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EDUCATIONAL SCENARIO

SOCIAL DETERMINANTS OF HEALTH DURING AN EPIDEMIC/PANDEMIC OUTBREAK

(For High School classes – English version)



University of Ioannina



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Scenario Title: Social determinants of health during an epidemic/pandemic outbreak (High school / Senior high school version)

Main partner responsible

The Educational Approaches to Virtual Reality Laboratory (EARTH Lab), Department of Primary Education, University of Ioannina, Ioannina, Greece.

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 realize 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.

Scientific content and its relevance to Public Health Education

- It is widely accepted that social parameters and social inequities magnify health inequities among citizens. The concept of health does not only depend on medical and biological factors.
- Social determinants of health during an epidemic or a pandemic are emphasized. They consist of a dimension that is often undermined in science education or STEM courses, although they are, in fact, decisive of one's health condition.
- The comprehension of the connection between science and society, as well as the social embedding of science, is promoted.
- Social and health disparities pose a serious issue in public health promotion. Students have to be aware of this problem in order to evolve to active citizens.
- The notion of health is contextualized in authentic societal settings (health policies), and an authentic way of health-related decision-making, including emotional, social, economic, and ethical factors.
- The inclusion of social determinants of health in health-related decision-making is necessary for health promotion both in personal and societal level.
- Some environmental determinant of health are approached, and more particularly, the major problem of the origin of Emerging Infectious Diseases, in the context of the One Health Approach.

Estimated duration & relevant subjects

12 teaching hours (extended version of the scenario), organized in continuous two-hour periods if possible.
10 teaching hours (short version of the scenario).

Designed for Biology, Science, Health Science, or Social Science classes of high school (senior high school) grades (K10-12 grades).

The Biology (or Science, or Health Science, or Social Science) teacher could cooperate with the English language teacher in order combine Science Learning with English Language Instruction, according to the Content and Language integrated learning (CLIL). In this way both scientific literacy and English fluency are promoted. The learning sequence is appropriate for this method since all the DLOs and SERs are available in English.

STEM Content

- Promotion of the interconnection among science, technology, society and the environment (STSE).
- Promotion of critical STEM literacy, critical health literacy and critical scientific literacy aspects in STEM courses instruction with a view to promoting active citizenship.
- Highlight of the role of science for the establishment of social justice.
- Collection and proper handling of research data, conclusion drawing and appropriate research project presentation by students.
- Descriptive statistics (simple measures, indices, charts, and graphs) as a means of analyzing presenting qualitative and quantitative scientific data.
- The process of an authentic scientific research and issues concerning the trustworthiness, biases, and misinterpretation of data.

***Non-STEM Content:** Conduct of authentic empirical social research by students – students in the role of social researchers under authentic small-scale research conditions, collaborative student work for the design of appropriate social research tools.*

Content glossary

Anthroponosis (pl. anthroponoses): Anthroponoses are the human communicable diseases that are transmitted from human to human through direct or indirect transmission routes. Measles and diphtheria are examples of anthroponoses.

Communicable/infectious/contagious disease: Communicable diseases are those diseases (which are in turn the harmful unnatural conditions of the human organism) which can be transmitted from one person to another. Communicable diseases are mainly caused by pathogens, such as bacteria, viruses, fungi and protozoa (they can be rarely caused by infectious particles, as in the case of the Creutzfeldt-Jakob disease). Disease transmission can be direct (through human intercourse) or indirect (e.g., through insects or infected objects). Some examples of communicable diseases are influenza, chickenpox, malaria, and the Ebola disease. On the other hand, there are non-communicable diseases, such as diabetes, phenylketonuria and Alzheimer's disease.

Data analysis: Data analysis is the phase following data gathering in empirical research. It includes various techniques (e.g. mathematical handling, logical functions, groupings, codification etc.). According to the empiricist view of science the aim of data analysis is to draw conclusions which lead, in turn, to the confirmation or the refutation of the initial research hypotheses, or the formation of a new scientific theory.

Data gathering: Data gathering is the process of recording observations of a phenomenon (natural or social) during empirical research. According to the empiricist view of science, it is one of the first stages of empirical research.

Emerging Infectious Diseases: Emerging Infectious Diseases are the communicable diseases the frequency of which has increased rapidly over the last twenty years and/or have the potential of rapid increase in the near future. Emerging Infectious Diseases are often anthroponoses and they are usually the cause or potential cause of epidemics and pandemics. Old diseases which reappear are sometimes included in Emerging Infectious Diseases. Typical cases of emerging infectious diseases are the COVID-19, the Ebola disease, measles and outbreaks of antibiotic-resistant bacteria strains.

Empirical research: Empirical research is the kind of research which is based on the gathering, the analysis, and the interpretation of empirical data. Empirical data are the qualitative or quantitative data which are collected from the observation of a phenomenon by the researcher.

Health disparities/inequities: Health disparities or inequities are the differences in health condition among social groups which are caused by social, economic or environmental differences, and that negatively affect the health of certain social groups. Common causes of health disparities are ethnicity, gender, sexual identity, age, disability, socioeconomic status, and geographical factors. A typical case of health disparity is the high incidence of cardiovascular diseases in African Americans although no biological reason for this difference exists.

One Health: The One Health approach is a transdisciplinary approach that considers human health under a broad context highlighting the direct interconnections with animal health and the environment. Zoonoses, vector-transmitted diseases and antibiotic-resistant bacteria strains are common issues dealt with the One Health approach.

Qualitative data: Qualitative are the data which refer to qualitative variables. Qualitative variables have values that are not numerical. The genders or the political beliefs of the people in a population are examples of qualitative data.

Quantitative data: Quantitative are the data which refer to quantitative variables. Quantitative variables have numeric values. They might be able to take all possible values between two limits (constant variables) or it might take only certain values (discrete variables). The heights or the ages of the people in a population are examples of quantitative data.

Research tool: Research tool is the medium which a researcher uses to collect data for empirical research. Questionnaires and interviews are common research tools for social research.

Social determinants of health: Social determinants of health are the non-medical factors which affect the health condition of some people or a population. Social determinants of health usually include factors such as living conditions, working conditions, socioeconomic status, educational level, unemployment, social discriminations and social exclusion. Social determinants of health are often used to explain the disproportionately lower health indices in certain social groups, such as the incidence of communicable and non-communicable diseases, life expectancy and accessibility to the healthcare system.

Social research: Social research is the sum of the different ways of systematic and scientific study of social phenomena. These ways often aim at the detection of mechanisms and the development of models which explain the social phenomena.

Zoonosis (pl. zoonoses): Zoonoses are the communicable diseases that can be transmitted between humans and vertebrate animals. If they are transmitted from humans to animals they are called zoonoses, while the ones that are transmitted from animals to humans are called anthroozoonoses. The west Nile fever and brucellosis are typical examples of anthroozoonoses. The transmission of an anthroozoonosis from animals to humans does not exclude human-to-human transmission.

Pedagogical glossary

Assessment rubric: An assessment rubric is a strictly organized assessment system with certain assessment criteria, which is used for the precise quantitative assessment of several features of an answer or a project according to certain criteria and corresponding grading scales.

Brainstorming: Brainstorming is an instructional technique, with several variations, that might take place within a small group or with the entire class. During brainstorming all students shortly express their ideas or concepts which are relevant to a given guiding question or central term. Criticism on the ideas is absent during brainstorming and its aim is the production of a lot and divergent ideas.

Collaborative learning: By the term collaborative learning we refer to a sum of learning techniques, during which students cooperate or collaborate during the learning process, instead of the atomistic, and often rival, view of students by the traditional school. Collaborative learning can boost the learning outcomes, students' interests and participation and their collaboration and communication skills.

Concept map: Concept maps are a kind of graphic organizers similar to mind maps. They include concepts in frames interconnected with arrows. A verb is written above each arrow which determines the kind of the semantic connection, in a way that the two interconnected concepts and the arrow (verb) form a semantically independent sentence.

Critical health literacy: Critical health literacy is an important dimension of health literacy beyond fundamental literacy and comprehension skills in health contexts. It includes quite useful notions and skills for a health literate citizen in modern society. Critical health literacy mainly consists of the critical appraisal of health information, the comprehension of the interconnection between health and society - and the notion

of social determinants of health in particular - and the participation in civic actions for the promotion of health.

Critical reading: Critical reading is an instructional technique which consists of the thorough study of an information source (e.g., a text or a diagram). During critical reading, students have to recall, interpret and evaluate information from the source, training the corresponding critical thinking skills.

Graphic organizer: Graphic organizers are a group of various ways of schematic (visual) and diagrammatic representation of the connections among facts, concepts or processes. They can be used as teaching, learning, or assessment tools. Common kinds of graphic organizers are mind maps, concept maps, flow charts and Venn diagrams.

Infographic: An infographic (information graphic) is a kind of multimodal representation of facts and information. It usually forms a broad graphic composition combining short texts, numerical data, graphs, diagrams, sketches, colours, and shapes. The aim of the infographic is to present a big amount of information on a topic in a visual way, making it immediately comprehensible.

Inquiry based learning: By the term inquiry-based learning we refer to the engagement of students in active learning processes during which they practice several scientific skills. Students make use of these skills in order to answer scientific questions either posed by the students themselves or by the teacher, by the handling of authentic data, either experimentally collected by themselves or given already collected. Some other common inquiry skills include models construction and use, carrying out experiments, data collection and organization, variable handling, data driven conclusion-making and communicating over scientific issues. In structured inquiry students are given the research question to-be-answered, as well as detailed step-by-step guidance of the entire process of inquiry. In guided inquiry student are only given the research question to-be-answered and the decision-making processes about the research procedure are set up to them.

Mind map: Mind maps are a kind of graphic organisers which, in their generic form, include concepts in frames which are interconnected with lines. Each line represents a semantic connection between the two concepts it connects. Mind mapping is easy even for novice students. Although showing the existence of semantic connections, it does not clarify the kind of connections depicted.

Project based learning: Project based learning is an instructional approach of active learning having several forms, during which students work in groups on the development of projects, often referring to authentic problems or situations approaching real life conditions. Project based learning includes the phases of project initiation, project development and project presentation.

Role game: By referring to the term role game in educational contexts we mean a broad spectrum of activities in which one (usually a student) assumes the role of another character, often fictional. The student has to act and express themselves as the character would do, while keeping some kind of distancing from the assigned character, as well.

