Junior Science Cafe Implementation Scenario: "Climate change"

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Name of institutions: Cinzia Belmonte, FormaScienza

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1: Introduction

This scenario describes how to realize a **junior science café** on the **Climate Change.**
This scenario is especially linked to the **1st biennium of the Italian Technical Schools**, but it could be proposed also for the **Early Secondary Schools** and the other kinds of Secondary Schools (**High Schools and Vocational Schools**).
This Implementation Scenario is designed as a 7-week (2 teaching hour per week) project. The meetings are planned during the school timetable. The final event should have duration of around 2 hours and it could take place out or in of school timetable, depending on the choice of the teachers and the students.
The observed educational challenges and the reasons for implementing a Junior Science café as a response to these challenges are provided.

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2: Educational Challenges

The Italian National Guidelines and the European Recommendation move from some challenges that the innovation society poses to the education system. Two of these are the following.

- The knowledge, as well as the technology, are constantly evolving and there aren't systematic dealing which can remain valid for long periods;
- The innovation requires us to deal with the unexpected: new problems for which standard procedures could be unsuitable.

Moreover, the scenario stems from the identification of general **needs**:

- **Experimentation of innovative methods for teaching science**. From all the surveys, it is pointed out that students have a bad relationship with science subjects, but this relationship steadily deteriorating for over ten years. In terms of interest, as shown by the drop in enrollment in science faculties, in terms of knowledge, as shown by the OECD-PISA test (OECD-PISA report of 04.12.2007) To reverse this trend is in our view necessary and urgent to work in search of innovative teaching methods to gradually reconstruct the relationship between young people and science.
- **New relationship of young people with science**. The increase in the amount of information does not match, however, an increase in the quality of the same. Some recent investigations of the Italian National Council of Research - CNR (A. Valente and S. Caravita, "Communication of Science and Education", in press) show that secondary school students rely mostly on the internet to gather information, often using sources of unreliability. The same surveys, however, reveal a high confidence in the information obtained from the school. For this reason, we consider crucial that the school might serve as the liaison between the student and the media to help them orient themselves and to discriminate the information according to its reliability.
- • **A bridge between school and university**. Although they are still considered quite prestigious in Italy, the professions of science are largely unknown by the students. The means of mass communication help to create an image of the scientist distorted, often related to aspects almost caricatures. To reconnect young people to consider science a priority to build a concrete link between the world of education and research, leading scientists to confront directly in the classroom with students.
- **A space of confrontation between researchers and teachers**. To fully address the scientific issues one of the roads there seems to be a mutual exchange between teachers and scientists, creating spaces in which they can give their support to teaching. It is important for scientific researchers and teachers to be compared to highlight aspects of science in school, because science presents itself as a "living" material.

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3: Scenario Characteristics and Rationale of the Educational Approach

Reasoning on educational approach

The answer to the these challenges is given by an education that combines a set of specific **skills**, appropriately selected, with a solid scientific foundations and cultural rights, which provide the conceptual tools to understand, to frame and to interpret the complexity of reality, the evolving knowledge and the change itself. Moreover, the specific skills should be "dynamical" to address the complexity and variability of evolving contexts.

Standards for the skill certifications have been introduced and need to be delivered at the end of education cycles (see bibliography [C1], [C3]). It's expected that teachers pursue their educational activities aiming at the development of the required skills by the students.

The development of skills is connected to the learning method.

Several international reports(see bibliography [B5], [B9], [B10]). are calling for teachings based on **problem solving** and on **inquiry-based** education, in order to allow students to achieve a real understanding of "how science works". The same reports, as the National Guidelines for Italian schools of all levels, emphasize the educational value of a laboratory practice and methods of teaching in which students can make actual research, with the aim not only of learning the content of science but of developing an autonomous critical and creative scientific thinking.

Also a **project work** methodology can help to develop "dynamic" skills. Through a project work, the students could deal with complex situations, make decisions based on many variables and in conditions of uncertainty. After the training the whole process could be discussed among teachers and students, pointing out the difficulties arose during the process and strategies. As results, the students develop also the crucial transversal skill of *learning to learn*, which guarantee the "dynamic" or "plasticity" of the skills.

Inquiry-based and project-based approach could be adopted even in a sequential curriculum that addresses one after the other content or specific procedures: in addition to the application of principles and standard procedures, the teacher could propose problems which requires analysis and interpretation activities.

