to build computer programs such as animations and games. Block coding is considered "syntax-free" in that a user does not need to be careful about the order and requisite syntax of commands and punctuation, which need to be memorized in text-based programming. This means it has a tremendous potential to take education to the next level.

The project supports ICT teachers in exploring how coding can positively impact tech education, students' communication and social skills, job prospects, and public health literacy. The learning experience supports youths in understanding how STEM may contribute to create new and revolutionizing solutions to address the determinants of health, as well as stimulate their creativity, decision-making and problem-solving capabilities, and enhance their entrepreneurial mindset. This scenario will point physical activity as a core component of healthy lifestyles and apps as solutions to address this need and connected problems (e.g., child obesity). During the learning process, students will properly communicate evidence on the topic while improving their low-code and multimodal content creation skills.

Estimated duration

After initial socioscientific and technical background on the topic in classroom environment, 5-6 sessions of 40-45 minutes for supplementary learning activities and school project (lesson 6 – lesson 12)

School Research Project

Topics

Importance of digital literacy and real-life implications.
Basic/Intermediate/advanced technical features and principles of programming solutions development.
Possible applications of mobile applications in public health (e.g., in the promotion of physical exercise).

Research management, design and administration

Challenge: Content exposition creation on one topic involving "physical activity habits", promoting not only technology, but also public health.

Method *(summary)*: Lessons 6/7 to 11/12 will be dedicated to the school research project. Students are, as usual, organized in groups and each group addresses the practiced programming and technological concepts and connects them to health.

Development process:

The project is based on the use of technology to create scientific artefacts. The five-six sessions will be lightly supervised by the teachers and developed by the students, with scheduled moments for checking the work development.

Groups of students will be instructed to create an interactive game or tool app that explores the topic of physical exercising, as well as some other resources (of their choice) that they see fit on the same topic:

During **session 1**, students are presented, not only, with software to use for content creation but also the norms to follow:

1. Each group should have, at least:
   a. 1 app on the theme of physical activity that contains sensors (they can use existing templates or build from scratch and there is no need to be similar to those they tried, it's full-on creativity)
   b. One other multimodal resource on the theme of healthy habits.
      i. It can be a mental/conceptual map, a quizz, a presentation, an interactive resource, an infographic, a story, a video, etc.
   c. A short portfolio with all the created resources.
2. Each group is required to:
   a. brainstorm a project idea, develop drawing(s) of the app/game on computer, creating a storyboard.
   b. meet regularly with the teacher to discuss the feasibility of the app and if necessary make any changes to their plan.
   c. Present a short (till 10 minutes) elevator pitch of your project idea to the class.
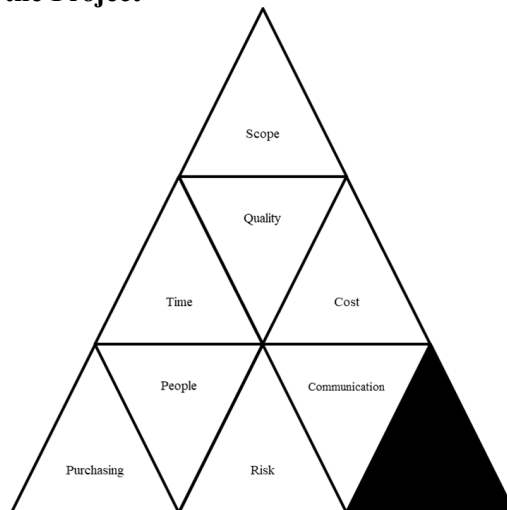3. Create a portfolio (free structure, let the student be creative) write up of your project.

In the end of session 1, the groups are created and a brainstorm of ideas for the project is undergone.

During session 2, the teacher will collect students' ideas and topics and, if valid, students start working on their project. The teacher will provide support to students and contributes to the development of the project.

From session 3-forward, the students will actively and independently work on their project and are encouraged to exchange ideas with the other groups.

Project Management Framework and Instruments

1. Plan: Determine How to Do the Project

2. Plan: Define Project Scope

- What are the outputs?
Digital-scientific artefacts
Open schooling Event

-What are the requirements of project outputs?
A regular functioning computer (and android device) with internet connection to use MIT App Inventor and content creation tools (infographics, videos, images, podcasts, etc.) and a software for presentation development.
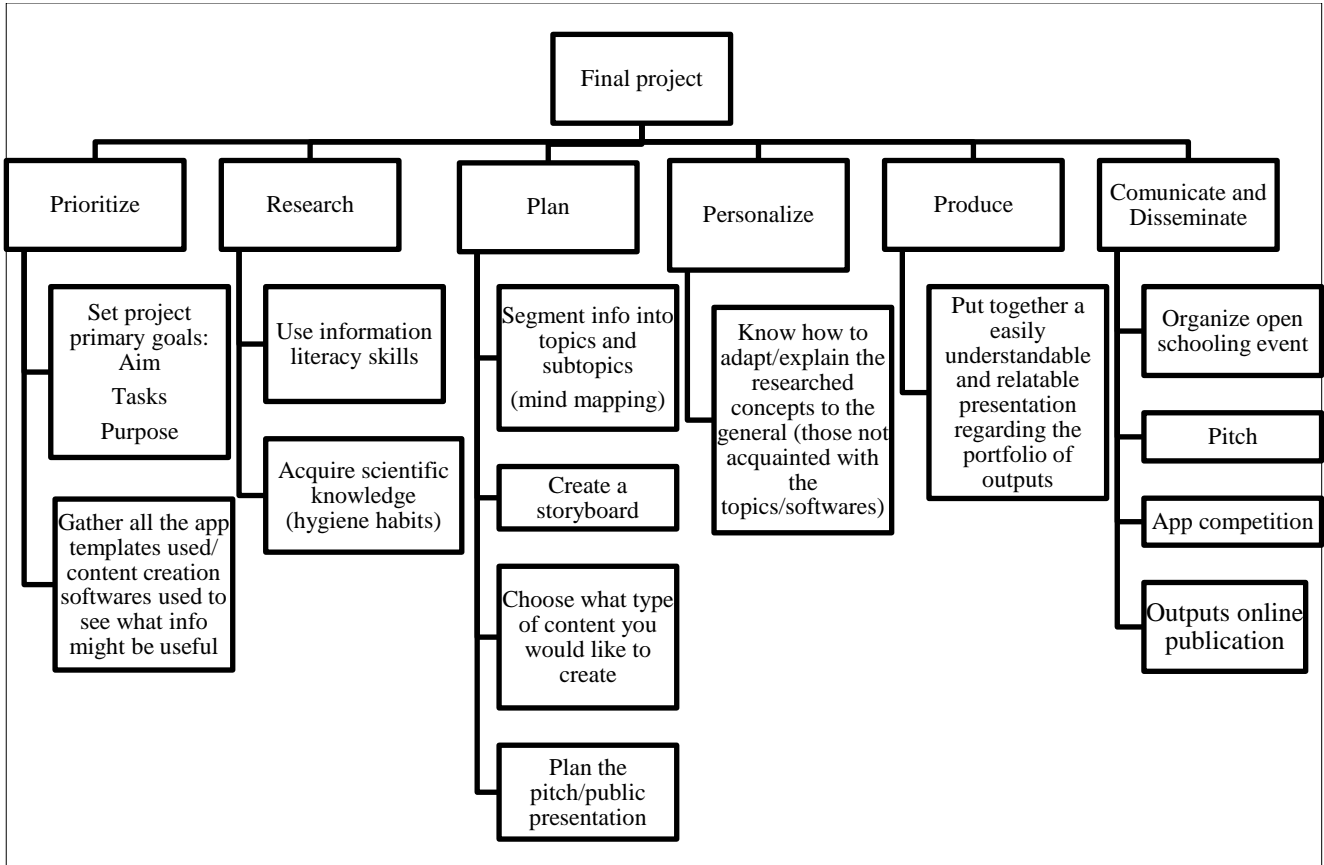
- Are there any constraints to produce the project outputs?

The limitation of time from students/teachers (even on Science Club, there are other projects being developed and not all schools have access to the club all the time)
Possible lack of equipment/ internet connection

- Define the tasks to produce the outputs

Work Breakdown Structure
(filled with examples, these may change according to your project organisation)

3. Plan: Determine Project Time

    a. Define the detailed activities for each WBS element
    b. Put the activities in sequence
    c. Estimate the resources (human and acquisitions) for each activity
    d. Estimate the calendar time (days or weeks) for each activity
    e. Create the Gantt Chart

Resource Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources
Prioritizing (set project goals; gather info)	15 minutes	Computer/tablet
Researching (use information literacy skills; acquire scientific knowledge)	3 hours	Computer/tablet
Planning (mind mapping; storytelling; pitch and content planning)	4 hours	Computer/tablet
Personalization (Adaptation/Explanation)	1 hour (overlapping with above)	Computer/tablet
Production (presentation/ pitch)	4 hours	Computer/tablet
Communication and dissemination	2-4 hours	Computer/tablet, projector

Gantt Chart
(filled with examples, these may change according to your project organisation)

Activity	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
Prioritizing (set project goals; gather info)	■					
Researching (use information literacy skills; acquire scientific knowledge)	■	■	■			
Planning (mind mapping; storytelling; pitch and content planning)	■	■	■			
Personalization (Adaptation/Explanation)		■	■	■	■	
Production (presentation/ pitch)		■	■	■	■	
Communication and dissemination						■

4. Plan: Determine Project Cost

    a.   Estimate how much each activity will cost

Note: include the cost for Labor, Supplies, overhead (like office space and equipment)

    b.   Add the estimates to determine the total cost of your project

Cost Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources	Human Resource Cost*	Other Resources Cost (supplies)
Prioritizing (set project goals; gather info)	15 minutes	Computer/tablet	10€	n.a
Researching (use information literacy skills; acquire scientific knowledge)	3 hours	Computer/tablet	60€	n.a
Planning (mind mapping; storytelling; pitch and content planning)	4 hours	Computer/tablet	80€	n.a
Personalization (Adaptation/Explanation)	2 hour (overlapping with above)	Computer/tablet	40€	n.a
Production (presentation/ pitch)	4 hours	Computer/tablet	140€	n.a
Communication and dissemination	2-4 hours	Computer/tablet, projector	70-100€	n.a
Total	15h15-17h15 (some overlapping with each other)	-	400-430€	-

5. Plan: Determine Project Quality

    a.   Ensure your project produces quality outputs
    b.   Plan what quality means to your project
    c.   Determine how you will ensure quality

Quality Breakdown Structure
(filled with examples, these may change according to your project organisation)

Requirement	Quality planning	Quality assurance	Quality control
1.1	Minimum number of created contents per portfolio	Minimum number of created contents: 3 (app (fully functional); multimodal digital artefact; portfolio)	Monitor the development of students' plans when needed
1.2	Approaches used	Ability to use multimodal mental mapping/storytelling approach independently	Monitor the development of students' plans when needed
1.3	Assessment rubric for Portfolio	Assessment rubric based on scientific accuracy, methodological accuracy, effectiveness to its goals, proper presentation, and structuring logic	Monitor the development of students' outputs when needed

Requirement	Quality planning	Quality assurance	Quality control
1.4	Assessment rubric for the 5 P's Pitch	Assessment rubric based on the 5P's ("Priorizar" (Prioritize); "Pesquisar" (Research); "Planificar" (Plan); Personalizar (Personalize); Produzir (Produce)	Monitor the development of students' presentations when needed

6. Plan: Determine Project Risks

a. Identify the two types of risks (uncertain future events that can affect your project): threats have a negative impact on your project; opportunities have a positive impact on your project.

Risk Breakdown Structure
(filled with examples, these may change according to your project organisation)

Risk	Probability (How likely is it to happen)	Impact (How big of an effect will it have)	Owner (who takes care about the risk)	Action Plan (initiatives to reduce threats and increase opportunities)
Lack of technological equipment/ internet connection	Low	High	School Principal (Graça) ICT teacher (Albertina)	-Prior preparation -Attribute only 1 computer/ android device per small group of students - Encourage students to use their own devices if possible
Lack of time to fully implement the project (due to teachers' teaching hours/ other running projects)	Medium	High	Science Club teacher (Rosa)	- Reorganization of the research project to better fit their needs - Skip small steps/details in the development process that don't majorly affect the project - Reduce the number of deliverables per group of students
Modest number of people that accepted invitation to attend the open schooling event	Medium	Medium	School Principal (Céu) ICT and Science teachers (Marina & Paulo) Students: -Sara - Ana - Alexandre - Nuno	- Invitations to the broader local community - More persistent invitations to students' friends and families (Phonecalls, email,etc.)

7. Plan: Plan Procurement Processes

a. Determine what goods and services you need
b. Have what you need at the time that you need it

Supplies Breakdown Structure
(filled with examples, these may change according to your project organisation)

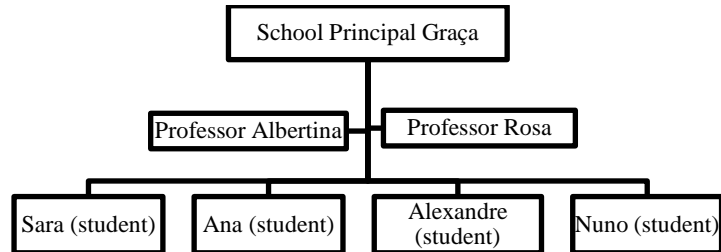| Supply	Supply Cost (supplies)	When to be available	How to be available
Computer	700 euros	During the whole project (Implemented scenarios till the end of the open schooling event)	Commitment of school top management/ students (if they choose to use their own)

8. Plan: Plan People

a. Acquire the project team
b. Map the project team in the Organization Breakdown Structure
c. Assign the project team members to roles

d. Assign the project team members to activities
e. Train the project team
f. Determine how you will motivate and reward the team
g. Map Stakeholders – people or groups interested in the project
h. Determine how you will engage stakeholders in the project

Organization Breakdown Structure
(filled with examples, these may change according to your project organisation)

Responsibility assignment matrix
(filled with examples, these may change according to your project organisation)

Activity	Team members						
	Sara (student)	**Ana (student)**	**Alexandre (student)**	**Nuno (student)**	**Professor Albertina (ICT)**	**Professor Rosa (Science)**	**School Principal Graça**
Set main project goals				X/P			
Research process	X	X	X	P	C	C	
Mind map the concepts		X		X/P			
Create storyboard for the app	X		X	P			
Prepare/Create the Pitch			X	X/P	P	P	
Prepare/Create the outputs	X	X		P	P	P	
Coordinate the overall implementation of the project				X	X	X	I
Coordinate the school event		X	X			X	I
Attend the school event and present their work	X	X	X	X	C/P	C/P	
Reward attribution (to be attributed through voting)					P	P	

Letter	Role
X	Executes work
P	Controls progress
C	Should be consulted
I	Should be informed

Stakeholders Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Directly involved in the project (yes/no)	Served or Affected by the Project	Likely to be user of the results of the project
Families/Friends	yes	yes	yes
School community	yes	yes	yes
School management	no	yes	yes
Municipality	no	yes	yes
Residents' association	no	yes	yes
INL (International Iberian Nanotechnology Laboratory)	yes	no	yes
Lúcio Craveiro da Silva Library	yes	yes	yes
General Directorate of Education (DGE)	no	no	yes

Stakeholders Management Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Who they are and why should be involved in the project	Why the project is relevant for them	Strategies to obtain support
Families/Friends	Students' families and friends will be invited to attend the school event during which students will present their projects. They will make the evaluation of this type of initiative a lot easier and provide key research questions for future surveys. Their involvement also maximizes the impact of the project in terms of both digital and health literacy.	Due to their interest in the children's education and school well-being.	Attend the school project presentation in a school event and present it in parents' meeting
School community	The school community should be involved in the survey and observations to be done by students in school environment. They will provide relevant feedback. Their involvement also maximizes the impact of the project in terms of both digital and health literacy.	Due to their interest in students' education and school well-being, and the teachers' intention to professionally upgrade their careers/collect new and useful experiences for further students.	Attend the school project presentation in a school event and present the school project in a school community meeting/ schools' website/social networks
School management	The school management assures relevant resources for students' projects and should be involved in the survey Their involvement also maximizes the impact of the project in terms of both digital and health literacy.	Due to their interest in contributing and integrate open schooling/ active citizenship/ modern ways of teaching and learning.	Attend the school project presentation in a school event and present it in parents' meeting.
Municipality	The municipality should be involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to municipality interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project).
Residents' association	Residents' associations should be involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to residents' associations interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project).
INL (International Iberian Nanotechnology Laboratory)	INL will contribute for the development of students' projects by providing a place for the final presentation/ organize a field trip/ store and show off the outputs/ conduct short talks.	Due to their interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event), as well as on contributing for youths' education in digital and health issues and "hands-on" approaches.	Invitation to participate in the open schooling event (that also provides a summary description of the school project) and availability for them to show the community the importance of their work.
Lúcio Craveiro da Silva Library	The library will provide all the research material needed/ a space for developing the projects/ store outputs.	Due to their interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event) and interest on encouraging youths' education.	Invitation to participate in the open schooling event (that also provides a summary description of the school project) and availability for them to show the community the importance of their work.
General Directorate of Education (DGE)	DGE acts as mediator, creating a bridge between the PAFSE project and education. It supports the project and is interested in learning outcomes.	Due to their interest in new educational methodologies and desire for enhancing the educational system.	Invitation to participate in the open schooling event. Sharing of a sample of the project material (along with a summary of the project) to the people of the Directorate, responsible for the communication and school initiatives.

9. Plan: Plan Communication

a. Assure the right information to the right people, at the right time, in a useful format
b. Assure effective project meetings
c. Build the communications plan

Communications plan
(filled with examples, these may change according to your project organisation)

Organized by (from)	Participants (to)	What	When	How/Where	Purpose
Professor Albertina	Team	Kick-off meeting	September; Before the project starts to summarize responsibilities	Virtual meeting/school meeting room	Provide a complete description of the project and what the end product will be.
Professors Albertina and Rosa	Parents	Meeting	Before the project starts (date to be defined)	Virtual meeting/school meeting room / ICT room	Explain the project, ask for support and cooperation when needed and invite for participation in the survey and open schooling event.
Professors Albertina and Rosa	Team	Team meeting	Weekly (e.g. Thursday 6 pm)	IT Virtual meeting/school meeting room / ICT room	- Overall plan for the project - Discuss project developments and plan next stage - Instruct team on how to carry out the following steps - Monitor the progress of the project and if there are any issues with completion
Professor Albertina	Team	Professors Meeting	Every two weeks	Virtual meeting/school meeting room / ICT room	-Monitor the general progress of the project -Discuss any difficulties found during the project depth and find ways to overcome them -Discuss alternative options for the enactment of the educational scenarios
Professors Albertina and Rosa	Parents	Invitation to parents' participation in open schooling event	At least 2 weeks before the open schooling event (date to be defined)	By email/ Parents meeting	Remind of the project goals and invite for participation in the open schooling event.
Professors Albertina and Rosa School management	School community, Municipality, Residents' association Directorate for Education, INL, Library	Invitations to stakeholders participation in open schooling event	At least 2 weeks before the open schooling event (date to be defined)	By email/ Virtual meeting	Explain the project and invite for participation in the open schooling event.

10. Plan: Finish the project planning by building the Charter

1.0 Project identification	
Name	Partnerships for Science Education
Summary description	The project will enable moments of creative freedom, where students apply the programming/ICT/IT concepts learned during previous sessions in a project linked with health topics. Students will participate in "hands-on" and "learn-by-doing" activities and carry out their own research project, fostering not only specific skills but also their soft skills, the so called "21st century skills".
Project owner	Agrupamento de Escolas André Soares (for exemple)

Project manager	Professor Albertina
Stakeholders	Families/Friends (Interest in their children's high-quality education)
	School Community (Interest in achievements of other members of the school community)
	School Management (Interest of high-quality educational services provided by the school)
	Municipality (Interest in schoolwork in their area)
	Residents' Association (Interest in students' work from the local society)
	INL (interest in innovative projects and disseminating communication of science)
	Library (interest in acquiring learning resources)
	National Directorate for Education (Interest in innovative school educational projects)
Team and roles	Professor Graça (Principal)
	Professor Albertina (ICT teacher)
	Professor Rosa (Science teacher)
	Sara (Student)
	Ana (Student)
	Alexandre (Student)
	Nuno (Student)

2.0 Needs that support the project

- These types of projects are not normally developed to such extent. Students are rarely asked to directly apply their knowledge and share it with the community or be active and contributor citizens. It is extremely important that they learn how to present important issues to the community, how to communicate science, how to "make the other understand the importance of a certain issue". Communication skill are underrated.
- The current state of education lacks active learning methodologies and student autonomy.
- Promote technological and health awareness. These concepts are key to every other existing sector and is something worth focusing.
- Boost STEM curriculum. Increasingly, students are shifting away from science education. Thus, it is imperative to show them how useful and (even) fun and interesting it can be.

3.0 Project goals

Teachers' professional workshop on the project completed – October 15
S: Reach the majority of the expected stakeholders
M: Regular meetings to track progress; Organizational chart
A: Develop the project in small, controlled steps
R: Be aware of limitations/obstacles and tackle them with feasible solutions
T: Project completed – March 31; Open schooling event – April 30

4.0 Project scope

The scope of the project is to engage students in "hands-on" and "learn-by-doing" activities, fomenting skills they usually don't in traditional teaching, as well as rise their motivation towards STEM, in particular technology.

5.0 Key Deliverables

APP
Multimodal content (infographic; video; podcast; etc.)
Pitch presentation
Portfolio (Containing all of the above, the storyboard and mind map and a small reflection on their work)

6.0 Milestones and dates

Storyboard (date to be defined)
Mind map (date to be defined)
APP (date to be defined)
Multimodal content (date to be defined)
Pitch presentation (date to be defined)
Open schooling event prepared (date to be defined)
Open schooling event done (date to be defined)

7.0 Constraints

Possible lack of equipment
Possible time constraint due to teachers'/ students' schedule
Participation of at least 10 students in the project (limit)
Participation of at least 50 people in the open schooling event (limit)
Project should be finished on 30 April (limit)

8.0 Risks and opportunities

Risks:
Possible lack of equipment
Possible time constraint due to teachers'/ students' schedule
Modest number of people that accepted invitation to attend the open schooling event
Opportunities:
Students interest in technologies
Innovative and interesting methodologies (gamification; storytelling, mind mapping)
Teachers' motivation on the project so that ICT has proven recognition

9.0 Project success criteria

Project completed before the third period.
High-quality project outputs according to the guidelines
High students' interest and participation in the project and the open schooling event
Open schooling event with the participation of the entire school community, parents, and local stakeholders.

10.0 Project success factors

Appropriate engagement of students and parents.
Appropriate time management/methodologies during the lessons
Interest of teachers in the school project main pillars – open schooling; communicating science
Adequate attendance of stakeholders in the open schooling event
Adequate use of the outputs

Teaching-learning process milestones:
1. Students will be able to propose basic/intermediate/advanced programming solutions.
2. Students will be able to communicate the findings, motivations and limitations of various solutions considered in the work process.
3. Students will be able to identify and communicate the importance of digital literacy/end-user development in public health and citizenship.

Teaching-learning process for school project (summary):
1. Development of multimodal materials.
2. Mobile Applications development.
3. Presentation of all the resources created in the open schooling event, where students will be advocating better conditions for their community and show their relationship with public health and low-code environments.

Organization of the open schooling event:
1. Each project output (portfolio) is presented by the students in a community setting (e.g., exposition center, municipality, science fair) with appropriate/pre-prepared environment (computer and smartphone with the MIT App Inventor installed).
2. Students do a pitch on how mobile solutions can be used to address public health, like the case of physical activity. Technical speeches to motivate peers to new technologies and technological environments. Students will also be advocating better conditions for their community and show their relationship with citizens health.
3. Students, parents, school community and relevant local stakeholders attend the event and recognize that mobile solutions can be used to address real life challenges, public health ones, and others. They also get high-level understanding on strategies to minimize the phenomena and how they may have an influence on the relevant settings (e.g., home, school, workplace, community).

Data Analysis and Reporting

Content Analysis.
Multimodal resources.
Portfolio development.

Target Audience for Recommendations

School community and local stakeholders: students, parents, municipalities, engineers, public health authorities, and local enterprises.

Public Debate and Recommendations (based on research results)

Presentation of the resources produced by students in a community setting and dissemination of evidence recommendations via social, community and conventional media.
Discussion and feedback.
Attribution of the prize of "best app".

Main partner responsible: UM

19. Project management resource and inquiry instruments on the topic of "Planet of the viruses"

Overview

Viruses are powerful yet microscopic creatures. They are associated with infectious factors that cause viral diseases in animals (including humans), plants, bacteria, and fungi. For this reason, they are referred to as "infectious agents of unimaginably small dimensions." From the point of view of ecosystems, they are essential elements of the environment that transfers DNA between organisms. From the point of view of evolution, they are a vital selection factor. From the perspective of the human economy, they primarily have a negative image - they cause economic losses in animal breeding or plant cultivation. By causing diseases in humans - especially those that occur on a large scale - they cause economic losses resulting from employees' absence in workplaces. It is estimated that during our lifetime, due to a seasonal cold - caused by rhinoviruses, each of us will spend a year in bed with a runny nose and cough).

Estimated duration

5-6 sessions of 40-45 minutes for supplementary learning activities and school project (lesson 6 – lesson 12)

School research project

Topics:
Main topic: Is every viral infection dangerous for us?
Specific research questions:
- Why did the number of infectious diseases caused by rotavirus or influenza virus decrease during the pandemic?
- Does the number of vaccination in the community correlates with number of cases for infectious diseases in your community?

Research management, design, and administration:

The task of the students is to perform social research that will answer the above problem questions.
The task of the students is to collect and analize data on this topic, the proposed forms are:
- interviews with doctors,
- survey in the school community and in students' families,
- interviews and analysis of statistical data (GUS statistics https://stat.gov.pl/wyszukiownica/?query=tag:choroby+zaka%C5%BAne; https://ourworldindata.org/), https://docs.google.com/document/d/1cd88Jaidtaizyr-uDowSyMWsf0nRCMysh1nEwHJGELI/edit,
- data from local epidemiological station (LES) about cases of viral diseases in the area.

Students are encouraged to make presentations and graphs comparing the number of cases of viral diseases, what percentage requires hospital treatment and what percentage is fatal - in the years before the pandemic (2017-2019) and in the pandemic (2020-2022).
The task of the students is also to prepare conclusions from the conducted analyzes and to present the school community with recommendations for preventive measures.

Data analysis and reporting:
Collect and analyse descriptive statistics data. Visual analysis of individualized graphs of the participants through data referring to level, trend, stability/variability. Descriptive statistical data for baseline and intervention, such as mean, median, range.
An important aspect is to define what has changed in the behaviour of the public before and during the pandemic. Students analyse and present data in Excel.

Development process:
The project is based on the use of surveys and data analysis to create scientific artefacts and build digital literacy (e.g., finding, reviewing, organising and sharing information effectively).
The two sessions will be supervised by the teachers and developed by the students, with scheduled moments for checking the work development.
Groups of students will be instructed to create a presentation that will summarize findings from the surveys.

During **session 1**, students are presented, not only, with software to use for survey creation but also acknowledged with rules for creating proper survey questions.

1. Each group should have, at least:
    a. Google account to create online google forms tool.
    b. Target group which will be approached during gaining data
2. Each group is required to:
    c. brainstorm a survey idea, develop a complete survey with questions
    d. meet regularly with the teacher to discuss the feasibility of the survey and if necessary make any changes to their plan.
    e. Present a short (5-10 minutes) elevator pitch of your project idea to the class.
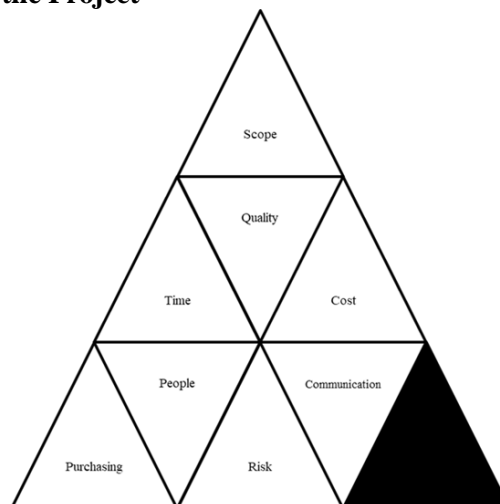3. Summarize the gained data, present the main conclusions for other groups.

Finishing session 1, the groups are created and ideas start being discussed.

During session 2, the teacher will pass by the groups to collect ideas and topics and, if valid, students can start working on their project. The teacher will provide all the needed help, even if that means that he is a contributor to the project.

From session 3-forward, the students will actively work on their project and are encouraged to exchange ideas with other groups.

Project Management Framework and Instruments

1. Plan: Determine How to Do the Project

2. Plan: Define Project Scope

- What are the outputs?
Open schooling Event
Infographics

-What are the requirements of project outputs?
A regular functioning computer (and android device) with an internet connection Google Forms and content creation tools (infographics, videos, images, podcasts, etc.) a a software for presentation development;

- Are there any constraints to producing the project outputs?
The limitation of time from students/teachers (even on Science Club, there are other projects being developed and not all schools have access to the club all the time)
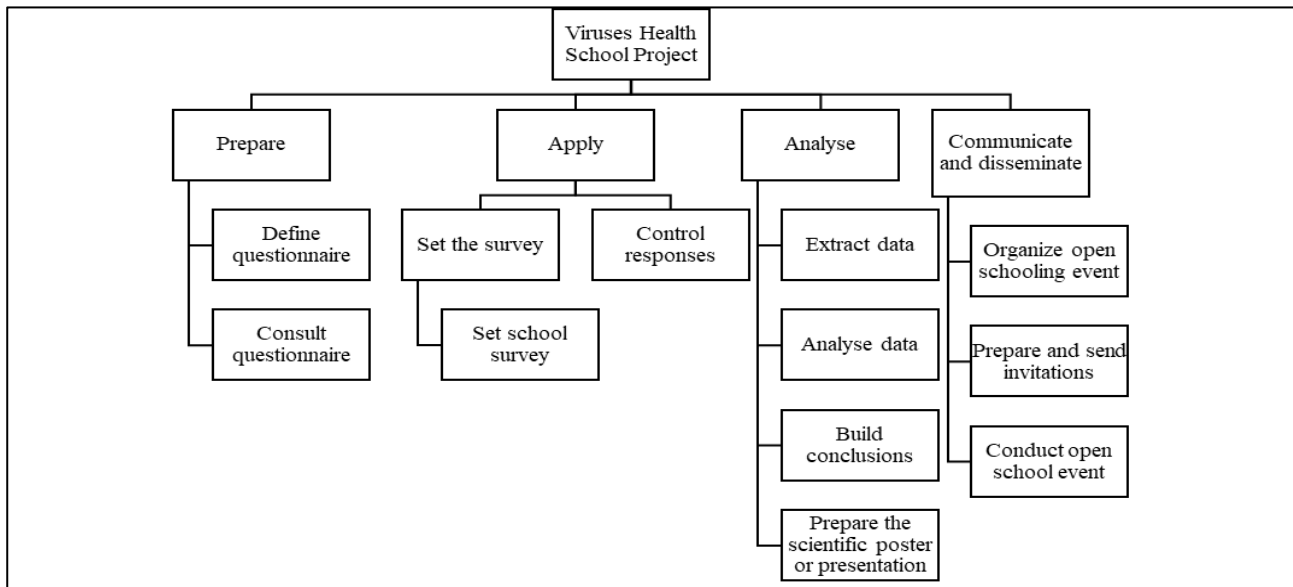Possible lack of interest on part of students
Possible lack of equipment/ internet connection

- Define the tasks to produce the outputs

Work Breakdown Structure
(filled with examples, these may change according to your project organisation)

3. Plan: Determine Project Time

a. Define the detailed activities for each WBS element
b. Put the activities in sequence
c. Estimate the resources (human and acquisitions) for each activity
d. Estimate the calendar time (days or weeks) for each activity
e. Create the Gantt Chart

Resource Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources
Prioritizing (set project goals; gather info)	30 minutes	Computer/tablet, paper
Researching (use information literacy skills; acquire scientific knowledge)	1 hour	Computer/tablet
Planning (creating relevant questions)	3 hours	Computer/tablet, paper
Conducting the survey	4 hours	Computer/tablet
Analyzing the data	5 hours	Computer/tablet
Communication and dissemination	2-4 hours	Computer/tablet, projector

Gantt Chart
(filled with examples, these may change according to your project organisation)

Activity	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
Prioritizing (set project goals; gather info)	■					
Researching (use information literacy skills; acquire scientific knowledge)	■	■				
Planning (creating relevant questions)		■	■			
Conducting the survey			■			
Analyzing the data				■	■	
Communication and dissemination						■

4. Plan: Determine Project Cost

    a.   Estimate how much each activity will cost

Note: include the cost for Labor, Supplies, overhead (like office space and equipment)

    b.   Add the estimates to determine the total cost of your project

Cost Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources	Human Resource Cost*	Other Resources Cost (supplies)
Prioritizing (set project goals; gather info)	30 minutes	Computer/tablet, paper	10€	n.a
Researching (use information literacy skills; acquire scientific knowledge)	1 hour	Computer/tablet	20-30€	n.a
Planning (creating relevant questions)	3 hours	Computer/tablet, paper	60€	n.a
Conducting the survey	4 hours	Computer/tablet, paper	20€	n.a
Analyzing the data	5 hours	Computer/tablet	150 €	n.a
Communication and dissemination	2-4 hours	Computer/tablet, projector	50-80€	n.a
Total	15h30-17h30 (some overlapping with each other)	-	310-350€	-

5. Plan: Determine Project Quality

    a.   Ensure your project produces quality outputs
    b.   Plan what quality means to your project
    c.   Determine how you will ensure quality
    d.   Ensure your project produces quality outputs
    e.   Plan what quality means to your project
    f.   Determine how you will ensure quality

Quality Breakdown Structure
(filled with examples, these may change according to your project organisation)

Requirement	Quality planning	Quality assurance	Quality control
1.1	Minimum number of created questions	Minimum number of created questions: 5	Monitor the development of students' plans on a daily
1.2	Approaches used	Ability to create simple but insightful questions	Monitor the development of students' plans on a daily basis
1.3	Assessment of different questions in one survey	Assessment rubric based on basic guidelines following: Introduction; development; conclusions.	Monitor the development of students' outputs on a daily basis

6. Plan: Determine Project Risks

    a.   Identify the two types of risks (uncertain future events that can affect your project): threats have a negative impact on your project; opportunities have a positive impact on your project

Risk Breakdown Structure
(filled with examples, these may change according to your project organisation)

Risk	**Probability** (How likely is it to happen)	**Impact** (How big of an effect will it have)	**Owner** (who takes care of the risk)	**Action Plan** (initiatives to reduce threats and increase opportunities)
Lack of technological equipment/ internet connection	Low	High	School Principal (Jadwiga) ICT teacher (Paweł)	-Prior preparation -Attribute only 1 computer/ android device per small group of students - Encourage students to use their own devices if possible
Lack of time to fully implement the project (due to teachers' teaching hours/ other running projects)	Medium	High	Science Club teacher (Zofia)	- Reorganization of the research project to better fit their needs - Skip small steps/details in the development process that don't majorly affect the project - Reduce the number of deliverables per group of students
Modest number of people that accepted invitation to attend the open schooling event	*Medium*	*Medium*	School Principal (Jadwiga) ICT and Science Club teacher (Paweł) Students: - Maria - Szymon - Miłosz - Stanisław	- Invitations to the broader local community - More persistent invitations to students' friends and families (Phonecalls, email,etc.)

7. Plan: Plan Procurement Processes

 a. Determine what goods and services you need
 b. Have what you need at the time that you need it

Acquisitions Breakdown Structure
(filled with examples, these may change according to your project organisation)

Supply	**Supply Cost** (supplies)	**When to be available**	**How to be available**
Paper	20 euros	During the whole project (Implemented scenarios till the end of the open schooling event)	Commitment of school top management
Printer	50 euros	During the whole project (Implemented scenarios till the end of the open schooling event)	Commitment of school top management
Computer	700 euros	During the whole project (Implemented scenarios till the end of the open schooling event)	Commitment of school top management/ students (if they choose to use their own)

8. Plan: Plan People

 a. Acquire the project team
 b. Map the project team in the Organization Breakdown Structure
 c. Assign the project team members to roles
 d. Assign the project team members to activities
 e. Train the project team
 f. Determine how you will motivate and reward the team
 g. Map Stakeholders – people or groups interested in the project
 h. Determine how you will engage stakeholders in the project

Responsibility assignment matrix
(filled with examples, these may change according to your project organisation)

Activity	Team members							
	Szymon (student)	**Miłosz** (student)	**Ania** (student)	**Olga** (student)	**Edyta** (student)	**Professor Pawel (ICT)**	**Professor Zofia (Science)**	**School Principal Jadwiga**
Set main project goals	X	X	X	X	X	C/P	C	
Research process	X	X	X	X	X/P	C	C/P	
Prepare/Create the Pitch		X		X	X/P	C/P	C	
Prepare/Create the outputs	X	X	X	X	X/P	P	P	
Coordinate the overall implementation of the project						X	X	I
Coordinate the school event						X	X	I
Attend the school event and present their work	X	X	X	X	X	C/P	C/P	
Reward attribution (to be attributed through voting)						P	P	

Letter	Role
X	Executes work
P	Controls progress
C	Should be consulted
I	Should be informed

Stakeholders Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Directly involved in the project (yes/no)	Served or Affected by the Project	Likely to be user of the results of the project
Families/Friends	yes	yes	yes
School community	yes	yes	yes
School management	no	yes	yes
Municipality	no	yes	yes
Teachers Education Center (ODN)	no	no	yes

Stakeholders Management Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Who they are and why should be involved in the project	Why the project is relevant for them	Strategies to obtain support
Families/Friends	Students' families and friends will be invited to attend the school event during which students will present their projects. They will make the evaluation of this type of initiative a lot easier and provide key research questions for future surveys. Their involvement also maximizes the impact of the project in terms of both digital and health literacy.	Due to their interest in the children's education and school well-being.	Attend the school project presentation in a school event and present it in parents' meeting
School community	The school community should be involved in the survey and observations to be done by students in school environment. They will provide relevant feedback. Their involvement also maximizes the impact of the project in terms of both digital and health literacy.	Due to their interest in students' education and school well-being, and the teachers' intention to professionally upgrade their careers/collect new and useful experiences for further students.	Attend the school project presentation in a school event and present the school project in a school community meeting/ schools' website/social networks

Stakeholder name	Who they are and why should be involved in the project	Why the project is relevant for them	Strategies to obtain support
School management	The school management assures relevant resources for students' projects and should be involved in the survey Their involvement also maximizes the impact of the project in terms of both digital and health literacy.	Due to their interest in contributing and integrating open schooling/ active citizenship/ modern ways of teaching and learning.	Attend the school project presentation in a school event and present it in parents' meeting.
Teachers Education Center (ODN)	ODN acts as a mediator, creating a bridge between the PAFSE project and education. It supports the project and is interested in learning outcomes.	Due to their interest in new educational methodologies and desire for enhancing the educational system.	Invitation to participate in the open schooling event. Sharing of a sample of the project material (along with a summary of the project) to the people of the Directorate, responsible for the communication and school initiatives.