Values clarification: Values clarification is quite a common technique in values education. At its general form, students have to prioritize values they select from a list, according to their own hierarchical value system, especially in terms of a given decision-making problem. It is a highly self-reflective activity, during which they are concerned about the values they have even if they were not aware of them.

Competences / Learning Goals

I. Knowledge (Core Concepts)

a) *Transdisciplinary concepts:* Critical health literacy, public health literacy, STSE (Science, Technology, Society, Environment) interconnections, One Health approach, health disparities, health policies, empirical social research.

b) *Specific content concepts:* Communicable diseases, zoonoses, anthroponoses, antropozoonoses, emerging infectious diseases, social determinants of health, social inequities, social groups.

II. Skills

a) *General skills:* Critical thinking, reflective thinking, critical reading, decision making, collaboration and communication within small groups, presentation skills.

b) Specific skills: Critical reading of scientific sources (videos, infographics, informative health texts, academic texts), argumentation about the social and environmental dimensions of scientific topics, empirical social research design, questionnaire (research tool) design, gathering of qualitative and quantitative data, statistical analysis of qualitative and quantitative data, drawing data-driven conclusions, presentation of scientific topics, discussing about scientific topics, handling of educational simulations.

III. Attitudes (Affective domain)

a) Attitudes and values: Awareness concerning environmental, social and ethical aspects of an epidemic, recognition of modern civilization as a factor of emergence of new infectious diseases, empathy development towards sensitive social groups, emotion recognition, recognition of the interference of emotional factors in decision making, recognition of the difficulty in decision making and values hierarchy within realistic contexts, values recognition and hierarchical organization, reconsidering of values hierarchies concerning social disparities, awareness about health disparities, recognition of the interconnection between science and society.

b) Behaviors: Health-related decision-making driven by scientific data, civic actions for the limitation of health disparities, health-related behaviour and decision-making with an orientation towards humanistic values.

Classroom organisation requirements

During the 1st teaching hour students work independently on computers. From the 2nd to the 4th teaching hour students work in pairs, having one computer for each pair. From the 5th to the 6th teaching hour students work on pairs on their computers, with a potential of cooperation of two pairs at four-member groups (2+2 technique). From the 7th to the 10th teaching hours students work in small groups, about 3 to 5 members each, the precise number of members depending on the number of sections of the questionnaire. During the 11th and the 12th teaching hours the whole class works collectively.

Prerequisite knowledge and skills

- Existence of communicable diseases capable of leading to pandemic and epidemic outbreaks.
- Examples of historical or recent epidemics and pandemics.
- The students' experience of everyday life during COVID-19 pandemic would be quite useful.
- The notion of social inequities in modern society in relation to various factors (e.g. concerning profession, income, education, origin, gender etc.).
- The existence of questionnaires as social research tools.
- Basic competencies of finding, comparing and evaluating pieces of information in texts.
- Intermediate (or at least limited) fluency in English in case that DLOs and SERs other than the ones of the PAFSE repository are used.

School research project

Topics

- A. What is the origin of communicable diseases?
- B. How can an epidemic crisis affect various social groups?
- C. How did the COVID-19 pandemic affect social groups in the local society?

I. Research management, design, and administration

Research item (questionnaire) design for the conduct of an Internet school research on the effect of the COVID-19 pandemic on the local society. The research focuses on the personal experience of the pandemic by each citizen and the impact the pandemic had on several local society groups.

Conduct of empirical social research in the local society.

Data collection, analysis and interpretation.

Presentation and communication of the research project.

Minor aspects of the project design are going to be determined by students themselves.

II. 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.

III. 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 sector about educational issues) 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.

IV. Public debates and recommendations

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

Teacher guidance notes

- Students often find it difficult to acknowledge the importance of social determinants in shaping one's health condition. The notion of health is often seen exclusively from a medical or a biological viewpoint and the impact of social conditions is undermined. Consequently, the social determinants of health are often omitted or severely undermined in the conceptualization of health by students.
- Attention ought to be paid to the careful handling of the issues of social inequities in order not to reproduce stereotypes or have some students become offended. The examples of social groups or social inequities should be carefully selected, since the scope of the learning sequence is to cultivate students' citizenship and critical health literacy skills. The reproduction of commonplace stereotypes might intensify students' bias and easy labeling that do not represent the complex and changing nature of a real society. On the contrary, it promotes a deterministic way of thinking for the students hindering their meaningful critical understanding.
- Teaching ought not to be restricted to the notion of the existence of health inequities due to social inequities. Furthermore, potential actions for bridging the health gaps should be emphasized, especially those to which students as potential citizens could contribute. They should realize that health inequities are not irreversible, but they could be in part restricted, through citizens' personal and collective actions.
- Students experientially approach the role of a researcher by designing and conducting empirical research by themselves. The concept, the characteristics, the difficulties and the limitations of research are approached, and students are trained in inquiry skills like gathering, handling, interpreting and presenting data. Moreover, they approach some epistemic aspects of scientific practice, such as the procedure and the way of production of new scientific knowledge, the intrinsic variance of social research, the different interpretations of the same data and the notion of theory-laden practice.

Assessment activities

The assessment activities act complementarily to one another and aim at the close monitoring of the students' learning procedure. Some activities aim at formative and some others at summative assessment, some assess students in a quantitative and some others in a qualitative way, some aim at conceptual understandings, some at critical thinking skills, some at collaboration and communication skills and some others at affective domain assessment. They all contribute to having a multi-perspective view for each student. The teacher can omit or undermine some of the assessment activities if they think so. Some of the learning activities happen as the lesson takes place without special activities done or special assessment material designed (e.g. observation of students' participation or performance at question-and-answering).

- Initial assessment of students' initial conceptions and attitudes in the phase of students' ideas externalization, via a short questionnaire and constructing a concept or mind map.

Diagnostic quantitative and qualitative assessment aiming at conceptual understanding and affective connotations.

- Formative assessment of students' worksheets during the entire learning sequence.
Formative qualitative assessment aiming at conceptual understanding, critical thinking skills and affective connotations.
- Formative student assessment through observation of their participation in question-and-answering techniques and in class discussions during the entire learning sequence.
Formative qualitative assessment aiming at participation, conceptual understanding, reasoning, collaboration and communication skills.
- Formative student assessment through the observation of their participation in the role game and the way they handle their role.
Formative qualitative assessment aiming at reasoning, communication skills and affective connotations.
- Summative student groups assessment of the quality of the intermediate reports on project data analysis and of the project oral presentation according to assessment rubrics.
Summative qualitative and quantitative assessment aiming at higher-order inquiry and communication skills.
- Summative assessment of the final project report made collaboratively by the whole class. *Summative qualitative and quantitative assessment at inquiry, communication and self-reflection skills.*
- Summative assessment of students' self-referred beliefs, attitudes and behaviours through a questionnaire with Likert-scale questions at the end of the learning sequence.
Summative quantitative assessment aiming at affective connotation.
- Summative assessment of the learning procedure by the students in terms of likeability, interest, difficulty, self-fulfillment, collaboration and time management.
Summative quantitative and qualitative assessment aiming at self-reflection.

Teacher professional development actions

Teacher professional development on:

- STEM/science/health education for social justice and citizenship through the promotion of critical literacy aspects.
- The use of active (experiential) learning techniques (role playing, values clarification).
- Project-based learning and collaborative learning techniques.
- Fundamental principles of the conduct of a social empirical research and the design of questionnaires as a research tools.
- Coordination of the conduct of students' empirical research.
- Use of appropriate software for questionnaire design, data analysis (descriptive statistics) and presentation.
- Inquiry-based-learning contextualization of the scenario's digital learning objects (structured inquiry, guided inquiry, case study, argumentation, problem solving)

Digital Learning Objects (DLOs)

DLOs created specifically for the needs of the PAFSE project

I. *'Concept mapping about the social determinants of an epidemic'*

<http://photodentro.pafse.eu/handle/8586/32>

'Concept map tool'

<http://photodentro.pafse.eu/handle/8586/32?&locale=en>

Graphic organizer development environment for the externalization of students' conceptions. Students are given the environment to freely design a concept or mind map about the environmental and social aspects of an epidemic. Some guiding core concepts and connections are provided to help students begin the concept or mind mapping activity more easily.

II. *'Map concerning the origin of communicable diseases'*

<http://photodentro.pafse.eu/handle/8586/170>

Interactive simulation and map software about the chronology (approximate date) and place of origin of recent epidemics and pandemics and past endemic diseases. Students select on a 20th and 21st century timeline dates representing the first description of pathogens which lead to the outbreak of recent epidemics and pandemics. Endemic disease choices are also available next to the timeline. By selecting

each disease, the geographical area of disease origin is coloured on the map and a short informative text about the disease and its origin appears.

III. *'Social determinants of epidemics'*

<http://photodentro.pafse.eu/handle/8586/239>

Environment for guided navigation and critical reading of adapted texts, short videos and infographics concerning social disparities during epidemics in close relation to the notion of social determinants of health. Two videos, two text excerpts and some small infographics have been selected to be incorporated in the navigation environment. Students critically study the sources mentioned above.

IV. *'Health-related decision-making during an epidemic'*

<http://photodentro.pafse.eu/handle/8586/240>

Experiential three-part role game environment, in which the user (a pair of students) chooses a character to impersonate. During the first part the pair gives one-word-answers (yes/no) to a series of health-related questions according to the role and sees how much 'advantage' they have in terms of health. At the second part some keywords are given to the students, and they have to describe the experience of the character during an epidemic and make health-related decisions on crucial issues. At the third part students have to prioritize conflicting values within an epidemic context, according to the ethical criteria of their role and their own ethical criteria.

DLOs which have been retrieved from online resources

V. *'Health and social inequities among European countries'*

<https://health-inequalities.eu/el/toolbox/interactive-map/>

Interactive European map depicting social and financial indices of European counties in relation to health-related indices. The possible correlation among indices is noted and the relation of each country's index to the European mean is presented, as well as index variations among regions within the same country.

Supplementary Educational Resources (SERs)

A. SERs created specifically for the needs of the PAFSE project

I. *'Conceptions about the social determinants of health and the origin of diseases'*

<http://photodentro.pafse.eu/handle/8586/174>

Initial assessment and misconception detection software about the environmental and social dimensions of epidemics in the form of a short quiz with close-ended and short-answer questions.

B. SERs which have been retrieved from online resources

II. *'Health disparities during the COVID-19 pandemic'*

<https://www.health.org.uk/news-and-comment/charts-and-infographics/same-pandemic-unequal-impacts>

Comprehensive infographic about the interconnection between health and social inequities during the COVID-19 pandemic.