An **interdisciplinary approach** is also recommended. The interdisciplinary approach, especially across the sciences, aims to bring the learning process to the study of the complexity of the natural world, and recomposing around a theme the knowledges that only for ease of study, when necessary, can be separately addressed. Earth science, physics, chemistry and biology are parts of the cultural tool-kit, which has been developed to know, understand and think. The observation of phenomena, the formulation of hypothesis and the experimental verification of their reliability, allow students to evaluate their own creativity, to appreciate their capabilities and to feel nearer the proposed topics.

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Scenario Characteristics

This scenario follows a Junior Science Café (JSC) practice on Climate Change.
The JSC is a project-based practice, adopting a web-inquiry based method and interdisciplinary approach. This practice responds to the challenge described above.
The JSC is student-centered practice. We start from the interests and questions of the students and the students are responsible of all step of the organization. This approach helps to **motivate the students and active links among Media Information, School and Research.**
The **students will involve the local community in the scientific debate**: they are engaged in an activity for change.
Students are also invited to **develop citizenship competences** as finding contacts with experts, make information useful and expendable inside and outside school, understand the scientific stakes of today and tomorrow, discriminate reliable information.
The approach is a **web-inquiry based approach.** The students will search experts to answer the question on the Internet. For recognizing an expert in science, the student should elaborate criteria to read a scientific curriculum and to understand if the speaker is reliable and they will understand where and how the scientific knowledge is produced and the organization of the research. They also should elaborate criteria for discriminate reliable and unreliable information. The student will become more conscious when he/she approach to the information on the Internet, because through the JSC practice he/she **acquire tools to discriminate reliable information**. This ability is crucial in a world where the notions and the information are continuously evolving.
The interdisciplinary approach help to **recognize and distinguish the specific methods of different scientific subjects** and it contributes to develop an image of science as part of general culture.
It does not aim to clarify in an exhaustive and definitive way the curiosity of the students. Do not expect to draw from immediate conclusions of the debate! A good debate is a debate where we go out with more questions than there was originally, establishing links between sociological, political, cultural and economical context. If students remain with open question they will be motivated to continue the study on the topic, during and after the school. This practice could **orient the student to STEM studies**.
Through the participative context of a science café organization, the students learn to share a collective project in an atmosphere of cooperation and collaboration, where also highlight the individuality and specific skills of everyone. The JSC practice will **develop social and collaboration skills**.

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4: Learning objectives

In this scenario the teaching (curriculum) are linked to the information on the Internet, starting from the interests of the students. In this way not only the students will acquire reliable information on the climate change, but also they could reach many other objective, which are declared in the guidelines as "transversal" to the subjects.

4.1 General Learning objectives

The science café practice allows for developing the following skills:

- learn to share a collective project in an atmosphere of cooperation and collaboration and also highlight the individuality and specific skills of everyone;
- be aware of where and how scientific knowledge is produced;
- learn to search, interpret and analyze scientific information and connect different topics and subjects;
- to use and adapt the specific skills and knowledge developed at School in different contexts to solve complex problems;
- stimulate the empowerment and agency of the students, by involving them in actions for changing their reality;
- learn to learn.

4.2 Specific Learning objectives

The specific learning objectives of this scenario are listed in the following in terms of skills, ability and knowledge.

Skills

- observe, describe and analyze phenomena belonging to the natural and artificial reality and recognize the various forms of concepts system and complexity
- qualitatively and quantitatively analyze phenomena related to the transformation of energy from the experience
- be aware of the potential and limitations of technology in the cultural and social context in which they are applied

knowledge

- The Atmosphere; the Climate; The consequences of climate changes: availability of drinking water, desertification, human migrations.
- Origin of life: levels of organization of living matter (molecular structure, cell structure and sub-cellular viruses, prokaryotic cell, eukaryotic cell).
- Theories of interpretation of the evolution of species.
- Reproductive processes, variability and environmental habitats.
- Ecosystems (energy circuits, food chains, biogeochemical cycles).
- The human population growth and its consequences (health, food, economic).
- Ecology: Environmental Protection Agency (sustainable use of natural resources and waste

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management).