9. Plan: Plan Communication

a. Assure the right information to the right people, at the right time, in a useful format
b. Assure effective project meetings
c. Build the communications plan

Communications plan
(filled with examples, these may change according to your project organisation)

Organized by (from)	Participants (to)	What	When	How/Where	Purpose
Professor Zofia	Team	Kick-off meeting	September; Before the project starts to summarize responsibilities	Virtual meeting/school meeting room	Provide a complete description of the project and what the end product will be.
Professors Paweł and Zofia	Parents	Meeting	Before the project starts (date to be defined)	Virtual meeting/school meeting room / ICT room	Explain the project, ask for support and cooperation when needed and invite for participation in the survey and open schooling event.
Professors Paweł and Zofia	Team	Team meeting	Weekly (e.g. Tuesday 5pm)	IT Virtual meeting/school meeting room / ICT room	- Overall plan for the project - Discuss project developments and plan next stage - Instruct team on how to carry out the following steps - Monitor the progress of the project and if there are any issues with completion
Professor Zofia	Team	Professors Meeting	Every two weeks	Virtual meeting/school meeting room / ICT room	-Monitor the general progress of the project -Discuss any difficulties found during the project depth and find ways to overcome them -Discuss alternative options for the enactment of the educational scenarios
Professors Paweł and Zofia	Parents	Invitation to parents' participation in open schooling event	At least 2 weeks before the open schooling event (date to be defined)	By email/ Parents meeting	Remind of the project goals and invite for participation in the open schooling event.

Organized by (from)	Participants (to)	What	When	How/Where	Purpose
Professors Zofia, Paweł and Principal Jadwiga	School community, Municipality, ODN	Invitations to stakeholders participation in open schooling event	At least 2 weeks before the open schooling event (date to be defined)	By email/ Virtual meeting	Explain the project and invite for participation in the open schooling event.

10. Plan: Finish the project planning by building the Charter

1.0 Project identification	
Name	Partnerships for Science Education – AMU
Summary description	The project will enable moments of creative freedom, where students apply the creating surveys and analzing data in a project linked with health topics. Students will participate in "hands-on" and "learn-by-doing" activities and carry out their own research project, fostering not only specific skills but also their soft skills, the so called "21st century skills".
Project owner	Zespół Szkół Urszulańskich
Project manager	Professor Zofia
Stakeholders	Families/Friends (Interest in their children's high-quality education) School Community (Interest in achievements of other members of the school community) Municipality (Interest in schoolwork in their area) ODN (Teachers Education Center)
Team and roles	Professor Jadwiga (Principal) Professor Paweł (ICT teacher) Szymon (Student) Paweł (Student) Olga (Student) Ania (Student) Edyta (Student)

2.0 Needs that support the project
- These types of projects are not normally developed to such an extent. Students are rarely asked to directly apply their knowledge and share it with the community are be active and contributor citizens. It is extremely important that they learn how to present important issues to the community, how to communicate science, how to "make the other understand the importance of a certain issue". Communication skills are underrated.   - The current state of education lacks active learning methodologies and student autonomy.   - Promote technological and health awareness. These concepts are key to every other existing sector and are something worth focusing on.   - Boost STEM curriculum. Increasingly, students are shifting away from science education. Thus, it is imperative to show them how useful and (even) fun and interesting it can be.

3.0 Project goals
Teachers' professional workshop on the project completed – October 12   S: Reach the majority of the expected stakeholders   M: Regular meetings to track progress; Organizational chart   A: Develop the project in small, controlled steps   R: Be aware of limitations/obstacles and tackle them with feasible solutions   T: Project completed – March 20; Open schooling event – April 25

4.0 Project scope
The scope of the project is to engage students in "hands-on" and "learn-by-doing" activities, fomenting skills they usually don't in traditional teaching, as well as rise their motivation towards STEM, in particular technology.

5.0 Key Deliverables
Survey   Data analysis   Multimodal content (infographic; video; podcast; etc.)   Pitch presentation

6.0 Milestones and dates
Survey (date to be defined)   Data analysis (date to be defined)   Pitch presentation (date to be defined)   Open schooling event prepared (date to be defined)   Open schooling event done (date to be defined)

7.0 Constraints
Possible lack of equipment   Possible time constraints due to teachers'/ students' schedule   Participation of at least 10 students in the project (limit)   Participation of at least 50 people in the open schooling event (limit)   Project should be finished on 25 April (limit)

8.0 Risks and opportunities
Risks: Possible lack of equipment   Possible time constraint due to teachers'/ students' schedule   Modest number of people that accepted invitation to attend the open schooling event   Opportunities: Students interest in technologies   Innovative and interesting methodologies (gamification; storytelling)   Teachers' motivation on the project so that ICT has proven recognition

9.0 Project success criteria
Project is completed before the third period.   High-quality project outputs according to the guidelines   High students' interest and participation in the project and the open schooling event   Open schooling event with the participation of the entire school community, parents, and local stakeholders.

10.0 Project success factors
Appropriate engagement of students and parents.   Appropriate time management/methodologies during the lessons   Interest of teachers in the school project main pillars – open schooling; communicating science   Adequate attendance of stakeholders in the open schooling event   Adequate use of the outputs

Target audience for recommendations:
Students, parents, caregivers, teachers, local agency.

Public debates and recommendations:
Publication of research findings at a school event or a local community festival.

Teacher guidance notes

Designs and develops interventions for information access and searches supportive networks.
Handles social disparities carefully to avoid stereotypes or stigmatization of students.
Focus on understanding of inquiry experience through their role as researchers.

Teacher professional development actions

- Inquiry-based teaching and learning in accordance with the learning objective areas involved (content knowledge, inquiry skills, nature of science).
- Issues concerning the use of models in science and STEM education.
- STEM literacy aspects being promoted through the educational scenario (use of scientific models, authentic problem solving, inquiry-based teaching and learning, attitudes towards science, science within the societal contexts) and the issues of scientific and health numeracy.
- Project-based teaching and learning and principles and techniques of collaborative learning.
- Argumentation – structure and use of it in debates and discussions.
- The utilisation of Digital Learning Objects in the learning process.

- Main ideas of introducing scenario into the school – presenting to the teachers' possibility of doing only the chosen activities from the scenario which answer to the needs of their group.

Assessment activities

Initial assessment of prior knowledge and attitudes of students (baseline phase).
Continuous assessment of learning outcomes by applying multiple measurements in each phase of the process.

Main partner responsible: AMU

20. Project management resource and inquiry instruments on the topic of "Different faces of bacteria."

Overview

Bacteria are a group of unicellular, prokaryotic organisms that make up their kingdom. They are the first organisms that appeared on Earth about 3.5 billion years ago. Before eukaryotic cells evolved, bacteria flourished without competition. They are ubiquitous, and apart from places that are sterile by nature (e.g., inside of our organs), bacteria can be found in all biotopes. They are also found in radioactive areas and even in space - where they probably got along with spacecraft. There are roughly five quintillions (5×10^{30}) bacteria on Earth, making up a large proportion of the planet's biomass. So far, their biodiversity has not been fully known.

Among the bacteria, we have commensal, mutualistic, predatory, and parasitic organisms. They have unique abilities to survive unfavorable environmental conditions, and their adaptability is almost exemplary. Such a wide range of ecological influences and evolutionary abilities mean that from the anthropocentric perspective, they can be perceived both as friends and enemies, causing several dangerous bacterial diseases, influencing the world's fate, and making our life possible. Their role is difficult to overestimate; they contribute to the circulation of elements in nature. They take part in all biogeochemical cycles and the processes of fermentation and rotting. As symbiotic organisms, they enable the digestion of food or facilitate its digestion and subsequent excretion; they produce vitamins and affect the general well-being. More and more studies indicate the role of the microbiome in the functioning of organisms in human functioning and the relationship of diseases such as Parkinson's and Alzheimer's syndrome or depression with the microbiota.

Estimated duration

3-4 sessions of 40-45 minutes for supplementary learning activities and school project (lesson 6 – lesson 12)

School research project - useful bacteria and fermentation

Topics:
Main topic:
Specific research questions:
- How are bacteria adapted to different environments?
- What conditions must exist for lactate fermentation to occur?
- What are the best conditions for yogurt production at home?

Research management, design, and administration:

Pickling cucumbers/yogurt production
Recipe for pickling cucumbers, for making yogurt:
 http://pracowniaaserow.pl/domowy-jogurt-naturalny/

Students can pickle pickles or make yogurt. Their task is to find the ideal conditions for this process (including temperature, amount of salt, sugar or any spices, etc.). Various unexpected effects may appear during the fermentation process, e.g., yogurt may turn bitter, which will indicate the presence of other bacteria - mainly anaerobic. Making microscopic slides from bacterial cultures' prepared cultures and comparing them is recommended.
 After a week:
The smear is prepared on a degreased, cooled down glass slide by applying and spreading drops of the microorganism suspension (e.g., drops of water from cucumbers)
Then fix the specimen by pulling the slide 3x over the burner (thermal fixation method).
Dye the preparation with methylene blue.

Data analysis and reporting:

Collect and analyse descriptive statistics data. Visual analysis of individualized graphs of the participants through data referring to level, trend, stability/variability. Descriptive statistical data for baseline and intervention, such as mean, median, range.

Development process:

The project is based on the use of the surveys and data analysis to create scientific artefacts and build digital literacy (e.g., finding, reviewing, organising and sharing information effectively).

The two sessions will be supervised by the teachers and developed by the students, with scheduled moments for checking the work development.

Groups of students will be instructed to create a presentation which will summarize findings from the surveys.

During **session 1**, students are presented, not only, with software to use for survey creation but also acknowledged with rules for creating proper survey questions.

1. Each group should have, at least:
    a. Access to laboratory equipment
    b. Defined variables which will be changed during experiment
2. Each group is required to:
    c. brainstorm a survey idea, develop a complete survey with questions
    d. meet regularly with the teacher to discuss the feasibility of their experiment plan and if necessary make any changes to their plan.
    e. Present a short (5-10 minutes) elevator pitch of your project idea to the class.
3. Summarize the gained data, present the main conclusions for other groups.
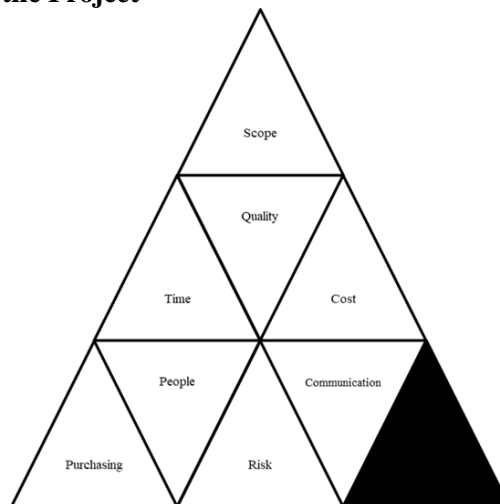
Finishing session 1, the groups are created and ideas start being discussed.

During session 2, the teacher will pass by the groups to collect ideas and topics and, if valid, students can start working on their project. The teacher will provide all the needed help, even if that means that he is a contributor to the project.

From session 3-forward, the students will actively work on their project and are encouraged to exchange ideas with other groups.

Project Management Framework and Instruments

1. Plan: Determine How to Do the Project

2. Plan: Define Project Scope

- What are the outputs?
Open schooling Event
Infographics

-What are the requirements of project outputs?
A regular functioning computer (and android device) with an internet connection Google Forms and content creation tools (infographics, videos, images, podcasts, etc.) and software for presentation development.

- Are there any constraints to producing the project outputs?
The limitation of time from students/teachers (even on Science Club, there are other projects being developed and not all schools have access to the club all the time).
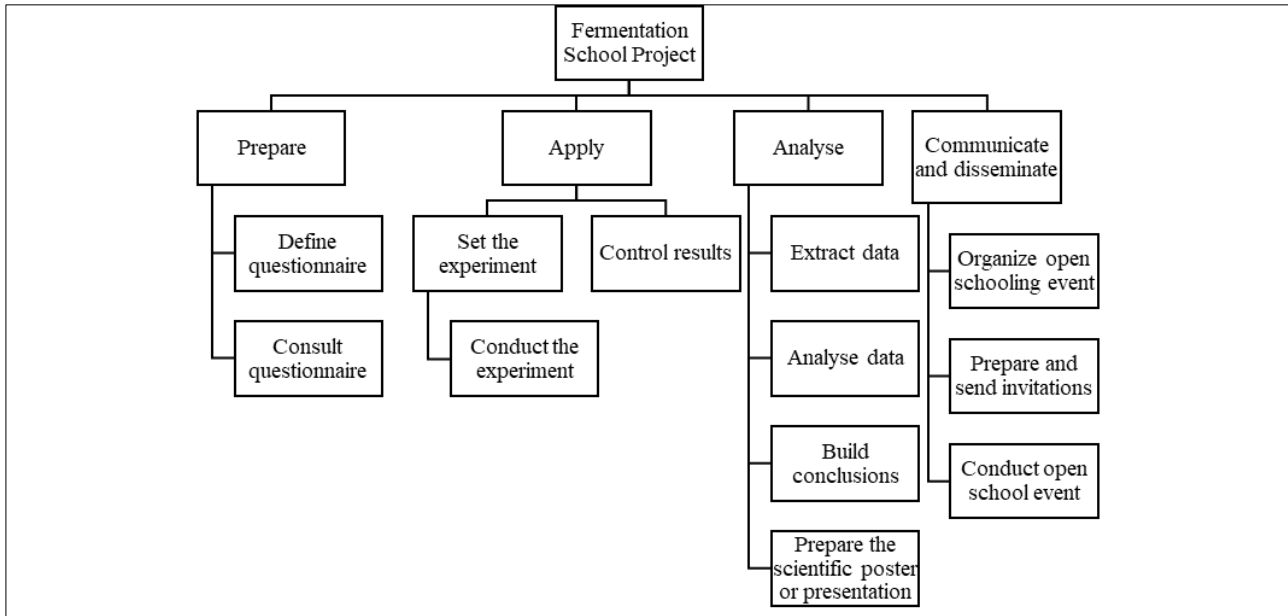Possible lack of interest on part of students.
Possible lack of equipment/ internet connection.

- Define the tasks to produce the outputs

Work Breakdown Structure
(filled with examples, these may change according to your project organisation)

3. Plan: Determine Project Time

a. Define the detailed activities for each WBS element
b. Put the activities in sequence
c. Estimate the resources (human and acquisitions) for each activity
d. Estimate the calendar time (days or weeks) for each activity
e. Create the Gantt Chart

Resource Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources
Prioritizing (set project goals; gather info)	30 minutes	Computer/tablet, paper
Researching (use information literacy skills; acquire scientific knowledge)	1 hour	Computer/tablet
Planning (creating relevant questions)	3 hours	Computer/tablet, paper
Conducting the experiment	4 hours	Computer/tablet
Analyzing the data	5 hours	Computer/tablet
Communication and dissemination	2-4 hours	Computer/tablet, projector

Gantt Chart
(filled with examples, these may change according to your project organisation)

Activity	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
Prioritizing (set project goals; gather info)	■					
Researching (use information literacy skills; acquire scientific knowledge)	■	■				

Planning (creating relevant questions, getting equipment)		■	■					
Conducting the experiment			■					
Analyzing the data				■				
Communication and dissemination					■	■		

4. Plan: Determine Project Cost

    a. Estimate how much each activity will cost

Note: include the cost for Labor, Supplies, overhead (like office space and equipment)

    b. Add the estimates to determine the total cost of your project

Cost Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources	Human Resource Cost*	Other Resources Cost (supplies)
Prioritizing (set project goals; gather info)	30 minutes	Computer/tablet, paper	10€	n.a
Researching (use information literacy skills; acquire scientific knowledge)	1 hour	Computer/tablet	20-30€	n.a
Planning (creating relevant questions)	3 hours	Computer/tablet, paper	60€	n.a
Conducting the experiment	4 hours	Computer/tablet, paper	20€	n.a
Analyzing the data	5 hours	Computer/tablet	150 €	n.a
Communication and dissemination	2-4 hours	Computer/tablet, projector	50-80€	n.a
Total	15h30-17h30 (some overlapping with each other)	-	310-350€	-

5. Plan: Determine Project Quality

    a. Ensure your project produces quality outputs
    b. Plan what quality means to your project
    c. Determine how you will ensure quality
    d. Ensure your project produces quality outputs
    e. Plan what quality means to your project
    f. Determine how you will ensure quality

Quality Breakdown Structure
(filled with examples, these may change according to your project organisation)

Requirement	Quality planning	Quality assurance	Quality control
1.1	Minimum number of conducted experiments - 3	Minimum number of created repetitions - 5	Monitor the development of students' plans on a daily
1.2	Approaches used	Ability to create simple but insightful questions	Monitor the development of students' plans on a daily basis
1.3	Assessment of different variables in the experiment	Assessment rubric based on basic guidelines following: Introduction; development; conclusions.	Monitor the development of students' outputs on a daily basis

6. Plan: Determine Project Risks

a. Identify the two types of risks (uncertain future events that can affect your project): threats have a negative impact on your project; opportunities have a positive impact on your project

Risk Breakdown Structure
(filled with examples, these may change according to your project organisation)

Risk	Probability (How likely is it to happen)	Impact (How big of an effect will it have)	Owner (who takes care of the risk)	Action Plan (initiatives to reduce threats and increase opportunities)
Lack of technological equipment/ internet connection	Low	High	School Principal (Anna) ICT teacher (Piotr)	-Prior preparation -Attribute only 1 computer/ android device per small group of students - Encourage students to use their own devices if possible
Lack of time to fully implement the project (due to teachers' teaching hours/ other running projects)	Medium	High	Science Club teacher (Piotr)	- Reorganization of the research project to better fit their needs - Skip small steps/details in the development process that don't majorly affect the project - Reduce the number of deliverables per group of students
Modest number of people that accepted invitation to attend the open schooling event	Medium	Medium	School Principal (Anna) ICT and Science Club teacher (Piotr) Students: - Sebastian - Agata - Michal - Ola	- Invitations to the broader local community - More persistent invitations to students' friends and families (Phonecalls, email,etc.)

7. Plan: Plan Procurement Processes

a. Determine what goods and services you need
b. Have what you need at the time that you need it

Acquisitions Breakdown Structure
(filled with examples, these may change according to your project organisation)

Supply	Supply Cost (supplies)	When to be available	How to be available
Paper	20 euros	During the whole project (Implemented scenarios till the end of the open schooling event)	Commitment of school top management
Printer	50 euros	During the whole project (Implemented scenarios till the end of the open schooling event)	Commitment of school top management
Microscope	200 euros	During the whole project (Implemented scenarios till the end of the open schooling event)	Commitment of school top management
Computer	700 euros	During the whole project (Implemented scenarios till the end of the open schooling event)	Commitment of school top management/ students (if they choose to use their own)

8. Plan: Plan People

a.   Acquire the project team
b.   Map the project team in the Organization Breakdown Structure
c.   Assign the project team members to roles
d.   Assign the project team members to activities
e.   Train the project team
f.   Determine how you will motivate and reward the team
g.   Map Stakeholders – people or groups interested in the project
h.   Determine how you will engage stakeholders in the project

Responsibility assignment matrix
(filled with examples, these may change according to your project organisation)

Activity	Team members							
	Sebastian (student)	**Michal** (student)	**Agata** (student)	**Ola** (student)	**Ewa** (student)	**Professor Paweł (ICT)**	**Professor Piotr (Science)**	**School Principal Anna**
Set main project goals	X	X	X	X	X	C/P	C	
Research process	X	X	X		X/P	C	C/P	
Prepare/Create the Pitch				X	X/P	C/P	C	
Prepare/Create the outputs	X	X	X	X	X/P	P	P	
Coordinate the overall implementation of the project						X	X	I
Coordinate the school event					X	X	X	I
Attend the school event and present their work	X	X	X	X	X	C/P	C/P	
Reward attribution (to be attributed through voting)						P	P	

Letter	Role
X	Executes work
P	Controls progress
C	Should be consulted
I	Should be informed

Stakeholders Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Directly involved in the project (yes/no)	Served or Affected by the Project	Likely to be user of the results of the project
Families/Friends	yes	yes	yes
School community	yes	yes	yes
School management	no	yes	yes
Municipality	no	yes	yes
Teachers Education Center (ODN)	no	no	yes

Stakeholders Management Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Who they are and why should be involved in the project	Why the project is relevant for them	Strategies to obtain support
Families/Friends	Students' families and friends will be invited to attend the school event during which students will present their projects. They will make the evaluation of this type of initiative a lot easier and provide key research questions for future surveys. Their involvement also maximizes the impact of the project in terms of both digital and health literacy.	Due to their interest in the children's education and school well-being.	Attend the school project presentation in a school event and present it in parents' meeting
School community	The school community should be involved in the survey and observations to be done by students in school environment. They will provide relevant feedback. Their involvement also maximizes the impact of the project in terms of both digital and health literacy.	Due to their interest in students' education and school well-being, and the teachers' intention to professionally upgrade their careers/collect new and useful experiences for further students.	Attend the school project presentation in a school event and present the school project in a school community meeting/ schools' website/social networks
School management	The school management assures relevant resources for students' projects and should be involved in the survey Their involvement also maximizes the impact of the project in terms of both digital and health literacy.	Due to their interest in contributing and integrating open schooling/ active citizenship/ modern ways of teaching and learning.	Attend the school project presentation in a school event and present it in parents' meeting.
Teachers Education Center (ODN)	ODN acts as a mediator, creating a bridge between the PAFSE project and education. It supports the project and is interested in learning outcomes.	Due to their interest in new educational methodologies and desire for enhancing the educational system.	Invitation to participate in the open schooling event. Sharing of a sample of the project material (along with a summary of the project) to the people of the Directorate, responsible for the communication and school initiatives.

9. Plan: Plan Communication

    a. Assure the right information to the right people, at the right time, in a useful format
    b. Assure effective project meetings
    c. Build the communications plan

Communications plan
(filled with examples, these may change according to your project organisation)

Organized by (from)	Participants (to)	What	When	How/Where	Purpose
Professor Piotr	Team	Kick-off meeting	September; Before the project starts to summarize responsibilities	Virtual meeting/school meeting room	Provide a complete description of the project and what the end product will be.
Professors Paweł and Piotr	Parents	Meeting	Before the project starts (date to be defined)	Virtual meeting/school meeting room / ICT room	Explain the project, ask for support and cooperation when needed and invite for participation in the survey and open schooling event.

Organized by (from)	Participants (to)	What	When	How/Where	Purpose
Professors Paweł and Piotr	Team	Team meeting	Weekly (e.g. Friday 3pm)	IT Virtual meeting/school meeting room / ICT room	- Overall plan for the project - Discuss project developments and plan next stage - Instruct team on how to carry out the following steps - Monitor the progress of the project and if there are any issues with completion
Professor Piotr	Team	Professors Meeting	Every two weeks	Virtual meeting/school meeting room / ICT room	-Monitor the general progress of the project -Discuss any difficulties found during the project depth and find ways to overcome them -Discuss alternative options for the enactment of the educational scenarios
Professors Paweł and Piotr	Parents	Invitation to parents' participation in open schooling event	At least 2 weeks before the open schooling event (date to be defined)	By email/ Parents meeting	Remind of the project goals and invite for participation in the open schooling event.
Professors Piotr, Paweł and Principal Anna	School community, ODN	Invitations to stakeholders participation in open schooling event	At least 2 weeks before the open schooling event (date to be defined)	By email/ Virtual meeting	Explain the project and invite for participation in the open schooling event.

10. Plan: Finish the project planning by building the Charter

1.0 Project identification	
Name	Partnerships for Science Education – AMU
Summary description	The project will enable moments of creative freedom, where students apply the creating experiment and analyzing data in a project linked with health topics. Students will participate in "hands-on" and "learn-by-doing" activities and carry out their own research project, fostering not only specific skills but also their soft skills, the so called "21st century skills".
Project owner	Liceum Ogólnoksztacáce im. Marii Magdaleny
Project manager	Professor Piotr
Stakeholders	Families/Friends (Interest in their children's high-quality education) School Community (Interest in achievements of other members of the school community) Municipality (Interest in schoolwork in their area) ODN (Teachers Education Center)
Team and roles	Professor Anna (Principal) Professor Piotr (ICT teacher) Sebastian (Student) Michał (Student) Ola (Student) Agata (Student) Ewa (Student)

2.0 Needs that support the project

- These types of projects are not normally developed to such an extent. Students are rarely asked to directly apply their knowledge and share it with the community or are active and contributor citizens. It is extremely important that they learn how to present important issues to the community, how to communicate science, how to "make the other understand the importance of a certain issue". Communication skills are underrated.
- The current state of education lacks active learning methodologies and student autonomy.
- Promote technological and health awareness. These concepts are key to every other existing sector and are something worth focusing on.
- Boost STEM curriculum. Increasingly, students are shifting away from science education. Thus, it is imperative to show them how useful and (even) fun and interesting it can be.

3.0 Project goals

Teachers' professional workshop on the project completed – October 12
S: Reach the majority of the expected stakeholders
M: Regular meetings to track progress; Organizational chart
A: Develop the project in small, controlled steps
R: Be aware of limitations/obstacles and tackle them with feasible solutions
T: Project completed – March 10; Open schooling event – April 25

4.0 Project scope

The scope of the project is to engage students in "hands-on" and "learn-by-doing" activities, fomenting skills they usually don't in traditional teaching, as well as rise their motivation towards STEM, in particular technology.

5.0 Key Deliverables

Plan of the experiment
Data analysis
Multimodal content (infographic; video; podcast; etc.)
Pitch presentation

6.0 Milestones and dates

Conducting of the experiment (date to be defined)
Data analysis (date to be defined)
Pitch presentation (date to be defined)
Open schooling event prepared (date to be defined)
Open schooling event done (date to be defined)

7.0 Constraints

Possible lack of equipment
Possible time constraint due to teachers'/ students' schedule
Participation of at least 10 students in the project (limit)
Participation of at least 50 people in the open schooling event (limit)
Project should be finished on 25 April (limit)

8.0 Risks and opportunities

Risks:
Possible lack of equipment
Possible time constraints due to teachers'/ students' schedule
Modest number of people that accepted invitation to attend the open schooling event
Opportunities:
Students interest in technologies
Innovative and interesting methodologies (gamification; storytelling)
Teachers' motivation on the project so that ICT has proven recognition

9.0 Project success criteria

Project completed before the third period.
High-quality project outputs according to the guidelines
High students' interest and participation in the project and the open schooling event
Open schooling event with the participation of the entire school community, parents, and local stakeholders.

10.0 Project success factors

Appropriate engagement of students and parents.
Appropriate time management/methodologies during the lessons
Interest of teachers in the school project main pillars – open schooling; communicating science
Adequate attendance of stakeholders in the open schooling event
Adequate use of the outputs

Target audience for recommendations:
Students, parents, caregivers, teachers, local agencies.

Public debates and recommendations:
Publication of research findings at a school event or a local community festival.

Teacher guidance notes
Designs and develops interventions for information access and searches supportive networks.
Focus on understanding of inquiry experience through their role as researchers.

Teacher professional development actions

- motivates students to engage with STEM
- practical knowhow in STEM/science/health science content applying evidence-based practices (structured inquiry, task analysis, prompting, time delay)
- training in project and infographic implementation
- Inquiry-based teaching and learning in accordance with the learning objective areas involved (content knowledge, inquiry skills, nature of science).
- Issues concerning the use of models in science and STEM education.
- STEM literacy aspects being promoted through the educational scenario (use of scientific models, authentic problem solving, inquiry-based teaching and learning, attitudes towards science, science within the societal contexts) and the issues of scientific and health numeracy.
- Project-based teaching and learning and principles and techniques of collaborative learning.
- Argumentation – structure and use of it in debates and discussions.
- The utilisation of Digital Learning Objects in the learning process.

Assessment activities

Initial assessment of prior knowledge and attitudes of students (baseline phase).
Continuous assessment of learning outcomes by applying multiple measurements in each phase of the process.
Total assessment.

Main partner responsible: AMU

Overview

Fight between viruses and bacteria is one of the oldest known to science. Two different kinds of microbes fighting for the domination. Beside of them, valuable player also are fungi which can produce antibiotics which kills bacteria. Nevertheless, bacteria has ability to manage the antibiotics by for example pumping them out or more interestingly to build antibiotic resistance towards them.

Discovery of the antibiotics revolutionized medicine and significantly decreased deaths from inflammation after operations or accidents. Needless to say, through decades of wide antibiotic use, now as a society we struggle with antibiotic resistant bacteria, as we underestimated their abilities and we took the antibiotics for granted.

Estimated duration

4-5 sessions of 40-45 minutes for supplementary learning activities and school project (lesson 6 – lesson 12)

Topics:

Main topic:

Specific research questions:

- How antibiotic resistant bacteria can have a significant influence on treatment of bacterial diseases?

Research management, design, and administration:

Students design the survey among their school community about antbiotics. Questions which might be involved in the survey are:

- How often do you take the antibiotics?
- What do you treat by taking antibiotics?
- Are you taking antibiotics without physician visit and prescription?
- How long do you take antibiotics course?
- Have you ever taken antibiotics shorter/longer then physician prescribed?

Gained data students can compare with data from pharmaceutical companies and investigate is there a correlation between numbers of purchasing of the antibiotics and occurrences of antibiotic resistant bacteria. Conclusions should be presented at open school event with recommendations for the school community how to avoid creating more antibiotic resistant bacteria.

Data analysis and reporting:

Collect and analyse descriptive statistics data. Visual analysis of individualized graphs of the participants through data referring to level, trend, stability/variability. Descriptive statistical data for baseline and intervention, such as mean, median, range.

Development process:

The project is based on the use of the surveys and data analysis to create scientific artefacts and build digital literacy (e.g., finding, reviewing, organising and sharing information effectively)

The two sessions will be supervised by the teachers and developed by the students, with scheduled moments for checking the work development.

Groups of students will be instructed to create a presentation which will summarize findings from the surveys.

During **session 1**, students are presented, not only, with software to use for survey creation but also acknowledged with rules for creating proper survey questions.

1. Each group should have, at least:

   a. Computer and internet connection
   b. Target group which will be approached during gaining data

2. Each group is required to:

   a. brainstorm a survey idea, develop a complete survey with questions

b. meet regularly with the teacher to discuss the feasibility of the survey and if necessary make any changes to their plan.

c. Present a short (5-10 minutes) elevator pitch of your project idea to the class.

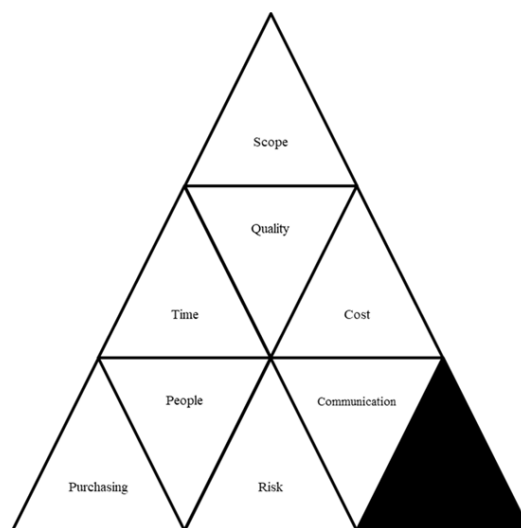d. Summarize the gained data, present the main conclusions for other groups.

Finishing session 1, the groups are created and ideas start being discussed.

During session 2, the teacher will pass by the groups to collect ideas and topics and, if valid, students can start working on their project. The teacher will provide all the needed help, even if that means that he is a contributor to the project.

From session 3-forward, the students will actively work on their project and are encouraged to exchange ideas with other groups

Project Management Framework and Instruments

1. Plan: Determine How to Do the Project
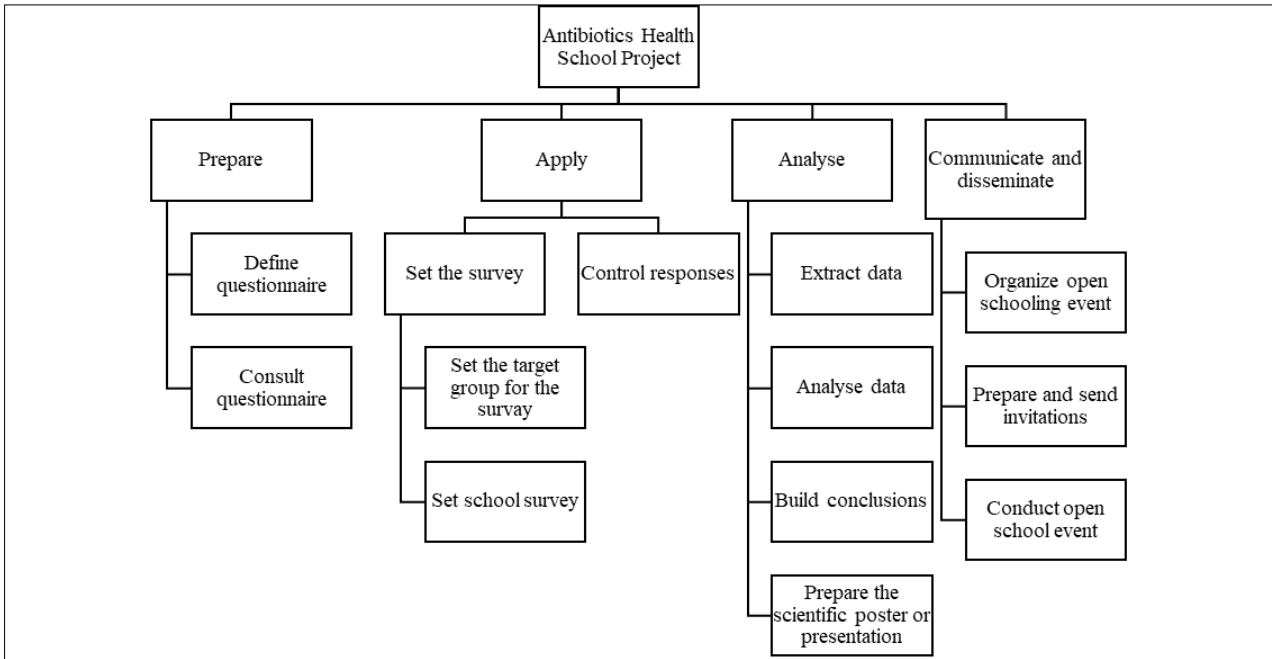

2. Plan: Define Project Scope

- What are the outputs?
Open schooling Event
Infographics

-What are the requirements of project outputs?
A regular functioning computer (and android device) with an internet connection Google Forms and content creation tools (infographics, videos, images, podcasts, etc.) a a software for presentation development;

- Are there any constraints to producing the project outputs?
The limitation of time from students/teachers (even on Science Club, there are other projects being developed and not all schools have access to the club all the time)
Possible lack of interest on part of students
Possible lack of equipment/ internet connection

- Define the tasks to produce the outputs

Work Breakdown Structure
(filled with examples, these may change according to your project organisation)

3. Plan: Determine Project Time

   a. Define the detailed activities for each WBS element
   b. Put the activities in sequence
   c. Estimate the resources (human and acquisitions) for each activity
   d. Estimate the calendar time (days or weeks) for each activity
   e. Create the Gantt Chart

Resource Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources
Prioritizing (set project goals; gather info)	30 minutes	Computer/tablet, paper
Researching (use information literacy skills; acquire scientific knowledge)	1 hour	Computer/tablet
Planning (creating relevant questions)	3 hours	Computer/tablet, paper
Conducting the survey	4 hours	Computer/tablet
Analyzing the data	5 hours	Computer/tablet
Communication and dissemination	2-4 hours	Computer/tablet, projector

Gantt Chart
(filled with examples, these may change according to your project organisation)

Activity	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
Prioritizing (set project goals; gather info)	■					
Researching (use information literacy skills; acquire scientific knowledge)	■	■				
Planning (creating relevant questions)		■	■			
Conducting the survey			■			
Analyzing the data				■	■	
Communication and dissemination						■

4. Plan: Determine Project Cost

   a. Estimate how much each activity will cost
Note: include the cost for Labor, Supplies, overhead (like office space and equipment)

b. Add the estimates to determine the total cost of your project

Cost Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources	Human Resource Cost*	Other Resources Cost (supplies)
Prioritizing (set project goals; gather info)	30 minutes	Computer/tablet, paper	10€	n.a
Researching (use information literacy skills; acquire scientific knowledge)	1 hour	Computer/tablet	20-30€	n.a
Planning (creating relevant questions)	3 hours	Computer/tablet, paper	60€	n.a
Conducting the survey	4 hours	Computer/tablet, paper	20€	n.a
Analyzing the data	2 hours	Computer/tablet	150 €	n.a
Communication and dissemination	2 hours	Computer/tablet, projector	50-80€	n.a
Total	12h30 (some overlapping with each other)	-	310-350€	-

5. Plan: Determine Project Quality

a. Ensure your project produces quality outputs
b. Plan what quality means to your project
c. Determine how you will ensure quality
d. Ensure your project produces quality outputs
e. Plan what quality means to your project
f. Determine how you will ensure quality

Quality Breakdown Structure
(filled with examples, these may change according to your project organisation)

Requirement	Quality planning	Quality assurance	Quality control
1.1	Minimum number of created questions	Minimum number of created questions: 5	Monitor the development of students' plans on a daily
1.2	Approaches used	Ability to create simple but insightful questions	Monitor the development of students' plans on a daily basis
1.3	Assessment of different variables in the experiment	Assessment rubric based on basic guidelines following: Introduction; development; conclusions.	Monitor the development of students' outputs on a daily basis

6. Plan: Determine Project Risks

a. Identify the two types of risks (uncertain future events that can affect your project): threats have a negative impact on your project; opportunities have a positive impact on your project

Risk Breakdown Structure
(filled with examples, these may change according to your project organisation)

Risk	Probability (How likely is it to happen)	Impact (How big of an effect will it have)	Owner (who takes care of the risk)	Action Plan (initiatives to reduce threats and increase opportunities)
Lack of technological equipment/ internet connection	Low	High	School Principal (Jadwiga) ICT teacher (Paweł)	-Prior preparation -Attribute only 1 computer/ android device per small group of students - Encourage students to use their own devices if possible

Risk	Probability (How likely is it to happen)	Impact (How big of an effect will it have)	Owner (who takes care of the risk)	Action Plan (initiatives to reduce threats and increase opportunities)
Lack of time to fully implement the project (due to teachers' teaching hours/ other running projects)	Medium	High	Science Club teacher (Zofia)	- Reorganization of the research project to better fit their needs - Skip small steps/details in the development process that don't majorly affect the project - Reduce the number of deliverables per group of students
Modest number of people that accepted invitation to attend the open schooling event	Medium	Medium	School Principal (Jadwiga) ICT and Science Club teacher (Paweł) Students: - Maria - Szymon - Miłosz - Stanisław	- Invitations to the broader local community - More persistent invitations to students' friends and families (Phonecalls, email,etc.)