III. *'The animal origin of epidemics'*

<https://www.youtube.com/watch?v=qp5CEcIyk94>

Educational YouTube video about the animal origin of epidemics, by exemplifying this with the cases of West Nile virus and Ebola virus.

IV. *'Health inequities in the USA'*

<https://www.youtube.com/watch?v=VCnBgaGJMKc>

Short news excerpt regarding health disparities during the COVID-19 pandemic in the USA, related to nationality/race and working conditions.

V. *'Types of health disparities during the COVID-19 pandemic'*

<https://www.youtube.com/watch?v=6leuxxEDM-E>

YouTube video by the World Financial Forum about the ways in which various kinds of social disparities lead to an unequal experience of the COVID-19 pandemic by different social groups (social determinants of health).

VI. *'The causes and consequences of health disparities'*

<https://www.cdc.gov/coronavirus/2019-ncov/community/health-equity/racial-ethnic-disparities/index.html>

- Informative text by the Centre for Disease Control and Prevention about the social determinants of health in the case of the COVID-19 pandemic. In particular, social reasons for health disparities and their health outcomes on citizens are presented and explained.
- VII. *'Health disparities during epidemics'*
<https://ejournals.epublishing.ekt.gr/index.php/ekke/article/view/23229>
Academic paper on social disparities and health disparities during epidemics with emphasis on the case of COVID-19 (in Greek).
- VIII. *'Inequities in the Greek society during the COVID-19 pandemic'*
<https://www.statistics.gr/el/infographic-menoume-spiti-5>,
<https://www.statistics.gr/el/infographic-menoume-spiti-2>,
<https://www.statistics.gr/el/infographic-menoume-spiti-8>
Infographics by the Hellenic Statistical Authority concerning statistical data from the COVID-19 pandemic in Greece. The chosen infographics highlight residence size, accessibility to the Internet and underlying health condition.
- IX. *'Consequences of the COVID-19 pandemic on the society'*
https://www.youtube.com/watch?v=6vkMJNRJ_NY
Educational YouTube video about the consequences of social disparities and discrimination on the impact the COVID-19 pandemic had on different social groups.
- X. *'The social determinants of health'*
<https://www.youtube.com/watch?v=8PH4JYfF4Ns>
Educational introductory YouTube video about the theoretical conceptualization of the social determinants of health.
- XI. *'E-me platform H5P tools for the school project'*
H5P tools of the e-me platform (<https://e-me4all.eu/>). By choosing 'e-me content' students can use the 'Questionnaire' tool to create the questionnaire, the 'Graph' tool to handle and present the statistical data, and the 'Accordion' tool to form the final research report.

Teaching -learning activities

Some educational activities have been framed in dotted frames, like the following one:



These activities could be seen as optional under conditions. Even though they are parts of the educational scenario, they are not inseparable ones, and they could be omitted if the teacher thinks so, mainly due to reasons relevant to restricted teaching time, limited student competences, or low student motives. This can be done according teacher's will and the omission of some framed activities does not affect the other ones, e. g., the framed activities of the 2nd, 5th, and 6th hours might be omitted, thus the framed activities of the 1st, 3rd, and 4th hours be carried hours properly. Some of the framed activities might be used as optional activities for more 'advanced' student groups that end their task earlier than the rest, or as alternative, or optional homework for students interested.

1st teaching hour – What students think about the environmental and social determinants of an epidemic?

Learning objectives

Knowledge	Skills	Attitudes and Behaviours
-	➤ Concept/mind mapping	➤ Sincere self-expression

Teaching phase according to the inquiry & project based instructional model: Engagement – Externalization of students' initial conceptions

- Students are initially engaged in the learning sequence and are introduced to its main topic, which is the impact of an epidemic crisis to society, and to its different social groups. Some relevant news headlines, infographics or short videos could be used at this stage to spark a conversation in class on the topic. The infographic SER II could be utilized. SER II refers to the COVID-19 pandemic and is quite

comprehensive and appropriate to be used in the phase of engagement, preferably translated in students' native language.

The teacher could also use some news of the timeliness as engagement material to ignite students' initial interest and participation in the lesson. The teacher could distribute copies of the news to students, or could use a projector machine for the entire classroom, or students could see it in personal devices (computers or tablets) in groups.

- Students continue by externalizing their initial concepts and attitudes regarding a) the origin of communicable diseases and b) the social determinants of health during an epidemic crisis. For this reason, SER I and DLO I are used to help the detection of students' conceptions. Students answer a short digital questionnaire (SER I) of about 15-20 close-ended or short-answer questions regarding their knowledge and attitudes about the origin of communicable diseases and the social dimensions of an epidemic. The questions are meaningful so that they bring core concepts and attitudes to the surface. Students are made clear that the questionnaire is anonymous and that it is not a grading activity.
- Afterwards, they move on to DLO I, where they are assigned to construct a graphic organizer in the form of a mind map or a concept map; they can easily turn a mind map into a concept map, if it is not too confusing for them. They are given some guiding central concepts and connections, as well as some concept options that can orientate students for the initiation of the map construction, about the environmental and social determinants of epidemics. Then, students continue expanding their maps independently by completing the concepts and connections they desire, even deleting already written concepts and connections. The graphic organizer of each student should express their own perceptions and conceptions seen under their personal point of view. It is made clear that the maps are anonymous and that they are not going to be used for grading.

If students are already familiar with the use of another concept mapping tool other than DLO I, they can use the familiar software and the guiding concepts and linkages could be written on board. Otherwise, the concept or mind map might be written on paper.

- The students' data from the questionnaires and the graphical representations are collected by the teacher who shows some indicative questionnaire results anonymously to the class. Students can explain their rationale if they would like to, and a first classroom discussion on the answers follows. In this way some common misconceptions might arise. However, this instruction phase does not aim to misconception reconstruction but to their expression, their realization, and use of them as a reference level by the teacher for the rest of the learning sequence.

The questionnaire completion and the graphic depiction of conception are suggested to be done digitally because the handling and the data collection are easier. If digital media (computers or tablets) are not easily accessible, they can be made on paper after the providence of the necessary guidance.

2nd teaching hour – Emerging Infectious Diseases and the animal origin of communicable diseases

Learning objectives

Knowledge	Skills	Attitudes and Behaviours
<ul style="list-style-type: none"> ➤ Distinction between anthroponoses and zoonoses ➤ Exemplification of Emerging Infectious Diseases ➤ Identification of the settings that help the emergence of new infectious diseases 	<ul style="list-style-type: none"> ➤ Map reading skills ➤ Handling of digital simulations 	<ul style="list-style-type: none"> ➤ Acknowledgement of the constant issue of emergence of new infectious diseases ➤ Awareness about the modern lifestyle as a factor promoting the emergence of new infectious diseases

Teaching phase according to the inquiry & project based instructional model: Completion and reconstruction of students' initial conceptions through inquiry

- At this phase, students are engaged with the animal origin of most communicable diseases and the effect of the modern way of living, regarding the relationship with the natural environment, on the appearance of new Emerging Infectious Diseases (seen in the framework of 'One Health' approach). DLO II is used for making this approach via structured inquiry within small groups in order to answer short scientific

questions. The inquiry aims at the completion and reconstruction of students' initial conceptions which have been previously shown in the learning sequence.

- DLO II includes an interactive timeline with a world map. Students select points on the timeline that stand for dates of the 20th and 21st century that some epidemic and pandemic causing pathogens were described for the first time (SARS-COV-2, HIV, Zika virus, avian influenza virus, swine influenza virus, SARS virus, MERS virus, Nipah virus, antibiotic-resistant bacterial strains, etc.). By selecting each pathogen the area of its origin on the map gets coloured, and some general information on the origin of the pathogen and main features of the disease appear. There are some other choices out of the timeline, as well, referring to common endemic diseases (e.g. measles, vericella, malaria), which appeared mainly for the first time during the agricultural revolution.
- At first, students select several diseases from the timeline trying to answer the question regarding how the communicable diseases originated. They conclude that most of them have come from animal pathogens (anthropozoonoses), which were mutated and turned into human pathogens (anthroponoses). Students also find certain examples of antroponoses and anthropozoonoses in DLO II.
- Then, students use DLO II to match specific human diseases to the animal they came from. They try to detect possible ways in which humans came in touch with the animals of each case, since the animals are in many cases wild. Students exchange their opinions in pairs and then in groups of four.

Each group is responsible for a small number of diseases (for example 3) and their work must be brief. They could be announced, in advance, the time exact limit they have (e.g. 5 minutes) for their work and the time limit to be respected.

- Afterwards, students focus on recent cases of contagious diseases (cases from the 20th and 21st century). By selecting the proper options in the learning object, they try to draw a conclusion regarding the geographical origin of recent epidemics and pandemics. Students are given a global climate and a global population map as complements to the map of epidemic origins. They conclude that the diseases often origin from subtropical and tropical areas, and specifically from areas of human expansion towards non-developed natural areas.
- Students brainstorm in groups of four on aspects of modern lifestyle and civilization that intensify the emergence of new infectious diseases, as can be seen in the timeline. The brainstorming is then repeated and enriched by involving the entire classroom and a classroom discussion on these activities follows (city expansion to natural areas, habitat fragmentation, wild animal consumption and trade, intensive farming, overuse of antibiotics etc.). Students conclude that the common denominator of most of these activities is the intense intercourse between human and wild animals.

The group brainstorming is about to last just for a few minutes, for instance 5-6 minutes, and aims mainly to the students' 'unlock'. If the time is not enough for the group brainstorming, the brainstorming can be made with the whole classroom providing each student takes part in the brainstorming at least once.

- As a final recapitulation of the lesson the educational video SER III is suggested to be shown and commented. The video concerns the connection between natural habitat alteration and the increase of emerging infectious diseases, explaining the cases of the Ebola virus and the West Nile virus. The video can be projected with a projector machine.