Ability

- Analyze the current status and the modification of the world in reference to the exploitation of Earth's resources.
- Reconstruct the evolutionary history of humans, emphasizing the complexity of the phylogenetic tree of the hominids.
- Describe the role of organisms, essential for the balance of the natural environment and the rebalance of environment degraded by pollution.

These objectives are in line with those of **1st biennium of the Technical Schools**, but they could be proposed also for the **Early Secondary Schools** and the other kinds of Secondary Schools (**High Schools and Vocational Schools**).

4.3 Understanding the Climate Change and Transversal Skills in the Italian Curriculum

In Italian Schools, teachers are required to develop skills. The National Guidelines only "suggest" knowledge and abilities that, in view of school autonomy, the Class Council of the teachers is encouraged, not obliged, to follow.
In the following we suggest links to the Italian curriculum.

Early secondary Schools

In the last year of the Early Secondary School, the "understanding of Climate Change" is recommended among the relevant "themes".

In Italy the guidelines for the Primary and Early Secondary Schools recommend to «raise awareness that the great problems of the human condition (environmental degradation, climate chaos, the energy crisis, the unequal distribution of resources, health and illness, the meeting and confrontation of cultures and religions, bioethical dilemmas, the search for a new quality of life) can be addressed and resolved through close cooperation not only between nations but also between disciplines and between cultures».

Technical Schools

Subjects: Integrated Sciences (Science of the Earth and Biology, Physics, Chemistry), Geography. In particular the skills, ability and knowledge fit with those of the subject **"Integrated Sciences (Science of the Earth and Biology)" for the 1st biennium.**

For the teaching of the subject Integrated Sciences, The Guideline of the Technical Schools recommends:
"The teacher of "Integrated Science (Earth Science and Biology)" can help the student to achieve at the end of the five-year course, learning outcomes that enable him to: use appropriate models for investigating phenomena and for interpreting experimental data; recognize, in the various disciplines studied, the scientific criteria of reliability of knowledge and conclusions that belong to them; use the networks and digital tools in study, research and analysis of the subjects; [...] use the cultural tools and methodologies acquired for interpreting with rational, critical and responsible attitude the reality, its phenomena and its problems, even for lifelong learning; place scientific discoveries and technological innovations in their historical, cultural and ethical perspectives, conscious of the historicity of knowledge"
In the following, we recall the definition of the subject "Integrated Sciences" given in National Guidelines. As we can

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see, this subject is elected as natural space-time for the project based and interdisciplinary activities.

"The integrated science should not be seen as a new discipline, which blend different disciplines, but as the scope of development and application of a common methodology of science teaching. To this aim, the research and the adoption of a uniform language for different sciences, of comparable models, as well as themes and concepts that have a unifying value are essential.

To develop a real expertise, students need the space and the time to build their skills through questions, exchange ideas with other students, laboratory experiments and problems to solve.

More than just the provision of general and abstract methods, the realization of the integration of the sciences depend on the ability of schools to transfer knowledge and skills in an educational project which allows an organic, strong links between concepts, models, theories and procedures.

It goes without saying that the quality of the act of education is not measured by the breadth of the curriculum offered, but with the depth of the concepts covered as well as it should be clear that the mistakes made by students during the learning process provide valuable information for the selection of additional and / or diversified educational interventions".

High Schools

For the High Schools, the **subject**s linked to the theme "Climate Change" are: **Geography, Biology, Physics**.

The guidelines for the High Schools orient to teach a method of study autonomous and flexible, making it possible to conduct research and personal insights and to continue effectively after higher education, natural extension of high school courses, and to be able to update throughout the whole of their lives.

For the High Schools, the connected transversal learning objectives are the following (divided for "areas")

Methodological Area

- be aware of the diversity of methods used by the various disciplines and be able to assess the reliability criteria of the results they achieved.
- be able to make the necessary connections between the methods and content of the individual disciplines.

Logical Area

- be able to support an assumption and knowing how to listen and critically evaluate the arguments of others.
- Be able to read and critically interpret the contents of the different forms of communication.

Linguistic and Communication Area

- Know how to use information technology and communication to study, do research, communicate.

Vocational Schools

For "Vocational Schools", as for the technical Schools, the Guidelines say that "the teaching of science and technology lies within a general horizon in which the knowledge is recomposed to give to pupils the cultural and applicative tools to develop rational, critical and creative attitudes to deal with reality and its problems and also for lifelong learning ". The teaching of technical and scientific disciplines has to lead to "awareness, openness and great mastery of scientific knowledge, not separated from the will power and the ability to work in teams."