7. Plan: Plan Procurement Processes

    a.   Determine what goods and services you need
    b.   Have what you need at the time that you need it

Acquisitions Breakdown Structure
(filled with examples, these may change according to your project organisation)

Supply	Supply Cost (supplies)	When to be available	How to be available
Paper	20 euros	During the whole project (Implemented scenarios till the end of the open schooling event)	Commitment of school top management
Printer	50 euros	During the whole project (Implemented scenarios till the end of the open schooling event)	Commitment of school top management
Computer	700 euros	During the whole project (Implemented scenarios till the end of the open schooling event)	Commitment of school top management/ students (if they choose to use their own)

8. Plan: Plan People

    a.   Acquire the project team
    b.   Map the project team in the Organization Breakdown Structure
    c.   Assign the project team members to roles
    d.   Assign the project team members to activities
    e.   Train the project team
    f.   Determine how you will motivate and reward the team
    g.   Map Stakeholders – people or groups interested in the project
    h.   Determine how you will engage stakeholders in the project

Responsibility assignment matrix
(filled with examples, these may change according to your project organisation)

Activity	Team members							
	Szymon (student)	Miłosz (student)	Ania (student)	Olga (student)	Edyta (student)	Professor Paweł (ICT)	Professor Zofia (Science)	School Principal Jadwiga
Set main project goals	X	X	X	X	X	C/P	C	
Research process	X	X	X		X/P	C	C/P	
Prepare/Create the Pitch		X		X	X/P	C/P	C	

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Activity	Team members							
	Szymon (student)	**Miłosz** (student)	**Ania** (student)	**Olga** (student)	**Edyta** (student)	**Professor Paweł (ICT)**	**Professor Zofia (Science)**	**School Principal Jadwiga**
Prepare/Create the outputs	X	X	X	X	X/P	P	P	
Coordinate the overall implementation of the project						X	X	I
Coordinate the school event					X	X	X	I
Attend the school event and present their work	X	X	X	X	X	C/P	C/P	
Reward attribution (to be attributed through voting)						P	P	

Letter	Role
X	Executes work
P	Controls progress
C	Should be consulted
I	Should be informed

Stakeholders Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Directly involved in the project (yes/no)	Served or Affected by the Project	Likely to be user of the results of the project
Families/Friends	yes	yes	yes
School community	yes	yes	yes
School management	no	yes	yes
Municipality	no	yes	yes
Local Epidemiological Station (LES)	no	no	yes

Stakeholders Management Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Who they are and why should be involved in the project	Why the project is relevant for them	Strategies to obtain support
Families/Friends	Students' families and friends will be invited to attend the school event during which students will present their projects. They will make the evaluation of this type of initiative a lot easier and provide key research questions for future surveys. Their involvement also maximizes the impact of the project in terms of both digital and health literacy.	Due to their interest in the children's education and school well-being.	Attend the school project presentation in a school event and present it in parents' meeting
School community	The school community should be involved in the survey and observations to be done by students in school environment. They will provide relevant feedback. Their involvement also maximizes the impact of the project in terms of both digital and health literacy.	Due to their interest in students' education and school well-being, and the teachers' intention to professionally upgrade their careers/collect new and useful experiences for further students.	Attend the school project presentation in a school event and present the school project in a school community meeting/ schools' website/social networks

Stakeholder name	Who they are and why should be involved in the project	Why the project is relevant for them	Strategies to obtain support
School management	The school management assures relevant resources for students' projects and should be involved in the survey Their involvement also maximizes the impact of the project in terms of both digital and health literacy.	Due to their interest in contributing and integrate open schooling/ active citizenship/ modern ways of teaching and learning.	Attend the school project presentation in a school event and present it in parents' meeting.
Municipality	The municipality should be involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to municipality interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project).
Local Epidemiological Station	LES acts as a mediator, creating a bridge between the PAFSE project and education. It supports the project and is interested in learning outcomes.	Due to their interest in new educational methodologies and desire for enhancing the educational system.	Invitation to participate in the open schooling event. Sharing of a sample of the project material (along with a summary of the project) to the people of the Directorate, responsible for the communication and school initiatives.

9. Plan: Plan Communication

    a.   Assure the right information to the right people, at the right time, in a useful format
    b.   Assure effective project meetings
    c.   Build the communications plan

Communications plan
(filled with examples, these may change according to your project organisation)

Organized by (from)	Participants (to)	What	When	How/Where	Purpose
Professor Zofia	Team	Kick-off meeting	September; Before the project starts to summarize responsibilities	Virtual meeting/school meeting room	Provide a complete description of the project and what the end product will be.
Professors Paweł and Zofia	Parents	Meeting	Before the project starts (date to be defined)	Virtual meeting/school meeting room / ICT room	Explain the project, ask for support and cooperation when needed and invite for participation in the survey and open schooling event.
Professors Paweł and Zofia	Team	Team meeting	Weekly (e.g. Tuesday 5pm)	IT Virtual meeting/school meeting room / ICT room	- Overall plan for the project - Discuss project developments and plan next stage - Instruct team on how to carry out the following steps - Monitor the progress of the project and if there are any issues with completion

Organized by (from)	Participants (to)	What	When	How/Where	Purpose
Professor Zofia	Team	Professors Meeting	Every two weeks	Virtual meeting/school meeting room / ICT room	-Monitor the general progress of the project -Discuss any difficulties found during the project depth and find ways to overcome them -Discuss alternative options for the enactment of the educational scenarios
Professors Paweł and Zofia	Parents	Invitation to parents' participation in open schooling event	At least 2 weeks before the open schooling event (date to be defined)	By email/ Parents meeting	Remind of the project goals and invite for participation in the open schooling event.
Professors Zofia, Paweł and Principal Jadwiga	School community, Municipality, ODN	Invitations to stakeholders participation in open schooling event	At least 2 weeks before the open schooling event (date to be defined)	By email/ Virtual meeting	Explain the project and invite for participation in the open schooling event.

10. Plan: Finish the project planning by building the Charter

1.0 Project identification	
Name	Partnerships for Science Education – AMU
Summary description	The project will enable moments of creative freedom, where students apply the creating survey and analyzing data in a project linked with health topics. Students will participate in "hands-on" and "learn-by-doing" activities and carry out their own research project, fostering not only specific skills but also their soft skills, the so called "21st century skills".
Project owner	Zespół Szkół Urszulańskich
Project manager	Professor Zofia
Stakeholders	Families/Friends (Interest in their children's high-quality education) School Community (Interest in achievements of other members of the school community) Municipality (Interest in schoolwork in their area) ODN (Teachers Education Center)
Team and roles	Professor Jadwiga (Principal) Professor Paweł (ICT teacher) Szymon (Student) Paweł (Student) Olga (Student) Ania (Student) Edyta (Student)

2.0 Needs that support the project

- These types of projects are not normally developed to such an extent. Students are rarely asked to directly apply their knowledge and share it with the community or are active and contributor citizens. It is extremely important that they learn how to present important issues to the community, how to communicate science, how to "make the other understand the importance of a certain issue". Communication skills are underrated.
- The current state of education lacks active learning methodologies and student autonomy.
- Promote technological and health awareness. These concepts are key to every other existing sector and are something worth focusing on.
- Boost STEM curriculum. Increasingly, students are shifting away from science education. Thus, it is imperative to show them how useful and (even) fun and interesting it can be.

3.0 Project goals

Teachers' professional workshop on the project completed – October 12
S: Reach the majority of the expected stakeholders

M: Regular meetings to track progress; Organizational chart
A: Develop the project in small, controlled steps
R: Be aware of limitations/obstacles and tackle them with feasible solutions
T: Project completed – March 15; Open schooling event – April 25

4.0 Project scope

The scope of the project is to engage students in "hands-on" and "learn-by-doing" activities, fomenting skills they usually don't in traditional teaching, as well as rise their motivation towards STEM, in particular technology.

5.0 Key Deliverables

Survey
Data analysis
Multimodal content (infographic; video; podcast; etc.)
Pitch presentation

6.0 Milestones and dates

Survey (date to be defined)
Data analysis (date to be defined)
Pitch presentation (date to be defined)
Open schooling event prepared (date to be defined)
Open schooling event done (date to be defined)

7.0 Constraints

Possible lack of equipment
Possible time constraint due to teachers'/ students' schedule
Participation of at least 10 students in the project (limit)
Participation of at least 50 people in the open schooling event (limit)
Project should be finished on 25 April (limit)

8.0 Risks and opportunities

Risks:
Possible lack of equipment
Possible time constraints due to teachers'/ students' schedule
Modest number of people that accepted invitation to attend the open schooling event
Opportunities:
Students interest in technologies
Innovative and interesting methodologies (gamification; storytelling)
Teachers' motivation on the project so that ICT has proven recognition

9.0 Project success criteria

Project completed before the third period.
High-quality project outputs according to the guidelines
High students' interest and participation in the project and the open schooling event
Open schooling event with the participation of the entire school community, parents, and local stakeholders.

10.0 Project success factors

Appropriate engagement of students and parents.
Appropriate time management/methodologies during the lessons
Interest of teachers in the school project main pillars – open schooling; communicating science
Adequate attendance of stakeholders in the open schooling event
Adequate use of the outputs

Target audience for recommendations:
Students, parents, caregivers, teachers, local agencies.

Public debates and recommendations:
Publication of research findings at a school event or a local community festival.

Teacher guidance notes

Designs and develops interventions for information access and searches supportive networks.
Focus on understanding of inquiry experience through their role as researchers.

Teacher professional development actions

- motivates students to engage with STEM
- practical knowhow in STEM/science/health science content applying evidence-based practices (structured inquiry, task analysis, prompting, time delay)
- training in project and infographic implementation
- Inquiry-based teaching and learning in accordance with the learning objective areas involved (content knowledge, inquiry skills, nature of science).
- Issues concerning the use of models in science and STEM education.
- STEM literacy aspects being promoted through the educational scenario (use of scientific models, authentic problem solving, inquiry-based teaching and learning, attitudes towards science, science within the societal contexts) and the issues of scientific and health numeracy.
- Project-based teaching and learning and principles and techniques of collaborative learning.
- Argumentation – structure and use of it in debates and discussions.
- The utilisation of Digital Learning Objects in the learning process.

Assessment activities

Initial assessment of prior knowledge and attitudes of students (baseline phase).
Continuous assessment of learning outcomes by applying multiple measurements in each phase of the process.
Total assessment.

Main partner responsible: AMU

22. School research project - Bacteria Public Relations – what are the society attitudes towards bacteria?

Overview

Bacteria are complex kingdom with variety of species. Also their relation with humans is complex. Bacteria are important part of food industry, as well as working hard in sewer plants as one of the most important organisms to decompose organic matter. Moreover, they are in close relationship with plants creating precious bond which close nitrogen cycle in the nature, or even in closer relation with humans where in our guts microbiome takes care of our food digestion, vitamin synthesis or even influence our brain in decisions of the chosen diet.

On the other hand, bacteria cause many deaths around the world, and society spend enormous funds to disinfect and get rid of bacteria which can cause devastating infections which can lead to death. One of the greatest achievements of the mankind was the discovery of antibiotics – substances which can kill bacteria and heal is from the infections caused by it. So are bacteria good or bad? Are they necessary for our living in this planet, or they cause misery and losses?

Estimated duration

6-7 sessions of 40-45 minutes for supplementary learning activities and school project (lesson 6 – lesson 12)

Topics:

Main topic:

Specific research questions:

- What is the impact of bacteria on the human economy?
- What is the role of bacteria in the dairy industry?

Research management, design, and administration:

Students can conduct research on the perception of bacteria in their local community, pose research problems and consider how to change the perception of bacteria in society - where are the main issues? Students divide between themselves on the groups which investigate:

- Role of bacteria in food industry,
- Role of bacteria as microbiome in humans,
- Role of bacteria in environmental protection (role in the sewer plants, role in cleaning the oils spills),
- Role of bacteria in pharmaceutics.
- Role of bacteria as pathogens.

Students has to conduct literature review, analysis of the gained information as well as conduct the survey were they will investigate attitudes towards bacteria.

On the open school event students present the results of their investigations and with participation of school community decide - do bacteria benefit us more or do more harm? Could we live in the world without bacteria?

Data analysis and reporting:

Collect and analyse descriptive statistics data. Visual analysis of individualized graphs of the participants through data referring to level, trend, stability/variability. Descriptive statistical data for baseline and intervention, such as mean, median, range.

Development process:

The project is based on the use of surveys and data analysis to create scientific artefacts and build digital literacy (e.g., finding, reviewing, organising and sharing information effectively)

The two sessions will be supervised by the teachers and developed by the students, with scheduled moments for checking the work development.

Groups of students will be instructed to create an presentation which will summarize findings from the surveys.

During **session 1**, students are presented, not only, with software to use for survey creation but also acknowledged with rules for creating proper survey questions.

1. Each group should have, at least:
   a. Computer and internet connection
   b. Target group which will be approached during gaining data

2. Each group is required to:
   a. brainstorm a literature review and survey idea, develop a complete survey with questions
   b. meet regularly with the teacher to discuss the feasibility of the survey and if necessary make any changes to their plan.
   c. Present a short (5-10 minutes) elevator pitch of your project idea to the class.

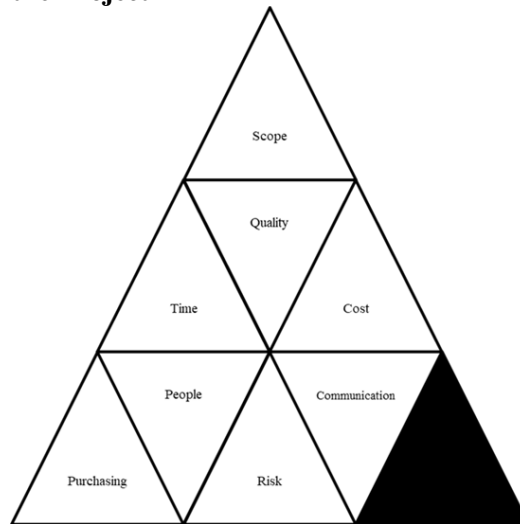3. Summarize the gained data, present main conclusions for other groups.

Finishing session 1, the groups are created and ideas start being discussed.

During session 2, the teacher will pass by the groups to collect ideas and topics and, if valid, students can start working on their project. The teacher will provide all the needed help, even if that means that he is an contributor to the project.
From session 3-forward, the students will actively work on their project and are encouraged to exchange ideas with other groups

Project Management Framework and Instruments

1. Plan: Determine How to Do the Project

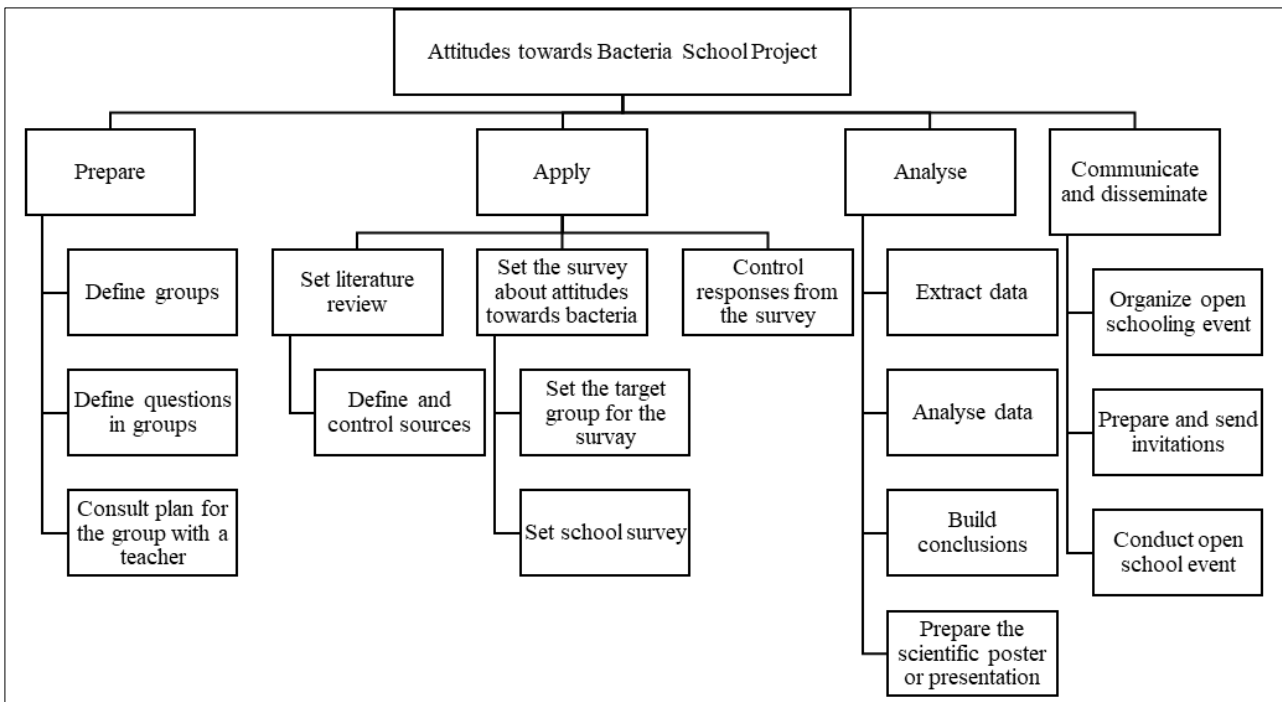**2. Plan: Define Project Scope**

- What are the outputs?
Open schooling Event
Infographics

-What are the requirements of project outputs?
A regular functioning computer (and android device) with an internet connection Google Forms and content creation tools (infographics, videos, images, podcasts, etc.) a software for presentation development;

 - Are there any constraints to producing the project outputs?
The limitation of time from students/teachers (even on Science Club, there are other projects being developed and not all schools have access to the club all the time)
Possible lack of interest on part of students
Possible lack of equipment/ internet connection

- Define the tasks to produce the outputs

Work Breakdown Structure
(filled with examples, these may change according to your project organisation)

3. Plan: Determine Project Time

a. Define the detailed activities for each WBS element
b. Put the activities in sequence
c. Estimate the resources (human and acquisitions) for each activity
d. Estimate the calendar time (days or weeks) for each activity
e. Create the Gantt Chart

Resource Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources
Prioritizing (set project goals; gather info)	30 minutes	Computer/tablet, paper
Researching (use information literacy skills; acquire scientific knowledge)	1 hour	Computer/tablet
Planning (creating relevant questions)	3 hours	Computer/tablet, paper
Conducting the survey	4 hours	Computer/tablet
Analyzing the data	5 hours	Computer/tablet
Communication and dissemination	2-4 hours	Computer/tablet, projector

Gantt Chart
(filled with examples, these may change according to your project organisation)

Activity	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
Prioritizing (set project goals; gather info)	■					
Researching (use information literacy skills; acquire scientific knowledge)	■	■				
Planning (creating relevant questions)		■	■			
Conducting literature review			■			
Conducting the survey				■		
Analyzing the data					■	
Communication and dissemination						■

4. Plan: Determine Project Cost

a. Estimate how much each activity will cost

Note: include the cost for Labor, Supplies, overhead (like office space and equipment)

b. Add the estimates to determine the total cost of your project

Cost Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources	Human Resource Cost*	Other Resources Cost (supplies)
Prioritizing (set project goals; gather info)	30 minutes	Computer/tablet, paper	10€	n.a
Researching (use information literacy skills; acquire scientific knowledge)	3 hours	Computer/tablet	20-30€	n.a
Planning (creating relevant questions)	3 hours	Computer/tablet, paper	60€	n.a
Conducting the survey	4 hours	Computer/tablet, paper	20€	n.a
Analyzing the data	5 hours	Computer/tablet	150 €	n.a
Communication and dissemination	2-4 hours	Computer/tablet, projector	50-80€	n.a
Total	17h30 (some overlapping with each other)	-	310-350€	-

5. Plan: Determine Project Quality

a. Ensure your project produces quality outputs
b. Plan what quality means to your project
c. Determine how you will ensure quality
d. Ensure your project produces quality outputs
e. Plan what quality means to your project
f. Determine how you will ensure quality

Quality Breakdown Structure
(filled with examples, these may change according to your project organisation)

Requirement	Quality planning	Quality assurance	Quality control
1.1	Minimum number of created questions and scientific sources of information	Minimum number of created questions: 5, minimum number of sources 10	Monitor the development of students' plans on a daily
1.2	Approaches used	Ability to create simple but insightful questions and ability to find relevant sources of information	Monitor the development of students' plans on a daily basis
1.3	Assessment of different variables in experiment	Assessment rubric based on basic guideline following: Introduction; development; conclusions.	Monitor the development of students' outputs on a daily basis

6. Plan: Determine Project Risks

a. Identify the two types of risks (uncertain future events that can affect your project): threats have a negative impact on your project; opportunities have a positive impact on your project

Risk Breakdown Structure
(filled with examples, these may change according to your project organisation)

Risk	Probability (How likely is it to happen)	Impact (How big of an effect will it have)	Owner (who takes care about the risk)	Action Plan (initiatives to reduce threats and increase opportunities)
Lack of technological equipment/ internet connection	Low	High	School Principal (Magda) ICT teacher (Paweł)	-Prior preparation -Attribute only 1 computer/ android device per small group of students - Encourage students to use their own devices if possible
Lack of time to fully implement the project (due to teachers' teaching hours/ other running projects)	Medium	High	Science Club teacher (Grazyna)	- Reorganization of the research project to better fit their needs - Skip small steps/details in the development process that don't majorly affect the project - Reduce the number of deliverables per group of students
Modest number of people that accepted invitation to attend the open schooling event	Medium	Medium	School Principal(Magda) ICT and Science Club teacher (Grazyna) Students: - Marta - Kasia - Marek - Stanisław	- Invitations to the broader local community - More persistent invitations to students' friends and families (Phonecalls, email,etc.)

7. Plan: Plan Procurement Processes

    a.   Determine what goods and services you need
    b.   Have what you need at the time that you need it

Acquisitions Breakdown Structure
(filled with examples, these may change according to your project organisation)

Supply	Supply Cost (supplies)	When to be available	How to be available
Paper	20 euros	During the whole project (Implemented scenarios till the end of the open schooling event)	Commitment of school top management
Printer	50 euros	During the whole project (Implemented scenarios till the end of the open schooling event)	Commitment of school top management
Computer	700 euros	During the whole project (Implemented scenarios till the end of the open schooling event)	Commitment of school top management/ students (if they choose to use their own)

8. Plan: Plan People

a.   Acquire the project team
b.   Map the project team in the Organization Breakdown Structure
c.   Assign the project team members to roles
d.   Assign the project team members to activities
e.   Train the project team
f.   Determine how you will motivate and reward the team
g.   Map Stakeholders – people or groups interested in the project

h. Determine how you will engage stakeholders in the project

Responsibility assignment matrix
(filled with examples, these may change according to your project organisation)

Activity	Team members							
	Marta (student)	**Kasia** (student)	**Marek** (student)	**Stanisław** (student)	**Ela** (student)	**Professor Paweł (ICT)**	**Professor Grażyna (Science)**	**School Principal Magda**
Set main project goals	X	X	X	X	X	C/P	C	
Research process	X	X	X	X	X/P	C	C/P	
Prepare/Create the Pitch		X		X	X/P	C/P	C	
Prepare/Create the outputs	X	X	X	X	X/P	P	P	
Coordinate the overall implementation of the project						X	X	I
Coordinate the school event					X	X	X	I
Attend the school event and present their work	X	X	X	X	X	C/P	C/P	
Reward attribution (to be attributed through voting)						P	P	

Letter	Role
X	Executes work
P	Controls progress
C	Should be consulted
I	Should be informed

Stakeholders Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Directly involved in the project (yes/no)	Served or Affected by the Project	Likely to be user of the results of the project
Families/Friends	yes	yes	yes
School community	yes	yes	yes
School management	no	yes	yes
Municipality	no	yes	yes
Teachers Education Center (ODN)	no	no	yes

Stakeholders Management Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Who they are and why should be involved in the project	Why the project is relevant for them	Strategies to obtain support
Families/Friends	Students' families and friends will be invited to attend the school event during which students will present their projects. They will make the evaluation of this type of initiative a lot easier and provide key research questions for future surveys. Their involvement also maximizes the impact of the project in terms of both digital and health literacy.	Due to their interest in the children's education and school well-being.	Attend the school project presentation in a school event and present it in parents' meeting

Stakeholder name	Who they are and why should be involved in the project	Why the project is relevant for them	Strategies to obtain support
School community	The school community should be involved in the survey and observations to be done by students in school environment. They will provide relevant feedback. Their involvement also maximizes the impact of the project in terms of both digital and health literacy.	Due to their interest in students' education and school well-being, and the teachers' intention to professionally upgrade their careers/collect new and useful experiences for further students.	Attend the school project presentation in a school event and present the school project in a school community meeting/ schools' website/social networks
School management	The school management assures relevant resources for students' projects and should be involved in the survey Their involvement also maximizes the impact of the project in terms of both digital and health literacy.	Due to their interest in contributing and integrate open schooling/ active citizenship/ modern ways of teaching and learning.	Attend the school project presentation in a school event and present it in parents' meeting.
Municipality	The municipality should be involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to municipality interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project).
Teachers Education Ceneter (ODN)	ODN acts as a mediator, creating a bridge between the PAFSE project and education. It supports the project and is interested in learning outcomes.	Due to their interest in new educational methodologies and desire for enhancing the educational system.	Invitation to participate in the open schooling event. Sharing of a sample of the project material (along with a summary of the project) to the people of the Directorate, responsible for the communication and school initiatives.

9. Plan: Plan Communication

    a. Assure the right information to the right people, at the right time, in a useful format
    b. Assure effective project meetings
    c. Build the communications plan

Communications plan
(filled with examples, these may change according to your project organisation)

Organized by (from)	Participants (to)	What	When	How/Where	Purpose
Professor Grażyna	Team	Kick-off meeting	September; Before the project starts to summarize responsibilities	Virtual meeting/school meeting room	Provide a complete description of the project and what the end product will be.
Professor Paweł	Parents	Meeting	Before the project starts (date to be defined)	Virtual meeting/school meeting room / ICT room	Explain the project, ask for support and cooperation when needed and invite for participation in the survey and open schooling event.
Professor Paweł	Team	Team meeting	Weekly (e.g. Tuesday 5pm)	IT Virtual meeting/school meeting room / ICT room	- Overall plan for the project - Discuss project developments and plan next stage - Instruct team on how to carry out the following steps - Monitor the progress of the project and if there are any issues with completion

Organized by (from)	Participants (to)	What	When	How/Where	Purpose
Professor Grażyna	Team	Professors Meeting	Every two weeks	Virtual meeting/school meeting room / ICT room	-Monitor the general progress of the project -Discuss any difficulties found during the project depth and find ways to overcome them -Discuss alternative options for the enactment of the educational scenarios
Professor Paweł	Parents	Invitation to parents' participation in open schooling event	At least 2 weeks before the open schooling event (date to be defined)	By email/ Parents meeting	Remind of the project goals and invite for participation in the open schooling event.
Professors Grażyna, Paweł and Principal Magda	School community, Municipality, ODN	Invitations to stakeholders participation in open schooling event	At least 2 weeks before the open schooling event (date to be defined)	By email/ Virtual meeting	Explain the project and invite for participation in the open schooling event.

10. Plan: Finish the project planning by building the Charter

1.0 Project identification	
Name	Partnerships for Science Education – AMU
Summary description	The project will enable moments of creative freedom, where students apply the creating survey, literature review and analzing data in a project linked with health topics. Students will participate in "hands-on" and "learn-by-doing" activities and carry out their own research project, fostering not only specific skills but also their soft skills, the so called "21st century skills".
Project owner	II Liceum Ogólnokształcące w Poznaniu
Project manager	Professor Grażyna
Stakeholders	Families/Friends (Interest in their children's high-quality education) School Community (Interest in achievements of other members of the school community) Municipality (Interest in schoolwork in their area) ODN (Teachers Education Center)
Team and roles	Professor Magda (Principal) Professor Paweł (ICT teacher) Marta (Student) Kasia (Student) Marek (Student)

2.0 Needs that support the project
- These types of projects are not normally developed to such an extent. Students are rarely asked to directly apply their knowledge and share it with the community or are active and contributor citizens. It is extremely important that they learn how to present important issues to the community, how to communicate science, how to "make the other understand the importance of a certain issue". Communication skills are underrated. - The current state of education lacks active learning methodologies and student autonomy. - Promote technological and health awareness. These concepts are key to every other existing sector and are something worth focusing on. - Boost STEM curriculum. Increasingly, students are shifting away from science education. Thus, it is imperative to show them how useful and (even) fun and interesting it can be.

3.0 Project goals
Teachers' professional workshop on the project completed – October 12 S: Reach the majority of the expected stakeholders M: Regular meetings to track progress; Organizational chart A: Develop the project in small, controlled steps R: Be aware of limitations/obstacles and tackle them with feasible solutions T: Project completed – March 15; Open schooling event – April 25

4.0 Project scope

The scope of the project is to engage students in "hands-on" and "learn-by-doing" activities, fomenting skills they usually don't in traditional teaching, as well as rise their motivation towards STEM, in particular technology.

5.0 Key Deliverables

Survey
Data analysis
Multimodal content (infographic; video; podcast; etc.)
Pitch presentation

6.0 Milestones and dates

Survey (date to be defined)
Data analysis (date to be defined)
Pitch presentation (date to be defined)
Open schooling event prepared (date to be defined)
Open schooling event done (date to be defined)

7.0 Constraints

Possible lack of equipment
Possible time constraints due to teachers'/ students' schedule
Participation of at least 10 students in the project (limit)
Participation of at least 50 people in the open schooling event (limit)
Project should be finished on 25 April (limit)

8.0 Risks and opportunities

Risks:
Possible lack of equipment
Possible time constraint due to teachers'/ students' schedule
Modest number of people that accepted invitation to attend the open schooling event
Opportunities:
Students interest in technologies
Innovative and interesting methodologies (gamification; storytelling)
Teachers' motivation on the project so that ICT has proven recognition

9.0 Project success criteria

Project completed before the third period.
High-quality project outputs according to the guidelines
High students' interest and participation in the project and the open schooling event
Open schooling event with the participation of the entire school community, parents, and local stakeholders.

10.0 Project success factors

Appropriate engagement of students and parents.
Appropriate time management/methodologies during the lessons
Interest of teachers in the school project main pillars – open schooling; communicating science
Adequate attendance of stakeholders in the open schooling event
Adequate use of the outputs

Target audience for recommendations:
Students, parents, caregivers, teachers, local agencies.

Public debates and recommendations:
Publication of research findings at a school event or a local community festival.

Teacher guidance notes

Designs and develops interventions for information access and searches supportive networks.
Focus on understanding of inquiry experience through their role as researchers.

Teacher professional development actions

- motivates students to engage with STEM
- practical knowhow in STEM/science/health science content applying evidence-based practices (structured inquiry, task analysis, prompting, time delay)
- training in project and infographic implementation
- Inquiry-based teaching and learning in accordance with the learning objective areas involved (content knowledge, inquiry skills, nature of science).
- Issues concerning the use of models in science and STEM education.
- STEM literacy aspects being promoted through the educational scenario (use of scientific models, authentic problem solving, inquiry-based teaching and learning, attitudes towards science, science within the societal contexts) and the issues of scientific and health numeracy.
- Project-based teaching and learning and principles and techniques of collaborative learning.
- Argumentation – structure and use of it in debates and discussions.
- The utilisation of Digital Learning Objects in the learning process.

Assessment activities

Initial assessment of prior knowledge and attitudes of students (baseline phase).
Continuous assessment of learning outcomes by applying multiple measurements in each phase of the process.
Total assessment.

Main partner responsible: AMU

23. Project management resource and inquiry instruments on the topic of "Vaccination - if so, how does the immune system learn?"

Overview

Vaccinations are considered the most effective weapon that humanity has created to fight infectious diseases. However, researchers note that immunization has become a victim of its own success. Thanks to population vaccinations, we are unfamiliar with high mortality due to infectious diseases in childhood and severe complications after passing various diseases. Moreover because of the rise of antivaccination movements, many of viral diseases which should be known only from history textbooks, are resurfacing causing epidemic outbreaks.

Estimated duration

4-5 sessions of 40-45 minutes for supplementary learning activities and school project (lesson 6 – lesson 12)

School research project

Topics

Main topic: What is the perception of vaccination in the immediate area?
Specific research questions:

- How the vaccination protects from an infectious disease?
- How does a social antivaccination movement may affect an epidemic outbreak?

Research management, design, and administration

Students gather data for the following questions and analyze it with the help of a teacher:

Who in the family and against what diseases were vaccinated, and how many times?

Was the immunization schedule different in the Parents' Day and now? What are the differences? Where do they come from? Are these changes good?

What are vaccinations - for what purpose do we carry them out (protection against severe course and death, not complete protection against infection)?

What arguments are used by those who are against, and what are those for?

During management of the project important is to be aware of the importance and sensitivity any data which are considering health issues. Teacher must be aware of different backgrounds of their students and prevent divisions or stigmatization inside of the students' group.

Data analysis and reporting

Collect and analyze descriptive statistics data. Visual analysis of individualized graphs of the participants through data referring to level, trend, stability/variability. Descriptive statistical data for baseline and intervention, such as mean, median, range. Also, students will receive data from local epidemiological station (LES) about cases of viral diseases in the area.

Development process

The project is based on the use of the surveys and data analysis to create scientific artefacts and build digital literacy (e.g., finding, reviewing, organising and sharing information effectively)

The two sessions will be supervised by the teachers and developed by the students, with scheduled moments for checking the work development.

Groups of students will be instructed to create a presentation which will summarize findings from the surveys. During **session 1**, students are presented, not only, with software to use for survey creation but also acknowledged with rules for creating proper survey questions.

1. Each group should have, at least:

    a. Computer and internet connection
    b. Target group which will be approached during gaining data

2. Each group is required to:
    a. brainstorm a survey idea, develop a complete survey with questions
    b. meet regularly with the teacher to discuss the feasibility of the survey and if necessary make any changes to their plan.

   c.   Present a short (5-10 minutes) elevator pitch of your project idea to the class.
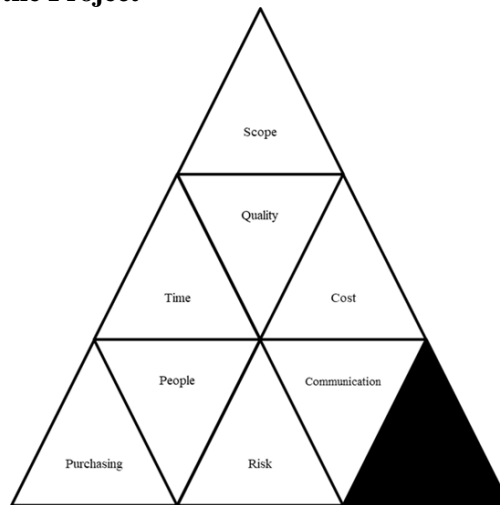3.   Summarize the gained data, present the main conclusions for other groups.

Finishing session 1, the groups are created and ideas start being discussed.

During session 2, the teacher will pass by the groups to collect ideas and topics and, if valid, students can start working on their project. The teacher will provide all the needed help, even if that means that he is an contributor to the project.

From session 3-forward, the students will actively work on their project and are encouraged to exchange ideas with other groups

Project Management Framework and Instruments

1. Plan: Determine How to Do the Project

2. Plan: Define Project Scope

- What are the outputs?
Open schooling Event
Infographics

-What are the requirements of project outputs?
A regular functioning computer (and android device) with an internet connection Google Forms and content creation tools (infographics, videos, images, podcasts, etc.) a a software for presentation development.