3rd-4th teaching hours – The magnification of health disparities due to social inequities during the COVID-19 pandemic and introduction to the concept of social determinants of health

Learning objectives

Knowledge	Skills	Attitudes and Behaviours
<ul style="list-style-type: none"> ➤ Exemplification of cases of health disparities ➤ Explanation of the ways social inequities can lead to health disparities ➤ Description of the phenomenon of social determinants of health ➤ Assessment of the extent 	<ul style="list-style-type: none"> ➤ Critical and logical thinking ➤ Critical appraisal of sources of different origin ➤ Data-driven answer to questions ➤ Test of correlation between numerical indices 	<ul style="list-style-type: none"> ➤ Acknowledgement of the global existence of health disparities ➤ Awareness about health disparities faced by vulnerable social groups ➤ Awareness about the health consequences of social inequities

<p>people for different social groups are expected to face health disparities</p> <p>➤ Exemplification of indices showing social and health disparities</p>		<p>➤ Acknowledgement of the existence of health disparities among European countries</p>
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Teaching phase according to the inquiry & project based instructional model: Completion and reconstruction of students' initial conceptions through inquiry

- At this phase, students work in groups of four and are engaged in critical reading of various information sources with the aid of DLO III. It includes the controlled navigation in certain information sources (short videos, infographics, a public health organisation text and academic text excerpts) concerning the magnification of social inequities during the COVID-19 pandemic. The information sources are adapted according to the learning objectives and the students' abilities and language. The educational resources selected as information sources highlight inequities due to citizens' nationality, gender, socioeconomic status, profession, and health condition. Students have to study critically each source, which means to find, interpret and evaluate the source's information. The central inquiry question of the entire critical reading process (having the form of structured inquiry) is whether an epidemic or a pandemic (bearing in mind the example of the COVID-19) has the same impact on all citizens, which means whether all citizens start from 'the same level' when an epidemic crisis, and a health crisis in general, happens. The critical appraisal of each source is guided by a central research question which students are told to answer according to the critical reading of the sources.
- Students work in groups following their worksheets and studying successively five sources of informative material (educational resources). The educational resources have been adapted to students' language and to the learning objectives. Each information source sheds light on a different aspect or dimension of the general research question posed to the students. After studying each source, or the sum of them, a class discussion should be done to compare students' conclusions and comment on them. The educational resources that have been incorporated in DLO III are the following sources:
 - i. Video SER IV (part of the news referring to the working and racial inequities in the USA in relation to the COVID-19 pandemic. The activation of subtitles is suggested). Students watch the video and have to note down the basic COVID-19 pandemic health inequities in relation to working conditions and race or national descent. They try to detect the reasons leading to these inequities and then, they have to think of what differences would have a cleaner, an open market seller and an office worker in their daily life during the COVID-19 pandemic in regard to the exposure to the virus and the difficulty in the application of precautionary measures. Afterwards, students argue which of these three jobs would be more likely to have an immigrant or an unskilled person. Students answer to the final question whether citizens' health condition depends exclusively on medical reasons, or whether they interfere with social ones as well.
 - ii. Video SER V (Short presentation of health inequities during the COVID-19 pandemic in connection to the accessibility of the healthcare system, the economic status of the neighborhood, the accessibility to technology and remote working, and the existence of disabilities). Students are assigned to find the five social parameters, mentioned in the video, which affected citizens' exposure to COVID-19. Then, they attempt to explain and interpret some possible reasons why each of these categories leads to health inequities and to mention some relevant examples. They also complete other possible parameters leading to health inequities and are asked to consider whether some of these parameters affect one another. The guiding inquiry question of this video is which social factors lead to health inequities during the COVID-19 pandemic, and in what ways they did so.
 - iii. Public health organization text SER VI (a translated and linguistically adapted form of a text by the Center for Disease Control and Prevention). Students have to find social determinants in the text (e.g., working conditions, income, nationality, education level), leading to health inequities and to interpret the possible reasons for these causative relations. Afterwards, they have to find in the text the different kinds of health inequities mentioned (e.g. exposure risk, hospitalization risk, transmission risk). They attempt to interpret the possible causes of these health inequities and the consequences they would have in citizens' health condition. Students are given two hypothetical cases of citizens and try to analyze, with the aid of their worksheets, the health

inequities they would face during an epidemic outbreak similar to the COVID-19. Finally, students try to come up with ways in which a proper health policy could attempt to downsize health inequities caused by one social inequity case mentioned in the text. The guiding inquiry question of the study of this text is the same with the previous one but requires a much greater degree of analysis.

iv.

Academic text SER VII (a translated and linguistically adapted version of text excerpts referring to the intensification of social inequities during epidemic crises). Students read critically some text excerpts, and keeping in mind what they have already seen, they are assigned to summarize and enrich what they have already studied about the consequences of social inequities during an epidemic. They find examples different from COVID-19 in the text, for example the Ebola epidemics in Africa and cases of non-communicable diseases, and test whether the emergence of health inequities due to social inequities took place in these cases as well. They also focus on the issue of access to digital technologies and explain, based on the texts, why the rise of digital technologies magnifies health inequities. They generalize and conceptualize the notion of social determinants of health by using their own examples and attempting to formulate a definition for the concept. The study of this text aims to answer the guiding inquiry question whether health inequities due to social inequities appeared only during the COVID-19 pandemic, or whether they are intrinsic features of all health crises.

v.

Infographics SER VIII (Infographics referring to inequities during the COVID-19 pandemic in Greece concerning residence, health conditions and access to the Internet). Students use the infographics to evaluate to what extent these three parameters would unequally affect the Greeks during an epidemic outbreak. The evaluation is done according to given criteria (e.g. access to health information, infection risk at work, capability for remote working and schooling, quarantine effectiveness etc.). Then, they propose possible interventions for limiting these inequities and assess their applicability. The question studied with these infographics is to what extent health inequities appeared during the COVID-19 pandemic in Greece.

In case there are not computers or tablets available for the activity of the group analysis of the sources, the sources that are texts and infographics could be distributed to groups in print, and the videos could be shown repeatedly to the entire class with a projector machine, while the groups work on this task.

If the study tasks of each source are considered of high difficulty, or being quite time-consuming, they can be decreased if the teacher thinks so. The source iv (SER VII) has been considered as optional, because it contains more complex linguistic structure and advanced scientific terms, that could be hard to understand for some students. Its analysis might be assigned to the groups that have finished their tasks earlier than the other ones. During the study of the source v (SER VIII, infographics), each group might focus on one single infographic to save time.

- Students have studied about health inequities within the same society up until now. With the aid of the interactive map DLO V they are now studying about COVID-19 disparities between different societies, and, in particular, among European counties. They select two European countries in the DLO V interactive map; they can optionally select their own country and another of their choice. Students try to find differences in educational level and financial status between the two states by comparing them to a) the European mean, b) one another and c) between different regions of the same country. They test whether a correlation of these indices with health accessibility, life expectancy and self-reported health condition exists. They try to interpret these data and consider how these problems –if found to exist– could be encountered. The inquiry question of this phase is how health disparities differ among European states.
- At the end of the inquiry phase students draw general conclusions on the social determinants of health, based on their study. A short relevant discussion in class should follow.
- The inquiry process up to the critical reading of text (iii) is suggested to be organized for the 3rd teaching hour, whereas the 4th teaching hour is suggested to be dedicated to the critical reading of sources (iv) and (v), and to the study of the map. If time is not sufficient, the study of SER VII (v) can be assigned as homework, as the other activities are estimated to have more educational benefits, yet greater degree of difficulty.

If time is not sufficient for the completion of the activities, the study of SER VIII (source v) can be assigned as homework, because the rest of the resources are considered to have more learning value and higher difficulty level than SER VIII.

5th-6th teaching hours – The personal experience of the COVID-19 pandemic, emotional and ethical aspects of the COVID-19 pandemic as parameters for health-related decision making

Learning objectives

Knowledge	Skills	Attitudes and Behaviours
<ul style="list-style-type: none"> ➤ Explanation of the ways social determinants of health function ➤ Description of the effect of lifestyle of different social groups during an epidemic ➤ Exemplification of health disparities during an epidemic ➤ Explanation of the way values affect decision-making 	<ul style="list-style-type: none"> ➤ Critical thinking ➤ Argumentation about decision-making ➤ Argumentation by referring to values ➤ Active listening and participation in discussions 	<ul style="list-style-type: none"> ➤ Recognition and descriptions of emotions ➤ Acknowledgment of the interference of emotions at decision-making ➤ Development of empathy for different social groups ➤ Awareness about social and health disparities ➤ Recognition and identification with values ➤ Values hierarchy ➤ Development of a personal values system about social and health disparities ➤ Acknowledgement of the interference of the values system at decision-making

Teaching phase according to the inquiry & project based instructional model: Application of knowledge and skills gained through inquiry

- At this phase, students apply the knowledge they gained during the inquiry phase on the social determinants of health through experiential learning, by playing a role game and getting engaged in values education activities.
- At first, a short recapitulation about the social determinants of health takes place as a connection to the previous teaching section and aiming at the better conceptualization of the issue. The educational videos SERs IX and X are suggested to be shown and commented in a classroom discussion. These are two educational videos appropriate for the clarification of misunderstandings and the furthering of meaningful conceptual understanding of the notion of social determinants of health.

If the teacher thinks being more appropriate, only one instead of the two videos could be shown and commented, or other educational material be used, in order to recapitulate the main concepts of the previous lesson.

- Then, students participate in a three-part experiential role game in pairs, with the aid of DLO IV. Each pair of students is randomly given a hypothetical person (role) by DLO IV, accompanied with a short description. People from various social groups facing different kinds and different degrees of health disparities during an epidemic or pandemic are represented in the game.
- During the first part of the role game, each pair is assigned to give an one-word answer (yes/no) to some questions concerning exposure risk, healthcare accessibility and health disparities due to social inequities in general, during an epidemic crisis (in this case COVID-19 because of its familiarity) according to the assigned role. Students are given about 15 questions, such as ‘Is remote working plausible?’, ‘Is quarantining within the same house possible?’ and so on. The number of positive answers represents the advantage each person has when compared to the others, in terms of protecting their health condition during an epidemic.
- After answers from all the pairs are submitted, the results are presented in the DLO. Each pair’s role is represented by a character. The health inequities are visualized by the total score of each character. A classroom discussion follows, with each pair presenting the rationale behind their answer and commenting on the result.
- Then, each pair deepens the study of their role. Alternatively, two pairs can cooperate having two roles assigned, in total. Each pair has to be put in their character’s shoes and attempt to describe the role’s

personal and subjective experience during an epidemic crisis. Students are given some keywords, parameters, or guiding questions by the DLO (such as possible emotions or dimensions they could include in their answer) which could scaffold those students who have difficulties in organizing their answer. The answer can be either submitted in the DLO or be written on the worksheet, for students without the ease of typing fast on the computer.

The role game aims to getting a vague approach of viewpoints that diverse people of the society have. They are not expected to reach fully realistic viewpoints, but the aim is their activation to start getting aware about the subjective realities different people in a society face. The extent to which groups are expected to focus on the topic is likely to differ according to their competences, skills, and experiences.