To this end, it is highlighted that the role of the laboratory is crucial. The laboratory not only is a place where theory meets practice, but it is also a teaching methodology, that involves all disciplines, facilitates the customization of the process of teaching / learning and enables students to acquire "knowledge" through "doing", giving strength to the idea that school is the place where you "learn to learn". Moreover, it is required that "the laboratory activities will be integrated in the subjects and will constitute the basis of multidisciplinary educational projects aimed to the acquisition of skills."

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The privileged space to practice this interdisciplinary teaching is found in the (transversal) subject “Cittadinanza e costituzione” - Citizenship and the Constitution.

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5: Learning activities

The students will organize a junior science café on the Climate Change. The audience will be the local community (other students, parents, generic audience).

The CREAT-IT activities are conceptualized as Inquiry-Based Science Education (IBSE) activities. This is structured around the five IBSE phases suggested by the Cosmos project (2008):

Phase 1: Question Eliciting Activities/Exhibiting Curiosity
Phase 2: Active Investigation
Phase 3: Creation
Phase 4: Discussion
Phase 5: Reflection

The JSC practice, as developed in Scicafe project (2009-2012), follows 7 steps:

Step 1. Choice of theme
Step 2. Choice of expert speakers
Step 3. Preparation of the meeting with the experts
Step 4. Meeting with the experts
Step 5 Preparation of the science café
Step 6. Final event: the science café
Step 7. Reflection and follow-up.

In the following, specific Junior Science café activities are based on an understanding of IBSE, including both teachers' and pupils' inquiry processes, based on the CREAT-IT Pedagogical Framework.

Phase 1: Question Eliciting Activities/Exhibiting Curiosity
Step 1. Choice of theme
Phase 2: Active Investigation
Step 2. Choice of expert speakers
Step 3. Preparation of the meeting with the experts
Step 4. Meeting with the experts
Phase 3: Creation
Step 5 Preparation of the science café
Phase 4: Discussion
Step 6. Final event: the science café
Phase 5: Reflection
Step 7. Reflection and follow-up.

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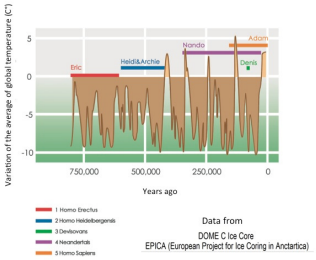
4.1 Phase 1: Question Eliciting Activities/Exhibiting Curiosity

Step 1 Choice of theme

Following the choice of curriculum based science education theme by the teacher, the teacher presents contents (phenomenon, movie or other) that stimulate pupil-generated questions about the theme, which links the interests of the student to the curriculum.

1. The teacher explains that students will organize a science café on climate change. The teacher exhibits curiosity (videos, film clips, imagines) asks to find links with knowledge and with the interests of the students and stimulates questions.
2. Each student writes his question/curiosity on a post-it and attach on the wall.
3. Each student reads his/her question and discuss among the others.
4. All together the students group their questions for areas.
5. The students chose the question area that they want as focus of their science café.

We can show images, newspaper or graphs to stimulate the questions. In Bibliography you can found some sources.

Newspapers or news on-line	Video or images on the world population	Graphs
		

4.1 Phase 2: Active Investigation

Step 2 choice of the experts

The will chose the two experts to invite for answer their questions. The students make hypothesis on the experts' profiles based on the areas of the previous step. They could invite a physicist and a biologist.

1. Teacher inquires about who is an expert.
2. Creation of criteria by the pupils based on
   a) Curriculum thematic investigation related to the specific research interests.
   b) Scientific excellence related to peer review system and the workings of scientific community

The teacher explains the science organization and the peer review system. The teacher explains how to read a scientific curriculum.

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You can explain to the students how to read and evaluate a curriculum vitae thanks to this example (see [A1]). Suppose that young people are looking for a physicist for a meeting on the shape of the universe. The students search the expert profiles on the internet and they found the experts as in the table below.	
Prof. A Age: 55 Publications: 250 Interests: measurement of cosmic radiation Experience in communication: yes **Prof. B** Age: 47 Publications: 150 Interests: neutron stars Experience in communication: yes **Dr. C** Age: 39 Publications: 100 Interests: cosmology and shape of the universe Experience in communication: yes **Prof. D** Age: 53 Publications: 65 Interests: measurement of cosmic radiation Experience in communication: yes	In this case we exclude Prof. B because her/his research interests are not directly related to the theme chosen for the science café, and Prof. D because she/he has a profile similar to A but with far fewer publications. Between A and C we can choose basing on further considerations such as age or more detailed information.