 - Are there any constraints to producing the project outputs?
The limitation of time from students/teachers (even on Science Club, there are other projects being developed and not all schools have access to the club all the time)
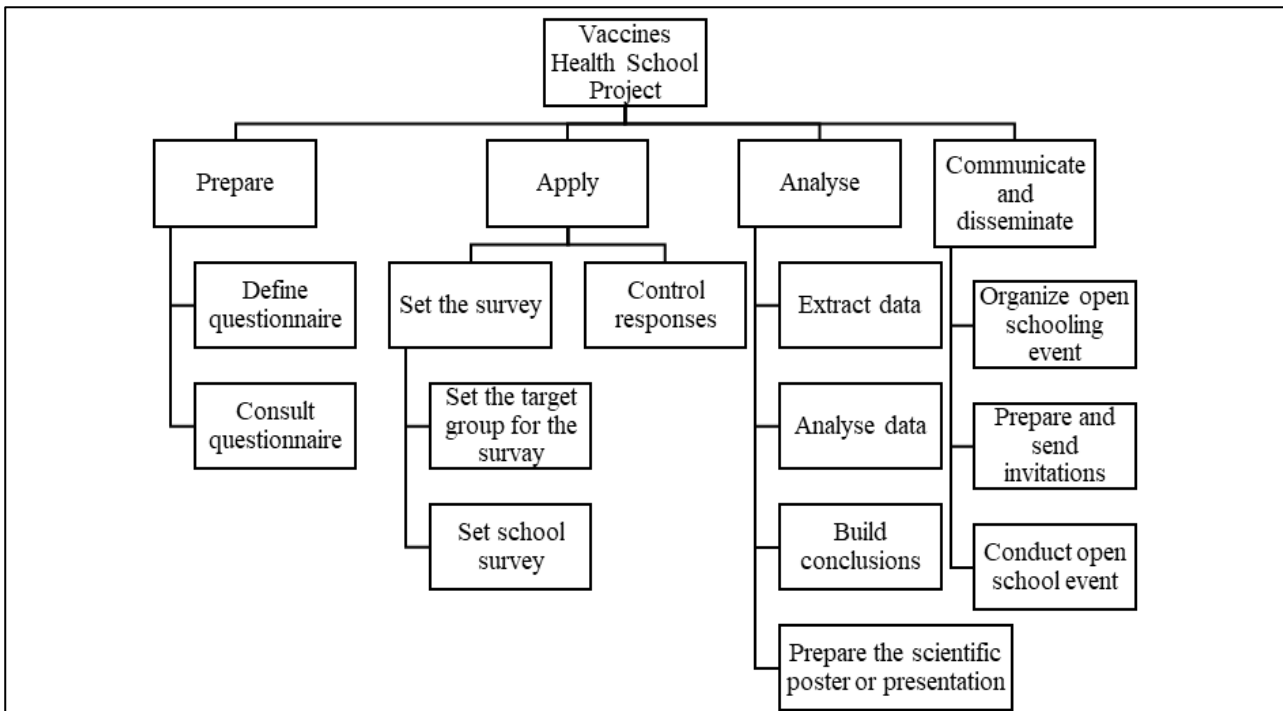Possible lack of interest on part of students
Possible lack of equipment/ internet connection

- Define the tasks to produce the outputs

Work Breakdown Structure
(filled with examples, these may change according to your project organisation)

3. Plan: Determine Project Time

a. Define the detailed activities for each WBS element
b. Put the activities in sequence
c. Estimate the resources (human and acquisitions) for each activity
d. Estimate the calendar time (days or weeks) for each activity
e. Create the Gantt Chart

Resource Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources
Prioritizing (set project goals; gather info)	30 minutes	Computer/tablet, paper
Researching (use information literacy skills; acquire scientific knowledge)	1 hour	Computer/tablet
Planning (creating relevant questions)	3 hours	Computer/tablet, paper
Conducting the survey	4 hours	Computer/tablet
Analyzing the data	5 hours	Computer/tablet
Communication and dissemination	2-4 hours	Computer/tablet, projector

Gantt Chart
(filled with examples, these may change according to your project organisation)

Activity	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
Prioritizing (set project goals; gather info)	■					
Researching (use information literacy skills; acquire scientific knowledge)		■				
Planning (creating relevant questions)			■			
Conducting the survey			■			
Analyzing the data				■		
Communication and dissemination						■

4. Plan: Determine Project Cost

    a.   Estimate how much each activity will cost

Note: include the cost for Labor, Supplies, overhead (like office space and equipment)

    b.   Add the estimates to determine the total cost of your project

Cost Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources	Human Resource Cost*	Other Resources Cost (supplies)
Prioritizing (set project goals; gather info)	30 minutes	Computer/tablet, paper	10€	n.a
Researching (use information literacy skills; acquire scientific knowledge)	1 hour	Computer/tablet	20-30€	n.a
Planning (creating relevant questions)	3 hours	Computer/tablet, paper	60€	n.a
Conducting the survey	4 hours	Computer/tablet, paper	20€	n.a
Analyzing the data	5 hours	Computer/tablet	150 €	n.a
Communication and dissemination	2-4 hours	Computer/tablet, projector	50-80€	n.a
Total	15h30-17h30 (some overlapping with each other)	-	310-350€	-

5. Plan: Determine Project Quality

    a.   Ensure your project produces quality outputs
    b.   Plan what quality means to your project
    c.   Determine how you will ensure quality
    d.   Ensure your project produces quality outputs
    e.   Plan what quality means to your project
    f.   Determine how you will ensure quality

Quality Breakdown Structure
(filled with examples, these may change according to your project organisation)

Requirement	Quality planning	Quality assurance	Quality control
1.1	Minimum number of created questions	Minimum number of created questions: 5	Monitor the development of students' plans on a daily
1.2	Approaches used	Ability to create simple but insightful questions	Monitor the development of students' plans on a daily basis
1.3	Assessment of different variables in experiment	Assessment rubric based on basic guidelines following: Introduction; development; conclusions.	Monitor the development of students' outputs on a daily basis

6. Plan: Determine Project Risks

    a.   Identify the two types of risks (uncertain future events that can affect your project): threats have a negative impact on your project; opportunities have a positive impact on your project

Risk Breakdown Structure
(filled with examples, these may change according to your project organisation)

Risk	Probability (How likely is it to happen)	Impact (How big of an effect will it have)	Owner (who takes care about the risk)	Action Plan (initiatives to reduce threats and increase opportunities)
Lack of technological equipment/ internet connection	Low	High	School Principal (Jadwiga) ICT teacher (Paweł)	-Prior preparation -Attribute only 1 computer/ android device per small group of students - Encourage students to use their own devices if possible
Lack of time to fully implement the project (due to teachers' teaching hours/ other running projects)	Medium	High	Science Club teacher (Zofia)	- Reorganization of the research project to better fit their needs - Skip small steps/details in the development process that don't majorly affect the project - Reduce the number of deliverables per group of students
Modest number of people that accepted invitation to attend the open schooling event	Medium	Medium	School Prinicpal (Jadwiga) ICT and Science Club teacher (Paweł) Students: - Maria - Szymon - Miłosz - Stanisław	- Invitations to the broader local community - More persistent invitations to students' friends and families (Phonecalls, email,etc.)

7. Plan: Plan Procurement Processes

    a.   Determine what goods and services you need
    b.   Have what you need at the time that you need it

Acquisitions Breakdown Structure
(filled with examples, these may change according to your project organisation)

Supply	Supply Cost (supplies)	When to be available	How to be available
Paper	20 euros	During the whole project (Implemented scenarios till the end of the open schooling event)	Commitment of school top management
Printer	50 euros	During the whole project (Implemented scenarios till the end of the open schooling event)	Commitment of school top management
Computer	700 euros	During the whole project (Implemented scenarios till the end of the open schooling event)	Commitment of school top management/ students (if they choose to use their own)

8. Plan: Plan People

    a.   Acquire the project team
    b.   Map the project team in the Organization Breakdown Structure
    c.   Assign the project team members to roles
    d.   Assign the project team members to activities
    e.   Train the project team
    f.   Determine how you will motivate and reward the team
    g.   Map Stakeholders – people or groups interested in the project
    h.   Determine how you will engage stakeholders in the project

Responsibility assignment matrix
(filled with examples, these may change according to your project organisation)

Activity	Team members							
	Szymon (student)	**Miłosz** (student)	**Ania** (student)	**Olga** (student)	**Edyta** (student)	**Professor Paweł (ICT)**	**Professor Zofia (Science)**	**School Principal Jadwiga**
Set main project goals	X		X	X	X	C/P	C	
Research process	X	X	X	X	X/P	C	C/P	
Prepare/Create the Pitch		X		X	X/P	C/P	C	
Prepare/Create the outputs	X	X	X	X	X/P	P	P	
Coordinate the overall implementation of the project						X	X	I
Coordinate the school event					X	X	X	I
Attend the school event and present their work	X	X	X	X	X	C/P	C/P	
Reward attribution (to be attributed through voting)						P	P	

Letter	Role
X	Executes work
P	Controls progress
C	Should be consulted
I	Should be informed

Stakeholders Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Directly involved in the project (yes/no)	Served or Affected by the Project	Likely to be user of the results of the project
Families/Friends	yes	Yes	yes
School community	yes	Yes	yes
School management	no	Yes	yes
Municipality	no	Yes	yes
Teachers Education Center (ODN)	no	No	yes

Stakeholders Management Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Who they are and why should be involved in the project	Why the project is relevant for them	Strategies to obtain support
Families/Friends	Students' families and friends will be invited to attend the school event during which students will present their projects. They will make the evaluation of this type of initiative a lot easier and provide key research questions for future surveys. Their involvement also maximizes the impact of the project in terms of both digital and health literacy.	Due to their interest in the children's education and school well-being.	Attend the school project presentation in a school event and present it in parents' meeting
School community	The school community should be involved in the survey and observations to be done by students in school environment. They will provide relevant feedback. Their involvement also maximizes the impact of the project in terms of both digital and health literacy.	Due to their interest in students' education and school well-being, and the teachers' intention to professionally upgrade their careers/collect new and useful experiences for further students.	Attend the school project presentation in a school event and present the school project in a school community meeting/ schools' website/social networks

Stakeholder name	Who they are and why should be involved in the project	Why the project is relevant for them	Strategies to obtain support
School management	The school management assures relevant resources for students' projects and should be involved in the survey Their involvement also maximizes the impact of the project in terms of both digital and health literacy.	Due to their interest in contributing and integrate open schooling/ active citizenship/ modern ways of teaching and learning.	Attend the school project presentation in a school event and present it in parents' meeting.
Municipality	The municipality should be involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to municipality interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project).
Teachers Education Center (ODN)	ODN acts as a mediator, creating a bridge between the PAFSE project and education. It supports the project and is interested in learning outcomes.	Due to their interest in new educational methodologies and desire for enhancing the educational system.	Invitation to participate in the open schooling event. Sharing of a sample of the project material (along with a summary of the project) to the people of the Directorate, responsible for the communication and school initiatives.

9. Plan: Plan Communication

    a.   Assure the right information to the right people, at the right time, in a useful format
    b.   Assure effective project meetings
    c.   Build the communications plan

Communications plan
(filled with examples, these may change according to your project organisation)

Organized by (from)	Participants (to)	What	When	How/Where	Purpose
Professor Zofia	Team	Kick-off meeting	September; Before the project starts to summarize responsibilities	Virtual meeting/school meeting room	Provide a complete description of the project and what the end product will be.
Professors Paweł and Zofia	Parents	Meeting	Before the project starts (date to be defined)	Virtual meeting/school meeting room / ICT room	Explain the project, ask for support and cooperation when needed and invite for participation in the survey and open schooling event.
Professors Paweł and Zofia	Team	Team meeting	Weekly (e.g., Tuesday 5pm)	IT Virtual meeting/school meeting room / ICT room	- Overall plan for the project - Discuss project developments and plan next stage - Instruct team on how to carry out the following steps - Monitor the progress of the project and if there are any issues with completion
Professor Zofia	Team	Professors Meeting	Every two weeks	Virtual meeting/school meeting room / ICT room	-Monitor the general progress of the project -Discuss any difficulties found during the project depth and find ways to overcome them

Organized by (from)	Participants (to)	What	When	How/Where	Purpose
					-Discuss alternative options for the enactment of the educational scenarios
Professors Paweł and Zofia	Parents	Invitation to parents' participation in open schooling event	At least 2 weeks before the open schooling event (date to be defined)	By email/ Parents meeting	Remind of the project goals and invite for participation in the open schooling event.
Professors Zofia, Paweł and Principal Jadwiga	School community, Municipality, ODN	Invitations to stakeholders participation in open schooling event	At least 2 weeks before the open schooling event (date to be defined)	By email/ Virtual meeting	Explain the project and invite for participation in the open schooling event.

10. Plan: Finish the project planning by building the Charter

1.0 Project identification	
Name	Partnerships for Science Education – AMU
Summary description	The project will enable moments of creative freedom, where students apply the creating survey and analzing data in a project linked with health topics. Students will participate in "hands-on" and "learn-by-doing" activities and carry out their own research project, fostering not only specific skills but also their soft skills, the so called "21st century skills".
Project owner	Zespół Szkół Urszulańskich
Project manager	Professor Zofia
Stakeholders	Families/Friends (Interest in their children's high-quality education) School Community (Interest in achievements of other members of the school community) Municipality (Interest in schoolwork in their area) ODN (Teachers Education Center)
Team and roles	Professor Jadwiga (Principal) Professor Paweł (ICT teacher) Szymon (Student) Paweł (Student) Olga (Student) Ania (Student) Edyta (Student)

2.0 Needs that support the project

- These types of projects are not normally developed to such an extent. Students are rarely asked to directly apply their knowledge and share it with the community or are active and contributor citizens. It is extremely important that they learn how to present important issues to the community, how to communicate science, how to "make the other understand the importance of a certain issue". Communication skills are underrated.
- The current state of education lacks active learning methodologies and student autonomy.
- Promote technological and health awareness. These concepts are key to every other existing sector and is something worth focusing on.
- Boost STEM curriculum. Increasingly, students are shifting away from science education. Thus, it is imperative to show them how useful and (even) fun and interesting it can be.

3.0 Project goals

Teachers' professional workshop on the project completed – October 12
S: Reach the majority of the expected stakeholders
M: Regular meetings to track progress; Organizational chart
A: Develop the project in small, controlled steps
R: Be aware of limitations/obstacles and tackle them with feasible solutions
T: Project completed – March 15; Open schooling event – April 25

4.0 Project scope

The scope of the project is to engage students in "hands-on" and "learn-by-doing" activities, fomenting skills they usually don't in traditional teaching, as well as rise their motivation towards STEM, in particular technology.

5.0 Key Deliverables

Survey
Data analysis
Multimodal content (infographic; video; podcast; etc.)
Pitch presentation

6.0 Milestones and dates

Survey (date to be defined)
Data analysis (date to be defined)
Pitch presentation (date to be defined)
Open schooling event prepared (date to be defined)
Open schooling event done (date to be defined)

7.0 Constraints

Possible lack of equipment
Possible time constraint due to teachers'/ students' schedule
Participation of at least 10 students in the project (limit)
Participation of at least 50 people in the open schooling event (limit)
Project should be finished on 25 April (limit)

8.0 Risks and opportunities

Risks:
Possible lack of equipment
Possible time constraint due to teachers'/ students' schedule
Modest number of people that accepted invitation to attend the open schooling event
Opportunities:
Students interest in technologies
Innovative and interesting methodologies (gamification; storytelling)
Teachers' motivation on the project so that ICT has proven recognition

9.0 Project success criteria

Project completed before the third period.
High-quality project outputs according to the guidelines
High students' interest and participation in the project and the open schooling event
Open schooling event with the participation of the entire school community, parents, and local stakeholders.

10.0 Project success factors

Appropriate engagement of students and parents.
Appropriate time management/methodologies during the lessons
Interest of teachers in the school project main pillars – open schooling; communicating science
Adequate attendance of stakeholders in the open schooling event
Adequate use of the outputs

Target audience for recommendations:
Students, parents, caregivers, teachers, local agency.

Public debates and recommendations:
Publication of research findings at a school event or a local community festival.

Teacher guidance notes

Designs and develops interventions for information access and searches supportive networks.
Handles social disparities carefully to avoid stereotypes or stigmatization of students (information about vaccination are sensitive data)
Focus on understanding of inquiry experience through their role as researchers.

Teacher professional development actions

- motivates students to engage with STEM
- practical knowhow in STEM/science/health science content applying evidence-based practices (structured inquiry, task analysis, prompting, time delay)
- inquiry-based teaching and learning in accordance with the learning objective areas involved (content knowledge, inquiry skills, nature of science).
- issues concerning the use of models in science and STEM education.
- STEM literacy aspects are promoted through the educational scenario (use of scientific models, authentic problem solving, inquiry-based teaching and learning, attitudes towards science, science within the societal contexts) and the issues of scientific and health numeracy.
- project-based teaching and learning and principles and techniques of collaborative learning.
- argumentation – structure and use of it in debates and discussions.
- the utilization of Digital Learning Objects in the learning process.

Assessment activities

Initial assessment of prior knowledge and attitudes of students (baseline phase).
Continuous assessment of learning outcomes by applying multiple measurements in each phase of the process.
Total assessment.

Main partner responsible: AMU

24. Project management resource and inquiry instruments on the topic of "Droplets & the physics of viruses transmission"

Overview

The teaching-learning activities prepare students and school community to reduce the risk of airborne diseases and epidemics in a phase of the COVID-19 pandemic that remains uncertain how Sars-Cov-2 virus mutates and spreads in high vaccinated populations. Nevertheless, there is strong scientific evidence that the virus is transmitted essentially by air. So is important to engage students in discourse on the measures that limit the spread of the virus droplets to prevent the fast growing of respiratory diseases within the school community. With the technological advances achieved today, it is possible and relevant to explore with students a Computational Fluid Dynamics (CFD) tool that simulates and predicts the propagation of respiratory particles when changing the configuration of spaces and other conditions (e.g., area, furniture, number of inhabitants, distance between them, use/no use of mask, ventilation) and so estimate the risk of disease transmission between individuals. During the learning activities students understand how airborne transmission works and how STEM may contribute to anticipate, mitigate, and solve public health threats. Students are introduced and explore a CFD tool in laboratory environment, explore a series of simulations produced specifically for the learning scenario and prepare a small report explaining the spread of particles in multiple spaces. Finally, a debate is conducted by the teacher in the classroom and students are challenged to propose a series of measures that mitigate or prevent the spread of respiratory diseases with a particular focus in school spaces. Scientific outputs (presentation, poster, infographic, brochures) are produced and presented in open schooling events.

Estimated duration

After initial socioscientific and technical background on the topic in classroom environment, 6 sessions of 40-45 minutes for school project (session 7 – session 12).

School Research Project

Topics:
- Airborne Transmission Process.
- Airborne Diseases.
- Computational Fluid Dynamics Tool (CFD).
- How a ventilation System Helps mitigate the dissemination of airborne diseases.
- Public Health.
- Scientific information.
- Responsible citizenship.

Challenge: explore the simulator, build your simulations and report!

Development process (summary):
Based on the knowledge coming from lessons 1-6, students will go to the laboratory of the mechanical engineering department at ISEL and will interact with the computational tool. They can build their own spaces, change environmental conditions, see the differences, describe the simulations, and report their case studies on a short report. Then teacher proposes successive debates about the scientific reports in the form of "research seminars" taking place in the school or in the science club. Students, parents, school community and relevant local stakeholders attend the event and understand how the rapid growth of new cases of airborne diseases, such as COVID-19, or other acute respiratory diseases such as Flu, is influenced by individual behaviour and environmental factors. They also get high-level understanding on strategies to minimize the phenomena and how they may have an influence on the relevant settings (e.g., home, school, workplace, public space at the community level).

Session 1: Understand the Tool

Activity 1. Students receive a short explanation about the simulation tool and how to operate it. In this case, it is explained that a CFD (Computational Fluid Dynamics) tool is an equipment that allows the simulation of fluids (in the case of the scenario: air and particles) in a certain environment. The teacher refers that that in order to correctly perform the simulation of both the airflow and particle flow inside of each environment is necessary to input certain general conditions of the space to the simulator, such as the room air temperature,

pressure and velocity. Then is explained that to simulate the particle flow, parameters such as the velocity, injection angle and number of particles, along with the external forces (e.g.: gravity and drag forces) also have to be inputted in the CFD tool.

Activity 2. Students observe a set of simulations similar to those they will produce in the subsequent session when they will be visiting the mechanical engineering department in ISEL. The main goal of this session is to familiarize students with the simulations and simulation tool.

Session 2: Do the simulations

Activity 1. Students visit the laboratory of mechanical engineering department of ISEL and interact with the computational tool. Students are divided in groups. Then, each group produces a series of test simulations, regarding particle flow. These test simulations are developed in a simple environment (are similar to ones referred in lesson 3 of the educational scenario) and the results are obtained swiftly. Students must run a minimum of 5 test simulations (e.g.: 1 simulation of an occupant speaking, 2 simulations when an occupant coughs, and 2 simulations when the occupant sneezes). Students create the simple environments/situations to be simulated (adding the occupants, the ventilation system, and implementing the CFD boundary conditions such as the surface temperatures inside the room, or the airflow rate from the suppliers). During this activity, the 9th grade physics teacher (project head-coordinator) and the ICT teacher help the students in the exploration of the tool, along with the ISEL team. The main goal of this activity is to enlighten students interest on the simulator.

Activity 2. Students create more complex environments (e.g.: add occupants with a more realistic shape and more elements to the room such as tables, keyboards, chairs, windows, lamps, etc.), and simulate the particle flow for each environment created (3 breathing regime to be simulated: speaking, sneezing, and coughing). To analyze the results of the simulations, the same resources as those used during the implementation of the scenario are made available. (2 types of videos, images of each environment at the end of each simulation, and from different perspectives). In this activity students must, at least, simulate the 3 breathing regimes for 2 different environments so that they can have 2 case studies to perform data analysis.

Session 3: Data analysis

Students interpret the simulations they perform in the previous sessions. As mentioned, students have a series of resources available to analyze the simulations, such as videos, images of the room at the end of the simulation and will also have access to worksheets. These worksheets contain a series of questions that support students structured work in the interpretation of simulations results. Subsequently, students elaborate brief scientific reports that explain the behavior of the particles in each simulated breathing regime, as well as the differences of simulations. During this activity, the ICT teacher helps students in the use of the learning resources (available to interpret the simulation results) and other teachers help students in writing and reviewing the reports for later presentation during the open schooling event.

Session 4: Elaborating Preventive measures regarding airborne diseases

A series of debates are promoted to mitigate the spread of respiratory diseases after students' preparation about measures to be applied, either at the individual or at the community level. Some of these preventive measures may include proposals to change the configuration of different environments (e.g.: classroom). Students' proposals rely on the results obtained in the simulations and on the scientific reports produced in the previous session. The successive debates can be conducted in the science club, or in school environment. During the argumentation process, students must refer to the arguments that justify the selected measures. In this activity, the 9th grade physics teacher (head-coordinator) defines the rules of the debate and other teachers assist the coordinator in the conduction of these debates. In order to students organize their reasoning during the debate, a worksheet is provided and they use it to take all kinds of notes (recommendations, arguments, etc.).

Session 5: Poster preparation

Activity 1. Session 5 starts with the discussion of the best presentation format of the project results. The output of the project is produced. A poster, a scientific presentation and an infographic are suggested, and can be built

in paper or in software tools (Microsoft Office PowerPoint, Canva). The scientific/poster presentation is focused on physics of viruses' transmission and droplets characterization and includes the content of the brief reports previously produced by the students The infographics should include information regarding airborne diseases (types, effects, etc.), and the measures to take place at the community level to prevent/mitigate the dissemination of such diseases. In this activity the arts professor helps the students in the design of the output using creative approach. The ICT teacher helps students in the creation of the scientific output and presentation.

Activity 2. In activity 2 students discuss with the teacher the organization of a forum or "research seminars" for presentation and discussion of the output that invites students, teachers, parents, social partners of the local community to participate and engage in debate. These events are organised in the school or science club.

Session 6. Open schooling event

During session 6 students will be holding a community event to share the results of their project with the participation of students, teachers, parents and partners of the local community. Each group will be presenting their evidence and informing the public about the questions they have addressed during the project while improving communication skills and developing responsible citizenship.

- Each project output (e.g.: poster and scientific presentation, infographic) is presented by the students in a community setting (e.g., exposition centre, municipality, garden, museum, science fair).
- Students will communicate policy measures using STEM-based argumentation. Students appeal to the action of all in health of the community, providing great understanding that preventing the spreading of an airborne disease is a responsibility of all, not only of the ministry of health or healthcare providers.
- Students, parents, school community and relevant local stakeholders attend the event and understand how the incidence of respiratory diseases is influenced by individual behaviour and environmental factors. They also get high-level understanding on strategies to minimize the phenomena and how they may have an influence on the relevant settings (e.g., home, school, workplace, public space at the community level).

Project Management Framework and Instruments

1. Plan: Determine How to Do the Project
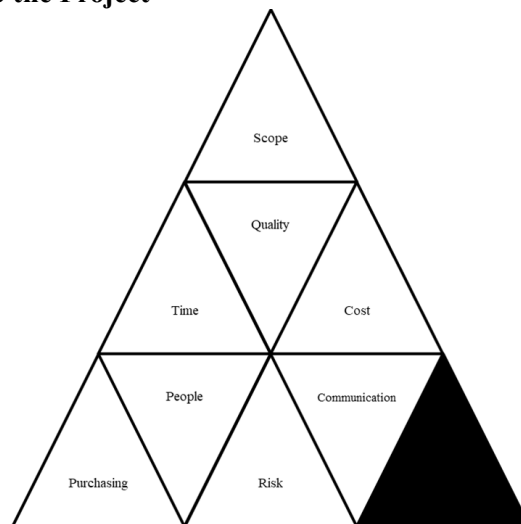
2. Plan: Define Project Scope

- What are the outputs?

✓ scientific slide presentation/poster about basic concepts related to the physics of viruses' transmission and droplets characterization.
✓ brief report on how droplets disseminate in different sets of environments using the simulation results that
✓ students will analyze throughout the scenario implementation
✓ infographics: airborne diseases (types) and preventive measures
✓ brochures for parents, municipalities, and other stakeholders
✓ open schooling event

-What are the requirements of project outputs?

- ✓ printed poster: A3 format, Color, 6 sections (introduction, goals, methods, results, conclusions, recommendations).
- ✓ brochures: A4 format, Color, 4 sections (introduction, results, conclusions, recommendations)
- ✓ laptop for the presentations
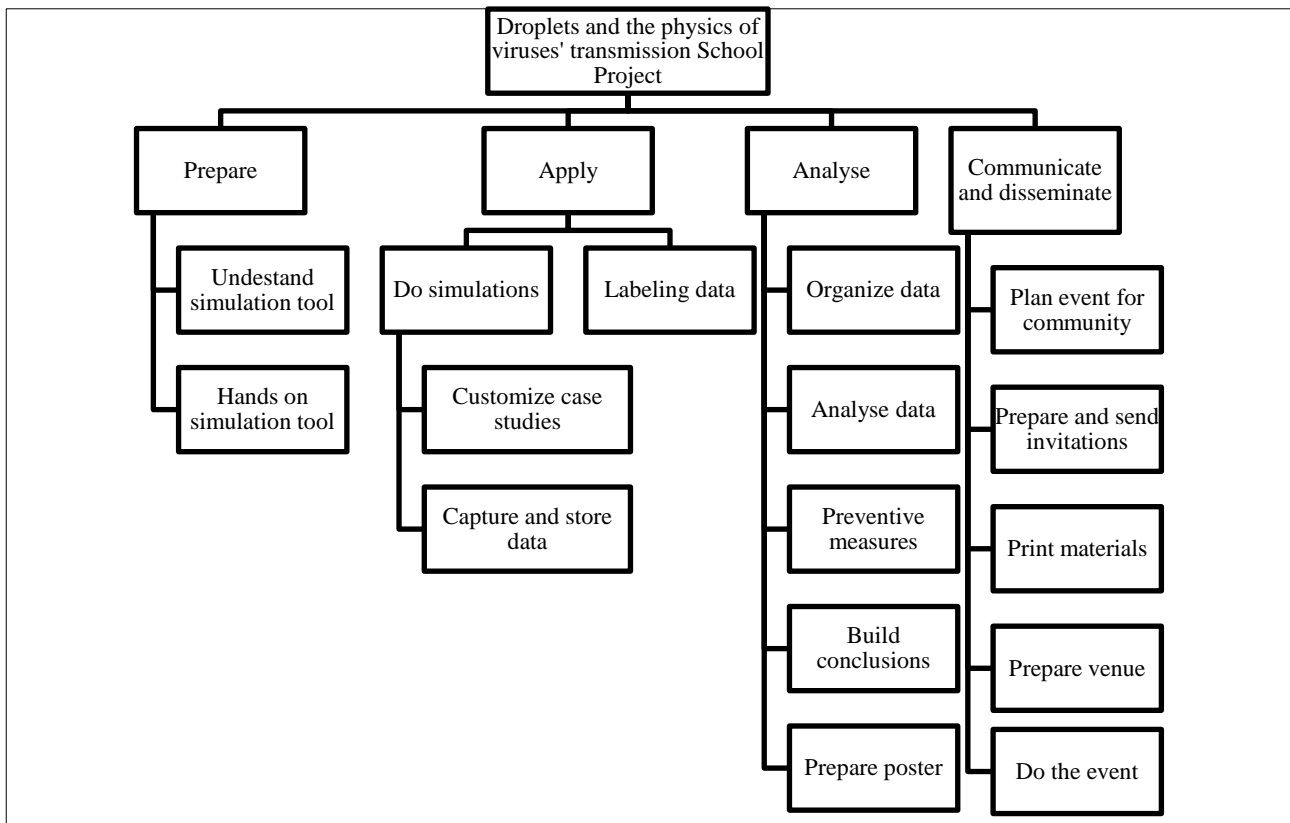- ✓ projector for the presentations

- Are there any constraints to produce the project outputs?
The work should be completed in 6 lessons and 4-6 sessions, implemented in a consecutive period of time to maximize the impact.

- Define the tasks to produce the outputs – build the Work Breakdown Structure

Work Breakdown Structure (WBS)
(filled with examples, these may change according to your project organisation)

3. Plan: Determine Project Time

- a. Define the detailed activities for each WBS element
- b. Put the activities in sequence
- c. Estimate the resources (human and acquisitions) for each activity
- d. Estimate the calendar time (days or weeks) for each activity
- e. Create the Gantt Chart

Resource Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources
Understand simulation tool	1 hour	laptop
Hands on simulation tool	15 minutes	laptop
Do simulations	3 hours	laptop
Analyse data	3 hours	laptop, paper
Prepare poster	3 hours	laptop, paper
Present projects' outputs	2 hours	laptop, paper

Gantt Chart
(filled with examples, these may change according to your project organisation)

Activity	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7
Understand simulation tool	■						
Hands on simulation tool		■					
Do simulations		■					
Analyse data			■	■			
Prepare poster					■	■	
Present projects' outputs							■

4. Plan: Determine Project Cost

  a. Estimate how much each activity will cost
Note: include the cost for Labor, Supplies, overhead (like office space and equipment)

  b. Add the estimates to determine the total cost of your project

Cost Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources	Human Resource Cost	Other Resources Cost (supplies)
Understand simulation tool	1 hour	laptop	20 euros	n.a
Hands on simulation tool	15 minutes	laptop	5 euros	n.a
Do simulations	3 hours	laptop	60 euros	n.a
Analyse data	3 hours	laptop and paper	60 euros	n.a
Prepare poster	3 hours	laptop and paper	60 euros	n.a
Present the projects' outputs	2 hours	laptop and paper	40 euros	n.a
Total	12h15	-	245 €	-

* Example on how to calculate resources and budget, without connection to the PAFSE real context

5. Plan: Determine Project Quality

  a. Ensure your project produces quality outputs
  b. Plan what quality means to your project
  c. Determine how you will ensure quality
  d. Ensure your project produces quality outputs
  e. Plan what quality means to your project
  f. Determine how you will ensure quality

Quality Breakdown Structure
(filled with examples, these may change according to your project organisation)

Requirement	Quality planning	Quality assurance	Quality control
1.1	Minimum number of test simulations	Minimum number of test simulations: 5	Monitor the student´s engagement with the tool
1.2	Minimum number of particle flow simulations	Minimum number of particle flow simulations: 6	Monitor the student´s engagement with the tool
1.3	Poster template with six sections	Poster with six sections: introduction, goals, methods, results, conclusions, recommendations.	Monitor the developments of students' poster
1.4	Assessement rubric for project outputs	Assessment rubric with four criteria: scientific accuracy, methodological accuracy, effectiveness to its goals, proper presentation	Assess the project final outputs

6. Plan: Determine Project Risks

a. Identify the two types of risks (uncertain future events that can affect your project): threats have a negative impact on your project; opportunities have a positive impact on your project

Risk Breakdown Structure
(filled with examples, these may change according to your project organisation)

Risk	Probability (How likely is it to happen)	Impact (How big of an effect will it have)	Owner (Who takes care about the risk)	Action Plan (Initiatives to reduce threats and increase opportunities)
Modest number of simulations produced/analysed	High	High	Professors Students	Reduce the complexity of elements to be analyzed
Modest number of people that accepted invitation to attend the open schooling event	Medium	Medium	Professors Students	- Re–invitations by email - Telephone calls
Modest students' interest for the school project	Medium	High	Professors Students	-Give motives to the students (e.g. presenting at the school event, project as an alternative assessment tool instead of tests) -Scaffold students who face difficulties

7. Plan: Plan Procurement Processes

a. Determine what goods and services you need
b. Have what you need at the time that you need it

Supplies Breakdown Structure
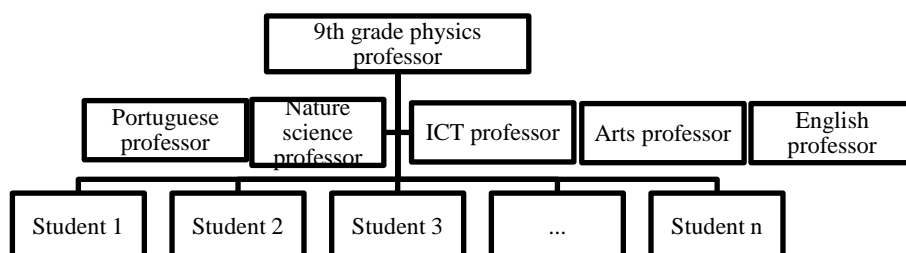*(filled with examples, these may change according to your project organisation)*

Supply	Supply Cost (supplies)	When to be available	How to be available
Paper	20 euros	In the beginning of the project	Commitment of school top management
Printer	50 euros	In the beginning of the project	Commitment of school top management
Mobile laptop	1250 euros	In the beginning of the project	Commitment of school top management
Printed post	40 euros	Before the open schooling event	Poster printing in Stapples Office Center

8. Plan: Plan People

a. Acquire the project team
b. Map the project team in the Organization Breakdown Structure
c. Assign the project team members to roles
d. Assign the project team members to activities
e. Train the project team
f. Determine how you will motivate and reward the team
g. Map Stakeholders – people or groups interested in the project
h. Determine how you will engage stakeholders in the project

Organization Breakdown Structure
(filled with examples, these may change according to your project organisation)

Responsibility assignment matrix
(filled with examples, these may change according to your project organisation)

Activity	Team members						
	Students	9th Grade Physics professor	Nature science professor	ICT professor	Arts professor	Portuguese professor	English professor
Understand simulation tool	X	C/P	I	C/P	I	I	I
Hands on simulation tool	X	C/P	I	C/P	I	I	I
Do simulations	X	C/P	I	C/P	I	I	I
Analyse data	X	C/P	C/P	C/P	C/I	C/I	C/I
Prepare poster	X/P	C/P	C/I	C/I	C/P	C/P	C/P
Coordinate the overall implementation of the project		X/C/P	C/I	C/I	C/I	C/I	C/I
Coordinate the school event		X/C/P	C/I	C/I	C/I	C/I	C/I
Attend the school event and present their work	X	X/P	X	X	X	X	X

Letter	Role
X	Executes work
P	Controls progress
C	Should be consulted
I	Should be informed

Stakeholders Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Directly involved in the project (yes/no)	Served or Affected by the Project	Likely to be user of the results of the project
Parents	yes	yes	yes
School community	yes	yes	yes
School management	no	yes	yes
Municipality	no	yes	yes
Residents' association	no	yes	yes
Mechanical Engineering Department at ISEL	no	yes	yes
Fire Department Headquarters	no	yes	yes

Stakeholders Management Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Who they are and why should be involved in the project	Why the project is relevant for them	Strategies to obtain support
Parents	Students' families should be involved in the open schooling event. Their involvement also maximizes the impact of the project in terms of global literacy.	Due to their interest in pupils' education and school health and well-being	Present the school project in parents meeting.
School community	The school community should be involved in the open schooling event. Their involvement also maximizes the impact of the project in terms of global literacy.	Due to their interest in students' education and school health and well-being	Present the school project in a school community meeting.
School management	The school management assures relevant resources for students' projects and should be involved in the open schooling event. Their involvement also maximizes the impact of the project in terms of global literacy.	Due to their interest in students' education and school health and wellbeing. Also due to their interest in demonstrating the interest of school in contributing to community health (to be a health promotion school).	Present the school project in parents meeting.

Stakeholder name	Who they are and why should be involved in the project	Why the project is relevant for them	Strategies to obtain support
Municipality	The municipality should be involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to municipality interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project).
Residents' association	Residents' associations should be involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to residents' associations interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project).
Mechanical Engineering Department at ISEL	The Mechanical Engineering Department at ISEL should be involved in the project allowing students to interact with the computational tool. In this location, students can build their own spaces, change environmental conditions, see differences, describe simulations, and report their case studies on a short report.	Due to their interest in novel methodologies for STEM education and role in policy making.	Invitation to participate in the open schooling event (that also provides a summary description of the school project).
Fire Department Headquarters	Students will visit the facilities of a fire department and get contact with volunteers and professionals. This will allow them to see the personal protection equipment for health and safety of first responders, the equipment and instruments in the rescue and transport vehicles and understand the functioning of the integrated medical emergency system and know what the procedures for evaluating and monitoring victims are.	Due to volunteer fire department interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event.

9. Plan: Plan Communication

a. Assure the right information to the right people, at the right time, in a useful format
b. Assure effective project meetings
c. Build the communications plan

Communications plan
(filled with examples, these may change according to your project organisation)

Organized by (from)	Participants (to)	What	When	How/Where	Purpose
9th Physics professor	Team	Kick-off meeting	Begining of the project (date to be defined)	School facilities	Provide a complete description of the project and what the output product will be.
9th Physics professor and Team	Team	Team meeting	Every week (date to be defined)	School facilities	- Overall plan for the project - Discuss project developments and plan next stage - Instruct team on how to - Provide updates on the progress of the project and if there are any issues with completion

Organized by (from)	Participants (to)	What	When	How/Where	Purpose
9th Physics professor	Team and Parents	Meeting	Before the project starts (date to be defined)	School meeting room	Explain the project and invite for participation in the open schooling event.
9th Physics professor	Parents	Meeting	Before the project starts (date to be defined)	Virtual meeting	Explain the project and invite for participation in the open schooling event.
9th Physics professor, Team, School management	School community Municipality Residents' association Mechanical Engineering Department at ISEL Fire Department Headquarters	Invitations to stakeholders' participation in open schooling event	Before the open schooling event (date to be defined)	By email	Explain the project and invite for participation in the open schooling event.

10. Plan: Finish the project planning by building the Charter

1.0 Project identification	
Name	Droplets and the physics of viruses' transmission
Summary description	It is intended at the end of the project implementation that the students produce a scientific poster/presentation regarding the basic concepts related with the physics of viruses 'transmission and construct an infographic regarding airborne diseases and preventive measures to mitigate the dissemination of such diseases, using the evidence they collected from the analysis of the CFD simulations.
Project owner	- Alvalade School - Benfica School - Olivais School - D.Filipa de Lencastre School - Luís de Camões School
Project manager	To be defined
Stakeholders	- Parents - Due to their interest in pupils' education and school health and well-being. - School community- Due to their interest in students' education and school health and well-being. - School management - Due to their interest in students' education and school health and well-being. - Municipality - Due to municipality interest in the results of students' projects. - Residents' association - Due to residents' associations interest in the results of students' projects. - Mechanical Engineering Department at ISEL - Due to their interest in novel methodologies for STEM education and role in policy making. - Fire Department Headquarters - volunteer fire department interest in the results of students' projects.
Team and roles	- Students - The ones who will implement the project, by following the project-based learning methodology with the resources aforementioned. - Teachers - The ones who will monitor the progress of all the activities develop by students during the project implementation. - 9th grade physics teacher - The head coordinator of the project. The one who will distribute and coordinate all the proposed activities between students and the reaming teachers. - ICT teacher - Responsible for the engagement of the students with the simulation tool along with the 9th grade physics teacher. - Science teacher - Responsible for the conclusions to be withdrawn from the simulations results regarding public health impacts along with the 9th grade physics teacher. - Arts teacher - Responsible for the design and creative presentation of the scientific poster along with the 9th grade physics teacher. - Portuguese teacher – Collaboration on the text review. - English teacher - Collaboration on the text review.