- Afterwards, students are given some hypothetical cases of health-related decision-making (e.g. the application of strong precautionary measures, the frequency of purchase of healthcare products, the attitude towards vaccination, the degree of getting informed on health topics etc.). They have to take these decisions according to the rationale and criteria they think their role would make use of. It is highlighted that decision making is not always based on pure rational reasoning, and that this has been explained by neurobiological data. Emotional factors usually interfere to a great degree in decision-making, especially for short-term decisions. Students are urged to take the whole emotional state of their role into account in order to make decisions that seem more realistic for their character. It is clarified that correct or wrong answers do not exist and that the prediction of the role's behaviours is based exclusively upon the personal interpretation of the role's features by each pair of students.
- Each pair presents briefly the role's personal experiences and decisions to the class and a short discussion follows about them. Each pair explains the rationale behind the character's presentation and choices. The following discussion focuses mainly on alternative suggestions on the roles' experiences and decisions other than the one presented. It is important these decisions to be supported by arguments, in order to show that each personality is complex and, although affected to a great extent by social circumstances, it cannot be reduced to simple schemes of naïve social determinism, but is, instead, open to different interpretations.

The classroom discussion and idea exchange phase is of the most critical since different students promote themselves the emergence of different views of social life and reality, and come across with perspectives that themselves had not even think of. Sufficient time must be given for this activity. In time that time or students' competences are not considered enough for the decision-making simulation (framed activity), this could be omitted, and 2-3 indicative decision-making questions could be addressed to the whole class, instead, in general context of awareness.

- In the final part of DLO IV, each pair has to put several conflicting values in hierarchy according to some values systems (values clarification). Each pair is given some sentences, each of which represents a different value during an epidemic, such as the funding of medical research, the society's financial activity, the help of sensitive social groups, the environmental awareness regarding the overuse of medical products, etc. The values are given in the form of sentences in order to be more comprehensible for students, since they are expressed through specific examples. Some examples of these sentences could be 'small corporations should continue working even if they mean high intercourse among people', 'it is very important to reduce human intercourse at any cost', 'it is important to make regulations regarding pollution by medical waste', 'fundamental health interventions must be obligatory even for those who do not agree with them', and other similar sentences. The number of sentences is suggested to be about 7 to 10. Each pair has to make three hierarchies of the values, putting them from the most important to the least one. The two hierarchies resemble the personal value systems of the two students, whereas the third resembles the value system of the assigned role. It is made clear again that there are neither correct nor wrong answers, as well as morally accepted or discredited ones. It is also explained that students might find some values equally important, but in emergency cases, like during an epidemic, values have to be scaled, although the value hierarchy and decision-making are much more complex in reality. Students are urged to express themselves freely and sincerely and not to reproduce what it is generally thought to be morally accepted.
- A class discussion takes place about the many different value systems people might have, the existence of conflicting values by the same person, the importance of values for decision making and the importance of value evaluation for policy making. Different students' values hierarchies are used to exemplify how different values systems lead to very divergent personal behaviours and policy making

during an epidemic. The interconnection among values, attitudes, decision making, and behaviours is also highlighted.

The entire three-part role game could be done without using the DLO if computers or tablets are not available. Group discussions, worksheets, and group experiential games could be used, instead.

- The 5th teaching hour is suggested to be dedicated to the commentary of the videos, the first part of the role game and the beginning of the second part, whereas the 6th teaching hour is suggested to be dedicated for the completion of the second part and the entire third part (values education) of the role game.

7th-8th teaching hours – Development of a questionnaire to study the personal experience and health disparities of the COVID-19 pandemic (School project)

Learning objectives

Knowledge	Skills	Attitudes and Behaviours
<ul style="list-style-type: none"> ➤ Description of the phases of an empirical social research ➤ Naming of the categories of questionnaire questions ➤ Distinction between qualitative and quantitative data 	<ul style="list-style-type: none"> ➤ Formulation of questions appropriate for questionnaires ➤ Assessment of questions suitability for the inclusion in a research questionnaire ➤ Feedback provision ➤ Cooperation and communication 	<ul style="list-style-type: none"> ➤ Positive reception of feedback ➤ Positive attitude towards to feedback ➤ Positive attitude towards teamwork ➤ Adoption of scientific methodology to study phenomena

Teaching phase according to the inquiry & project based instructional model: Initiation of the project (research tool design and data gathering)

- Students work on the short project of the learning sequence, which constitutes of the conduct of a short school empirical social research regarding the way citizens of the local society experienced the COVID-19 pandemic. The 7th and 8th teaching hours focus on the design of the social research tool, which is a questionnaire.
- The entire research project follows the phases, the methods, and practices of inquiry-based-learning, and more specifically the more advanced inquiry forms, in which the main subject/topic of research is defined, the research questions are either provided by the teacher (guided inquiry), or, even better, originate from students' interests (open inquiry), but the subsequent options regarding research methodology and conduct, data collection, analysis and interpretation, conclusion making, and communication, are set upon the students. In this way, students come in contact –as much as possible– with the authentic process of research, and practice higher cognitive skills of critical thinking, creative thinking, decision-making, and problem solving. In this case the research done is social, aiming to the confrontation of the common misconception, that social sciences follow totally different research methodology from physical sciences.
- Initially, the teacher outlines the main phases of empirical research and explains the fundamental principles of question selection and formulation, when designing a questionnaire. The generic scope of the questionnaire is to highlight the citizens' personal experiences of the COVID-19 pandemic, the emotions they felt, the changes that happened in their life and the difficulties they faced. Secondly, the questionnaire aims at the detection of health inequity issues and possible correlations to social factors. The exact research questions are defined and formulated by students themselves based on their personal interests. Students decide on the questionnaire sections, and they are divided in groups equal in number to the questionnaire sections. Each group of students is preferable comprised by 4 students, and is responsible for the study of one or two research questions, and the development and formulation of the questions for the relevant questionnaire section.
- Each group takes responsibility for coming up with and formulating the questions to fill in the assigned section. They are urged to choose explicit and meaningful questions without overlapping, examining only one issue per question, and to include both close-ended and open-ended questions in order to allow both the free expression of the citizens (qualitative data) and the gathering of quantitative data (e.g., from Likert scales) for the detection of correlations. Each group focuses on the kind of questions which is

more appropriate for the kind of data needed. It is important to clarify the different types of data (qualitative and quantitative) to students, and their different ways of collection, and their different function in social research, which means that qualitative data are more appropriate for free expression, and quantitative data are more appropriate for the organized study of a large amount of data.

If the teacher thinks that already-formulated questions from other questionnaires are useful, they could use some examples found on the Internet. These examples could be used in numerous ways, for instance as examples of 'good' and 'bad' cases of questions, as a practice assessment exercise of questions according to criteria, or as a source of ideas for the formulation of their own questions. If ready questions are used during the questionnaire development, they should first be subject of critical evaluation by students, otherwise students would not practice their critical thinking skills.

- When every group has finished the first outline of their questions, another group checks the questions made by the first team in order to suggest enrichments or modifications, which are always made in conciliation with the first group.

Each questionnaire section, for which one student group is responsible, should include just a few questions, which are carefully selected and formulated, so as that the analysis of the data from the answers is easier. For example 4-6 questions (open- and close-ended questions) might be included in each section of the final questionnaire.

- The questionnaire is presented to the entire class and it gets its final version, which is approved by all the students.
- Some students get the responsibility to write the questionnaire in an online form, which allows it to be more easily delivered to its targets. Applications such as the tools of the e-me platform (SER XI) can be used for this purpose.
- The online questionnaire is completed by a sample which has been selected to represent the target population. The sample has to be small in order to make the data analysis easier for students.

The fill-in of the questionnaires could be done anonymously by members of the local community, school, students' families., the rest of teachers. Filled-in questionnaires must be a few in order to be easily and properly analyzed by students. For example the number of questionnaires might be about 15 to 30, depending on the number and type of questions, and students' skills. If the questionnaires gathered are much more, only a sample of them could be analyzed.

9th-10th teaching hours – Analysis of the questionnaires collected (School project)

Learning objectives

Knowledge	Skills	Attitudes and Behaviours
<ul style="list-style-type: none"> ➤ Distinction between qualitative and quantitative data ➤ Description of the processes of proper analysis of qualitative data ➤ Description of the processes of proper analysis of quantitative data 	<ul style="list-style-type: none"> ➤ Proper statistical analysis of qualitative data ➤ Proper quantitative analysis of qualitative data ➤ Graph and chart creation ➤ Written description of research findings ➤ Data-driven conclusion-making ➤ Suggestion of complementary research approaches 	<ul style="list-style-type: none"> ➤ Positive attitude towards teamwork ➤ Sincere presentation of scientific findings ➤ Keeping up research ethics (e.g. being sincere, avoidance of biases, ensuring anonymity) ➤ Adoption of scientific methodology to study phenomena

Teaching phase according to the inquiry & project based instructional model: Continuation of the project (data analysis)

- The questionnaires are going to be filled-in by selected members of students' and teacher's affiliations, as it had been planned by the teacher and the students. The interval for the data collection has been estimated to be about a week between the 8th and 9th teaching hours. If participation is low, the analysis of the questionnaires could begin normally at the 9th teaching hour, but also be expanded for one extra teaching hour until a sufficient number of online questionnaires has been collected. The filled-in questionnaires are gathered by the students and this phase of the project is dedicated to data handling and

analysis. Each student group is assigned to the analysis of the data of the questionnaire section they had initially made.

- Each group shortly describes the results of its section on paper and uses the appropriate statistical techniques for the analysis and presentation of the collected data (quantitative or qualitative). In the case of quantitative data, simple charts and graphs (e.g., histograms, bar charts, pie charts, scatter plots) and fundamental descriptive statistics measures (e.g., mean, range, median) are used. On the other hand, qualitative data are grouped in categories and, again, simple graphs (e.g., bar charts, pie charts) and fundamental descriptive statistics measures are used (e.g., absolute and relative frequencies), as well as a selection of specific answers bearing some kind of significance. At this point, a revision or introduction of some necessary elements regarding statistical analysis and graphs creation might be needed. SER XI could be used to create graphs and charts.

The data analysis should include a short description of findings in written, calculation of statistical measures, and a graph creation, (almost) for every questionnaire question. Maybe, it is better for students groups to split into subgroups of two members, and each subgroup to take responsibility of the analysis of 1-3 questionnaire questions. If a group finishes the analysis of a minimum number of questionnaires (e.g. 15 questionnaires) too early, they can go on to analyze some more questionnaires. When a subgroup finishes the analysis, they can show their results to the other members to check.