3. Internet based search of the experts' profiles. The students will extract relevant data on the experts' profiles by reading the experts' curriculum. They will collect the data (see the Guidelines [11])
4. Discussion of the experts' profiles in light of the previous research interests and scientific excellence criteria.
5. Democratic choice (vote) of the experts' best equipped to lead further investigation in the curriculum specific theme

The step2 is composed by 5 sub-steps and so it is clearly an IBSE cycle it-self. This cycle is a web-inquiry on how the science and the scientists work. Many naïve ideas of the students will be reoriented through searching of the experts described above.

Step 3 Preparation of the meeting with the experts

The pupils refine their questions according to the specific specialization of the experts to prepare an interview with the experts.

Step 4. Meeting with the experts

The students meet the experts and pose the refined questions. The experts help students bring their question into focus and help them to develop their questions further.

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4.3 Phase 3: Creation

Step 5 Preparation of the science café

The pupils find and define links between the scientific topic at hand, literature, movie, art in general or other related content for introducing their questions during the events.

The students should involve the local community to participate to the final event. They could involve other classes, parents, other public. They could organize a streaming video of the event.

The students will be divided in groups. Each one will be responsible for something:

- conductor of the meeting,
- responsible of communication (manager of blog, internal and external promotion, program notes...)
- responsible for relations with the speakers,
- equipment Manager (audio-video, etc.),
- responsible for food and drinks,
- photographer.
- responsible for the streaming

4.3 Phase 4: Discussion

Step 6. Final event: the science café

The science café is a live "talk show". During the Science café, the questions will be discussed with experts and the local community. The students' questions open, focus and stimulate the debate but also the public could pose question and participate to the debate.

4.3 Phase 5: Reflection

Step 7: Reflection

Reflection after, follow-up. Make an overview of what has been discussed during the science café.

Upload results (recordings, assessment) to the CREAT-IT portal (portal.creatit-portal.eu)

Students write a blog post sharing their reflection with others in the community for feedback and further debate.

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6: Implementation Scenario Template

Case Study Approach: Junior Science Café	
Science unit topic **Earth science, Physics, Biology, Geography** **Climate Change** Class information *Secondary Schools* **Age range:** *14-16* Sex: *mixed* Ability: *No limitations regarding pupils ability*	**Materials and Resources** *What do you need? Post-it. Video, film clips, news from newspaper or from the Internet to introduce the topic.* *Where will the learning take place? On site or off site? In several spaces? (e.g. science laboratory, drama space etc.), or one The learning take place in several space: classroom, computer room, library or café. If the experts work near to the school you could plan to visit their offices or laboratories.* *Health and Safety implications? None* *Technology? Computer for internet searching. If it's possible other technology for taking photo, recording or web streaming.* *Teacher support? (e.g team teaching with arts and science expertise) Team teaching with both arts and science and arts (music\dance\design\drama) expertise is recommended.*

Prior knowledge

Although it is not necessary to have any specific prerequisite, it is recommended that students have basic theoretical elements of genetics and thermodynamics.

Individual session project objectives *(What do you want pupils to know and understand by the end of the lesson*

Session 1 questions about the climate change and links the interests of the student to the curriculum

Session 2 Students will elaborate criteria for identifying a reliable and suitable scientist based on curriculum thematic investigation related to the specific research interests and on scientific excellence related to peer review system and the workings of scientific community) Understanding how the science and the scientists work.

Session 3 The pupils refine their questions according to the specific specialization of the experts to prepare an interview with the experts. The students elaborate criteria for discriminate reliable information on the Internet.

Session 4 The students meet the experts and pose the refined questions. The experts help students bring their question into focus and help them to develop their questions further and to refine the criteria for seeking reliable information.

Session 5 The pupils find and define links between the scientific topic at hand, literature, movie, art in general or other related content for introducing their questions during the events. The scientific topic is connected to other subjects. The students should involve the local community to participate to the final event. They could involve other classes, parents, other public. They could organize a streaming video of the event. The students will be divided in groups. Each one will be responsible for something.