2.0 Needs that support the project
- The need for active and experiential school education which is not supported by the largest part of the Curriculum, yet boosts students' learning outputs, soft skills and interest in learning. The current state of education lacks active learning, inquiry-

- based learning, project-based learning, and other modern educational approaches which serve several educational benefits to students.
- The need for more effective STEM education which both provides all students with fundamental STEM skills for their everyday decision-making, and makes more students more intensely interested in STEM fields, even follow STEM careers in the future. Few students have a love for STEM subjects and even fewer have an aspiration to follow STEM related professional careers. This STEM educational projects hopes to bring more students in touch to the real essence of STEM theory and practice and make them love this field.
- The need for more effective Public Health Education. Public Health is a major health issue which is often undermined in Health Education. As the COVID-19 pandemic highlighted, personal health-related decisions affect the society and the way the society behaves affects every person in particular. Moreover, airborne diseases pose a constant threat for Public Health for every country in the world. The project aims to offer high-quality Public Health Education to students.
- The need for Education with a view to active citizenship. During this project students study the interrelations between science and the everyday social context and realize the importance of informed decision-making for science topics in everyday lives. Connection to social issues often lacks from science and STEM education. This project aims to give students the opportunity to understand the close entanglements of science and society and be active citizens in the future.

3.0 Project goals

- **Specific**: the area of improvement is the air transmission diseases and preventive measures to mitigate the spread of such diseases at the community level.
- **Measurable:** despite others the metrics that are used are the time that particles stay in the air and the distance particles reach in different environments
- **Achievable**: the scenario has a baseline case study that is used to compare to other case studies where variable changes to be compared isolated, each case study can be compared to each other regarding the baseline scenario
- **Relevant**: the indicators allow to infer the influence of the chosen variables in the particle dissemination, that will let to conclude/ reflect on the spread of airborne diseases and what measures and behaviours one should have to mitigate them
- **Time-bound**: the deadline is 30th of June 2023

4.0 Project scope

The project is based on a series of activities to be conducted at each session defined for the educational scenario. In short, these are the tasks for the project:

- Based on the knowledge coming from lessons 1-6, students will visit the laboratory of the mechanical engineering department at ISEL and will interact with the computational tool
- They can build their own spaces, change environmental conditions, see the differences, describe the simulations, and report their case studies (evidence on droplets' dissemination at different sets of environments) in a short report
- Then, teacher proposes successive debates about the scientific reports in the form of "research seminars" taking place in the school or in the science clubs
- Subsequently, students develop a scientific poster/presentation related to the physics of viruses' transmission and droplets characterization and an infographic related to airborne diseases (types) and respective preventive measures to be applied at the community.
- Students present the infographic and the scientific presentation/poster to the parents, school community and relevant local stakeholders in the open schooling events allowing the comprehension on how the rapid growth of new cases of airborne diseases, such as COVID-19, or other acute respiratory diseases such as Flu, is influenced by individual behaviour and environmental factors
- In addition, students will visit the facilities of a volunteer fire department, allowing them to see the personal protection equipment for health and safety of first responders, the equipment and instruments in the rescue and transport vehicles and understand the functioning of the integrated medical emergency system and know what the procedures for evaluating and monitoring victims are

5.0 Key Deliverables

- Worksheets from students' educational activities
- Scientific slide presentation/poster
- Scientific reports
- Infographic
- Brochures
- Open schooling event

6.0 Milestones and dates

- Elaboration of a scientific poster/presentation about basic concepts related to the physics of viruses' transmission and droplets characterization
- Elaboration of short reports on how droplets disseminate in different sets of environments using the simulation results that students will produce/analyze throughout the project implementation, to be concluded until 30th of June 2023
- Elaboration of an infographic: airborne diseases (types) and preventive measures until 30th of June 2023
- Elaboration of brochures for parents, municipalities, and other stakeholders, to be concluded until 30th June 2023
- Open schooling event preparation to be concluded before July 2023
- Presentation of project´s outputs at the open schooling event

7.0 Constraints

- Budget
- Project should be finished on 30th of June 2023 (limit)

8.0 Risks and opportunities

- Modest number of simulations produced/analysed
- Modest number of people that accepted invitation to attend the open schooling event

9.0 Project success criteria

Project completed until 30th of June 2023
High-quality project outputs according to the assessment rubrics
High students' interest and participation in the project and the open schooling event
Open schooling event in a community setting with the participation of the school community, parents, and local stakeholders

10.0 Project success factors

Appropriate engagement of students with the simulation tool
Appropriate simulation analysis conducted by students
Appropriate engagement of students and parents
Adequate attendance of stakeholders in the open schooling event
Interest of teachers in project-based learning

Teaching-learning process milestones:

Students will be able to:

1. Develop critical reasoning (e.g., analysing, organizing, debating, and sharing information about the simulations outputs).
2. Develop digital skills (e.g., finding, reviewing, and using different online resources to develop the activities).
3. Understand how a Computational Fluid Dynamics (CFD) Tool is handled and its relevance for managing public health threats.
4. Use concepts of physics science to explain the process of droplets dissemination in closed spaces.
5. Understand several factors that influence droplets' dissemination.
6. Understand how a ventilation system might mitigate the spreading of airborne disease.
7. Develop the ability to construct different types of arguments, counterarguments, and rebuttals in order to make decisions regarding socio-scientific questions.
8. Develop the ability to debate socio-scientific questions.
9. Influence community's perceptions and knowledge about respiratory viruses' transmission and airborne diseases.
10. Develop responsible citizenship and critical health literacy.

Teaching-learning process for school project (summary):

1. Collection of evidence (data, articles, pictures)
2. Evaluation of the evidence based on criteria and selection of the relevant and non-biased information.
3. Evaluation of CFD simulation results.
4. Design reports referring to the CFD simulation results.
5. Design criteria for arguments evaluation.
6. Design rubric for evaluation of public debate.
7. Design an agenda for the open schooling event.
8. Create a brochure/power-point related to measures to be taken to prevent and mitigate the dissemination of acute respiratory diseases and distribute it in open schooling event.

Organization of the open schooling event:

1. Each project output (simulations and report) is presented by the students in a community setting (e.g., exposition center, municipality, garden, museum, science fair).
2. Students will communicate policy measures using STEM-based argumentation. Students appeal to the action of all in health of the community, providing great understanding that preventing the spreading of a disease is a responsibility of all, not only of the ministry of health or healthcare providers.
3. Students, parents, school community and relevant local stakeholders attend the event and understand how the incidence of acute respiratory diseases is influenced by individual behaviour and environmental factors.

They also get high-level understanding on strategies to minimize the phenomena and how they may have an influence on the relevant settings (e.g., home, school, workplace, public space at the community level).

Target Audience for Recommendations

Other schools that use the repository platform.
Social NGOs.
Decision makers.
General public.
Mass media.
Families.
Friends.
Future students.

Public Debate and Recommendations

Presentation of the report of simulations by students in a community setting and dissemination of evidence recommendations via social, community and conventional media.
Interaction between schools informing school how their report (in the repository platform) enhanced the B-school project and study.
Networking between schools with similar environment.
Discussion and feedback.
Produce a revised report based on the reports from other schools.
Make recommendations for public spaces.
Dissemination of final report and recommendations in the school website and inform the major stakeholders (public transport companies, schools, canteens, hospitals and health care centres, etc.).

Main Partner responsible: ISEL

25. Project management resource and inquiry instruments on the topic of "Energy sources, and public health impact"

Overview

Air pollution is a global issue with well-documented public health effects. While some of the consequences of pollution are unpredictable in terms of climate change, others such as heat stress, chronic respiratory and cardiovascular diseases, cancers, are supported by considerable evidence. Energy supply chains highly contribute to air pollution, which now causes over 7 million deaths every year, with over 4 million deaths from household air pollution, and over 3.5 million from outdoor air pollution. Given the nature of the Earth as an energy-dependent system, the educational scenario supports physics teachers in organising classroom debate on energy transition towards more carbon-neutral environments. The learning experience prepares youths to become aware of energy sources and the importance of renewable sources in the sustainability of the Earth as a viable ecosystem. The impact of different sources of energy is discussed, with a focus on rationalization, economic and environmental impacts. With this scenario, teachers will be promoting awareness on implications of energy choices on air pollution, on the planet and for community health.

Estimated duration

After initial socioscientific and technical background on the topic in classroom environment (5-6 sessions), 6 sessions of 40-45 minutes for school project (session 7 – session 12)

School Research Project

Topics:
- Type of energies in systems.
- Direction in which energy is transferred.
- Renewable and non-renewable energy sources (advantages and disadvantages of their use and consequences for the sustainability of the Earth, interdisciplinary perspective).
- Distinguish temperature from heat, relating them through examples.
- Preferences that promote a rational use of energy.
- Consequences for the environment of the emission of pollutants from combustion reactions, propose mitigation and adaptation measures.
- Climate change as one of the major current environmental problems.
- Air pollution and climate change.
- Air pollution as an environmental determinant of health.

Research management, design and administration

Challenge: build an infographic, scientific poster/presentation, about Primary Energy sources, Energy Rationalization, and public health impacts!

Method (summary): students are organized in groups; each group addresses several ways to conduct energy rationalization in their school. The project challenges each group of students to create and present an infographic that synthetizes a) What they have learned throughout the teaching-learning sequence; b) Actions to reduce energy consumption at the school level; c) Relevant outcomes due to application of such measures. By following this process, at the end of the project students will have understood the importance of rational use of energy.

Development process: Building upon the knowledge acquired in previous classes, students seek to make observations in school environment and identify a series of actions to be adopted by the school community to rationalize energy consumption. In the development of the project, students carry out a survey/observations of school community infrastructure and people behaviour on the subject. The teacher discusses with students' possible questions to assess the attributes of the school in the topic of energy consumption and possible methods to get the answers. The advantages and limitations of the alternatives are discussed. Then a brainstorming of possible questions to address the topic is promoted by the teacher: 1. Are there solar panels at school? 2. Is there any strategy ongoing to save energy? 3. Is there any strategy ongoing to avoid waste of water? 4. Is there any strategy ongoing to create a more sustainable environment at school? 5. What are the school's energy consumption needs?

The output of the project is a list of school attributes, strengths and weaknesses and proposals to be adopted by the school community to mitigate long-term risks (e.g., escalation of the problem of climate change, increased air pollution, increased incidence of chronic respiratory diseases, etc.). Proposals for energy rationalization are linked with benefits that the change in behaviour can bring to the school community health and well-being.

Session 1-2: research administration

The teacher organizes groups, each group addresses 1 topic connected with rationalization of energy consumption within the school community:

 A. People's behavior towards energy rationalization (survey).
 B. School community policy regarding energy consumption (observation sheet).

The teacher discusses with students' possible questions to assess the attributes of the school infrastructures/ behavior of the school community and possible methods to get the answers. The application of an online questionnaire is suggested but other data collection methods (e.g.: observations sheet regarding the school infrastructures/policy towards energy rationalization) may be considered. The advantages and limitations of the alternatives are discussed.

A brainstorming of possible questions to address the topics is promoted by the teacher. An example of plausible questions to be made in order to complete the task are (other questions may be included):

 ✓ Are there solar panels at school?
 ✓ Is there any strategy ongoing to save energy?
 ✓ Is there any strategy ongoing to avoid waste of water?
 ✓ Is there any strategy ongoing to create a more sustainable environment at school?
 ✓ What are the school's energy consumption needs?
 ✓ Where does the current school energy spend going?
 ✓ How much gas does the school use and what is the cost?
 ✓ How much water does the school use and what is the cost?
 ✓ What temperature is the school heated to?
 ✓ What is uses most energy in school: lightning, heating, etc.?
 ✓ Is there any technology left on longer than needed, over night? On holidays?
 ✓ Do you follow any strategy to mitigate energy waste?
 ✓ What are you available to do in order to prevent energy waste?

After finishing the list of questions, students prepare the data collection instrument, where they discuss how the questions are going to be organized, strategies and activities to achieve the target, a timeline for collecting the responses, which events may constrain the data collection, etc. The teacher delegates each task (filling of the survey and/or observation sheet) to each group.

Session 3: Data analysis

After administering the survey and collecting the minimum number of responses, an Excel file may be downloaded from google forms. Alternatively, if the questionnaire is administered in paper, students prepare a file with the questions and distribution of responses. The teacher reminds students about the relevance of the project and supports each group of students in preparing tables, graphics and then promotes a debate around the results.

Session 4-5: presentation of the project results

Session 4 starts with the discussion of the best presentation format of the project results.

The output is produced and describes the research question, methodology, results, conclusions, and recommendations arising from the inquiry-based project. A poster is suggested, it can be built in paper or in a Microsoft Power-Point presentation.

Then students discuss with the teacher the organisation of a forum for presentation and discussion of the output that invites students, teachers, parents, social partners of the local community to participate and engage in a debate.

<u>Session 6: Open schooling event</u>

During session 6 students will be holding a community event to share the results of their project with the participation of students, teachers, parents, social partners of the local community.

Each group will be presenting their evidence and informing the public about the questions they have addressed in the project while improving communication skills and developing responsible citizenship.

- Each project output (e.g.: poster and scientific presentation, infographic) is presented by the students in a community setting (e.g., exposition centre, municipality, garden, museum, science fair).
- Students will communicate policy measures using STEM-based argumentation. Students appeal to the action of all in health of the community, providing great understanding that preventing energy waste is a responsibility of all, not only of the government and municipalities.
- Students, parents, school community and relevant local stakeholders attend the event and understand how energy waste is influenced by individual behaviour and environmental factors. They also get high-level understanding on strategies to minimize energy poverty and how they may have an influence on the relevant settings (e.g., home, school, workplace, public space at the level).

Project Management Framework and Instruments

1. Plan: Determine How to Do the Project
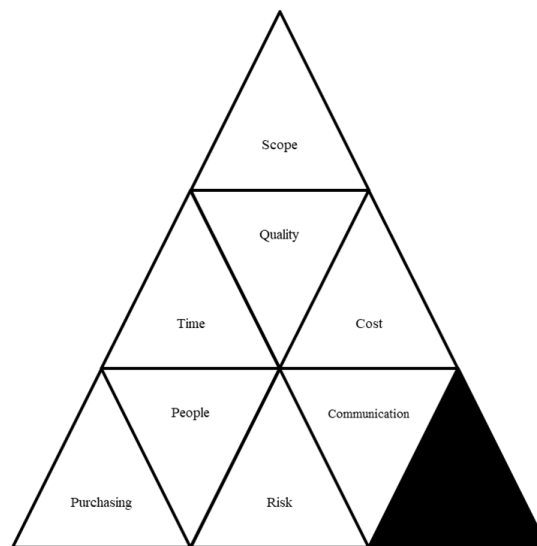
2. Plan: Define Project Scope

- What are the outputs?
  ✓ scientific poster about school attributes, strengths and weaknesses and proposals to be adopted by the school community to mitigate long-term risks to public health regarding excessive energy exploration/consumption (e.g., escalation of the problem of climate change, increased air pollution, increased incidence of chronic respiratory diseases, etc.).
  ✓ brochures for parents, municipalities, and other stakeholders.
  ✓ open schooling event.

-What are the requirements of project outputs?
  ✓ printed poster: A3 format, Color, 6 sections (introduction, goals, methods, results, conclusions, recommendations).
  ✓ brochures: A4 format, Color, 4 sections (introduction, results, conclusions, recommendations)
  ✓ laptop for the presentations
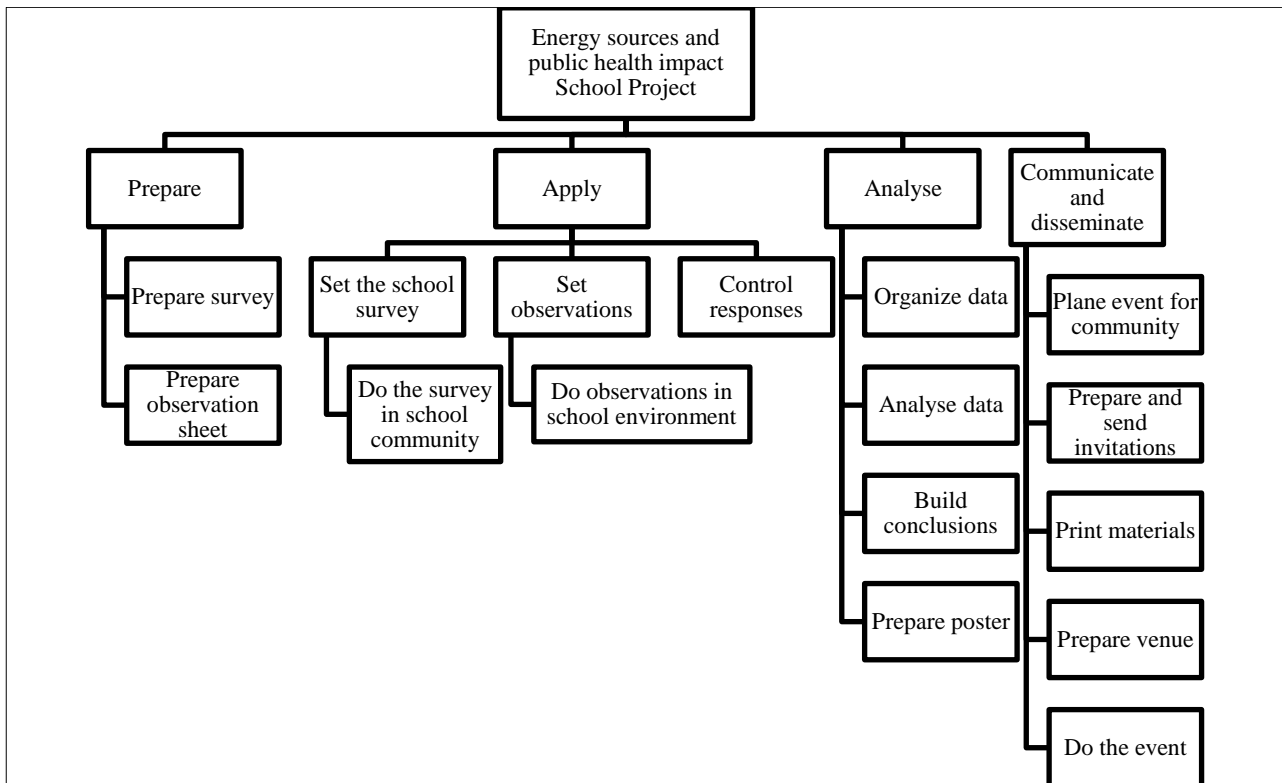 ✓ projector for the presentations

- Are there any constraints to produce the project outputs?
The project needs to be completed in 4-6 sessions, implemented in a consecutive period of time to maximize the impact.

- Define the tasks to produce the outputs – build the Work Breakdown Structure

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Work Breakdown Structure (WBS)
(filled with examples, these may change according to your project organisation)

3. Plan: Determine Project Time

a. Define the detailed activities for each WBS element
b. Put the activities in sequence
c. Estimate the resources (human and acquisitions) for each activity
d. Estimate the calendar time (days or weeks) for each activity
e. Create the Gantt Chart

Resource Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources
Define the survey	1 hour	paper, laptop
Organized the survey in a certain format	1 hour	paper, laptop
Prepare observation sheet	1 hour	paper, laptop
Do observations in school environment	3 hours	paper, laptop
Do the survey in school environment	3 hours	paper, laptop
Analyse data	3 hours	paper, laptop
Prepare poster	3 hours	paper, laptop
Poster presentation	2 hours	paper, laptop

Gantt Chart
(filled with examples, these may change according to your project organisation)

Activity	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
Define the survey	■					
Organized the survey in a certain format	■					
Prepare observation sheet	■					
Do observations in school environment		■				
Do the survey in school environment		■				
Analyse data			■			
Prepare poster				■	■	
Poster presentation						■

4. Plan: Determine Project Cost

   a.   Estimate how much each activity will cost
Note: include the cost for Labor, Supplies, overhead (like office space and equipment)

   b.   Add the estimates to determine the total cost of your project

Cost Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources	Human Resource Cost	Other Resources Cost (supplies)
Define the survey	1 hour	paper, laptop	20 euros	n.a
Organized the survey in a certain format	1 hour	paper, laptop	20 euros	n.a
Prepare observation sheet	1 hour	paper, laptop	20 euros	n.a
Do observations in school environment	3 hours	paper, laptop	60 euros	n.a
Do the survey in school environment	3 hours	paper, laptop	60 euros	n.a
Analyse data	3 hours	paper, laptop	60 euros	n.a
Prepare poster	3 hours	paper, laptop	60 euros	n.a
Poster presentation	2 hours	paper, laptop	40 euros	n.a.
Total	15h (the application of the survey and observation sheet will be made simultaneously)	-	340 euros	-

5. Plan: Determine Project Quality

   a.   Ensure your project produces quality outputs
   b.   Plan what quality means to your project
   c.   Determine how you will ensure quality
   d.   Ensure your project produces quality outputs
   e.   Plan what quality means to your project
   f.   Determine how you will ensure quality

Quality Breakdown Structure
(filled with examples, these may change according to your project organisation)

Requirement	Quality planning	Quality assurance	Quality control
1.1	Minimum number of responses to the survey	Minimum number of responses to the survey: 50	Monitor the number of responses to the survey on daily basis
1.2	Minimum number of observations	Minimum number of observations: 5	Monitor the number of observations on a daily basis
1.3	Poster template with six sections	Poster with six sections: introduction, goals, methods, results, conclusions, recommendations.	Monitor the developments of students' poster

6. Plan: Determine Project Risks

   a.   Identify the two types of risks (uncertain future events that can affect your project): threats have a negative impact on your project; opportunities have a positive impact on your project

Risk Breakdown Structure
(filled with examples, these may change according to your project organisation)

Risk	Probability (How likely is it to happen)	Impact (How big of an effect will it have)	Owner (who takes care about the risk)	Action Plan (initiatives to reduce threats and increase opportunities)
Modest number of responses to the survey	High	High	Professors Students	-Monitor the number of responses on a daily basis
Modest number of people that accepted invitation to attend the open schooling event	Medium	Medium	Professors Students	- Re–invitations by email - Telephone calls
Modest students' interest for the school project	Medium	High	Professors Students	-Give motives to the students (e.g. presenting at the school event, project as an alternative assessment tool instead of tests) -Scaffold students who face difficulties

7. Plan: Plan Procurement Processes

a. Determine what goods and services you need
b. Have what you need at the time that you need it

Supplies Breakdown Structure
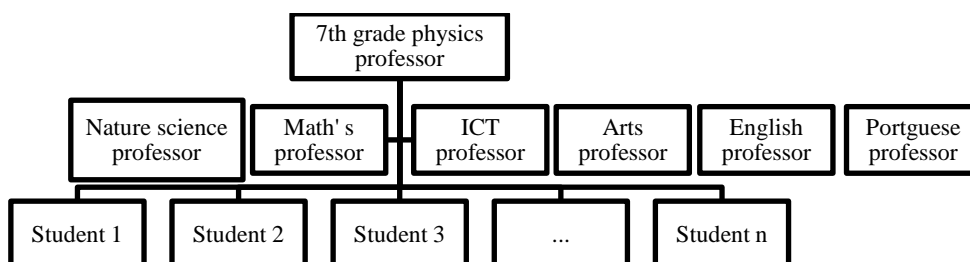*(filled with examples, these may change according to your project organisation)*

Supply	Supply Cost (supplies)	When to be available	How to be available
Paper	20 euros	In the beginning of the project	Commitment of school top management
Printer	50 euros	In the beginning of the project	Commitment of school top management
Mobile laptop	700 euros	In the beginning of the project	Commitment of school top management
Printed post	40 euros	Before the open schooling event	Poster printing in Stapples Office Center

8. Plan: Plan People

a. Acquire the project team
b. Map the project team in the Organization Breakdown Structure
c. Assign the project team members to roles
d. Assign the project team members to activities
e. Train the project team
f. Determine how you will motivate and reward the team
g. Map Stakeholders – people or groups interested in the project
h. Determine how you will engage stakeholders in the project

Organization Breakdown Structure
(filled with examples, these may change according to your project organisation)

Responsibility assignment matrix
(filled with examples, these may change according to your project organisation)

Activity	Team members							
	Students	**7th grade physics professor**	**Math professor**	**ICT professor**	**Nature science professor**	**Arts professor**	**Portuguese professor**	**English professor**
Define the survey	X	C/P	I	I	I	I	I	I
Organized the survey in a certain format	X	C/P	I	C/P	C/I	I	I	I
Prepare observation sheet	X	C/P	I	C/P	C/I	I	I	I
Do observations in school environment	X	C/P	C/I	C/I	C/I	I	I	I
Do the survey in school environment	X	C/P	C/I	C/I	C/I	I	I	I
Analyse data	X	C/P	C/I	C/I	C/I	I	I	I
Prepare poster	X	C/P	C/I	C/I	C/I	C/P	C/I	C/I
Poster presentation	X	C/P	C/I	C/I	C/I	C/P	C/I	C/I
Coordinate the overall implementation of the project		X/C/P	C/I	C/I	C/I	C/I	C/I	C/I

Letter	Role
X	Executes work
P	Controls progress
C	Should be consulted
I	Should be informed

Stakeholders Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	**Directly involved in the project (yes/no)**	**Served or Affected by the Project**	**Likely to be user of the results of the project**
Parents	yes	yes	yes
School community	yes	yes	yes
School management	no	yes	yes
Municipality	no	yes	yes
Residents' association	no	yes	yes
League for Nature Protection	no	yes	yes

Stakeholders Management Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	**Who they are and why should be involved in the project**	**Why the project is relevant for them**	**Strategies to obtain support**
Parents	Students' families are involved in the survey and in the open schooling event. Their involvement also maximizes the impact of the project in terms of global literacy.	Due to their interest in pupils' education and school health and well-being.	Present the school project in parents meeting
School community	The school community are involved in the survey, the observations of the school infrastructure to be done by students in school environment and at the open schooling event. Their involvement also maximizes the impact of the project in terms of global literacy.	Due to their interest in students' education and school health and well-being.	Present the school project in a school community meeting

Stakeholder name	Who they are and why should be involved in the project	Why the project is relevant for them	Strategies to obtain support
School management	The school management assures relevant resources for students' projects and is involved in the survey and in the open schooling event. Their involvement also maximizes the impact of the project in terms of global literacy.	Due to their interest in students' education and school health and wellbeing. Also due to their interest in demonstrating the interest of school in contributing to community health (to be a health promotion school).	Present the school project in parents meeting.
Municipality	The municipality is involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to municipality interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project).
Residents' association	Residents' associations are involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to residents' associations interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project).
League for Nature Protection	The League for Nature Protection is involved in the open schooling event where students share the results of their projects and communicate recommendations.	Due to their interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project).

9. Plan: Plan Communication

a. Assure the right information to the right people, at the right time, in a useful format
b. Assure effective project meetings
c. Build the communications plan

Communications plan
(filled with examples, these may change according to your project organisation)

Organized by (from)	Participants (to)	What	When	How/Where	Purpose
7th grade physics professor	Team	Kick-off meeting	Begining of the project (date to be defined)	School facilities	Provide a complete description of the project and what the end product will be.
7th grade physics professor	Team	Team meeting	Every week (date to be defined)	School facilities	- Overall plan for the project - Discuss project developments and plan next stage - Instruct team on how to - Provide updates on the progress of the project and if there are any issues with completion
7th grade physics professor	Team and Parents	Meeting	Before the project starts (date to be defined)	School meeting room	Explain the project and invite for participation in the survey and open schooling event.
7th grade physics professor and Team	Parents	Meeting	Before the project starts (date to be defined)	Virtual meeting	Explain the project and invite for participation in the survey and open schooling event.

Organized by (from)	Participants (to)	What	When	How/Where	Purpose
7th grade physics professor, Team, School management	School community Municipality Residents' association League for Nature Protection	Invitations to stakeholders' participation in open schooling event	Before the open schooling event (date to be defined)	By email	Explain the project and invite for participation in the open schooling event.

10. Plan: Finish the project planning by building the Charter

1.0 Project identification	
Name	Energy sources and public health impact
Summary description	It is intended that students perform a series of observations in school environment and identify a series of actions to be adopted by the school community to rationalize energy consumption.
Project owner	Alvalade School - Benfica School - Olivais School - D.Filipa de Lencastre School - Luis de Camões School
Project manager	The main coordinator at each school that will implement the scenario
Stakeholders	- Parents - Due to their interest in pupils' education and school health and well-being - School community- Due to their interest in students' education and school health and well-being - School management - Due to their interest in students' education and school health and well-being. - Municipality - Due to municipality interest in the results of students' projects. - Residents' association - Due to residents' associations interest in the results of students' projects. - League for Nature Protection - volunteer fire department interest in the results of students' projects
Team and roles	- Students - The ones who will implement the project, by following the project-based learning methodology with the resources. Teachers - The ones who will monitor the progress of all the activities developed by students during the project implementation. - 7th grade physics teacher - The head coordinator of the project. The one who will distribute and coordinate all the proposed activities between students and the reaming teachers. - Math´s teacher – Collaboration on the creation/organization of both the observation sheet and survey. - ICT teacher - Collaboration on the creation/organization of both the observation sheet and survey. - Science teacher - Collaboration on the creation/organization of both the observation sheet and survey as well as on the analysis of the collected data by students. - Arts teacher - Responsible for the design and creative presentation of the scientific poster along with the 7th grade physics teacher. - Portuguese teacher – Collaboration on the text review. - English teacher - Collaboration on the text review.

2.0 Needs that support the project
- The scientific and pedagogical content of the project allows teachers and students to explore the way in which sources of energy are consumed in the school community and their relationship with public health, and later, the presentation of action measures in their communities to mitigate the public health problems arising from energy waste and excessive energy exploration/consumption. - The project also increases students' understanding on how STEM (Science, Technology, Engineering and Mathematics) can contribute to anticipating, mitigating, and resolving threats to public health arising from situations like excessive energy exploration or energy waste, such as air pollution, throughout the use of interactive mechanisms that encourage more sustainable use of energy - The project also highlights the value of open education approaches to developing responsible active citizenship and personal and social responsibility for public health.

3.0 Project goals
- **Specific**: the area of improvement is the impact on human health of how one consumes energy. - **Measurable**: despite others, the metrics used are the monitoring of the responses to the survey on a daily basis. - **Achievable**: develop the project step-by-step

- **Relevant**: the collected indicators allow to infer the influence of the school attributes/behaviour regarding energy rationalization, that will let to conclude/ reflect on the quality of life and what measures and behaviours one should take to mitigate problems such as energy waste.
- **Time-bound**: the deadline to complete the project is June 30

4.0 Project scope

The project is based on a series of activities to be conducted at each session defined for the educational scenario. In short, these are the tasks for the project:

- Building upon the knowledge acquired in previous classes, students seek to make observations in school environment and identify a series of actions to be adopted by the school community to rationalize energy consumption. In the development of the project, students carry out a survey/observations of school community infrastructure and people behaviour on the subject.
- Then the teacher discusses with students' possible questions to assess the attributes of the school in the topic of energy consumption and possible methods to get the answers. The advantages and limitations of the alternatives are discussed. Then a brainstorming of possible questions to address the topic is promoted by the teacher: 1. Are there solar panels at school? 2. Is there any strategy ongoing to save energy? 3. Is there any strategy ongoing to avoid waste of water? 4. Is there any strategy ongoing to create a more sustainable environment at school? 5. What are the school's energy consumption needs?
- It is also scheduled that students visit the facilities of the League for Nature Protection, where they participate in a series of interactive activities promoted by the association, with the aim of raising students' awareness of public health problems related to environmental causes such as energy consumption.
- The output of the project is a list of school attributes, strengths and weaknesses and proposals to be adopted by the school community to mitigate long-term risks to public health regarding energy waste/ excessive energy consumption/exploration (e.g., escalation of the problem of climate change, increased air pollution, increased incidence of chronic respiratory diseases, etc.). Proposals for energy rationalization are linked with benefits that the change in behaviour can bring to the school community health and well-being.

5.0 Key Deliverables

- Survey
- Observation sheet
- Scientific poster
- Brochures
- Open schooling event

6.0 Milestones and dates

- Elaboration of the survey and observation sheet to de concluded-on week 1.
- Conclusion of the survey and observation sheet on week 2.
- Elaboration of a scientific slide poster to be concluded before the open schooling event (limit: June 30).
- Elaboration of brochures for parents, municipalities, and other stakeholders, to be concluded before the open schooling event (limit: June 30).
- Preparation of the open schooling event to be concluded before July 2023
- Presentation of project´s outputs at the open schooling event

7.0 Constraints

- Budget
- Lack of equipment
- Project to be finished on 30th of June 2023 (limit)

8.0 Risks and opportunities

- Modest number of responses to the survey
- Modest interest of the students for the project
- Possible time constraint due to teachers'/students' schedule
- Modest number of people that accepted invitation to attend the open schooling event.

9.0 Project success criteria

- Project completed until 30th of June 2023
- High students' interest and participation in the project and the open schooling event
- Open schooling event in a community setting with the participation of the entire school community, parents, and local stakeholders

10.0 Project success factors
- Appropriate engagement of students with the proposed activities such as the survey
- Appropriate engagement of students and parents
- Adequate attendance of stakeholders in the open schooling event
- Interest of teachers in project-based learning

Teaching-learning process milestones:

Students will be able to:

1. Develop critical reasoning (e.g., analysing, organizing, debating, and sharing information regarding lesson 3 – students are asked to satisfy households energy consumption needs having at their disposable several primary energy sources)
2. Develop digital skills (e.g., finding, reviewing, and using high-quality online resources to develop the activities)
3. Understand the concept of "Primary Energy" and its importance.
4. Understand the concepts of "Energy Production, Transfer, Conservation" and its importance.
5. Understand the impact at different levels (e.g., economic, social, health) of excessive energy exploration and consumption, as well as energy waste.
6. Develop the ability to build arguments, counterarguments, and rebuttals, to make a decision regarding socio-scientific questions.
7. Develop the ability to debate socio-scientific questions.
8. Investigate community's perceptions and knowledge concerning energy waste and excessive energy consumption.
9. Develop responsible citizenship and critical health literacy.

Teaching-learning process for school project (summary):

1. Collection of evidence (data, information, articles, pictures).
2. Evaluation of the evidence based on criteria and selection of the relevant and non-biased information.
3. Design criteria for arguments evaluation.
4. Design rubric for evaluation of public debate.
5. Design an agenda for the open schooling event.
6. Create a brochure and/or presentation with measures to be taken to efficiently satisfy energy consumption needs in different environments (e.g., school, house) and distribute it in open schooling event.

Organization of the open schooling event:

1. Each project output (brochures/presentation) is shared by the students with the school community in a relevant setting (e.g., exposition center, municipality, garden, museum, science fair).
2. Students will communicate policy measures using STEM-based argumentation. Students appeal to the action of all in health of the community, providing great understanding that preventing energy waste is a responsibility of all, not only of the government and municipalities.
3. Students, parents, school community and relevant local stakeholders attend the event and understand how energy waste is influenced by individual behaviour and environmental factors. They also get high-level understanding on strategies to minimize energy poverty and how they may have an influence on the relevant settings (e.g., home, school, workplace, public space at the level).

Data Analysis and Reporting

Data filtration
Define minimum representative data collected
Data categorization
Data presentation formats
Internal presentation
Report writing
Develop and create communication material

Target Audience for Recommendations

- Social NGOs
- Decision makers
- General public
- Mass media
- Families
- Friends

Public Debate and Recommendations

Gamming between schools with similar environment: compare choices
Gamming between schools with different environment: understand interconnection options and the European Energy Market operation
Discussion and feedback
Produce communication information
Make recommendations for energy consumption reduction
Dissemination of final report and recommendations in the school website

Main partner responsible: ISEL

26. Project management resource and inquiry instruments on the topic of "Noise and quality of life"

Overview

Noise pollution is a societal problem, particularly prevalent in city environment, with well-documented public health impacts. Exposure to noise can negatively affect a whole day of work, or even a night's sleep, reduce day-to-day productivity and harm people health and quality of life. According to the World Health Organization, noise pollution is one of the most important determinants of health. According to the European Environment Agency (EEA), noise is responsible for 16,600 premature deaths and more than 72,000 hospitalizations every year in Europe. For the protection of wildlife and humans' health and well-being, public discussions under the topic should be taken frequently, and assessments of noise intensity in specific situations/contexts/environments are recommended, to compare with the recommended limits. The scenario makes available for students a tool that supports upload of audio files and displays histograms, spectrograms, frequency, and amplitude values. A table with identified and expected risks is developed for each frequency, amplitude, and duration time, based on scientific studies. Therefore, the learning experience prepares youths to measure noise levels and become aware of risky environments, sources of noise pollution, and how this threat can have an effect on the health and quality of life of the community.

Estimated duration

After initial socioscientific and technical background on the topic in classroom environment (5-6 sessions), 6 sessions of 40-45 minutes for school project (session 7 – session 12)

School Research Project

Topics:

- Correlate, from experimental activities, the intensity, pitch, and timbre of a sound with the characteristics of the waveform and identify pure tones.
- Interpret noise spectrum graphics, identifying the level of sound intensity and the threshold of hearing and threshold of pain.
- Identify sources of noise, in different environments, using sound level meters, and based on research, critically evaluate the consequences of noise on human beings, proposing prevention and protection measures.
- Incidence of diseases related with high noise levels exposure.
- Action supporting health promotion and disease prevention in the community.

Research management, design and administration (summary topics):

- Identification of daily environments where noise is clear.
- Decide for daily environments where noise pollution is not considered a problem.
- Record sounds in school/community places, considering the 3 noise contexts: Ambient Noise, Neighborhood Noise and Occupational Noise Exposure.
- Define and insert data in the online tool.
- Promote reflection and discussion on risks and protective behaviour.
- Aid in the report elaboration that will be available in the repository platform.

Challenge: build an infographic about Noise Pollution: Consequences and Measures!