- After each group has finished the data description and analysis, it has to draw data-driven conclusions, to make possible interpretations and correlations and to suggest complementary research designs which would shed more light on the research.

The section of conclusion making is about the entire section that each group is responsible for, and not for every questionnaire question, in detail. So, it is written by the whole group. The suggestion of complementary research approaches might be difficult for some groups, and even very simple ideas are welcome.

11th-12th teaching hours – Presentation and review of the findings of the empirical research (School project)

Learning objectives

Knowledge	Skills	Attitudes and Behaviours
<ul style="list-style-type: none"> ➤ Distinction among the parts of an academic research paper ➤ Distinction between data and conclusions ➤ Exemplification of factors that cause uncertainties in a social research 	<ul style="list-style-type: none"> ➤ Presentation of scientific results ➤ Academic writing ➤ Summary making of scientific data ➤ Feedback provision ➤ Cooperation and communication 	<ul style="list-style-type: none"> ➤ Positive attitude towards to feedback ➤ Positive attitude towards teamwork ➤ Acknowledgement of errors, uncertainties, and restrictions as integral parts of scientific research

Teaching phase according to the inquiry & project based instructional model: Completion of the project & final assessment (project presentation)

- During the 11th teaching hour each group presents their research findings and the relevant report they have written to the rest of the class and a class discussion follows among the groups under the teacher's coordination. Students are urged to make arguments in relation to alternate conclusions and interpretations than the ones proposed, and to develop interpretations and correlations among different sections of the questionnaire. The teams are urged to take part in a fruitful dialogue and to exchange opinions instead of an one-sided presentation of the work of each group.

- The discussion might focus on issues concerning uncertainty, risks and biases in social empirical research. Such issues might be the misinterpretation of data, theory-laden practice, conflicting results, issues in the sampling process and personal biases in social research. The discussion should rely on specific examples from the survey findings and be encouraging to the students, not disapproving. These discussions are important because they highlight important notions of the Nature of Scientific Inquiry and of the Nature of Scientific Knowledge and disprove the common misconception that science has an impersonal and flawless character.

- During the 12th teaching hour, a short report is written based on the results of each team and the discussion that preceded, which is the final report of the school project. It is suggested the students to organise this final report (SER XI can be used) according to the structure of an academic paper (Introduction – Methodology – Results – Conclusions), having discrete roles for each part, which, in turn, define their content.

The final research report ought to be concise and short. The Introduction and Methodology parts can be written after the consensus of all students, or 2-3 students may write a first draft on the Introduction, 2-3 students a first draft on Methodology, and, then, the whole class might agree under the coordination of the teacher. Each group may write a summary of their results and conclusion, by writing 2-3 sentences and a graph or chart for the Results section, and 1-2 sentences for the Conclusion session, that will comprise the parts of the final report, along with 3-4 general conclusion sentences agreed by the entire classroom.

- The texts of the final project could be communicated in a school festival and/or in local mass media, possibly at some website.
- If the quality of students' work is high and the students are willing to do so, the project could be publicized in a student academic conference or journal.

Short version of the scenario (10 teaching hours)

The initial (expanded) version of the educational scenario lasts for 12 teaching hours. Difficulties that may arise due to its long duration (e.g. alignment with the Curriculum, availability of rooms, or resources). For that reason a shorter version of the scenario of 10 teaching hours is provided, which can be opted for if the teacher thinks so. The suggested modifications to the structure of the scenario are the following ones:

Expanded version of the scenario (14 hours)	Short version of the scenario (10 hours)	Modifications
1 st hour	1 st hour	Remaining the same.
2 nd hour	- (omitted)	The topic of this hour (environmental origin of infectious diseases) offers a complementary perspective, yet the topic remains independent from the rest of the scenario themes (social dimensions of epidemics). For this reason, it could be omitted, without having severe consequences on the whole learning sequences.
3 th -6 th hours	2 th -5 th hours	Remaining the same.
7 th -8 th hours	6 th hour (fusion)	The initial two-hour-session is about the development of the questionnaire, and it is considered to be summarized into a single teaching hour, after some modification be done. Each student group can be responsible for formulating only a small number of questions (e.g. 5 questions) and the phase of cross-evaluation between groups can be replaced by having the groups collaborating by two in order to come down to the final formulation of the questions. After finish of the lesson, the teacher sees the group questions, and can slightly modify the points they thinks so, they compile them to the final questionnaire, and they distribute it.
9 th -12 th hours	7 th -10 th hour	Remaining the same.

Supplementary learning activities

I. Discussion with experts

Some discussions with experts could take place as optional educational activities, which act complementary to the educational activities previously described. They can have the form of a short presentation, a free discussion, an interview or a combination of those and they could take place in the physical presence of the expert or via teleconference. The expert might be a person whose scientific specialization or whose

profession closely relates to issues that having been discussed in the classroom during the learning sequence. The students' discussion with the expert has some additive STEM educational value which is summarized with the following points:

- The experts have an advanced scientific or professional expertise so they have deeper content knowledge and are more suitable to give students a deeper understanding of the scientific contents and answer students' advanced questions.
- Students can see how the content of the learning sequence can be reflected to real world professional specializations. In this way they connect what they learn to authentic contexts and can learn further information about the real work of STEM professionals.
- Students have the opportunity to discuss with STEM professionals, which would otherwise be probably inaccessible to them. They can learn about the real work of scientists and about the real way new scientific knowledge is produced (Nature of Scientific Inquiry).
- Experts could act as role models for some students and trigger them to follow STEM related careers in the future.
- Experts could give students some more specific guidelines or answer advanced students' questions concerning their research project.

It is suggested to have the discussions done after the general activities have been completed and before or at the beginning of the school project (more specifically around the 6th or the 7th teaching hour). In this way students will have a good background in order to discuss and meaningfully understand the topics discussed with the experts and can ask them questions that will help them in decision-making concerning the conduct of the school project. Of course, if the teacher thinks that the discussions are better to take place at a different time they, are free to do so.

Some scientific and professional specializations that could be cases of experts are listed below with some indicative topics for discussion:

1. Members of environmental organizations – They could discuss with students about emerging infectious diseases, about the 'One Health' approach and about the way modern practices (environmental degradation, habitat loss and fragmentation, antibiotics overuse, modern farming) can increase the threat of the emergence of new infectious diseases.
2. Researchers on the social determinants of health – They could discuss with students about the way social disparities can lead to health disparities, different kinds and examples of health disparities in modern society and how health disparities were magnified during the COVID-19 pandemic.
3. Members of governmental organizations in charge of social policy – They could discuss with students about the different kinds and examples of health disparities in modern society, about vulnerable social groups that are more in danger of health disparities, actions of the state in order to confront health disparities and examples from the COVID-19 pandemic
4. Members of non-governmental organizations or civic networks against health and social disparities – They could discuss with students about different kinds and examples of health disparities within the state and globally, vulnerable social groups that are more in danger during a health crisis, ways of civic action in order to fight against health disparities, non-governmental organization and civic network actions against health disparities, examples and personal experiences from the COVID-19 pandemic.
5. Social empirical researchers – They could discuss with students about the way social empirical research is done, the phases of social research, the process of sampling, good and bad practices when developing a questionnaire, data analysis and presentation, limitations and bias in social research and examples of authentic cases of social empirical research.
6. Academics or university professors with relevant expertise.
7. Members of the PAFSE consortium with relevant expertise.

II. Educational visits

Some educational visits could take place within the context of this learning sequence. In this way the school's educational activities will be complemented with educational activities from other organizations or with visits to authentic places where research or work on relevant topics is being done. It would be preferable to make these visits after the students have examined the relevant issues in the learning sequence so that they will be able to meaningfully conceptualize what they examine during the educational visit. A short discussion before and after the educational visit is also necessary in order to determine and summarize the context of the visit and link it to the learning sequence in school.

Some suggested places for educational visits are listed below:

1. Medical or historical museum – During this visit, students could probably come across items featuring the way historical epidemics and pandemics affected past societies and different social groups and can compare them to the impact of the COVID-19 pandemic.
2. Research laboratory concerning social research on social aspects of the COVID-19 pandemic – During this visit, students discuss about the process of an empirical social research, discuss about the work of a social researcher, and discuss about health inequities, decision making and the personal experience of citizens during the pandemic.
3. Governmental organization concerning social policy against health disparities – During this visit, students could get informed about the extent health disparities have in their society, examples of health disparities, the situation during the COVID-19 pandemic and about the social policies that were launched in order to confront them. They could also see material for such campaigns.
4. Non-governmental organization or civic network against health disparities – During this visit, students could get informed about the extent of health disparities and the relevant actions of the organization or the network, about the situation of the COVID-19 pandemic, and the ways each citizen can take action to help the unprivileged during a health crisis. They could also see the way this organization or network work and coordinates its actions for themselves.
5. Institution for health awareness or promotion – During this visit, students could be informed about health awareness or promotion campaigns delivered especially for unprivileged or marginalized social groups, the specific features and difficulties these campaigns have, and the degree that they have been effective up until now. Moreover, they could see for themselves material from these campaigns.

Indicative literature

- Ariely, M., & Yarden, A. (2018). Using authentic texts to promote disciplinary literacy in biology. In *Teaching biology in schools* (pp. 204-215). Rutledge.
- Bechraki, E., Mavrikaki, E., Gialamas, V., & Galanaki, E. (2022). Development and validation of an instrument for the health literacy assessment of secondary school students (HeLiASeSS). *Health Education*, 122(6), 678-699.
- Bell, R. L., Smetana, L., & Binns, I. (2005). Simplifying inquiry instruction. *The science teacher*, 72(7), 30-33.
- Braund, M. (2021). Critical STEM Literacy and the COVID-19 Pandemic. *Canadian Journal of Science, Mathematics and Technology Education*, 1-18.
- Braveman, P. (2006). Health disparities and health equity: concepts and measurement. *Annual Review Public Health*, 27, 167-194.
- Braveman, P., Egerter, S., & Williams, D. R. (2011). The social determinants of health: coming of age. *Annual review of public health*, 32(1), 381-398.
- Budd, J. W. (2004). Mind maps as classroom exercises. *The journal of economic education*, 35(1), 35-46.
- Bybee, R. W. (2014). The BSCS 5E instructional model: Personal reflections and contemporary implications. *Science and Children*, 51(8), 10-13.
- Chalkidis, D., Santos, C., & Mikropoulos T. A. (2022). Partnerships for Science Education: Public health education and awareness with digital technologies. *13th Conference of European Researchers in Didactics of Biology (ERIDOB)*, 29th August -2nd September 2022, Nicosia, Cyprus.
- Chinn, D. (2011). Critical health literacy: A review and critical analysis. *Social science & medicine*, 73(1), 60-67.
- Constantinou, C. P., Tsivitanidou, O. E., & Rybska, E. (2018). What is inquiry-based science teaching and learning?. In *Professional development for inquiry-based science teaching and learning* (pp. 1-23). Springer, Cham.
- Creswell, J. W. (2011). *Educational Research. Planning, conducting and evaluating quantitative and qualitative research* (Fourth Edition). Pearson.
- Eyler, J. (2009). The power of experiential education. *Liberal education*, 95(4), 24-31.
- Freedman, D. A., Bess, K. D., Tucker, H. A., Boyd, D. L., Tuchman, A. M., & Wallston, K. A. (2009). Public health literacy defined. *American journal of preventive medicine*, 36(5), 446-451.