Session 6 The science café: the event. Discussion of the questions with experts and the local community.

Session 7 Reflection after, follow-up.

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Assessment	Differentiation	Key Concepts and Terminolgy
The teacher can assess the ability of the student to seek the reliable information on the internet, to read scientific curriculum - to understand the reliability of an experts. *The teacher shall asses these abilities by a test where the students analyze the reliability of article selected by the Internet.*	*All paticipant take part in the choise of theme, in the choise of experts and in the discussion.* *Each pupils had a different role in the organization* • *conductor of the meeting,* • *responsible of communication (manager of blog, internal and external promotion, program notes...)* • *responsible for relations with the speakers,* • *equipment Manager (audio-video, etc.),* • *responsible for food and drinks,* • *photographer.*	**Science terminology:** *Climate changes, Biological and cultural evolution, genetics, migration, local and global temperature, difference between effect and impact.* **Arts terminology:** .

IBSE Activity	Potential arts activity	Student	Teacher	12 CREAT-IT Pedagogical Principles
Phase 1: Question Eliciting	Begin cooperation with science café organizer at your school in order to generate ideas Discuss with your students the idea of creating a science café.	**Step 1 Choice of the topic.** Students think about questions they have regarding the scientific theme Each student writes his question/curiosity on a post-it and attach on the wall. Each student reads his/her question and discuss among the others. All together the students group their questions for areas. The students chose (i.e. vote) the question area that they want as focus of their science café.	**Step 1 Choice of the topic.** Following the choice of curriculum based science education theme, the teacher presents content (phenomenon, movie or other) that stimulates pupil-generated questions about the theme which links the interests of the student to the curriculum.	1. *Individual, collaborative and communal activities for change* 2. *Risk, immersion and play* 3. *Dialogue* 4. *Interrelationship of different ways of thinking and knowing*

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Phase 2: Active Investigation		**Step 2 Choice of the experts** The students make hypothesis on the experts' profiles based on the areas of the previous step. They could invite a physicist and a biologist. Students elaborate criteria based on a) Curriculum thematic investigation related to the specific research interests. b) Scientific excellence related to peer review system and the workings of scientific community Internet based search of the experts' profiles. The students will extract relevant data on the experts' profiles by reading the experts' curriculum. They will collect the data (see the Guideline referred in bibliography [1]) Discussion of the experts' profiles in light of the previous research interests and scientific excellence criteria. Democratic choice (vote) of the experts' best equipped to lead further investigation in the curriculum specific theme **Step 3 Preparation of the meeting with the experts** The pupils refine their questions according to the specific specialization of the experts to prepare an interview with the experts. The students elaborate criteria for discriminating the reliable information based on: a) sources (scientific papers)	**Step 3 Choice of the experts** Teacher inquires about who is expert on the science topic. Teacher invites the students to elaborate criteria to recognize an expert and to evaluate the experts' profile. The teacher explains the science organization and the peer review system. The teacher explains how to read a scientific curriculum. **Step 3 Preparation of the meeting with the experts** The teacher helps the students to elaborate criteria for discriminating the reliable information.	5. *Discipline knowledge* 6. *Possibilities* 7. *Ethics and trusteeship* 8. *Empowerment and agency*

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		b) references to the experiments **Step 4 Meeting with the experts.** The students meet the experts and pose the refined questions. The experts help students bring their question into focus and help them to develop their questions further.	**Step 4 Meeting with the experts.** The teacher fosters the students to fell free to ask their question to the experts.	

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Phase 3: Creation	**Step 5 Preparation of science café.** The pupils find and define links between the scientific topic at hand, literature, movie, art in general or other related content for introducing their questions during the events. Possible use of social media: Share video of discussion on YouTube to open up further discussion within the community. Conduct the discussion with video / audio conferencing. Post images of the work taken on Instagram. Twitter for comment. Present results online using Prezzie or Glogster.	**Step 5 Preparation of science café.** Divide class into groups with various roles (moderator,…) • conductor of the meeting, • responsible of communication (manager of blog, internal and external promotion, program notes...) • responsible for relations with the speakers, • equipment Manager (audio-video, etc.), • responsible for food and drinks, • photographer. • responsible for the streaming The pupils should involve local community in their event.		