Method (summary): Students are organized in groups; each group explores several ways to prevent noise pollution in their living environment. The project challenges each group of students to create and present an infographic that synthetizes a) What they have learned throughout the teaching-learning sequence; b) Actions to combat noise pollution at the school level; c) Relevant outcomes due to application of such measures. By following this process, at the end of the project students will have understood the importance of preventing noise pollution.

Development process (summary):

Building upon the knowledge acquired in previous classes, and by following inquiry-based approach, the groups seek to make observations in school environment and identify a series of actions to be adopted by the

school community to diminish the risks regarding noise pollution. In the development of the project, students carry out a survey/observations of school community behaviour related to subject. The teacher discusses with students' possible questions to assess the attributes of the school in the subject of noise pollution and possible methods to get the answers. The advantages and limitations of the alternatives are discussed. Then a brainstorming of possible questions to address the topic is promoted by the teacher:

1. Are any policy regarding noise pollution being taken by the school?
2. Is there any strategy ongoing to limit noise sounds?
3. Was the issue of noise pollution ever addressed in the school community?
4. What are the school's community perception on this subject?

The output of the project is a list of school attributes, strengths and weaknesses and proposals to be adopted by the school community to mitigate long-term risks (e.g., escalation of the problem of deafness increased by noise pollution, etc.). Proposals are linked with benefits that the change in behaviour can bring to the school health and well-being.

- Organization of open schooling event.
- Identification of noise pollution sources.
- Identification of the problems that arise from noise pollution.
- Identification of the level of harmfulness of each stated noise pollution source.
- Highlight of several alternative actions to prevent noise pollution.
- Highlight the benefits to the health and quality of life of the community if they adopt those proposals.
.

Session 1-2: research administration:
The teacher organizes work groups; each group addresses 1 topic connected with noise pollution within the school community:
    A. People's behavior towards noise pollution. (survey)
    B. School community policy regarding noise pollution. (observation sheet)

The teacher discusses with students' possible questions to assess the attributes of the school infrastructures/ behavior of the school community and possible methods to get the answers. The application of an online questionnaire is suggested but other data collection methods (e.g.: observations sheet regarding the school infrastructures/policy towards noise pollution mitigation) may be considered. The advantages and limitations of the alternatives are discussed.

A brainstorming of possible questions to address the topics is promoted by the teacher.
Some examples to kick-off the brainstorming/to complete the activity:

1. Is any policy regarding noise pollution being taken by the school?
2. Is there any strategy ongoing to limit noise sounds?
3. Was the issue of noise pollution ever addressed in the school community?
4. What are the school's community perceptions on this subject?
5. What are the main sources of noise pollution around school environment?
6. What are the impacts of noise pollution on students' academic performance?
7. Do you take precautions individually to avoid noise pollution?
8. Are you aware that there are rules and regulations regarding noise?
9. Are you familiar with the effects that noise pollution might have on humans' health and well-being?

After finishing the list of questions, students prepare the data collection instrument, where they discuss how the questions are going to be organized, strategies and activities to achieve the target, a timeline for collecting the responses, which events may constrain the data collection, etc. … The teacher delegates each task (filling of the survey and/or observation sheet) to each group.

Session 3: Data analysis

After administering the survey and collecting the minimum number of responses, an Excel file may be downloaded from google forms. Alternatively, if the questionnaire is administered in paper, students prepare a file with the questions and distribution of responses. The teacher reminds students about the relevance of the

project and supports each group of students in preparing tables, graphics and then promotes a debate around the results.

Session 4-5: presentation of the project results

Session 4 starts with the discussion of the best presentation format of the project results.
The output is produced and describes the research question, methodology, results, conclusions, and recommendations arising from the inquiry-based project. A poster is suggested, it can be built in paper or in a Microsoft Power-Point presentation.
Then students discuss with the teacher the organisation of a forum for presentation and discussion of the output that invites students, teachers, parents, social partners of the local community to participate and engage in a debate.

Session 6: open schooling event

During session 6 students will be holding a community event to share the results of their research with the participation of students, teachers, parents, social partners of the local community.
Each group will be presenting their evidence and informing the public about the questions they have addressed in the project while improving communication skills and developing responsible citizenship.

- Each project output (e.g.: poster and scientific presentation, infographic) is presented by the students in a community setting (e.g., exposition center, municipality, garden, museum, science fair).
- Students will communicate policy measures using STEM-based argumentation. Students appeal to the action of all in health of the community, providing great understanding that noise pollution, in somehow, is a responsibility of all, not only of the ministry of health or healthcare providers.
- Students, parents, school community and relevant local stakeholders attend the event and understand how the exposure to high noise levels is influenced by individual behaviour and environmental factors. They also get high-level understanding on strategies to minimize the phenomena and how they may have an influence on the relevant settings (e.g., home, school, workplace, public space at the community level).

Project Management Framework and Instruments

1. Plan: Determine How to Do the Project
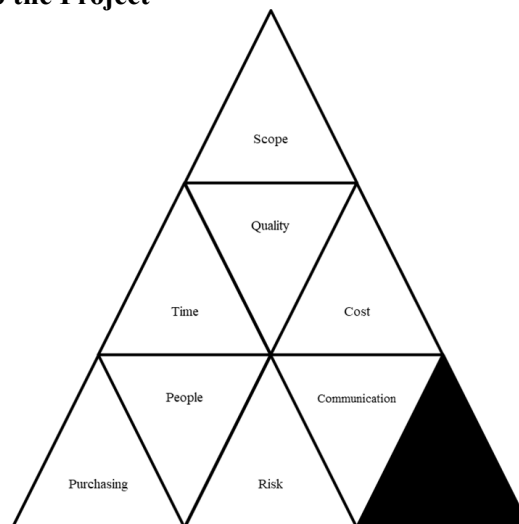
2. Plan: Define Project Scope

- What are the outputs?
  ✓ scientific slide presentation/poster about school attributes, strengths and weaknesses and proposals to be adopted by the school community to mitigate long-term risks to public health regarding noise pollution (e.g., escalation of the problem of deafness increased by noise pollution, etc.).
  ✓ brochures for parents, municipalities and other stakeholders
  ✓ open schooling event

-What are the requirements of project outputs?

✓ printed poster: A3 format, Color, 6 sections (introduction, goals, methods, results, conclusions, recommendations)
✓ brochures: A4 format, Color, 4 sections (introduction, results, conclusions, recommendations)
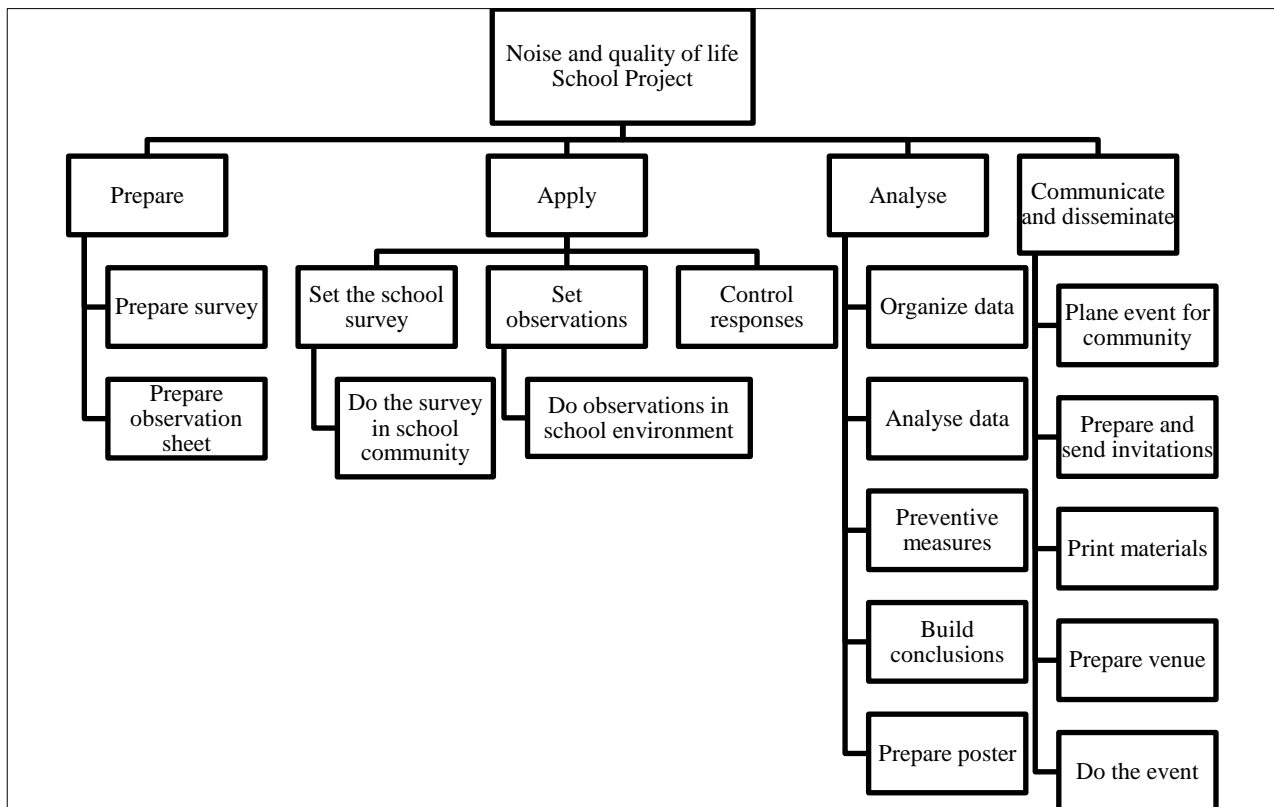✓ laptop for the presentations
✓ projector for the presentations

- Are there any constraints to produce the project outputs?
✓ The project needs to be completed in 4-6 sessions, implemented in a consecutive period of time to maximize the impact

- Define the tasks to produce the outputs – build the Work Breakdown Structure

Work Breakdown Structure(WBS)
(filled with examples, these may change according to your project organisation)

3. Plan: Determine Project Time

a. Define the detailed activities for each WBS element
b. Put the activities in sequence
c. Estimate the resources (human and acquisitions) for each activity
d. Estimate the calendar time (days or weeks) for each activity
e. Create the Gantt Chart

Resource Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources
Define the survey	1 hour	paper, laptop
Organized the survey in a certain format	1 hour	paper, laptop
Prepare observation sheet	1 hour	paper, laptop
Do observations in school environment	3 hours	paper, laptop
Do the survey in school environment	3 hours	paper, laptop
Analyse data	3 hours	paper, laptop
Prepare poster	3 hours	paper, laptop
Poster presentation	2 hours	paper, laptop

Gantt Chart
(filled with examples, these may change according to your project organisation)

Activity	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
Define the survey	■					
Organized the survey in a certain format	■					
Prepare observation sheet	■					
Do observations in school environment		■				
Do the survey in school environment		■				
Analyse data			■			
Prepare poster				■	■	
Poster presentation						■

4. Plan: Determine Project Cost

   a.   Estimate how much each activity will cost
Note: include the cost for Labor, Supplies, overhead (like office space and equipment)

   b.   Add the estimates to determine the total cost of your project

Cost Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources	Human Resource Cost	Other Resources Cost (supplies)
Define the survey	1 hour	paper, laptop	20 euros	n.a
Organized the survey in a certain format	1 hour	paper, laptop	20 euros	n.a
Prepare observation sheet	1 hour	paper, laptop	20 euros	n.a
Do observations in school environment	3 hours	paper, laptop	60 euros	n.a
Do the survey in school environment	3 hours	paper, laptop	60 euros	n.a
Analyse data	3 hours	paper, laptop	60 euros	n.a
Prepare poster	3 hours	paper, laptop	60 euros	n.a
Poster presentation	2 hours	paper, laptop	40 euros	n.a.
Total	15h (the application of the survey and observation sheet will be made simultaneously)	-	340 euros	-

5. Plan: Determine Project Quality

   a.   Ensure your project produces quality outputs
   b.   Plan what quality means to your project
   c.   Determine how you will ensure quality
   d.   Ensure your project produces quality outputs
   e.   Plan what quality means to your project
   f.   Determine how you will ensure quality

Quality Breakdown Structure
(filled with examples, these may change according to your project organisation)

Requirement	Quality planning	Quality assurance	Quality control
1.1	Minimum number of responses to the survey	Minimum number of responses to the survey: 50	Monitor the number of responses to the survey on daily basis
1.2	Minimum number of observations	Minimum number of observations: 5	Monitor the number of observations on a daily basis
1.3	Poster template with six sections	Poster with six sections: introduction, goals, methods, results, conclusions, recommendations.	Monitor the developments of students' poster

6. Plan: Determine Project Risks

    a.   Identify the two types of risks (uncertain future events that can affect your project): threats have a negative impact on your project; opportunities have a positive impact on your project

Risk Breakdown Structure
(filled with examples, these may change according to your project organisation)

Risk	Probability (How likely is it to happen)	Impact (How big of an effect will it have)	Owner (who takes care about the risk)	Action Plan (initiatives to reduce threats and increase opportunities)
Modest number of responses to the survey	High	High	Professors Students	-Monitor the number of responses on a daily basis
Modest number of people that accepted invitation to attend the open schooling event	Medium	Medium	Professors Students	- Re–invitations by email - Telephone calls
Modest students' interest for the school project	Medium	High	Professors Students	-Give motives to the students (e.g. presenting at the school event, project as an alternative assessment tool instead of tests) -Scaffold students who face difficulties

7. Plan: Plan Procurement Processes

    a.   Determine what goods and services you need
    b.   Have what you need at the time that you need it

Supplies Breakdown Structure
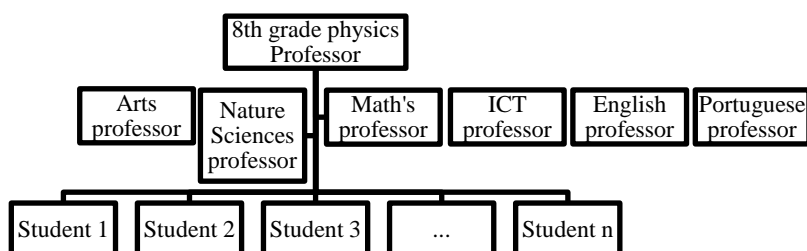*(filled with examples, these may change according to your project organisation)*

Supply	Supply Cost (supplies)	When to be available	How to be available
Paper	20 euros	In the beginning of the project	Commitment of school top management
Printer	50 euros	In the beginning of the project	Commitment of school top management
Mobile laptop	700 euros	In the beginning of the project	Commitment of school top management
Printed post	40 euros	Before the open schooling event	Poster printing in Staples Office Center

8. Plan: Plan People

    a.   Acquire the project team
    b.   Map the project team in the Organization Breakdown Structure
    c.   Assign the project team members to roles
    d.   Assign the project team members to activities
    e.   Train the project team
    f.   Determine how you will motivate and reward the team
    g.   Map Stakeholders – people or groups interested in the project
    h.   Determine how you will engage stakeholders in the project

Organization Breakdown Structure
(filled with examples, these may change according to your project organisation)

Responsibility assignment matrix
(filled with examples, these may change according to your project organisation)

Activity	Team members							
	Students	8th grade physics professor	Math professor	ICT professor	Nature science professor	Arts professor	Portuguese professor	English professor
Define the survey	X	C/P	I	I	I	I	I	I
Organized the survey in a certain format	X	C/P	I	C/P	C/I	I	I	I
Prepare observation sheet	X	C/P	I	C/P	C/I	I	I	I
Do observations in school environment	X	C/P	C/I	C/I	C/I	I	I	I
Do the survey in school environment	X	C/P	C/I	C/I	C/I	I	I	I
Analyse data	X	C/P	C/I	C/I	C/I	I	I	I
Prepare poster	X	C/P	C/I	C/I	C/I	C/P	C/I	C/I
Poster presentation	X	C/P	C/I	C/I	C/I	C/P	C/I	C/I
Coordinate the overall implementation of the project		X/C/P	C/I	C/I	C/I	C/I	C/I	C/I

Letter	Role
X	Executes work
P	Controls progress
C	Should be consulted
I	Should be informed

Stakeholders Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Directly involved in the project (yes/no)	Served or Affected by the Project	Likely to be user of the results of the project
Parents	yes	yes	yes
School community	yes	yes	yes
School management	no	yes	yes
Municipality	no	yes	yes
Laboratory of Audio and Acoustics of ISEL	no	yes	yes

Stakeholders Management Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Who they are and why should be involved in the project	Why the project is relevant for them	Strategies to obtain support
Parents	Students' families are involved in the survey and in the open schooling event. Their involvement also maximizes the impact of the project in terms of global literacy.	Due to their interest in pupils' education and school health and well being	Present the school project in parents meeting
School community	The school community is involved in the survey, the observations of the school infrastructure to be done by students in school environment and at the open schooling event. Their involvement also maximizes the impact of the project in terms of global literacy.	Due to their interest in students' education and school health and well being	Present the school project in a school community meeting

Stakeholder name	Who they are and why should be involved in the project	Why the project is relevant for them	Strategies to obtain support
School management	The school management assures relevant resources for students' projects and is involved in the survey and in the open schooling event. Their involvement also maximizes the impact of the project in terms of global literacy.	Due to their interest in students' education and school health and wellbeing. Also due to their interest in demonstrating the interest of school in contributing to community health (to be a health promotion school).	Present the school project in parents meeting.
Municipality	The municipality is involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to municipality interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project).
Residents' association	Residents' associations are involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to residents' associations interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project).
Laboratory of Audio and Acoustics of ISEL	This workspace will allow, at the end of the project, students, and teachers to highlight sound/noise issues by carrying out live experiences related to sound. Additionally, some demonstrations will be implemented	Due to their interest in novel methodologies for STEM education and role in policy making.	Invitation to participate in the open schooling event (that also provides a summary description of the school project).

9. Plan: Plan Communication

   a. Assure the right information to the right people, at the right time, in a useful format
   b. Assure effective project meetings
   c. Build the communications plan

Communications plan
(filled with examples, these may change according to your project organisation)

Organized by (from)	Participants (to)	What	When	How/Where	Purpose
8th grade physics professor	Team	Kick-off meeting	Beginning of the project (date to be defined)	School facilities	Provide a complete description of the project and what the end product will be.
8th grade physics professor	Team	Team meeting	Every week (date to be defined)	School facilities	- Overall plan for the project - Discuss project developments and plan next stage - Instruct team on how to - Provide updates on the progress of the project and if there are any issues with completion
8th grade physics professor	Team and Parents	Meeting	Before the project starts (date to be defined)	School meeting room	Explain the project and invite for participation in the survey and open schooling event.
8h grade physics professor and Team	Parents	Meeting	Before the project starts (date to be defined)	Virtual meeting	Explain the project and invite for participation in the survey and open schooling event.
8th grade physics professor, Team, School management	School community Municipality Residents' association and Laboratory of Audio and Acoustics of ISEL	Invitations to stakeholders' participation in open schooling event	Before the open schooling event (date to be defined)	By email	Explain the project and invite for participation in the open schooling event.

10. Plan: Finish the project planning by building the Charter

1.0 Project identification	
Name	Noise and Quality of Life
Summary description	Students perform a series of observations in school environment and identify a series of actions to be adopted by the school community to mitigate noise pollution effects
Project owner	- Alvalade School - Benfica School - Olivais School - D. Filipa de Lencastre School - Luís de Camões School
Project manager	- The main coordinator at each school aforementioned that will implement the scenario
Stakeholders	- Parents - Due to their interest in pupils' education and school health and well-being - School community- Due to their interest in students' education and school health and well being - School management - Due to their interest in students' education and school health and well-being. - Municipality - Due to municipality interest in the results of students' projects. - Residents' association - Due to residents' associations interest in the results of students' projects. - Laboratory of Audio and Acoustics of ISEL – This facility is necessary for carrying out experiments with sound in a controlled environment, consolidating the noise aspects.
Team and roles	- Students - The ones who will implement the project, by following the project-based learning methodology with the resources aforementioned. - Teachers - The ones who will monitor the progress of all the activities develop by students during the project implementation. - 8th grade physics teacher - The head coordinator of the project. The one who will distribute and coordinate all the proposed activities between students and the reaming teachers. - Math´s teacher – Collaboration on the creation/organization of both the observation sheet and survey. - ICT teacher - Collaboration on the creation/organization of both the observation sheet and survey. - Science teacher - Collaboration on the creation/organization of both the observation sheet and survey as well as on the analysis of the collected data by students. - Arts teacher - Responsible for the design and creative presentation of the scientific poster along with the 8th grade physics teacher. - Portuguese teacher – Collaboration on the text review. - English teacher - Collaboration on the text review.

2.0 Needs that support the project
• The study of noise in different contexts (environmental noise, neighborhood noise, work noise), and the impact that this problem has on people's quality of life is relevant, fundamentally, because it is a problem that is often ignored. , or relegated to second thoughts, but which can have a major impact on people's lives, such as affecting concentration at work, disturbing a night's sleep, or, in extreme cases, leading to premature death. • The project raises awareness among students and the school community about the noise problem and its impact on people's quality of life, helping to combat this problem, contributing to a more sustainable lifestyle. • The project also increases students' understanding of the noise phenomenon, the associated physical concepts, the handling/reading of sound measuring instruments and how STEM (Science, Technology, Engineering and Mathematics) can contribute to anticipating, mitigating and address public health threats due to noise in its various contexts. • The project also highlights the value of open education approaches to developing responsible active citizenship and personal and social responsibility for public health.

3.0 Project goals
- **Specific**: the area of improvement is the impact on human health related to noise and sound, and preventive measures to mitigate such impacts at the community level. - **Measurable**: despite others, the metrics that are used are the monitoring of the responses to the survey on a daily basis. - **Achievable**: development of the project, step-by-step. - **Relevant**: the indicators allow to infer the impacts that noise levels can have on the quality of life of the community and what measures and behaviours one should have to mitigate them - **Time-bound**: the deadline to complete the project is June 30

4.0 Project scope
The project is based on a series of activities to be conducted at each session defined for the educational scenario. In short, these are the tasks for the project:

- Building upon the knowledge acquired in previous classes, and by following inquiry-based approach, the groups seek to make observations in school environment and identify a series of actions to be adopted by the school community to diminish the risks regarding noise pollution.
- Then, the teacher discusses with students' possible questions to assess the attributes of the school in the subject of noise pollution and possible methods to get the answers. The advantages and limitations of the alternatives are discussed.
- Subsequently, a brainstorming of possible questions to address the topic is promoted by the teacher: 1. Are any policy regarding noise pollution being taken by the school? 2. Is there any strategy ongoing to limit noise sounds? 3. Was the issue of noise pollution ever addressed in the school community? 4. What are the school's community perception on this subject?
- The output of the project is a list of school attributes, strengths and weaknesses and proposals to be adopted by the school community to mitigate long-term risks (e.g., escalation of the problem of deafness increased by noise pollution, etc.). Proposals are linked with benefits that the change in behaviour can bring to the school health and well-being.

5.0 Key Deliverables

- Survey
- Observation sheet
- Scientific poster
- Brochures
- Open schooling event

6.0 Milestones and dates

- Elaboration of the survey and observation sheet to de concluded-on week 1.
- Conclusion of the survey and observation sheet on week 2.
- Elaboration of a scientific slide poster to be concluded before the open schooling event (limit: June 30).
- Elaboration of brochures for parents, municipalities, and other stakeholders, to be concluded before the open schooling event (limit: June 30).
- Preparation of the open schooling event to be concluded before July 2023
- Presentation of project´s outputs at the open schooling event

7.0 Constraints

- Budget
- Lack of equipment
- Project to be finished on 30th of June 2023 (limit)

8.0 Risks and opportunities

- Modest number of responses to the survey
- Modest interest of the students for the project
- Possible time constraint due to teachers'/students' schedule
- Modest number of people that accepted invitation to attend the open schooling event.

9.0 Project success criteria

- Project completed until 30th of June 2023
- High students' interest and participation in the project and the open schooling event
- Open schooling event in a community setting with the participation of the entire school community, parents, and local stakeholders

10.0 Project success factors

- Appropriate engagement of students with the proposed activities such as the survey
- Appropriate engagement of students and parents
- Adequate attendance of stakeholders in the open schooling event
- Interest of teachers in project-based learning

Teaching-learning process milestones:

Students will be able to:
1. Develop critical reasoning (e.g., analysing, organizing, debating, and sharing information regarding lesson 4 where it is asked to produce a sound-wave curve and a Spectral density graphic and interpret the observe data).
2. Develop digital skills (e.g., finding, reviewing, and using different online resources to develop the activities).
3. Understand the concept of "Noise and Sound" and how are they characterized.
4. Understand the concepts of "Noise pollution", its causes, effects and can it be prevented.

5. Understand how to analyse in a scientific way noise and sound measurements.
6. Develop the ability to construct different types of arguments, counterarguments, and rebuttals in order to make a decision regarding socio-scientific questions.
7. Develop the ability to debate socio-scientific questions.
8. Investigate community's perceptions and knowledge concerning noise pollution, its causes, effects and how can it be prevented.
9. Develop responsible citizenship and critical health literacy.

Teaching-learning process for school project (summary):

1. Collection of evidence (data, articles, pictures).
2. Evaluation of the evidence based on criteria and selection of the relevant and non-biased information.
3. Design criteria for arguments evaluation.
4. Design rubric for evaluation of public debate.
5. Design an agenda for open schooling event.
6. Create a brochure/power-point related to measures to be taken to combat noise pollution and distribute it in open schooling event.

Organization of the open schooling event:

1. Each project output (communication brochures/power-point) is presented by the students in a community setting (e.g., exposition centre, municipality, garden, museum, science fair).
2. Students will communicate policy measures using STEM-based argumentation. Students appeal to the action of all in health of the community, providing great understanding that preventing noise pollution is a responsibility of all, not only of the ministry of health or healthcare providers.
3. Students, parents, school community and relevant local stakeholders attend the event and understand how the incidence of energy waste is influenced by individual behaviour and environmental factors. They also get high-level understanding on strategies to minimize the phenomena and how they may have an influence on the relevant settings (e.g., home, school, workplace, public space at the level).

Expected outcomes of the teaching-learning process (summary):

▪ Students will be able to incorporate evidence coming from trustful data sources to support their ideas and arguments.
▪ Students will be able to communicate the merits and limitations of various data and data collection processes considered in the work process.
▪ Students will be able to identify and communicate factors that inhibit or promote responsible behaviors in their community in order to avoid annoyance of noise.

Data Analysis and Reporting
Data filtration.
Define minimum representative data collected.
Data categorization.
Data presentation formats.
Internal presentation.
Report writing.

Target Audience for Recommendations

Other schools that use the repository platform.
Social NGOs.
Decision makers.
General public.
Mass media.
Families.
Friends.
Future students

Public Debate and Recommendations

Discussion and feedback.

Analyse reports from other schools.

Define and insert data in the simulator.

Produce communication information.

Make recommendations for reduction of noise in workplaces and public spaces.

Dissemination of final report and recommendations in the school website and information to the main stakeholders (public transport companies, shopping centres, hospitals, etc.).

Main Partner responsible: ISEL

27. Project management resource and inquiry instruments on the topic of "The role of environment and animal health in zoonotic diseases and pandemics"

Overview

The COVID-19 pandemic has highlighted the potential of zoonotic diseases to affect human health outcomes. Therefore, it is crucial to understand how environmental changes can affect the dynamics and distribution of zoonotic diseases, so that we can improve our ability to predict epidemics and control them. Additionally, the environmental changes associated with the climate change scenario may lead to changes in health threats to both animal and human beings, multiplying existing health problems. The sustainable development goals are an urgent call for action by all countries - developed and developing - in a global partnership. They recognize that ending poverty and other deprivations must go hand-in-hand with strategies that improve health and education, reduce inequality, and spur economic growth – all while tackling climate change and working to preserve our oceans and forests.

The learning experience supports youths in understanding these public health threats in an integrative manner, and reach high-level comprehension on how STEM (science, technology, engineering, mathematics) may address these issues, contributing to evidence-based personal decision-making and public policy.

Estimated duration

After initial socioscientific and technical background on the topic in classroom environment (5-6 sessions), 5-6 sessions of 40-45 minutes for school project (session 6 – session 12)

School Research Project

Topics:
What is the origin of this zoonotic disease?
How is this zoonotic disease preventable?
What is the relation between climate change, biodiversity loss and pandemics? How these drivers have an impact in the zoonotic disease?

Development process:
The project is based on guided research about zoonotic diseases, climate change, and environmental issues around them. The six sessions will be supervised by the teachers and developed by the students, with scheduled moments for checking the work development.

During the sessions 1-2, students will perform bibliographic search using keywords provided by the teachers (e.g. zoonotic disease, prevalence, Portugal, transmission). Students will be asked to select the adequate data sources for their specific topic (zoonotic disease); this selection will be checked by the teachers mainly regarding the fiability of information. Thereafter, students will select the adequate data to answer the question guiding this project. Students will be asked to identify alternative communication platforms to present results. During the sessions 3-4, students will be asked to create an infographic dedicated to their specific zoonotic disease, where all the data collected during sessions 1-2 will be used. It is also important to integrate the previous knowlegde obtained throughout the teaching-learning sequence.

During the sessions 5-6, students develop observational and data collection activities within their community. To address the topic, in the session 5, students are asked to perform inquiry-based activities (interviews) in the community (family members, neighbours, commercial stores), answering the following questions:

1. What is climate change?
2. What are environmental determinants of health?
3. What do animal health and human health have in common?
4. What is a zoonotic disease?
5. How does animal health affect the emergence of pandemics?
6. What can we do at our community level to prevent climate change and pandemics?
7. What is your workplace/school doing to fight climate change?
8. What can we do to minimize our impact in the environment?
9. Which government/local initiatives do you know about climate change?

In session 6, with supervising, students will analyze the answers and based on the knowledge from the previous moments of school project and the teaching-learning sequence, they identify the knowledge gaps in the community. These gaps will be important to identify future health literacy activities to be developed. The final

infographic should cover suggested action for community leaders and policy makers. Students will be advocating better conditions for their community and show their relationship with citizens health and climate change.

Project Management Framework and Instruments

1. Plan: Determine How to Do It

2. Plan: Define Project Scope

- What are the outputs?
Example: scientific poster

-What are the requirements of project outputs?
Example: A3 format, Color, 5 sections (introduction, goals, methods, results, conclusions, recommendations).

- Are there any constraints to produce the project outputs?
Example: work will be completed in two weeks

- Define the tasks to produce the outputs – build the Work Breakdown Structure (WBS)

Work Breakdown Structure
(filled with examples, these may change according to your project organisation)

3. Plan: Determine Project Time

    a.   Define the detailed activities for each WBS element
    b.   Put the activities in sequence
    c.   Estimate the resources (human and acquisitions) for each activity
    d.   Estimate the calendar time (days or weeks) for each activity
    e.   Create the Gantt Chart

Resource Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources
Bibliographic research	2 hours	laptop
Create infographic	45 minutes	laptop
Observational and data collection activities	2 hours	laptop or paper
Analysis of data	45 minutes	laptop or mobile phone
Prepare scientific poster	3 hours	laptop

Gantt Chart
(filled with examples, these may change according to your project organisation)

Activity	Week 1	Week 2	Week 3	Week 4	Week 5
Bibliographic research	■				
Create infographic		■			
Observational and data collection activities			■		
Analysis of data			■	■	
Prepare scientific poster					■

4. Plan: Determine Project Cost

    a.   Estimate how much each activity will cost
Note: include the cost for Labor, Supplies, overhead (like office space and equipment)

    b.   Add the estimates to determine the total cost of your project

Cost Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources	Human Resource Cost*	Other Resources Cost (supplies)
Create infographic	45 minutes	paper	20 €	20 €
Observational and data collection activities	2 hours	laptop	5 €	n.a
Analysis of data	45 minutes	laptop or mobile phone	5 €	n.a
Prepare scientific poster	3 hours	laptop	60 €	20 €
Total	6h30	-	90 €	-

* Example on how to calculate resources and budget, without connection to the PAFSE real context

5. Plan: Determine Project Quality

    a.   Ensure your project produces quality outputs
    b.   Plan what quality means to your project
    c.   Determine how you will assure quality

Quality Breakdown Structure
(filled with examples, these may change according to your project organisation)

Requirement	Quality planning	Quality assurance	Quality control
1.1	Minimum number of observations	Minimum number of observations: 5	Monitor the number of observations on a daily basis
1.2	Minimum number of interviews	Minimum number of interviews: 10	Monitor the number of interviews on a daily basis
1.3	Infographic template with five sections	Infographic with five sections: introduction, goals, methods, results, conclusions, recommendations.	Monitor the developments of students' infographic

6. Plan: Determine Project Risks

    a.   Identify the two types of risks (uncertain future events that can affect your project): threats have a negative impact on your project; opportunities have a positive impact on your project.

Risk Breakdown Structure
(filled with examples, these may change according to your project organisation)

Risk	Probability (How likely is it to happen)	Impact (How big of an effect will it have)	Owner (who takes care about the risk)	Action Plan (initiatives to reduce threats and increase opportunities)
Modest number of responses to the interviews	High	High	Students: – Mary – Peter – John	–Identification of other potential target groups –Invitations and re–invitations
Modest number of people that accepted invitation to attend the open schooling event	Medium	Medium	Professor Francis Students: - Sophia - Caroline	- Re–invitations by email - Telephone calls

7. Plan: Plan Procurement Processes

    a.   Determine what goods and services you need
    b.   Have what you need at the time that you need it.

Acquisitions Breakdown Structure
(filled with examples, these may change according to your project organisation)

Supply	Supply Cost (supplies)	When to be available	How to be available
Paper	20 euros	In the beginning of the project	Commitment of school top management
Printer	50 euros	In the beginning of the project	Commitment of school top management
Mobile laptop	700 euros	In the beginning of the project	Commitment of school top management
Printed post	40 euros	Before the open schooling event	Poster printing in Stapples Office Center

8. Plan: Plan People

    a.   Acquire the project team
    b.   Map the project team in the Organization Breakdown Structure
    c.   Assign the project team members to roles
    d.   Assign the project team members to activities
    e.   Train the project team
    f.   Determine how you will motivate and reward the team
    g.   Map Stakeholders – people or groups interested in the project
    h.   Determine how you will engage stakeholders in the project

Organization Breakdown Structure
(filled with examples, these may change according to your project organisation)

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                        ┌──────────────┐
                        │  Professor   │
                        │   Francis    │
                        └──────┬───────┘
                ┌──────────────┴──────────────┐
        ┌───────┴───────┐            ┌─────────┴──────┐
        │  Professor    │            │   Professor    │
        │    Susan      │            │     Tiago      │
        └───────────────┘            └────────────────┘
  ┌─────────┬─────────┬─────────┬─────────┬─────────┐
┌─┴───┐ ┌───┴───┐ ┌───┴───┐ ┌───┴───┐ ┌───┴────┐
│Mary │ │Sophia │ │ Peter │ │ John  │ │Caroline│
│(stu)│ │(stu)  │ │(stu)  │ │(stu)  │ │(stu)   │
└─────┘ └───────┘ └───────┘ └───────┘ └────────┘
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Responsibility assignment matrix
(filled with examples, these may change according to your project organisation)

Activity	Team members							
	Mary (student)	**Sophia** (student)	**Peter** (student)	**John** (student)	**Caroline** (student)	**Professor Francis** (Science)	**Professor Susan** (Science)	**Professor Tiago** (ICT)
Bibliographic research	X	X	X			C/P		
Parameterize observation sheet					X	C/P		
Conduct interviews	X	X	X	X	X/P	C/P		
Analyze data							C/P	
Prepare infographic	X	X	X	X	X			C/P
Coordinate the overall implementation of the project						X	X	

Letter	Role
X	Executes work
P	Controls progress
C	Should be consulted
I	Should be informed

Stakeholders Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Directly involved in the project (yes/no)	Served or Affected by the Project	Likely to be user of the results of the project
Parents	yes	yes	yes
School community	yes	yes	yes
School management	no	yes	yes
Municipality	no	yes	yes
Residents' association	no	yes	yes
Environment and Animal Health Authorities	no	yes	yes
National Directorate for Education	yes	yes	yes
Egaz Moniz	yes	no	no
National Directorate For Health	yes	no	no

Stakeholders Management Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Who they are and why should be involved in the project	Why the project is relevant for them	Strategies to obtain support
Parents	Students' families should be involved in the interviews to collect the relevant responses. Their involvement also maximizes the impact of the project in terms of global literacy.	Due to their interest in pupils' education and school health and well-being.	Present the school project in parents meeting.
School community	The school community should be involved in the interviews and observations to be done by students in school environment. Their involvement also maximizes the impact of the project in terms of global literacy.	Due to their interest in students' education and school health and well-being.	Present the school project in a school community meeting.
School management	The school management assures relevant resources for students' projects and should be involved in the interviews. Their involvement also maximizes the impact of the project in terms of global literacy.	Due to their interest in students' education and school health and wellbeing. Also due to their interest in demonstrating the interest of school in contributing to community health (to be a health promotion school).	Present the school project in parents meeting.
Municipality	The municipality should be involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to municipality interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project).
Residents' association	Residents' associations should be involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to residents' associations interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project).
Environment and Animal Health Authorities	Environment and Animal Health Authorities should be involved in the open schooling event where students share the results of their projects and communicate recommendations.	Due to their interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project).
National Directorate for Education	The National Directorate for Education is supporting the project and interested in the results in terms of students' learnings.	Due to their interest in novel methodologies for STEM education and role in policy making.	Invitation to participate in the open schooling event.

9. Plan: Plan Communication

  a. Assure the right information to the right people, at the right time, in a useful format
  b. Assure effective project meetings
  c. Build the communications plan

Communications plan
(filled with examples, these may change according to your project organisation)

Organized by (from)	Participants (to)	What	When	How/Where	Purpose
Professor Francis	Team	Kick-off meeting	10 september	Laboratory	Provide a complete description of the project and what the end product will be.

Organized by (from)	Participants (to)	What	When	How/Where	Purpose
Professor Francis	Team	Team meeting	Every week (Wednesday, 14h)	IT classroom	- Overall plan for the project - Discuss project developments and plan next stage - Instruct team on how to - Provide updates on the progress of the project and if there are any issues with completion
Professor Francis	Team and Parents	Meeting	Before the project starts (date to be defined)	School meeting room	Explain the project and invite for participation in the interviews
Professor Francis and Team	Parents	Meeting	Before the project starts (date to be defined)	Virtual meeting	Explain the project and invite for participation in the interviews and open schooling event.
Professor Francis, Team, School management	School community Municipality Residents' association Primary healthcare center and Hospital National Directorate for Education	Invitations to stakeholders participation in open schooling event	Before the open schooling event (date to be defined)	By email	Explain the project and invite for participation in the open schooling event.