- Gaintatzis, P., Chalkidis, D., Iatraki, G., Mikropoulos, T. A., Megalou, E., Santos, C. (2023). Designing Digital Learning Objects for Public Health. *4th Panhellenic Conference in e-learning and Open Educational Resources*. 18-19 March 2023, Athens, Greece.
- Gillies, R. M. (2020). *Inquiry-based science education*. CRC Press.
- Hodson, D. (2011). *Looking to the future*. Springer Science & Business Media.
- Holbrook, J., & Rannikmae, M. (2009). The meaning of scientific literacy. *International Journal of Environmental and Science Education*, 4(3), 275-288.
- Jimoyiannis, A., Christopoulou, E., Paliouras, A., Petsos, A., Saridaki, A., Toukiloglou, P., & Tsakonas, P. (2013). Design and development of learning objects for lower secondary education in Greece: The case of computer science e-books. *Proc. of EDULEARN13 Conference*, 41-49.
- Jonassen, D. H., Carr, C., & Yueh, H. P. (1998). Computers as mindtools for engaging learners in critical thinking. *TechTrends*, 43(2), 24-32.
- Joyce, B., Weil, M., & Calhoun, E. (2017). *Models of Teaching* (Ninth Edition). Pearson.
- Kagan, S., & Kagan, M. (2009). *Kagan Cooperative Learning*. Kagan Publishing.
- Kilstadius, M., & Gericke, N. (2017). Defining contagion literacy: A Delphi study. *International Journal of Science Education*, 39(16), 2261-2282.
- Kinchin, I. M. (2000). Concept mapping in biology. *Journal of biological education*, 34(2), 61-68.
- Kokotsaki, D., Menzies, V., & Wiggins, A. (2016). Project-based learning: A review of the literature. *Improving schools*, 19(3), 267-277.
- Lederman, N. G. (2018). Nature of scientific knowledge and scientific inquiry in biology teaching. In *Teaching biology in schools* (pp. 216-235). Routledge.
- Mackenzie, J. S., & Jeggo, M. (2019). The One Health approach—Why is it so important?. *Tropical medicine and infectious disease*, 4(2), 88.
- Mavrikaki, E., Kyridis, A., & Antonatou, C. (2012). Greek senior high school students' attitudes about science and the scientific community after the H1N1 pandemic and the conflicts within the scientific community as it appeared in the Mass Media. *Journal of Studies in Education*, 2(IKEEART-2014-1839), 32-46.
- McGreal, R. (2004). Learning objects: A practical definition. *International Journal of Instructional Technology and Distance Learning (IJITDL)*, 9(1).
- Megalou, E., & Kaklamanis, C. (2014). Photodentro LOR, the Greek national learning object repository. *INTED2014 proceedings*, 309-319.
- Minner, D. D., Levy, A. J., & Century, J. (2010). Inquiry-based science instruction—what is it and does it matter? Results from a research synthesis years 1984 to 2002. *Journal of Research in Science Teaching: The Official Journal of the National Association for Research in Science Teaching*, 47(4), 474-496.
- Morens, D. M., & Fauci, A. S. (2020). Emerging pandemic diseases: how we got to COVID-19. *Cell*, 182(5), 1077-1092.
- Morens, D. M., Folkers, G. K., & Fauci, A. S. (2004). The challenge of emerging and re-emerging infectious diseases. *Nature*, 430(6996), 242-249.
- Nana-Sinkam, P., Kraschnewski, J., Sacco, R., Chavez, J., Fouad, M., Gal, T., ... & Behar-Zusman, V. (2021). Health disparities and equity in the era of COVID-19. *Journal of clinical and translational science*, 5(1), e99.
- Nutbeam, D. (2019). Health education and health promotion revisited. *Health Education Journal*, 78(6), 705-709.
- Oliveras, B., Márquez, C., & Sanmartí, N. (2013). The use of newspaper articles as a tool to develop critical thinking in science classes. *International Journal of Science Education*, 35(6), 885-905.
- Orlich, D. C., Harder, R. J., Callahan, R. C., Trevisan, M. S., & Brown, A. H. (2012). *Teaching strategies: A guide to effective instruction*. Cengage Learning.
- Osborne, J. (2014). Teaching scientific practices: Meeting the challenge of change. *Journal of Science Teacher Education*, 25(2), 177-196.

- Paakkari, L., & Okan, O. (2020). COVID-19: health literacy is an underestimated problem. *The Lancet Public Health*, 5(5), e249-e250.
- Papachristos, N., Mikropoulos, T.A. (2021). SciLOET: a framework for assessing digital learning objects for Science Education. In A. Reis, J. Barroso, J. B. Lopes, T. Mikropoulos, C.-W. Fan (Eds.) *Technology and Innovation in Learning, Teaching and Education, Proceedings of the Second International Conference, TECH-EDU 2020*. (pp. 340–348). Switzerland: Springer Nature.
- Riga, F., Winterbottom, M., Harris, E., & Newby, L. (2017). Inquiry-based science education. In *Science education* (pp. 247-261). Brill Sense.
- Rogers, T. N., Rogers, C. R., VanSant-Webb, E., Gu, L. Y., Yan, B., & Qeadan, F. (2020). Racial disparities in COVID-19 mortality among essential workers in the United States. *World medical & health policy*, 12(3), 311-327.
- Santos, C., Rybska, E., Klichowski, M., Jankowiak, B., Jaskulska, S., Domingues, N., ... & Rocha, J. (2023). Science education through project-based learning: a case study. *Procedia Computer Science*, 219, 1713-1720.
- Schmid, R. F., & Telaro, G. (1990). Concept mapping as an instructional strategy for high school biology. *The Journal of Educational Research*, 84(2), 78-85.
- Strahovnik, V. (2016). Ethics and values education. *Encyclopedia of educational philosophy and theory*, 769-774.
- Thagard, P. (2021). The cognitive science of COVID-19: Acceptance, denial, and belief change. *Methods*, 195, 92-102.
- Trevors, G., & Duffy, M. C. (2020). Correcting COVID-19 misconceptions requires caution. *Educational Researcher*, 49(7), 538-542.
- Wiley, D., Bliss, T. J., & McEwen, M. (2014). Open educational resources: A review of the literature. In *Handbook of research on educational communications and technology* (pp. 781-789).
- Zarcadoolas, C., Pleasant, A., & Greer, D. S. (2005). Understanding health literacy: an expanded model. *Health promotion international*, 20(2), 195-203.
- Zollman, A. (2012). Learning for STEM literacy: STEM literacy for learning. *School Science and Mathematics*, 112(1), 12-19.

Assessment Questionnaire- Knowledge, Skills, Beliefs, attitudes and behavior

Scenario topic: “Social determinants of health during an epidemic/pandemic outbreak”

A. Knowledge	
<p>1. Distinguishes antropoonoses, zoonoses and anthropozoonoses from one another</p>	<p>Question 1.1: Zoonoses are transmitted ... A) between humans and animals B) solely among animals C) solely among humans</p> <p>Question 1.2: The West Nile virus infects humans and birds and can be transmitted from birds to humans. It is a case of A) an anthropozoonosis B) an anthroponosis C) an endemic disease</p>
<p>2. Recognizes cases and features of Emerging Infectious Diseases</p>	<p>Question 2.1: Which of the following diseases is an example of Emerging Infectious Diseases? A) SARS B) Smallpox C) Malaria</p> <p>Question 2.2: Which of the following is NOT true about Emerging Infectious Diseases? A) They are decreasing over the last years B) They often cause epidemics and pandemics C) They originate from animal pathogens</p> <p>Question 2.3: Which of the following practices does NOT lead to the appearance of new Emerging Infectious Diseases? A) An increase in urban pollution B) The urban expansion in subtropical areas C) The antibiotic overuse</p>
<p>3. Recognizes cases of health disparities</p>	<p>Question 3.1: A case of health disparity is NOT ... A) the increased frequency of several diseases in elder people due to their biological maturity B) the exposure of a lot of manual workers to chronic physical damages C) the inability of a lot illiterate to get informed about health topics</p> <p>Question 3.2: Health disparities ... A) exist within every society and among different societies B) pose a problem primarily for developing countries C) are not responsible for variations in life expectancy</p> <p>Question 3.3: A disease is observed to infect mainly the migrants of a country as compared to the locals. A) This is a case of health disparity, only in the case no biological susceptibility to the disease underlies in the migrants B) This is definitely a case of health disparity C) This is a case of social disparity and not of a health disparity</p>