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Phase 4: Discussion	**Step 6 Science café: the event** Reading and video will introduce the questions. Possible web streaming organized by the students.	**Step 6 Science café: the event** Discussion of the questions with experts and the local community	The students should be autonomous in the organization.	
Phase 5: Reflection	The whole process is discussed among teachers and students.	Make an overview of what has been discussed during the science café. Upload results (recordings, assessment) to the CREAT-IT portal (portal.creatit-portal.eu) Students write a blog post sharing their reflection with others in the community for feedback and further debate. Students prepare an online self-refection presentation using Prezzie, Glogster, Scoopit	The teacher is a facilitator during discussion. You may focus on the following issues: difficulties arose during the process; various images chosen as activity foci. The teacher can ask the following questions: How does the result relate to your original idea? Has your thinking changed? What remains unclear? What new question could you ask? Guides the student to further open-ended study	

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[B3] C. Belmonte, T. Castellani (2010) **Il progetto Caffè scienza junior** in "Le scienze naturali nella scuola" n.41 fasc. III ISSN: 1721-9892

[B4] De Haan, G., Huck, J., Eds (2008) **Recommendations for Policy makers, Form-it. Take part on research project, 6th European Framework Programme**, Austrian Institute of Ecology

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The CREAT-IT project has been funded with support from the European Commission under grant agreement 2013 – 3637 / 001 - 001

C OFFICIAL DOCUMENTS ON EDUCATION SYSTEM

[C1] RECOMMENDATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 23 April 2008 on the establishment of the European Qualifications Framework for lifelong learning (2008/C 111/01)

Italian school system
[C2]ITALIAN SCHOOL SYSTEM, See Ministry of Education, University and Research website:
http://www.istruzione.it/urp/ordinamento_scolastico.shtml

[C3]Italian Decree for the reorganization of School
Ministerial Decree: DM n. 9 del 27 gennaio 2010
Presidential Decree: DPR 15 marzo 2010, n. 87; DPR 15 marzo 2010, n. 88; DPR 15 marzo 2010, n. 89;

[C4]*Documento d'indirizzo per la sperimentazione dell'insegnamento di "Cittadinanza e Costituzione"* del 04-03-2009. (ministerial guideline for the testing of the teaching of "Citizenship and Constitution")
http://hubmiur.pubblica.istruzione.it/web/ministero/cs040309

Curriculum first cycle (kindergarten- Primary and Secondary of first level School)
[C5] National Guidlines on Curriculum for the first cycle od School (2012)
http://www.indicazioninazionali.it/documenti_Indicazioni_nazionali/indicazioni_nazionali_infanzia_primo_ciclo.pdf

Curriculum Secondary School - High School
[C6] National Guidelines for the High School
http://www.indire.it/lucabas/lkmw_file/licei2010///indicazioni_nuovo_impaginato/_decreto_indicazioni_nazionali.pdf

Curriculum Secondary School - Technical Schools (Istituti tecnici)
[C7] National Guidelines for the Technical School [ISTITUTI TECNICI, LINEE GUIDA PER IL PASSAGGIO AL NUOVO ORDINAMENTO(d.P.R. 15 marzo 2010, articolo 8, comma 3)]
http://www.indire.it/lucabas/lkmw_file/nuovi_tecnici///INDIC/_LINEE_GUIDA_TECNICI_.pdf

Curriculum Secondary School - Vocational Schools (Istituti Professionali)
[C8] National Guidelines for Vocational School [ISTITUTI PROFESSIONALI, LINEE GUIDA PER IL PASSAGGIO AL NUOVO ORDINAMENTO (d.P.R. 15 marzo 2010, n. 87, articolo 8, comma 6)]
http://www.indire.it/lucabas/lkmw_file/nuovi_professionali///linee_guida/_LINEE%20GUIDA%20ISTITUTI%20%20PROFESSIONALI_.pdf

D Usefull links and Sources
Video-Trailer on Junior Science Café Practice by FormaScienza to show to the students for motivating and explaining the project: https://www.youtube.com/watch?v=AtKrQTghKBw

Intergovernmental Panel on Climate Change http://www.ipcc.ch
United Nations Environment Programme http://www.unep.org
World Meteorological Organization https://www.wmo.int/pages/index_en.html