10. Plan: Finish the project planning by building the Charter

1.0 Project identification	
Name	Health Education Project - Zoonotic diseases
Summary description	Students are asked to perform inquiry-based activities (interviews) in the community (family members, neighbors, commercial stores on the topics: origin of this zoonotic diseases; prevention of zoonotic diseases; relationship between climate change, biodiversity loss and pandemics.
Project owner	Identify the owner of the project (e.g.: school X)
Project manager	Identify the project manager
Stakeholders	Identify the stakeholders and briefly describe why they are interested parties
Team and roles	Identify the team and summarize the role of each resource in the project

2.0 Needs that support the project
The environmental changes associated with the climate change scenario may lead to changes in health threats to both animal and human beings, multiplying existing health problems.

3.0 Project goals
Describe what you want to achieve in the short-term, medium term and long term. Follow SMART principles (Specific, Measurable, Achievable, Realistic, and Timely). *Examples* Project completed – March 22 Open schooling event – April 22

4.0 Project scope
Identify the tasks of the project *Examples* Bibliographic research Parameterize observation sheet

Conduct interviews
Analyze data
Prepare infographic

5.0 Key Deliverables

Identify goods or services produced as a result of the project. A deliverable could be a report, a document, a software product, a server upgrade or any other building block of an overall project.

Examples
Questionnaire
Interview Guide
Observations Gride
Book
Poster
Infographic
System map
Brochures

6.0 Milestones and dates

Identify the principal landmarks of project execution stablished according to what is described in the project scope.

Examples
Bibliographic research concluded
Interviews concluded
Open schooling event prepared

7.0 Constraints

Identify the principal project constraints (cost, technical, other)

Examples
Budget 200 € (limit)
Project should be finished in 15 December (limit)

8.0 Risks and opportunities

Identify issues that may emerge in the future and influence project implementation.

Examples
Modest number of responses to the interviews
Modest number of people that accepted invitation to attend the open schooling event

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9.0 Project success criteria

Identify the criteria or measures of success. These are the project acceptance criteria.

Examples
Project completed before Christmas period
Open schooling event in a community setting with the participation of the entire school community, parents, and local stakeholders.

10.0 Project success factors

Identify the factors that you will manage in order to positively influence the success of the project.

Examples
Appropriate engagement of students and parents.
Interest of teachers in project-based learning.

Teaching-learning process milestones:

1. Students will be able to incorporate evidence in their infographic coming from reputable data sources to support their ideas and show media literacy.
2. Students will be able to communicate the merits and limitations of various data and information sources considered in the work process.

3. Students will be able to identify and communicate environmental factors that contribute to climate change in their community.
4. Students will be able to identify and communicate evidence-based policy measures to prevent and mitigate climate change effects in communities.
5. Students will be able to use scientific argumentation to justify policy choices.

Teaching-learning process for school project (summary):

1. Collection of evidence (data, articles, pictures).
2. Evaluation of the evidence based on criteria and selection of the relevant and non-biased information.
3. Identify effective presentation formats.
4. Produce the infographics.
5. Present the infographic in open schooling event.

Organization of the open schooling event:

a. Each project output (infographic) is presented by the students in a community setting (e.g., exposition center, garden, museum, science fair).
b. Students will communicate policy measures using science-based argumentation. Students appeal to the action of all in health of the community, providing great understanding that health literacy and health promotion is a responsibility of all, not only of the ministry of health or healthcare providers.
c. Students, parents, school community and relevant local stakeholders attend the event and understand how pandemics is influenced by a set of social and environmental factors that in turn affect both animal and human health. They also get high-level understanding on strategies to minimize the phenomena and how they may have an influence on the relevant settings (e.g., home, school, workplace, community).

Data Analysis and Reporting

Infographic based on science-driven data and information research.
Content Analysis.
Report writing with most important findings.
Development of presentation.

Target Audience for Recommendations

Parents, science teachers, local community – public.
Public Health, Environment and Animal Health Authorities and other stakeholders (farmers, industry, managers).

Public Debate and Recommendations (based on research results)

Presentation of the infographics by students in a community setting and dissemination of evidence recommendations via social, community and conventional media.
Release of initial draft report and preliminary recommendations for feedback.
Discussion and feedback.
Release of revised report and recommendations for public consultation.
Evidence-based recommendations that follow the ONE HEALTH approach.

Main partner responsible: UNL (School of Public Health)

28. Project management resource and inquiry instruments on the topic of "Non-communicable diseases"

Overview

The educational system has a central role in protecting children and youths' health and well-being.
The teaching-learning activities supports teachers and school community in exploring societal concerns around the determinants of health and prevalence of non-communicable diseases (NCDs) - major causes of premature deaths (< 70 years) worldwide - using updated scientific evidence. The teaching-learning script supports students in understanding this public health threat and understand on how STEM (Science, Technology, Engineering, Mathematics) contribute to approach and fight the major challenges of public health, contribute to evidence-based personal decision-making and public policy. The project explores the most important influences on humans' health and strengths abilities to prevent NCDs, by creating awareness on healthy lifestyles, social and environmental influences, and modifiable risk factors. It also supports students' participation in civic society initiatives and in the design of local responses for the issue, while providing significant interactions with the community and STEM related professions (researchers, public health specialists, data scientists, policy makers, enterprises). The entire educational scenario is based on the mandatory curriculum of natural sciences at EU level and promotes the following fundamental learnings:

- Distinguish health from quality of life.
- Understand the main determinants of health and well-being.
- Characterize the main non-communicable diseases, indicating the prevalence of associated risk factors.
- Interpret information on the determinants of individual and community health, analysing their importance in the quality of life of a population.
- Critically analyse action strategies in the promotion of individual, family, and community health, starting from issues framed in local, regional or national problems.

Estimated duration

After initial socioscientific and technical background on the topic in classroom environment (6-7 sessions), 5-6 sessions of 40-45 minutes for supplementary learning activities and school project (lesson 6 – lesson 12).

School Research Project

Overview. The project is based on guided research about social and environmental issues around NCDs, with a particular focus on the contribute of the school for a healthy community and on the general attributes of healthy communities. Students will be developing digital skills (e.g. finding, reviewing, organising and sharing information effectively, handling data appropriately, using different online resources and tools to study), acquire socio-scientific argumentation skills and improve communication and collaboration skills while understanding the multiplicity of factors leading to non-communicable diseases and mapping solutions for reducing or mitigating their impact at the school community with the support of stakeholders. At the end of the teaching-learning sequence, students will have developed the ability to explain how scientific knowledge and processes may contribute to the resolution of a socioscientific issue related to public health and to recognize dimensions of the issue that cannot be addressed by science.

In a first stage, students will be elaborating with the teacher on the principal research question, goals, data collection methods and instruments. They will be improving inquiry-based investigation skills to answer the questions of a socioscientific issue related to non-communicable diseases and their environmental determinants.

What are the major determinants of non-communicable diseases incidence?
Which environmental factors influence the incidence of non-communicable diseases in the school community?

Then students perform inquiry-based activities, administer the data collection instruments, analyse results, extract conclusions, and propose priorities for action. In the end, they will have created a poster that identifies strengths of the school and their surrounding area in a public health perspective, as well as identified areas for improvement that may be addressed by community stakeholders (students, residents, organisations, policy makers).

Relevance. Scientific evidence shows that the way public place functions, looks and feels influences health, wellbeing and incidence of diseases. With the project students will be contributing to tackle inequalities by

identifying potential strengths and weaknesses of spaces located at the school and in the neighbourhood, with a particular attention to the access of vulnerable groups. Based on the collected evidence, they will suggest actions and efforts for different stakeholders, according to the fields where they are needed most.

Estimated duration. The school research project starts after lesson 5 and has an estimated duration of 5-6 sessions of 45 minutes.

Session 1-2: research administration

The teacher organizes groups, each group addresses 1 topic connected with the environmental influences of non-communicable diseases in the school community:

    A. Accessibility, transportation options and security
    B. Public green and social spaces
    C. School environment

The teacher discusses with students' possible questions to assess the attributes of the communities in the subjects and possible methods to get the answers. The application of an online questionnaire is suggested but other data collection methods (e.g.: observations, interviews) may be considered. The advantages and limitations of the alternatives are discussed.

A brainstorming of possible questions to address the topics is promoted by the teacher.
Then the following may be presented to complete the task:

- **Accessibility, transportation options and security (Group 1)**
Can you walk from home to school?
Are there enough routes for walking and cycling to go to school?
The streets are flat and accessible for everyone?
Is easy for people with physical disabilities to use the streets?
Are there bike paths to go to school?
Are walking and cycling given priority over cars and other traffic as much as possible?
Are routes good quality, attractive and pleasant to use?
Do routes meet the needs of everyone, whatever their age or mobility, and is there seating
for those who need it?
Is the nearest public transport closer to school?
Is public transport to go to school good?
Is public transport to go to school affordable?
Are bus stops and stations in convenient places?
Is public transport safe and easy to access, whatever people age or mobility?
Are there many cars at the roads surrounding school?
Is there too much traffic surrounding school? Why?

- **Public green and social spaces (Group 2)**
Is the nearest park closer? What is the distance from the school to the park?
Is the park a place where you would choose to meet your friends?
Is the park accessible for people with special needs?
There are conditions in the park for playing and exercising?
There are facilities in the park to exercise?
There are facilities in the park to play and have joy with your family and friends?
There are enough places in the park to sit down?
There are places to seat that are clean, comfortable, conveniently located?
Do people have a choice of places to sit, either in the sun or shade?
Do vehicles dominate or block space dedicated to pedestrians or bicycles?
Do you feel secure in public space around school, during the day? And at night?
Is the area free of violence and antisocial behaviour?
Is the area safe for everyone, whatever their age, sex, ethnic group, religious beliefs,
sexuality or disability?
Do people feel safe both at school and when out and about?
Are there any social activities organized at the public space surrounding school?

Is easy for people with special needs to join those activities?

How many different types of activities are occurring in public space surrounding school- people walking, eating, playing baseball, chess, relaxing, reading?

Are there organized activities/initiatives ongoing in public space surrounding school?

Are there any local initiatives that encourage social interaction?

Are there any recreative events like art displays and performances occurring to celebrate local artists and cultures?

Are there any natural features into the urban space, such as street trees or plantings in plazas?

Is there any market with fresh products (e.g., vegetables, fruit, fish, etc.)?

Are there regular farmers markets at already existing properties, like building plazas, parking lots or streets?

Is there any community garden?

Is there any discussion or initiative ongoing about the design of public space?

Is there any discussion or initiative ongoing about planting trees?

Is there any discussion or initiative ongoing about water saving?

Is there any discussion or initiative ongoing about energy saving?

- **School environment (Group 3)**

Are there facilities to park the bicycle at school?

Are there any bins at school to deposit paper and plastic, for recycling purposes?

Are there facilities to repair objects near school, such as bicycles?

Are there facilities to leave used clothes and toys?

Are there solar panels at school?

Is there any strategy ongoing to save energy?

Is there any strategy ongoing to avoid waste of water?

During meals at school is usual to throw away food?

Is there any strategy ongoing to avoid food waste?

Is there a range of spaces (indoor, outdoor, purpose-built and more informal) where students can meet?

Is there a range of spaces to enjoy leisure and sporting activities?

Is there too much noise at school?

Is there any community garden at the school? Are you interested in contributing to it?

Do organisations such as local authorities and health services actively work with the school to understand needs?

Is there any initiative or channel connecting students and teachers with municipalities, such as "school parliament"?

After finishing the list of questions, students prepare the data collection instrument.

Is suggested that they work in groups and use a laptop to build an online questionnaire in Google forms. To conclude the preparation of the survey the teacher supports students in:

- ✓ writing the introductory text (HEADER)
    - o Project title/Project acronym
    - o Summary description of the project
    - o Why is the project relevant/project goals
    - o Who is implementing the project and where.
- ✓ configure the questions (WHAT)
    - o turning questions into sentences
    - o defining a scale for responses options
- ✓ identifying the target group (WHO)
- ✓ defining a strategy and activities to achieve the target (HOW)
- ✓ defining the minimum number of responses from the target (EXPECTED RESULTS)
- ✓ stablish a timeline for collecting the responses (WHEN)
- ✓ which events may constraint data collection (RISKS)
- ✓ which strategy to track results (CONTROL procedures)

Examples of scale:

1- strongly disagree; 2 – disagree; 3- not disagree, not agree 4- agree; 5 – strongly agree

2- definitely false; 2 – false; 3 – not false, not true; 4 – true; 5-definitely true

3- extremely unlikely; 2 – unlikely; 3 – not unlikely, not likely; 4 – likely; 5-extremely likely.
1 – yes; 2 – no

Example 1:
Can you walk from home to school?
Is possible to walk from home to school.
Response options: 1-strongly disagree; 2 – disagree; 3- not disagree, not agree 4- agree; 5 – fully agree

Example 2:
Is the nearest public transport closer to school?
The nearest public transport is closer to school.
Response options: 1-strongly disagree; 2 – disagree; 3- not disagree, not agree 4- agree; 5 – fully agree

Example 3:
Is there any local market with fresh products (e.g., vegetables, fruit, fish, etc.)?
There is a local market with fresh products (e.g., vegetables, fruit, fish, etc.)?
Response options: 1-yes; 2 – no;

Example 4:
Are there regular farmers markets at already existing and centrally located properties, like building plazas, parking lots or streets?
There are regular farmers markets at already existing properties, like building plazas, parking lots or streets?
3- extremely unlikely; 2 – unlikely; 3 – not unlikely, not likely; 4 – likely; 5-extremely likely.

Session 3: data analysis
After administering the survey and collecting the minimum number of responses, an Excel file may be downloaded from google forms. Alternatively, if the questionnaire is administered in paper, students prepare a file with the questions and distribution of responses. The teacher reminds students about the relevance of the project and supports each group of students in preparing tables, graphics and then promotes a debate around the results.

Session 4-5: presentation of evidence
Session 4 starts with the discussion of the best presentation format of the project results.
The output is produced and should describe the research question, methodology, results, conclusions and recommendations arising from the inquiry-based project. A poster is suggested, it can be built in paper or Canva software.
Then students discuss with the teacher the organisation of a forum for presentation and discussion of the output that invites students, teachers, parents, social partners of the local community to participate and engage in a debate.
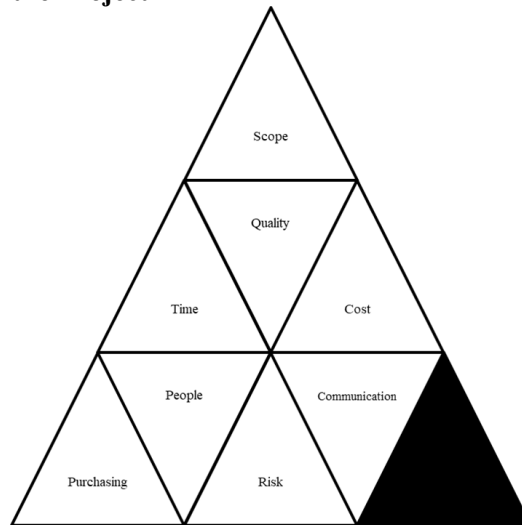
Session 6: open schooling event

During session 6 students will be holding a community event to share the results of their research with the participation of students, teachers, parents, social partners of the local community.
Each group will be presenting their evidence and informing the public about the questions they have addressed in the project while improving communication skills and developing responsible citizenship.

- Each project output (e.g.: poster) is presented by the students in a community setting (e.g., exposition center, municipality, garden, museum, science fair).
- Students will communicate policy measures using science-based argumentation. Students appeal to action of all in the health of the community, providing great understanding that health literacy and health promotion is a responsibility of all, not only of the ministry of health or healthcare providers.
- Students, parents, school community and relevant local stakeholders attend the event and understand how the prevalence of NCDs is influenced by a set of common behavioral factors related with lifestyles but also social and environmental factors. They also get high-level understanding on strategies to minimize the phenomena and how they may have an influence on the relevant settings (e.g., home, school, workplace, public space at the community).

Project Management Framework and Instruments

1. Plan: Determine How to Do the Project

2. Plan: Define Project Scope

- What are the outputs?
Example: scientific poster, open schooling event

-What are the requirements of project outputs?
Example: A3 format, Color, 5 sections (introduction, goals, methods, results, conclusions, recommendations).
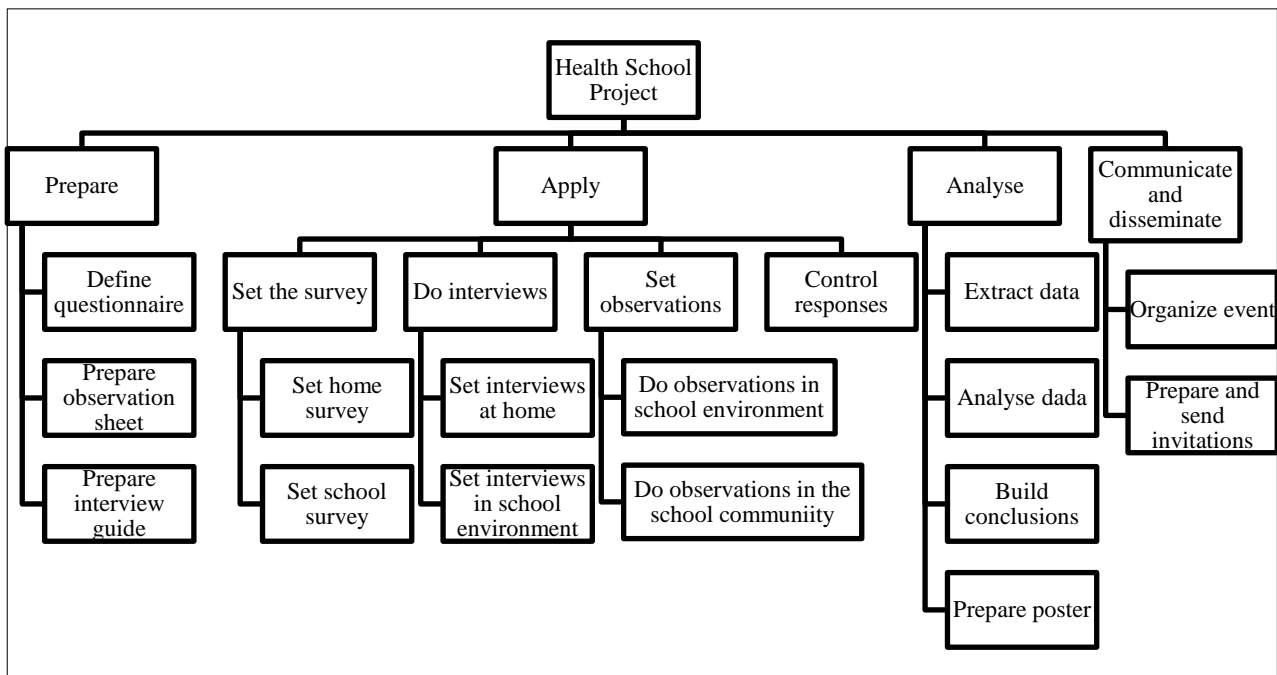
- Are there any constraints to produce the project outputs?
Example: work should be completed in two weeks

- Define the tasks to produce the outputs – build the Work Breakdown Structure

Work Breakdown Structure
(filled with examples, these may change according to your project organisation)

3. Plan: Determine Project Time

- a. Define the detailed activities for each WBS element
- b. Put the activities in sequence
- c. Estimate the resources (human and acquisitions) for each activity
- d. Estimate the calendar time (days or weeks) for each activity
- e. Create the Gantt Chart

Resource Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources
Define the questionnaire	1 hour	paper
Parameterize the questionnaire in google forms	15 minutes	laptop
Prepare observation sheet	1 hour	paper
Do observations in school environment	3 hours	paper or laptop
Set home survey	15 minutes	laptop or mobile phone
Prepare poster	3 hours	laptop

Gantt Chart
(filled with examples, these may change according to your project organisation)

Activity	Week 1	Week 2	Week 3	Week 4	Week 5
Define the questionnaire	■				
Parameterize the questionnaire in google forms		■			
Prepare observation sheet	■	■			
Do observations in school environment			■		
Set home survey					■
Prepare poster				■	

4. Plan: Determine Project Cost

- a. Estimate how much each activity will cost

Note: include the cost for Labor, Supplies, overhead (like office space and equipment)

- b. Add the estimates to determine the total cost of your project

Cost Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources	Human Resource Cost	Other Resources Cost (supplies)
Define the questionnaire	1 hour	paper	20 euros	n.a
Parameterize the questionnaire in google forms	15 minutes	laptop	5 euros	n.a
Prepare observation sheet	1 hour	paper	20 euros	n.a
Do observations in school environment	3 hours	paper or laptop	60 euros	n.a
Set home survey	15 minutes	laptop or mobile phone	5 euros	n.a
Prepare poster	3 hours	laptop	60 euros	40 euros
Total	8h30	-	170 €	-

5. Plan: Determine Project Quality

- a. Ensure your project produces quality outputs
- b. Plan what quality means to your project
- c. Determine how you will ensure quality

Quality Breakdown Structure
(filled with examples, these may change according to your project organisation)

Requirement	Quality planning	Quality assurance	Quality control
1.1	Minimum number of responses to the survey	Minimum number of responses to the survey: 50	Monitor the number of responses to the survey on a weekly basis
1.2	Minimum number of observations	Minimum number of observations: 5	Monitor the number of observations on a daily basis
1.3	Minimum number of interviews	Minimum number of interviews: 10	Monitor the number of interviews on a daily basis
1.4	Poster template with five sections	Poster with five sections: introduction, goals, methods, results, conclusions, recommendations.	Monitor the developments of students' poster

6. Plan: Determine Project Risks

  a. Identify the two types of risks (uncertain future events that can affect your project): threats have a negative impact on your project; opportunities have a positive impact on your project

Risk Breakdown Structure
(filled with examples, these may change according to your project organisation)

Risk	Probability (How likely is it to happen)	Impact (How big of an effect will it have)	Owner (who takes care about the risk)	Action Plan (initiatives to reduce threats and increase opportunities)
Modest number of responses to the survey	High	High	Students: – Mary – Peter – John	–Identification of other potential target groups –Invitations and re–invitations
Modest number of people that accepted invitation to attend the open schooling event	Medium	Medium	Professor Francis Students: - Sophia - Caroline	- Re–invitations by email - Telephone calls

7. Plan: Plan Procurement Processes

  a. Determine what goods and services you need

  b. Have what you need at the time that you need it.

Supplies Breakdown Structure
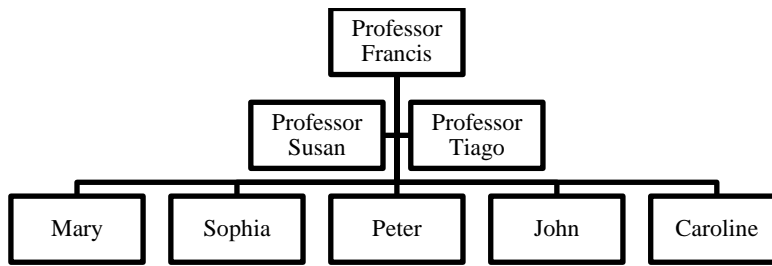*(filled with examples, these may change according to your project organisation)*

Supply	Supply Cost (supplies)	When to be available	How to be available
Paper	20 euros	In the beginning of the project	Commitment of school top management
Printer	50 euros	In the beginning of the project	Commitment of school top management
Mobile laptop	700 euros	In the beginning of the project	Commitment of school top management
Printed post	40 euros	Before the open schooling event	Poster printing in Stapples Office Center

8. Plan: Plan People

  a. Acquire the project team
  b. Map the project team in the Organization Breakdown Structure
  c. Assign the project team members to roles
  d. Assign the project team members to activities
  e. Train the project team
  f. Determine how you will motivate and reward the team
  g. Map Stakeholders – people or groups interested in the project
  h. Determine how you will engage stakeholders in the project

Organization Breakdown Structure
(filled with examples, these may change according to your project organisation)

Responsibility assignment matrix
(filled with examples, these may change according to your project organisation)

Activity	Team members							
	Mary	**Sophia**	**Peter**	**John**	**Caroline**	**Professor Francis (Science)**	**Professor Susan (Science)**	**Professor Tiago (ICT)**
Define the questionnaire	X	X	X			C/P		
Parameterize the questionnaire in google forms					X	C/P		
Prepare observation sheet			X	X	X		C/P	
Do observations in school environment			X	X/P	X		C/P	
Set home survey	X	X	X	X	X/P	C/P		
Prepare poster	X	X	X	X	X			C/P
Coordinate the overall implementation of the project					X	X		

Letter	Role
X	Executes work
P	Controls progress
C	Should be consulted
I	Should be informed

Stakeholders Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Directly involved in the project (yes/no)	Served or Affected by the Project	Likely to be user of the results of the project
Parents	yes	yes	yes
School community	yes	yes	yes
School management	no	yes	yes
Municipality	no	yes	yes
Residents' association	no	yes	yes
Primary healthcare center and Hospital	no	yes	yes
National Directorate for Education	yes	yes	yes
National Institute of Health Doutor Ricardo Jorge	yes	no	no
National Directorate For Health	yes	no	no

Stakeholders Management Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Who they are and why should be involved in the project	Why the project is relevant for them	Strategies to obtain support
Parents	Students' families should be involved in the survey to collect the relevant responses. Their involvement also maximizes the impact of the project in terms of global literacy.	Due to their interest in pupils' education and school health and well being	Present the school project in parents meeting
School community	The school community should be involved in the survey and observations to be done by students in school environment. Their involvement also maximizes the impact of the project in terms of global literacy.	Due to their interest in students' education and school health and well being	Present the school project in a school community meeting
School management	The school management assures relevant resources for students' projects and should be involved in the survey Their involvement also maximizes the impact of the project in terms of global literacy.	Due to their interest in students' education and school health and wellbeing. Also due to their interest in demonstrating the interest of school in contributing to community health (to be a health promotion school).	Present the school project in parents meeting.
Municipality	The municipality should be involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to municipality interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project). .
Residents' association	Residents' associations should be involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to residents' associations interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project). .
Primary healthcare center and Hospital	The Primary healthcare center and Hospital should be involved in the open schooling event where students share the results of their projects and communicate recommendations.	Due to their interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project). .
National Directorate for Education	The National Directorate for Education is supporting the project and interested in the results in terms of students' learnings.	Due to their interest in novel methodologies for STEM education and role in policy making.	Invitation to participate in the open schooling event.

9. Plan: Plan Communication

   a. Assure the right information to the right people, at the right time, in a useful format
   b. Assure effective project meetings
   c. Build the communications plan

Communications plan
(filled with examples, these may change according to your project organisation)

Organized by (from)	Participants (to)	What	When	How/Where	Purpose
Professor Francis	Team	Kick-off meeting	10 september	Laboratory	Provide a complete description of the project and what the end product will be.

Organized by (from)	Participants (to)	What	When	How/Where	Purpose
Professor Francis	Team	Team meeting	Every week (Wednesday, 14h)	IT classroom	- Overall plan for the project - Discuss project developments and plan next stage - Instruct team on how to - Provide updates on the progress of the project and if there are any issues with completion
Professor Francis	Team and Parents	Meeting	Before the project starts (date to be defined)	School meeting room	Explain the project and invite for participation in the survey
Professor Francis and Team	Parents	Meeting	Before the project starts (date to be defined)	Virtual meeting	Explain the project and invite for participation in the survey and open schooling event.
Professor Francis, Team, School management	School community Municipality Residents' association Primary healthcare center and Hospital National Directorate for Education National Institute of Health Doutor Ricardo Jorge National Directorate For Health	Invitations to stakeholders participation in open schooling event	Before the open schooling event (date to be defined)	By email	Explain the project and invite for participation in the open schooling event.

10. Plan: Finish the project planning by building the Charter

1.0 Project identification	
Name	Health Education Project - Non-communicable diseases
Summary description	The project is about guided research on social and environmental issues around NCDs: which environmental factors influence the incidence of non-communicable diseases in the school community? Students perform inquiry-based activities, administer the data collection instruments, analyse results, extract conclusions, and propose priorities for action. In the end, they will have created a poster that identifies strengths of the school and their surrounding area in a public health perspective, as well as identified areas for improvement that may be addressed by community stakeholders (students, residents, organisations, policy makers).
Project owner	Identify the owner of the project (e.g.: school X)
Project manager	Identify the project manager
Stakeholders	Identify the stakeholders and briefly describe why they are interested parties
Team and roles	Identify the team and summarize the role of each resource in the project

2.0 Needs that support the project
Scientific evidence shows that the way public place functions, looks and feels influences health, wellbeing and incidence of diseases. Based on the collected evidence, students will suggest actions and efforts for different stakeholders towards better public health, according to the fields where they are needed most.

3.0 Project goals

Describe what you want to achieve in the short-term, medium term and long term. Follow SMART principle (Specific, Measurable, Achievable, Realistic, and Timely).

Examples
Project completed – March 22
Open schooling event – April 22

4.0 Project scope

Identify the tasks of the project.

Examples
Define the questionnaire
Parameterize the questionnaire in google forms
Prepare observation sheet
Do observations in school environment
Set home survey
Prepare poster

5.0 Key Deliverables

Identify goods or services produced as a result of the project. A deliverable could be a report, a document, a software product, a server upgrade or any other building block of an overall project.

Examples
Questionnaire
Interview Guide
Observations Gride
Book
Poster
Infographic
Brochures

6.0 Milestones and dates

Identify the principal landmarks of project execution stablished according to what is described in the project scope.

Examples
Survey concluded
Interviews concluded
Open schooling event prepared

7.0 Constraints

Identify the principal project constraints (cost, technical, other)

Examples
Budget 200 € (limit)
Project should be finished in 15 December (limit)

8.0 Risks and opportunities

Identify issues that may emerge in the future and influence project implementation

Examples
Modest number of responses to the survey
Modest number of people that accepted invitation to attend the open schooling event

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9.0 Project success criteria

Identify the criteria or measures of success. These are the project acceptance criteria.

Examples
Project completed before Christmas period
Open schooling event in a community setting with the participation of the entire school community, parents, and local stakeholders.

10.0 Project success factors

Identify the factors that you will manage in order to positively influence the success of the project.

Examples
Appropriate engagement of students and parents.
Interest of teachers in project based learning.

Suggested printing (to be available at the wall where the project is developed): "You choose, ONE Life, TWO Directions" [LO 92].

Suggested complementary readings for teachers:
1. Watch this video
Lisbon case study Urban environment and health, 2017 - YouTube
2. Take a look at these infographics and texts!
Healthy places
Placemaking guidelines and initiatives
3. Perform this assessment
Place Standard

Teaching-learning process for school project (summary):

1. Collection of evidence.
2. Evaluation of the evidence based on criteria and selection of the relevant and non-biased information.
3. Identify effective presentation formats.
4. Produce the output (e.g.: scientific poster**).**
5. Present the output in open schooling event.

Expected outcomes of the teaching-learning process (summary):

- Students will be able to incorporate evidence coming from trustful data sources to support their ideas and arguments.
- Students will be able to communicate the merits and limitations of various data and data collection processes considered in the work process.
- Students will be able to identify and communicate factors that inhibit or promote healthy behaviors in their community.
- Students will be able to identify and communicate evidence-based policy measures to prevent and manage NCDs in their community.
- Students will be able to use non-biased data to justify policy choices.

Target Audience for Recommendations

School community and local stakeholders: students, parents, municipalities, healthcare providers, local enterprises.

Public Debate and Recommendations

Presentation of the infographics by students in a community setting and dissemination of evidence recommendations via social, community and conventional media.

Main Partner responsible: UNL (School of Public Health)

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29. Project management resource and inquiry instruments on the topic of "Sustainable Development Goals"

Overview

The Sustainable Development Goals (SDGs) provide a framework to address challenges faced worldwide. The United Nations Sustainable Development Agenda, created in 2015, includes 17 SDGs to be achieved by 2030. It was adopted by 193 members and is a result of the joint work of Governments and Citizens to meet an extended set of goals, such as making energy clean and affordable, stopping global warming, ending hunger and poverty, promoting healthy lives and creating sustainable cities and communities. Teaching the SDGs in schools promotes awareness on the global challenges and individual responsibility for actions while committing students to build a better and more sustainable future for everyone. Therefore, learning about the SDGs, reporting performance and actions, participating and/or developing campaigns, are dimensions of competence important for students' citizenship. The scenario supports teachers in encouraging students to be active participants in their local and global communities to solve the biggest challenges the world faces today while exploring how schools can help advancing the Global Goals and preparing them to capture evidence and communicate progresses. The final project engages students in community discourse on measures they can adopt to introduce positive changes, with big or small actions, thus creating a connection between students, the school, the community and local stakeholders.

Estimated duration

After initial socioscientific and technical background on the topic in classroom environment (5-6 sessions), 5-6 sessions of 40-45 minutes for students' projects

Supplementary learning resources and educational activities

During any session of the school research project (described down, in autonomous section) is organized at least one of the following activities:

1. <u>Discussion with school representatives.</u> The school is a transformative environment, and the representatives can discuss with students how sustainable development is promoted at the school setting. Students can identify actions and interventions promoted at the school level that may contribute to the SDGs.
2. <u>Discussion with private or third sector organizations regarding sustainable development.</u> Many organizations incorporate practices that promote sustainable development, and students can discuss with experts how these practices are introduced and monitored, as well as positive results they are bringing to society.
3. <u>Discussion with governmental actors regarding Sustainable Development.</u> Many countries and governments have agencies and departments dedicated to the promotion and monitoring of SDGs, and students can discuss with experts how SDGs are promoted and monitored at a national level.

These educational activities can be in the form of teleconference, classroom visits by experts, or students visiting organizations.

School Research Project

Topics
Global Agenda for Sustainable Development
Scientific evidence and monitoring indicators
Actions to achieve the SDGs
Translation of the SDGs to the local level

Research management, design and administration

<u>Overview.</u> The project is based on guided research about measures that can be adopted at the school level to support the Agenda for Sustainable Development 2030, with a focus on questions related with SDG3- Good Health and Well-being. Students will be contributing to a healthy school and to the sustainability of their community by developing inquiry-based activities and presenting their results in a schooling event open for community participation. The students perform inquiry-based activities, collect data, analyse results, extract conclusions, and propose priorities for action. In the end of the project, students will present a scientific poster

that identifies strengths of the school and the community in a public health and sustainability perspective, as well as areas for improvement that may be addressed by community stakeholders (e.g., students, residents, organisations, policy makers). During the process, they will be developing research skills, the capacity to navigate in digital environment, improve their skills to develop and communicate ideas, and teamwork skills, while investigating and discussing important actions that can be taken by the school regarding the requirements of sustainability.

Relevance. The agenda for Sustainable Development 2030 brings attention to the main challenges our world faces in different levels and defines ways to contribute for SDGs advancement from an individual to a global perspective. By learning about the SDGs, students get greater knowledge on solutions for problems they face in their own lives (e.g., energy poverty), as well as how to impact positively the lives of others. Students address the socioscientific issues brought by the project by collecting evidence and translating the research findings into concrete actions and efforts, to be taken at the school level, that contribute the sustainability agenda, while promoting equality, health, well-being and sustainability in their community.

Estimated duration. The school research project starts after lesson 5 and has an estimated duration of 5-6 sessions of 45 minutes.

Resources. The following Digital Educational Resources can assist at this stage:
- Education for Sustainable Development (ESD) **[ER12]**
- The World's Largest Lesson **[ER13]**
- Videos **[ER11]**

Phases of the School Research Project:

The School Research Project structure follows the typical phases of an inquiry-based project:

1. Orientation – discovering a problem: students are introduced to a problem, which is the effects of humans lives on the planet and the unsustainability of maintaining lifestyles and behaviours that destroy the capacity of sustainable living on earth. Teacher uses **[ER2]** to show some impacting images.

2. Conceptualization – finding a research/starting question: the teacher asks students if they believe they may have a relevant contribution for the sustainability of the planet and if the school can help in this mission. After discussion around potential starting questions, students elect one that drives the school research project.

- how may the school help advancing the SDGs?
- what are the challenges of the school community regarding sustainable development?
- what are the challenges of the school community regarding SDG3?
- what are the elements present at the school community that don't contribute to the UN Agenda for Sustainable Development?

Students are separated in groups and each group addresses one category, mostly related to a group of SDGs and systematically associated to SDG3- Good Health and Well-being. The three categories are:

A. Social progress (SDG1, SDG2, SDG3, SDG8, SDG10, SDG11)
B. Environmental protection (SDG 3, SDG6, SDG7, SDG 11, SDG 12,SDG13, SDG 14, SDG 15)
C. Sustainable lifestyle (SDG 3, SDG11, SDG12, SDG13, SDG14, SDG15)

The teacher discusses with students' possible questions to assess the attributes of the school community in the categories and possible methods to get the answers. It is suggested the application of an online questionnaire and to conduct observations, but other data collection methods (e.g.: interviews) may be included. The advantages and limitations of the alternatives are discussed.
For each category it is suggested below a couple of questions and a method to collect evidence. Given that the SDGs are related, some questions or attributes may be associated to more than one of the categories. At the end of the project, students must express on how these attributes in their school/community are related to Good Health and Well-being (SDG3).

- Social progress: Decent work, food security and reduced inequalities (SDG1, SDG2, SDG3, SDG8, SDG11)

Main SDGs	Questions	Suggested data collection instrument
1,3	There are humans in a situation of poverty in the community?	Survey
8	Is access to employment and decent income for all assured?	Survey
1,2,3	There are humans in situation of hunger or malnutrition in the community?	Survey
2, 3, 8	Are the price of the meals affordable?	Survey
2,3	Are the meals healthy? (With the key nutrients)	Survey
2, 3,11,12	Is it usual to throw away food? Is there food waste?	Survey or Observation
2, 3, 11, 12, 13	There is a community garden?	Observation
3, 8, 11, 13	Is public transport to go to school good and cheap?	Survey
3, 10, 11, 13	Is public transport accessible for everyone regardless of their mobility?	Survey
3, 4, 10, 11	Is the school accessible for everyone regardless of their mobility?	Survey
1, 2, 3, 10, 11	Are there activities organized in the school/around the school/by the community to address needs of social nature? (e.g. food donation, charity events, social fairs, exhibitions, informative campaigns)	Survey/Observation/Interview

Note: different scales for responses may be applied (e.g. 1- strongly disagree; 2 – disagree; 3- not disagree, not agree 4- agree; 5 – strongly agree; 2- definitely false; 2 – false; 3 – not false, not true; 4 – true; 5-definitely true; 1- extremely unlikely; 2 – unlikely; 3 – not unlikely, not likely; 4 – likely; 5-extremely likely; 1 – yes; 2 – no).