<p>4. Explain how health disparities arise from social inequities during an epidemic</p>	<p>Question 4.1: During the COVID-19 pandemic a lot of people working in professions having personal contact with a lot of people (e.g., sellers) obligatorily. This is a social disparity which leads to ... A) an increased exposure risk to the disease B) a decreased capability of getting informed about the disease C) an increased risk of having severe complications due to the disease</p> <p>Question 4.2: The digitization of several healthcare services (e.g., making appointments) might be an extra obstacle ... A) for the elderly B) for those who do not handle the spoken language C) for several manual workers</p> <p>Question 4.3: Which of the following social groups might have become victims of extensive misinformation during the COVID-19 pandemic? A) People with low educational level B) Immigrants C) People with low income</p> <p>Question 4.4: People with low income might have been more exposed to the disease during the COVID-19 pandemic ... A) because they were not able to afford for buying medical and pharmaceutical equipment (e.g. medical masks) B) because they were working in profession having extensive contact with other people C) because they might did not have access to the Internet for health information</p> <p>Question 4.5: Quarantining during COVID-19 pandemic was more difficult for ... A) members in extended families B) people working in office work C) people with disabilities</p>
<p>5. Describes the notions of health determinants of health</p>	<p>Question 5.1 Social determinants of health appear ... A) within the same country and among different countries B) among different countries C) within the same country</p> <p>Question 5.2: Social inequities ... A) lead to an increase in health disparities B) lead to a decrease in health disparities C) are not connected to health disparities</p>
<p>6. Recalls the phases of an empirical social research</p>	<p>Question 6.1: Which of the following phases is earlier during an empirical research? A) Data collection B) Data analysis C) Data interpretation</p> <p>Question 6.2: A common research tool for social research is ... A) the questionnaire B) observation making C) the use of digital simulations</p> <p>Question 6.3: Which of the following practices is included in the phase of data analysis in a social empirical research? A) The organization of answers collected through questionnaires B) The filling in of the questionnaires C) The questionnaire design</p>

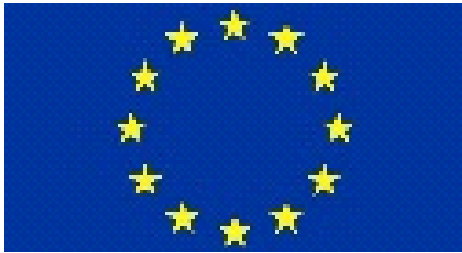
	<p>Question 6.4: In an empirical social research via questionnaires ... A) either quantitative or qualitative data can be gathered B) only quantitative data can be gathered C) only qualitative data can be gathered</p> <p>Question 6.5: The statement of the limitations and the weaknesses of a research is a very important point because ... A) it shows the directions that future research can follow B) explains the reasons why the specific research was difficult C) highlights that the research is not important if the limitations are too many</p>
B. Skills	
<p>1. States arguments concerning the rise of Emerging Infectious Diseases</p>	<p>Question 1.1: In which of the following cases it is more probable for a new infectious disease to emerge? A) In a dense city of Southeast Asia at the fringe of a tropical forest B) In a big and highly polluted city of the USA C) In a rural area of France</p> <p>Question 1.2: Why the restriction of intensive farming could hold the prevention of new infectious diseases emergence? A) Through the restriction of over-transmission conditions for animal diseases B) Through the restriction of the intercourse between wild animals and humans C) Through the restriction of the poor-quality diet and therefore the boost of the immune system</p>
<p>2. States arguments concerning the reasons of health disparities</p>	<p>Question 2.1: Health disparities are more intense for vulnerable social groups because ... A) these groups are already in more margined position in the society B) these groups belong to high risk groups for the disease due to biological reasons C) these groups intentionally select to lead a riskier lifestyle</p>
<p>3. Critically reads health related texts</p>	<p>Question 3.1: I am able to watch a news reportage about health topics and understand in detail the topic shown. 1) I strongly disagree ... 5) I strongly agree</p> <p>Question 3.2: I am able to read a text by a health institute and understand in detail the topic presented. 1) I strongly disagree ... 5) I strongly agree</p> <p>Question 3.3: I am able to read an academic text about a health topic and understand in detail the topic examined. 1) I strongly disagree ... 5) I strongly agree</p>
<p>4. Designs a social empirical research</p>	<p>Question 4.1: I am able to design an empirical social research in order to study a social phenomenon. 1) With great difficulty ... 5) With great convenience</p> <p>Question 4.2.: I am able to outline the limitations of a particular social empirical research. 1) With great difficulty ... 5) With great convenience</p>

<p>5. Makes a questionnaire for the conduction of an empirical research</p>	<p>Question 5.1: ‘How happy to you believe you are?’ This question is unsuitable for a questionnaire because ... A) it is unclear B) it is open-ended C) it examines several topics at once</p> <p>Question 5.2: ‘Do you agree with the new governmental measures concerning education and health?’ This question is unsuitable for a questionnaire because ... A) it examines several topics at once B) it is open-ended C) it is unclear</p> <p>Question 5.3: I am able to design a short questionnaire in order to study a social phenomenon. 1) With great difficulty ... 5) With great convenience</p> <p>Question 5.4: I am able to suggest improvements for a short questionnaire aiming to the study of a social phenomenon. 1) With great difficulty ... 5) With great convenience</p> <p>Question 5.5: I am able to evaluate the quality of a short questionnaire aiming to the study of a certain social phenomenon. 1) With great difficulty ... 5) With great convenience</p>
<p>6. Gathers and handles quantitative and qualitative data</p>	<p>Question 6.1: I am able to select a proper data collection method for a social empirical research in order to study a social phenomenon. 1) With great difficulty ... 5) With great convenience</p> <p>Question 6.2: I am able to use proper statistical measures and graphs in order to analyze the quantitative data of a social empirical research. 1) With great difficulty ... 5) With great convenience</p> <p>Question 6.3: I am able to organize and graphically present the qualitative data of a social empirical research. 1) With great difficulty ... 5) With great convenience</p>
<p>7. Presents the results of a social empirical research</p>	<p>Question 7.1: I am able to use graphs in order to concisely present the results of a study. 1) With great difficulty ... 5) With great convenience</p> <p>Question 7.2: I am able to summarize the results of a research. 1) With great difficulty ... 5) With great convenience</p> <p>Question 7.3: I am able to formulate possible conjectures in order to explain of the results of a research. 1) With great difficulty ... 5) With great convenience</p> <p>Question 7.4: I am able to make a short report describing the methodology, the results and the conclusions of an empirical research. 1) With great difficulty ... 5) With great convenience</p>
<p>C. Beliefs, Attitudes and Behaviours</p>	
<p>1. Recognizes features of the modern civilization as a factor contributing to the emergence of new communicable diseases</p>	<p>Question 1.1: Most communicable diseases originate from animal pathogens. 1) I strongly disagree ... 5) I strongly agree</p> <p>Question 1.2: The increase in interaction between humans and wild animals will lead to increase in the emergence of new diseases.</p>

	<p>1) I strongly disagree ... 5) I strongly agree</p> <p>Question 1.3: The modern lifestyle contributes to the emergence of new infectious diseases. 1) I strongly disagree ... 5) I strongly agree</p> <p>Question 1.4: New epidemics and pandemics might appear in the near future as a result of the modern. 1) I strongly disagree ... 5) I strongly agree</p>
<p>2. Is aware concerning the lives of vulnerable social groups during an epidemic</p>	<p>Question 2.1: All citizens of a society experience an epidemic in the same way. 1) I strongly disagree ... 5) I strongly agree</p> <p>Question 2.2: All citizens of a society have equal accessibility to the healthcare system during an epidemic. 1) I strongly disagree ... 5) I strongly agree</p> <p>Question 2.3: All citizens of a society are equally informed about health issues during an epidemic. 1) I strongly disagree ... 5) I strongly agree</p> <p>Question 2.4: All citizens of a society have equal exposure to the disease during an epidemic. 1) I strongly disagree ... 5) I strongly agree</p> <p>Question 2.5: Vulnerable social groups (e.g. refugees, people of low educational level, people of low economic background) are at greater risk of getting sick or even dying during an epidemic, as compared to people which are not included in vulnerable social groups. 1) I strongly disagree ... 5) I strongly agree</p> <p>Question 2.6: In the case of a pandemic, some countries are more advantageous in the administration of the pandemic compared to other countries. 1) I strongly disagree ... 5) I strongly agree</p>
<p>3. Recognises the emotions they feel during an epidemic</p>	<p>Question 3.1: I might feel fear during a new epidemic. 1) I strongly disagree ... 5) I strongly agree</p> <p>Question 3.2: I might feel insecurity during a new epidemic. 1) I strongly disagree ... 5) I strongly agree</p> <p>Question 3.3: I might feel despair during a new epidemic. 1) I strongly disagree ... 5) I strongly agree</p> <p>Question 3.4: I might feel pressure during a new epidemic. 1) I strongly disagree ... 5) I strongly agree</p> <p>Question 3.5: I might feel anger during a new epidemic. 1) I strongly disagree ... 5) I strongly agree</p> <p>Question 3.6: I estimate I will deal easily with my emotions during a following epidemic. 1) I strongly disagree ... 5) I strongly agree</p>
<p>4. Recognizes the interference of emotions in health-related decision making</p>	<p>Question 4.1: The emotional state of a person does not interfere in their decision making processes. 1) I strongly disagree ... 5) I strongly agree</p> <p>Question 4.2: During the COVID-19 pandemic I intentionally did acts because I wanted it a lot although I knew was putting myself at health. 1) I strongly disagree ... 5) I strongly agree</p>

	<p>Question 4.3: It is easier to get influenced by my emotions during taking a decision which might put me at risk when it is about the near future (e.g., the next hours) than when it is about a long-term decision. 1) I strongly disagree ... 5) I strongly agree</p>
5. Recognizes the difficulty in making decisions when different ethical values collide	<p>Question 5.1: I often feel a clash among my values when it comes to decision making. 1) I strongly disagree ... 5) I strongly agree.</p>
6. Prioritizes values into scale during decision making in the context of an epidemic	<p>Question 6.1: If I am invited for entertainment during an epidemic, I might go in spite of the increased risk of exposure to the disease. 1) I strongly disagree ... 5) I strongly agree</p> <p>Question 6.2: If I work in close contact with a lot of people during an epidemic, I am probably going to continue my work in spite of the increased exposure to the disease. 1) I strongly disagree ... 5) I strongly agree</p>
7. Recognizes the interconnection between science and society	<p>Question 7.1: The administration of an epidemic can rely exclusively upon the scientists' recommendations. 1) I strongly disagree ... 5) I strongly agree</p>
8. Takes part in civic actions for the elimination of health disparities	<p>Question 8.1: It is important to take actions which are going to help to encountering against health disparities? 1) I strongly disagree ... 5) I strongly agree</p> <p>Question 8.2: How important is it to financially support structures and organizations that support vulnerable social groups during an epidemic? 1) Completely improbable ... 5) Completely probable</p> <p>Question 8.3: How probable is it to vote political schemes, which try to minimize health disparities 1) Completely improbable ... 5) Completely probable</p> <p>Question 8.4: How probable is it to take action by helping myself vulnerable social groups (e.g. by taking part in actions of an NGO during an epidemic)? 1) Completely improbable ... 5) Completely probable</p>

Partnerships for Science Education



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