Here are (Italian) newspapers with "alarming news" to give to the students asking to analyze how reliable they are.
http://www.corriere.it/Primo_Piano/Scienze_e_Tecnologie/2006/11_Novembre/13/nairobi.shtml
http://www.repubblica.it/argomenti/innalzamento_livello_del_mare

Italian Science Café on Climate Changes with Sandro Calmanti, physicist and Andrea Novelletto, biologist.
Video-Trailer https://www.youtube.com/watch?v=EX36SIJQ8XM

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Web Streaming https://www.youtube.com/watch?v=_8FSr6mcV40

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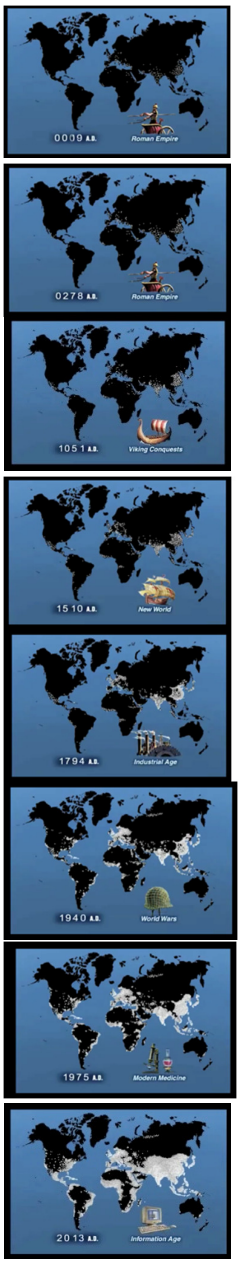
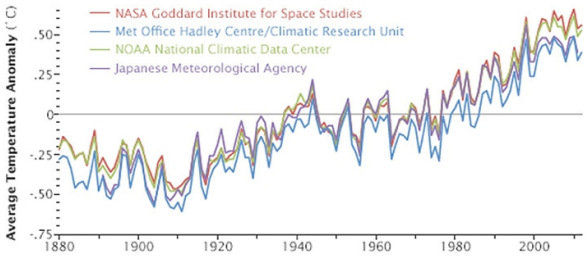
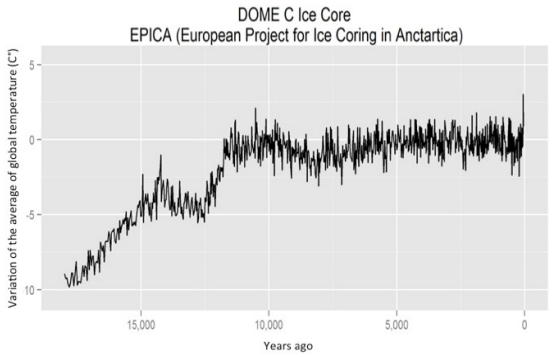
Video and images on the world population
https://www.youtube.com/watch?v=4BbkQiQyaYc



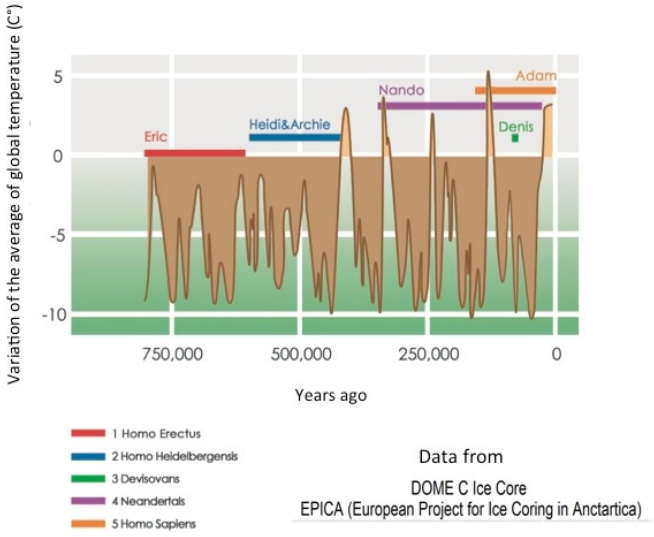
Graphs On the variation of the average of global temperature on short period.



Graphs On the variation of the average of global temperature on long period



Graphs On the variation of the average of global temperature on long period and humans species ages.



Lifelong Learning Programme

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