- Environmental protection: Sanitation, clean energy and climate action (SDG3, SDG6, SDG7, SDG11, SDG 12, SDG13, SDG 14, SDG 15)

Main SDG	Questions	Suggested data collection instrument
3, 6, 11, 12	Is there any waste of water at the school?	Survey or Observation
3, 8, 11, 13	Is the school accessible by public transport?	Survey
3, 11, 13	Is the school accessible by walking?	Survey
3, 11, 13	Is the school accessible by bicycle?	Survey
3, 11, 13	Is car the preferred mode of transportation in your community? (to go to school, supermarket, visit friends)	Survey
3, 11, 12, 13	Is there any waste of energy in the school?	Survey or Observation
3, 7, 11, 13	Are there clean sources of energy at the school?	Survey or Observation
3, 11, 13, 15	Are there green public spaces in the school/around the school?	Survey
3, 11, 13, 14, 15	Are there social activities organized in the school/around the school/by the community to address environmental protection? (e.g. clean the beach/park campaign, car-free day, bicycle day, informative campaigns)	Survey/Observation/Interview

Note: different scales for responses may be applied (e.g. 1- strongly disagree; 2 – disagree; 3- not disagree, not agree 4- agree; 5 – strongly agree; 2- definitely false; 2 – false; 3 – not false, not true; 4 – true; 5-definitely true; 3- extremely unlikely; 2 – unlikely; 3 – not unlikely, not likely; 4 – likely; 5-extremely likely; 1 – yes; 2 – no).

- Sustainable Lifestyle: Sustainable communities and responsible consumption (SDG3, SDG11, SDG12, SDG13, SDE14, SDG15)

Main SDG	Questions	Suggested data collection instrument
12, 13, 15	Is the paper usage in the school excessive?	Survey
12, 14	Is single-use plastic common in the school?	Survey
11, 12	Are school supplies (pencils, markers, crayons) re-used or used until they are unusable?	Survey
11, 12	Are there recycling bins for paper, glass, metal and plastic in the school/around the school?	Observation
11, 12	Are there donation bins in the school/around the school (e.g. for clothing items)?	Observation
12	Are there facilities in the school/around the school to repair objects?	Observation
11,13	Are there green spaces in the school/around the school?	Survey
3, 11	Are there public spaces in the school/around the school for people to do physical exercises and to be physically active?	Survey
3, 11, 12, 13, 14, 15	Are there social activities organized in the school or by the community to promote healthy and sustainable lifestyles? (e.g. clothes swap events, donation days, group walks/exercises)	Survey/Observation/Interview

Note: different scales for responses may be applied (e.g. 1- strongly disagree; 2 – disagree; 3- not disagree, not agree 4- agree; 5 – strongly agree; 2- definitely false; 2 – false; 3 – not false, not true; 4 – true; 5-definitely true; 1-extremely unlikely; 2 – unlikely; 3 – not unlikely, not likely; 4 – likely; 5-extremely likely; 1 – yes; 2 – no).

In summary, a problem statement and a starting question are defined that stimulates students' interest and curiosity on the theme. Students, with the guidance of the teacher, decide on the data collection methods to answer the question and test their hypothesis, administer surveys, observations, interviews with community members/stakeholders (being the first two methods preferred). The advantages and limitations of the alternatives are discussed, and the data collection instruments are prepared. It is suggested that they work in groups using a laptop to build an online questionnaire in Google forms. At this phase, students must write the following crucial aspects of their scientific project.

- ✓ Problem
- ✓ Research question
- ✓ Research objectives
- ✓ Data collection method and instruments
- ✓ Define study participants/target group (WHO)
- ✓ Defining a strategy and activities to achieve the target group (HOW)
- ✓ Defining the minimum number of responses from the target (EXPECTED RESULTS)
- ✓ Set a timeframe for data collection (WHEN)
- ✓ Identify events that may limit data collection, and define mitigation strategies (RISKS)
- ✓ Define how to monitor results (CONTROL procedures)

3. Investigation- collecting evidence and information of scientific nature: students carry out the investigation, design and implement the inquiry–based activities (exploration, observation, experimentation, data interpretation). After reaching a minimum number of responses, they can use Microsoft Office programs (e.g., excel, word) to organize their data, either it is quantitative or qualitative. Different methods of investigation can be employed, and the strategies to achieve the target group and the minimum number of responses/observations are defined, as well as alternative strategies if unexpected events that may limit data collection occur.

4. Conclusion- –analyzing the collected evidence:
Students analyse the data collected and draw conclusions. The teacher discusses with the students the obtained results andm based on the evidence, they discuss actions to be implemented in the school context that contribute to the SDGs and to promote public health. The teacher discusses with students what is the best method to present the results and software tools to produce the scientific poster may be used (the poster can also be produced on paper if the access on the computer is limited). The teacher supervises the work of students in preparing tables, graphs, texts, images and the production of the final output –the scientific poster. The

poster must include the research question, methodology, results, conclusions and recommendations from the inquiry project.
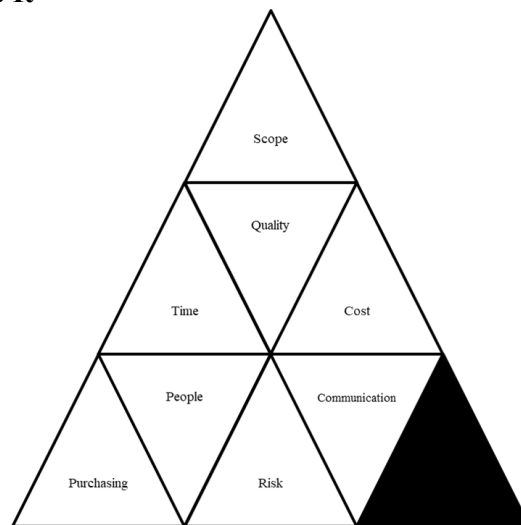
5. Discussion – exploring the implications of the new knowledge: students present the conclusions of their research to the teacher and receive feedback, comments and improvement suggestions. Then the organization of the open schooling event is discussed to present and discuss the findings of the projects. Each group of students will present the evidence of their scientific poster and inform the public about the challenges of the project. At this phase, students will be improving their communication skills and developing responsible citizenship. Students will be capable to explain how scientific knowledge may contribute to the resolution of a socioscientific issue related to sustainable development, and to recognize dimensions of the issue that cannot be addressed by science. The scientific poster, that identifies the strengths of the school and their surrounding area in terms of sustainable development, is presented and discussed. Within this scope, improvement areas that may be addressed by community stakeholders are identified (students, residents, organisations, policy makers).

In summary:

- Each project output (e.g.: scientific poster) is presented by the students in a community setting (e.g., exposition center, municipality, garden, museum, science fair).
- Students will communicate measures that contribute to the SDGs, using science-based data and argumentation. Students appeal to action that promotes health of the community and sustainable development.
- Students, parents, school community and relevant local stakeholders attend the event; understand strategies relevant for sustainable development and how each of them may be an agent of influence on the relevant settings (e.g., home, school, workplace, public space at the community).

Project Management Framework and Instruments

1. Plan: Determine How to Do It

2. Plan: Define Project Scope

- What are the outputs?
Example: scientific poster

-What are the requirements of project outputs?
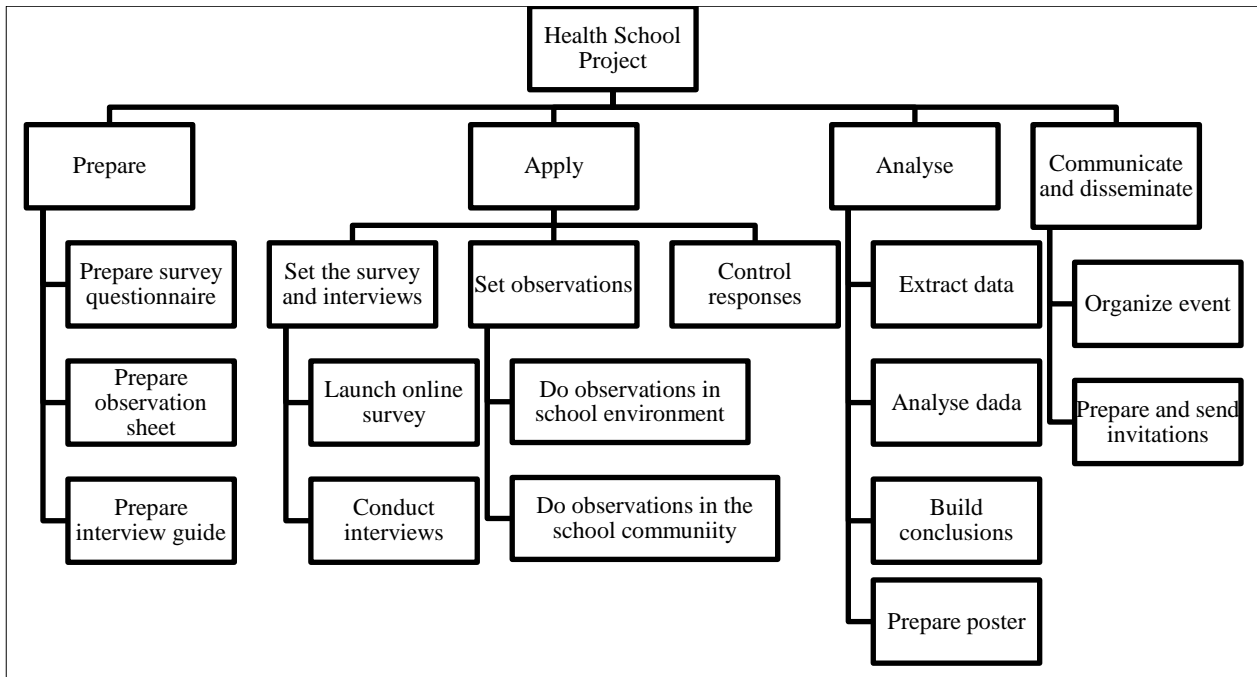Example: A3 format, Color, 5 sections (introduction, goals, methods, results, conclusions, recommendations).

- Are there any constraints to produce the project outputs?
Example: work will be completed in two weeks

- Define the tasks to produce the outputs – build the Work Breakdown Structure (WBS)

Work Breakdown Structure
(filled with examples, these may change according to your project organisation)

3. Plan: Determine Project Time

a. Define the detailed activities for each WBS element
b. Put the activities in sequence
c. Estimate the resources (human and acquisitions) for each activity
d. Estimate the calendar time (days or weeks) for each activity
e. Create the Gantt Chart

Resource Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources
Define information to be collected	2 hours	laptop
Parameterize the questionnaire in google forms	45 minutes	laptop
Observational and data collection activities	2 hours	laptop or paper
Analysis of data	45 minutes	laptop or mobile phone
Prepare scientific poster	3 hours	laptop

Gantt Chart
(filled with examples, these may change according to your project organisation)

Activity	Week 1	Week 2	Week 3	Week 4	Week 5
Bibliographic research	■				
Create infographic		■			
Observational and data collection activities			■		
Analysis of data			■	■	
Prepare scientific poster					■

4. Plan: Determine Project Cost

    a.   Estimate how much each activity will cost

Note: include the cost for Labor, Supplies, overhead (like office space and equipment)

    b.   Add the estimates to determine the total cost of your project

Cost Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources	Human Resource Cost*	Other Resources Cost (supplies)
Define information to be collected	2 hours	paper	20 €	20 €
Parameterize the questionnaire in google forms	45 minutes	laptop	5 €	n.a
Observational and data collection activities	2 hours	laptop or paper	15 €	n.a
Analysis of data	45 minutes	laptop or mobile phone	5 €	n.a
Prepare scientific poster	3 hours	laptop	60 €	20 €
Total	8h30	-	105 €	-

* Example on how to calculate resources and budget, without connection to the PAFSE real context

5. Plan: Determine Project Quality

    a.   Ensure your project produces quality outputs
    b.   Plan what quality means to your project
    c.   Determine how you will assure quality

Quality Breakdown Structure
(filled with examples, these may change according to your project organisation)

Requirement	Quality planning	Quality assurance	Quality control
1.1	Minimum number of observations	Minimum number of observations: 5	Monitor the number of observations on a daily basis
1.2	Minimum number of interviews	Minimum number of interviews: 10	Monitor the number of interviews on a daily basis
1.3	Minimum number of survey answers	Minimum number of survey answers: 40	Monitor the number of responses to the survey on a weekly basis
1.4	Infographic template with five sections	Infographic with five sections: introduction, goals, methods, results, conclusions, recommendations.	Monitor the developments of students' infographic

6. Plan: Determine Project Risks

    a.   Identify the two types of risks (uncertain future events that can affect your project):threats have a negative impact on your project; opportunities have a positive impact on your project

Risk Breakdown Structure
(filled with examples, these may change according to your project organisation)

Risk	Probability (How likely is it to happen)	Impact (How big of an effect will it have)	Owner (who takes care about the risk)	Action Plan (initiatives to reduce threats and increase opportunities)
Modest number of responses to the survey	High	High	Students: – Mary – Peter – John	–Identification of other potential target groups –Invitations and re–invitations
Modest number of people that accepted invitation to attend the open schooling event	Medium	Medium	Professor Francis Students: - Sophia - Caroline	- Re–invitations by email - Telephone calls

7. Plan: Plan Procurement Processes

    a.   Determine what goods and services you need
    b.   Have what you need at the time that you need it.

Acquisitions Breakdown Structure
(filled with examples, these may change according to your project organisation)
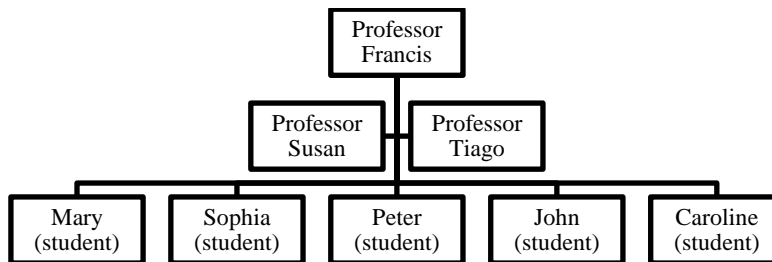
Supply	Supply Cost (supplies)	When to be available	How to be available
Paper	20 euros	In the beginning of the project	Commitment of school top management
Printer	50 euros	In the beginning of the project	Commitment of school top management
Mobile laptop	700 euros	In the beginning of the project	Commitment of school top management
Printed post	40 euros	Before the open schooling event	Poster printing in Stapples Office Center

8. Plan: Plan People

    a.   Acquire the project team
    b.   Map the project team in the Organization Breakdown Structure
    c.   Assign the project team members to roles
    d.   Assign the project team members to activities
    e.   Train the project team
    f.   Determine how you will motivate and reward the team
    g.   Map Stakeholders – people or groups interested in the project
    h.   Determine how you will engage stakeholders in the project

Organization Breakdown Structure
(filled with examples, these may change according to your project organisation)

Professor Francis
— Professor Susan
— Professor Tiago

Mary (student) — Sophia (student) — Peter (student) — John (student) — Caroline (student)

Responsibility assignment matrix
(filled with examples, these may change according to your project organisation)

Activity	Team members							
	Mary (student)	Sophia (student)	Peter (student)	John (student)	Caroline (student)	Professor Francis (Science)	Professor Susan (Science)	Professor Tiago (ICT)
Define the questionnaire	X	X	X			C/P		
Parameterize the questionnaire in google forms					X	C/P		
Parameterize observation sheet					X	C/P		
Conduct interviews	X	X	X	X	X/P	C/P		
Set home survey	X	X	X	X	X/P	C/P		
Analyze data							C/P	
Prepare poster	X	X	X	X	X			C/P
Coordinate the overall implementation of the project					X	X		

Letter	Role
X	Executes work
P	Controls progress
C	Should be consulted
I	Should be informed

Stakeholders Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Directly involved in the project (yes/no)	Served or Affected by the Project	Likely to be user of the results of the project
Parents	yes	yes	yes
School community	yes	yes	yes
School management	no	yes	yes
Municipality	no	yes	yes
Residents' association	no	yes	yes
Partners	no	yes	yes
National Directorate for Education	yes	yes	yes
National Directorate For Health	yes	no	no

Stakeholders Management Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Who they are and why should be involved in the project	Why the project is relevant for them	Strategies to obtain support
Parents	Students' families should be involved in the survey to collect the relevant responses. Their involvement also maximizes the impact of the project in terms of global literacy.	Due to their interest in pupils' education and school health and well being	Present the school project in parents meeting
School community	The school community should be involved in the survey to be organized by students in school environment. Their involvement also maximizes the impact of the project in terms of global literacy.	Due to their interest in students' education and school health and well being	Present the school project in a school community meeting
School management	The school management assures relevant resources for students' projects and should be involved in the survey Their involvement also maximizes the impact of the project in terms of global literacy.	Due to their interest in students' education and school health and wellbeing. Also due to their interest in demonstrating the interest of school in contributing to community health (to be a health promotion school).	Present the school project in parents meeting.
Municipality	The municipality should be involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to municipality interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project). .
Residents' association	Residents' associations should be involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to residents' associations interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project). .

Stakeholder name	Who they are and why should be involved in the project	Why the project is relevant for them	Strategies to obtain support
Partners	The Partners should be involved in the open schooling event where students share the results of their projects and communicate recommendations.	Due to their interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project). .
National Directorate for Education	The National Directorate for Education is supporting the project and interested in the results in terms of students' learnings.	Due to their interest in novel methodologies for STEM education and role in policy making.	Invitation to participate in the open schooling event.

9. Plan: Plan Communication

    a.   Assure the right information to the right people, at the right time, in a useful format
    b.   Assure effective project meetings
    c.   Build the communications plan

Communications plan
(filled with examples, these may change according to your project organisation)

Organized by (from)	Participants (to)	What	When	How/Where	Purpose
Professor Francis	Team	Kick-off meeting	10 september	Laboratory	Provide a complete description of the project and what the end product will be.
Professor Francis	Team	Team meeting	Every week (Wednesday, 14h)	IT classroom	- Overall plan for the project - Discuss project developments and plan next stage - Instruct team on how to - Provide updates on the progress of the project and if there are any issues with completion
Professor Francis	Team and Parents	Meeting	Before the project starts (date to be defined)	School meeting room	Explain the project and invite for participation in the survey
Professor Francis and Team	Parents	Meeting	Before the project starts (date to be defined)	Virtual meeting	Explain the project and invite for participation in the survey and open schooling event.
Professor Francis, Team, School management	School community Municipality Residents' association Partners National Directorate for Education National Directorate For Health	Invitations to stakeholders participation in open schooling event	Before the open schooling event (date to be defined)	By email	Explain the project and invite for participation in the open schooling event.

10. Plan: Finish the project planning by building the Charter

1.0 Project identification

Name	Health Promotion School - Sustainable Development
Summary description	The project is based on guided research about measures that can be adopted at the school level to support the Agenda for Sustainable Development 2030, with a focus on questions related with SDG3- Good Health and Well-being
Project owner	Identify the owner of the project (e.g.: school X)
Project manager	Identify the project manager
Stakeholders	Identify the stakeholders and briefly describe why they are interested parties
Team and roles	Identify the team and sumarize the role of each resource in the project (e.g: student, ICT teacher, Science Teacher, School manager, designer, software developer…)

2.0 Needs that support the project

The agenda for Sustainable Development 2030 brings attention to the main challenges our world faces in different levels and defines ways to contribute for SDGs advancement from an individual to a global perspective. By learning about the SDGs, students get greater knowledge on solutions for problems they face in their own lives (e.g., energy poverty), as well as how to impact positively the lives of others.

3.0 Project goals

Describe what you want to achieve in the short-term, medium term and long term. Follow SMART principle (Specific, Measurable, Achievable, Realistic, and Timely).

Examples
Project completed – March 22
Open schooling event – April 22

4.0 Project scope

Identify the tasks of the project.

Examples
Define the questionnaire
Parameterize observation sheet
Conduct interviews
Set home survey
Analyze data
Prepare poster
Coordinate the overall implementation of the project.

5.0 Key Deliverables

Identify goods or services produced as a result of the project. A deliverable could be a report, a document, a software product, a server upgrade or any other building block of an overall project.

Examples
Questionnaire
Interview Guide
Observations Gride
Book
Poster
Infographic
System map
Brochures

6.0 Milestones and dates

Identify the principal landmarks of project execution stablished according to what is described in the project scope.

Examples
Bibliographic research concluded
Interviews concluded
Open schooling event prepared

7.0 Constraints

Identify the principal project constraints (cost, technical, other)

Examples
Budget 200 € (limit)
Project should be finished on 15 December (limit)

8.0 Risks and opportunities

Identify issues that may emerge in the future and influence project implementation

Examples
Modest number of responses to the interviews
Modest number of people that accepted invitation to attend the open schooling event

9.0 Project success criteria

Identify the criteria or measures of success. These are the project acceptance criteria.

Examples
Project completed before Christmas period
Open schooling event in a community setting with the participation of the entire school community, parents, and local stakeholders.

10.0 Project success factors

Identify the factors that you will manage in order to positively influence the success of the project.
Examples
Appropriate engagement of students and parents.
Interest of teachers in project-based learning.

Additional information

- Students and teachers should use the resources introduced in the lessons, as well at the complementary resources *Education for Sustainable Development* **[ER12]**, and *The World's Largest Lesson* **[ER13]**. These resources Objects contain one section for each SDG, and these contain a great variety of materials including videos, reports, infographics, case studies, booklets. It is also suggested that teachers and students watch the videos **[ER11]**.
- In collaboration with the disciplines of Information and Communication Technologies and Visual Education, students can select the best software to prepare their scientific poster and subsequentially work on it with the support of the teacher (e.g., Canva, MS Power Point).

The project is based on guided research about the Global Goals and how schools can support this Agenda. To address the challenge proposed in this project, students bring the ideas from the first lessons and supplementary educational activities. Students understand the importance of progressing on the SDGs and of searching for reliable data to propose measures. Students propose actions for the school community that supports sustainable development.

Teaching-learning process milestones:
1. Students will be able to incorporate evidence in their infographic coming from reputable data sources to support their ideas and show media literacy.
2. Students will be able to identify and communicate evidence-based policy measures to help progressing the SDGs and producing positive outcomes in the school and community settings.
3. Students will be able to suggest and advocate for actions by different stakeholders, through scientific-based data and information.

Organization of the open schooling event:
- Each poster is presented by the students in a community setting (e.g., exposition center, garden, museum, science fair).
- In the public presentation, students must be prepared to communicate relevant evidence-based recommendations that help to support progress on the SDGs, and that bring consequently bringing positive impacts for the local level.

Students, parents, school community and relevant local stakeholders attend the event and understand how the progress regarding the SDGs is associated to positive outcomes for the community health and well-being. In this context, they discuss with students the project results and strategies to support the progress of the SDGs at school and community level.

Public Debate and Recommendations

Presentation of posters, and discussion of recommendations based on data collected with the community leadership and stakeholders, dissemination via social communication (national, local, and specific networks).

Main Partner responsible: UNL (School of Public Health)

Overview

The pandemic brought severe social and economic impacts and healthcare systems were disrupted by the need to diagnose, trace patients in isolation at home, assure in-home and inpatient care, according to the severity of the cases. At the moment, more than 6 million deaths had been attributed to COVID-19 around the globe. Creating awareness on the symptoms and actions to be taken in their presence is very important, not only to increase personal protection but also to help containing the spread of communicable diseases in the community. This can be supported by artificial intelligence (AI) systems, which have been successfully employed for healthcare purposes during the pandemic and many positive outcomes have been documented (e.g., improved COVID-19 screening, diagnostics, follow-up, timely response, most reliable response, efficient outcomes, etc.). In this context, is important to explore ideas and develop students thinking computing around the use of AI systems, and produce creative digital artifacts, using digital strategies and tools to support students' creativity in educational environments: know and explore the concept of AI, the steps for creating and developing an AI system, and promote understanding and classroom debate around its use as an emerging technology.

Estimated duration

After initial socioscientific and technical background on the topic in classroom environment (5-6 sessions), up to 12 sessions of 40-45 minutes for students' projects

Supplementary learning resources and educational activities

The most important supplementary educational activities is the School Research Project, that has the challenge to build a Chatbot to address the actions to be taken when symptoms appear.

The interaction between students and STEM organizations can be achieved through activities to be carried out in parallel with the execution of the School Research Project. Namely: Classroom visits by IT professionals, healthcare professionals, project managers, software developers or Teleconferences and the organization of a chatbot evaluation competition with rewards attribution where the judges belong to STEM organizations.

## School Research Project

Topics

- Major communicable diseases. H2019 Novel Coronavirus (2019-nCoV), Measles, Mumps, Zika Virus, Pertussis, Influenza
- CDs Symptoms
- Artificial Intelligence
- Building Chatbot
- Quality and reliability of Information Systems
- Scientific literacy, fact-checking techniques, quality of information sources

Research management, design and administration

Students are organized in groups. The project challenges each group of students to create and present a website that contains a chatbot that helps people decide what to do when they have symptoms. They must integrate the knowledge obtained during the teaching-learning sequence and ideas emerged during the meetings with experts.

General suggestion: use project management templates to organize the research project

1. Plan: Determine How to Do It
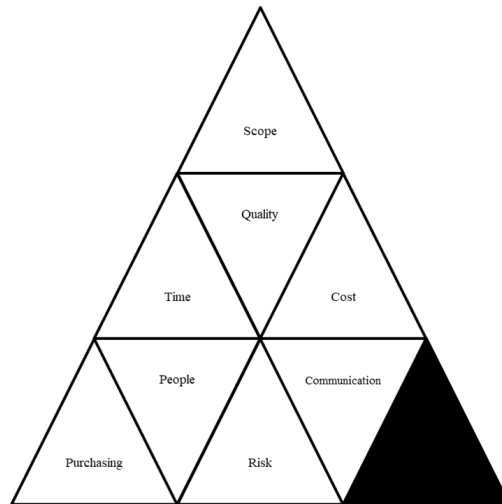
2. Plan: Define Project Scope

- What are the outputs?
Example: website and chatbot

-What are the requirements of project outputs?
Example: Photos and videos in digital format, open access chatbot

- Are there any constraints to produce the project outputs?
Example: work will be completed in two weeks

- Define the tasks to produce the outputs – build the Work Breakdown Structure

Work Breakdown Structure
(filled with examples, these may change according to your project organisation)

3. Plan: Determine Project Time

a. Define the detailed activities for each WBS element
b. Put the activities in sequence
c. Estimate the resources (human and acquisitions) for each activity
d. Estimate the calendar time (days or weeks) for each activity
e. Create the Gantt Chart

Resource Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources
Define website content	1 hour	paper
Development of website and chatbot	4 hours	laptop
Production of multimedia content	2 hours	laptop or mobile phone
Website and chatbot testing and launching	2 hours	laptop

Gantt Chart
(filled with examples, these may change according to your project organisation)

Activity	Week 1	Week 2	Week 3	Week 4	Week 5
Define website content	■				
Development of website and chatbot		■	■	■	
Production of multimedia content				■	■
Website and chatbot testing and launching					■

4. Plan: Determine Project Cost

    a.   Estimate how much each activity will cost
Note: include the cost for Labor, Supplies, overhead (like office space and equipment)

    b.   Add the estimates to determine the total cost of your project

Cost Breakdown Structure
(filled with examples, these may change according to your project organisation)

Activity	Human Resource	Other Resources	Human Resource Cost*	Other Resources Cost (supplies)
Define website content	1 hour	paper	20 €	n.a
Development of website and chatbot	4 hours	laptop	50 €	n.a
Production of multimedia content	2 hours	laptop	10 €	n.a
Website and chatbot testing and launching	2 hours	laptop	30 €	100 €
Total	8 hours	-	1100 €	-

* Example on how to calculate resources and budget, without connection to the PAFSE real context

5. Plan: Determine Project Quality

    a.   Ensure your project produces quality outputs
    b.   Plan what quality means to your project
    c.   Determine how you will assure quality

Quality Breakdown Structure
(filled with examples, these may change according to your project organisation)

Requirement	Quality planning	Quality assurance	Quality control
1.1	Website with chatbot- content quality	Chatbot with accurate content	Monitor the quality of the content used to develop chatbot
1.3	Website with chatbot- technical functioning	Accessible website with functioning chatbot	Monitor the developments of students' website and chatbot

6. Plan: Determine Project Risks

    a.   Identify the two types of risks (uncertain future events that can affect your project):threats have a negative impact on your project; opportunities have a positive impact on your project

Risk Breakdown Structure
(filled with examples, these may change according to your project organisation)

Risk	Probability (How likely is it to happen)	Impact (How big of an effect will it have)	Owner (who takes care about the risk)	Action Plan (initiatives to reduce threats and increase opportunities)
The content to be introduced at the chatbot is too complex	Medium	High	Students: – Mary – Peter – John	–Limit the scope of the chatbot regarding the diseases and symptoms
The chatbot does not work	Medium	Medium	Professor Francis Students: - Sophia - Caroline	- Seek assistance with IT professionals, healthcare professionals, project managers, software Developers, PAFSE researchers

7. Plan: Plan Procurement Processes

    a.   Determine what goods and services you need
    b.   Have what you need at the time that you need it.

Acquisitions Breakdown Structure
(filled with examples, these may change according to your project organisation)
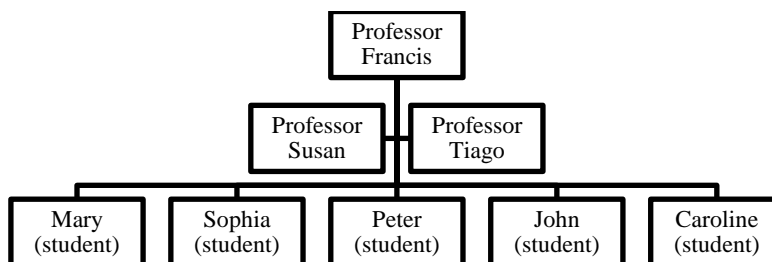
Supply	Supply Cost (supplies)	When to be available	How to be available
Paper	20 euros	In the beginning of the project	Commitment of school top management
Mobile laptop	700 euros	In the beginning of the project	Commitment of school top management
Website licence	100 euros	During the development of the project	Commitment of school top management

8. Plan: Plan People

    a.   Acquire the project team
    b.   Map the project team in the Organization Breakdown Structure
    c.   Assign the project team members to roles
    d.   Assign the project team members to activities
    e.   Train the project team
    f.   Determine how you will motivate and reward the team
    g.   Map Stakeholders – people or groups interested in the project
    h.   Determine how you will engage stakeholders in the project

Organization Breakdown Structure
(filled with examples, these may change according to your project organisation)

```
                    Professor
                     Francis
                        |
          ┌─────────────┴─────────────┐
      Professor                   Professor
       Susan                        Tiago
          └─────────────┬─────────────┘
     ┌────────┬─────────┼─────────┬────────┐
   Mary     Sophia    Peter      John    Caroline
 (student) (student) (student) (student) (student)
```

Responsibility assignment matrix
(filled with examples, these may change according to your project organisation)

Activity	Team members							
	Mary (student)	**Sophia** (student)	**Peter** (student)	**John** (student)	**Caroline** (student)	**Professor Francis (Science)**	**Professor Susan (ICT)**	**Professor Tiago (ICT)**
Define the scope of the website and chatbot	X	X	X			C/P		
Parameterize the content on the website		X			X	C/P	C/P	
Produce multimedia material	X	X	X	X	X/P	C/P		C/P
Test and launch website	X	X	X	X	X	C/P	C/P	
Coordinate the overall implementation of the project						X	X	

Letter	Role
X	Executes work
P	Controls progress
C	Should be consulted
I	Should be informed

Stakeholders Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Directly involved in the project (yes/no)	Served or Affected by the Project (yes/no)	Likely to be user of the results of the project (yes/no)
Parents	yes	yes	yes
School community	yes	yes	yes
School management	no	yes	yes
Municipality	no	yes	yes
Residents' association	no	yes	yes
Data scientists and technology developers	no	yes	yes
National Directorate for Education	yes	yes	yes

Stakeholders Management Matrix
(filled with examples, these may change according to your project organisation)

Stakeholder name	Who they are and why should be involved in the project	Why the project is relevant for them	Strategies to obtain support
Parents	Students' families should be involved in the development of the chatbot through suggestions. Their involvement also maximizes the impact of the project in terms of global literacy.	Due to their interest in pupils' education and school health and well being	Present the school project in parents meeting
School community	The school community should be involved in the activities to be organized by students in school environment. Their involvement also maximizes the impact of the project in terms of global literacy.	Due to their interest in students' education and school health and well being	Present the school project in a school community meeting

Stakeholder name	Who they are and why should be involved in the project	Why the project is relevant for them	Strategies to obtain support
School management	The school management assures relevant resources for students' projects and should be involved in the activities. Their involvement also maximizes the impact of the project in terms of global literacy.	Due to their interest in students' education and school health and wellbeing. Also due to their interest in demonstrating the interest of school in contributing to community health (to be a health promotion school).	Present the school project in parents meeting.
Municipality	The municipality should be involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to municipality interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project).
Residents' association	Residents' associations should be involved in the open schooling event where students share the results of their projects and communicate recommendations for the community level.	Due to residents' associations interest in the results of students' projects (recommendations generated by the results to be communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project).
Data scientists and technology developers	Data scientists and technology developers should be involved in the development of the website and in open schooling event where students share the results of their projects and communicate recommendations.	Due to their interest in the results of students' projects (the use of AI in public health decision making, as communicated in the open schooling event).	Invitation to participate in the open schooling event (that also provides a summary description of the school project).
National Directorate for Education	The National Directorate for Education is supporting the project and interested in the results in terms of students' learnings.	Due to their interest in novel methodologies for STEM education and role in policy making.	Invitation to participate in the open schooling event.

9. Plan: Plan Communication

a. Assure the right information to the right people, at the right time, in a useful format
b. Assure effective project meetings
c. Build the communications plan

Communications plan
(filled with examples, these may change according to your project organisation)

Organized by (from)	Participants (to)	What	When	How/Where	Purpose
Professor Francis	Team	Kick-off meeting	10 september	Laboratory	Provide a complete description of the project and what the end product will be.
Professor Francis	Team	Team meeting	Every week (Wednesday, 14h)	IT classroom	- Overall plan for the project - Discuss project developments and plan next stage - Instruct team on how to work on the content of the website - Provide updates on the progress of the project and if there are any issues with completion
Professor Francis	Team and Parents	Meeting	Before the project starts (date to be defined)	School meeting room	Explain the project

Organized by (from)	Participants (to)	What	When	How/Where	Purpose
Professor Francis and Team	Parents	Meeting	Before the project starts (date to be defined)	Virtual meeting	Explain the project and invite for participation in the open schooling event.
Professor Francis, Team, School management	School community Municipality Residents' association Data scientists and technology developers National Directorate for Education	Invitations to stakeholders participation in open schooling event	Before the open schooling event (date to be defined)	By email	Explain the project and invite for participation in the open schooling event.

10. Plan: Build the project charter

1.0 Project identification	
Name	Health education project – Intelligent Artificial Systems in Public Health
Summary description	Build a Chatbot to address the actions to be taken when clinical symptoms appear
Project owner	Identify the owner of the project (e.g.: school X)
Project manager	Identify the project manager
Stakeholders	Identify the stakeholders and briefly describe why they are interested parties
Team and roles	Identify the team and summarize the role of each resource in the project

2.0 Needs that support the project

Creating awareness on the symptoms and actions to be taken in their presence is very important, not only to increase personal protection but also to help containing the spread of communicable diseases in the community. This can be supported by artificial intelligence (AI) systems, which have been successfully employed for healthcare purposes during the pandemic and many positive outcomes have been documented (e.g., improved COVID-19 screening, diagnostics, follow-up, timely response, most reliable response, efficient outcomes, etc.).

3.0 Project goals

Describe what you want to achieve in the short-term, medium term and long term. Follow SMART principle (Specific, Measurable, Achievable, Realistic, and Timely).

Examples
Project completed – March 22
Open schooling event – April 22

4.0 Project scope

Define the tasks of the project.

Examples
Define website content
Development of website and chatbot
Production of multimedia content
Website and chatbot testing and launching

5.0 Key Deliverables

Identify goods or services produced as a result of the project. A deliverable could be a report, a document, a software product, a server upgrade or any other building block of an overall project.

Examples
Website
Chatbot
Page on social networks

6.0 Milestones and dates

Identify the principal landmarks of project execution stablished according to what is described in the project scope.

Examples
Website launched
Open schooling event prepared

7.0 Constraints

Identify the principal project constraints (cost, technical, other)

Examples
Budget 200 € (limit)
Project should be finished in 15 December (limit)

8.0 Risks and opportunities

Identify issues that may emerge in the future and influence project implementation

Examples
The content to be introduced at the chatbot is too complex
The chatbot does not work
Modest number of people that accepted invitation to attend the open schooling event

9.0 Project success criteria

Identify the criteria or measures of success. These are the project acceptance criteria.

Examples
Project completed before Christmas period
Open schooling event in a community setting with the participation of the entire school community, parents, and local stakeholders.

10.0 Project success factors

Identify the factors that you will manage in order to positively influence the success of the project.

Examples
Appropriate engagement of students and parents.
Interest of teachers in project-based learning.

Teaching-learning process milestones:
1. Students will be able to propose solutions based on chatbots for healthcare contexts
2. Students will be able to identify and communicate the importance of the role of AI in society and, in particular, in healthcare.
3. Students will be able to use technical argumentation to justify policy choices.

Teaching-learning process for school project (summary):
1. Development of materials (videos, tutorials, pictures).
2. Website and chatbot.
3. Presentation of the Website and chatbot in open schooling event.

Organization of the open schooling event:
1. Each project output (website and bot) is presented by the students in a community setting (e.g., local server or through computers placed in exposition center, garden, museum, science fair).
2. Students will prepare a pitch on how AI and chatbots can address public health challenges. Technical speeches to motivate peers to new technologies and environments.
3. Students, parents, school community and relevant local stakeholders attend the event and are introduced on the topic on how AI can be used to address challenges.

Data Analysis and Reporting
Content Analysis; Descriptive statistics; Data presentation formats; Report writing; Development of presentation.

Target Audience for Recommendations

School community and local stakeholders: students, parents, municipalities, healthcare providers, local enterprises.

Public Debate and Recommendations

Public presentation of the website and chatbot and dissemination of evidence-based recommendations via social, community and mainstream media. Release report and recommendations for public consultation.

Main partner responsible: UNL (Information Management School)

Partnerships for Science Education

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