ERASMUS+ KA220-SCH - Cooperation partnerships in school education

freeland

Promoting STEAM through participatory urban regeneration

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Environmental quality (Pollution)

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Environmental quality and pollution in an urban area

Description of the module:

This module helps teachers and students to explore the environmental quality, particularly some types of pollution, in an urban area. A brief description of some pollution types and causes are reported in the Methodology book and the Module offers practical activities and worksheets to explore environmental quality and pollution, and promote urban regeneration with some initiatives.

Learning objectives:

Students will be able to

- quantify qualitatively and quantitatively level and causes with the considered types of pollution (noise, light and air pollution) through direct observation, experiments and apps

- To create and deliver a questionnaire to assess personal perception of citizens about the environmental quality of an urban space

- analyse and compare collected data

- reflect on the impact of our daily activities and habits on the quality of a living space in relation to noise, light and air pollution.

- discuss scientific results and make relationships between diverse disciplines, in connection to the considered types of pollution and the link between pollution and human habits.

- present their projects to the public

- organize participatory events for the public

They will create presentations or videos of their own activities.

Methods that will be used:

Circle time, hands on, IBL

School subjects involved: Science, Physics, Chemistry, Maths, Civic education, social science

Module duration and suggested time allocation:

Step	Duration (hours)	Description of methods *Count the methods that will be used*
Presentation of the place & problem discussion	0.5	Circle time Brainstorming
3 Optional outdoor laboratories with several monitoring activities	4-6 per laboratory	Group work Hands-on Data analysis and discussion
Designing	1.5	
Evaluation	1	Public presentation, participatory event
Project delivery	1	Participatory event

Step by step template

Step 1: Presentation of the place & problem discussion

In this step, the real-world problem of urban neglect is presented and conceptualised. The presentation/orientation could be in person (outdoor activity) or virtual. The goal of this step is to describe the place in terms of problems and opportunities. To identify the problem, a guided discussion utilizing the **Circle Time** tool is recommended. During the Circle Time activities, questions can be used to start the discussion.

Duration: 1 hour (ITALY) / 45 MINUTES (POLAND, CROATIA)

Activities and methods:

This activity aims to raise students' curiosity about the various types of pollution caused by human activities. Through the circle time, possibly outdoors, the teacher stimulates students to give their own personal opinion if and how they perceive noise, light and air pollution in their daily life and what they think about the human activities that are the causes of these types of pollution.

*"*What do you feel? (e.g. hear sound, see artificial light from luminaires, or breathe polluted air? Is it pleasant or disturbing?*"*

"Can you identify the source of each of them? Are they generated by natural phenomena or by human activities?

Tips & Tricks:

- This activity should be performed outdoors, but there is no specific constraint in time or area characteristics. You should consider that some activities should be better done at night (e.g. for light pollution) and others are different at different times of the day (e.g. noise and air pollution during rush hours).
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Resources needed:

- Traffic and light system near the area.
- Knowledge on definition of each type of pollution and its causes (see Methodology)

Cross-curricular links: Science, Physics, Chemistry, Mathematics, Art, ICT

Step 2: Outdoor laboratories & research

After the brainstorming, one or more laboratories are proposed related to the monitoring of types of pollution in the site. These laboratories follow the steps of **Inquiry Based Learning** and they begin to focus on the topics emerged during the first step (e.g. light, noise and air pollution).

Duration: about 4-6 hours per laboratory

Activities and methods: Three laboratories are related to the theme and their description contains the details of application.

- The Laboratory “Noise detectives” is about the assessment of noise and causes in an urban area. Measurements are made qualitatively by personal perception and quantitatively by measurements with digital devices and apps.
- The Laboratory “What is in the air?” is about the assessment of particle matter concentration and causes in urban areas. The evaluation is quantitatively assessed through an outdoor experiment and lab analysis.
- The Laboratory “Shed light on light pollution” is about the assessment of light pollution. Measurements, that should be done at night, are made qualitatively by personal perception and quantitatively by measurements with digital devices and apps. Causes can be assessed by collecting data on lighting systems characteristics present in the area. A survey can be also developed to assess the perception of the urban night environment by young generations.

Most laboratories include hands-on activities, data elaboration on PC, preparation of digital presentations but also a discussion phase which is meant as a participatory activity with the engagement of the local stakeholders.

Tips & Tricks: Activities can be performed any time of the year. However some activities regarding light pollution should be done at night.

Resources needed: The list of tools is reported in the description of each laboratory.

Cross-curricular links: Science, Physics, Chemistry, Maths, Civic education, social science

After the laboratory/ies are performed, the groups will gather the results and summarize them in a report or a video that can be evaluated by teachers following the school's evaluation grid.

Eventually, a student group will import the data into the **Platform** to recreate the place virtually with the support of the partners (See next Step 3: Designing).

Step 3: Designing

With the support of the teachers, students think of possible solutions to any problems or assessments that they have noticed in previous steps.

Specifically, they can think of a project i) to raise awareness of peers, families and local institutions about the different types of pollution and propose solutions and behavior less impacting.

The project must impact the social aspect of the place, by involving the local community and citizens (family members, stakeholders that follow the project) and must be inclusive, collecting different experiences and knowledge from native and foreign students.

Therefore, the students should think about several aspects: not only designing actions and organizing events but also the way to communicate the project to the local people and municipality to engage them in the sustainability of the project. With the involvement of the Art teacher, students can create artworks or drawings inspired by the selected area and the type of pollutant, and display

their creations in public places as temporary or permanent installations to raise awareness among citizens and students about issues related to that pollutant.

The **Platform** is used to visualise the variations of the place (e.g planting vegetation that can reduce noise or air pollution, proposing to reduce light at night in places where is not needed or switch off lights during the central hour of the night) with a 3D model simulator, to visualize the changes as a digital twin of the real area.

In order to attract neighbors and parents, students can organize a public open-day for the presentation of their regeneration project .

Duration: 1.5 hour

Activities and methods:

Students, divided in groups plan different parts of the regeneration project:

- One or more groups plan the solutions that improve the sustainability of the area (e.g. ways of reducing pollution with vegetation that absorbs air pollutants or switching off light at night). They have to justify their choices.
- One group will work on the 3D Model platform to virtually visualize the changes.

Tips & Tricks: The definition of solutions might take an extra-effort for the students, therefore the teachers may indicate some sources (internet sources) or invite experts to speak about possible solutions to improve the environmental quality of the area by reducing pollution.

Resources needed:

- Notes and pens
- Internet for collecting information on pollution and ways of mitigation

Cross-curricular links: Civic education, Informatics, Art, Science (Physics, Chemistry).

Step 4: Data Evaluation

This is a work-in-progress step where the project is proposed to peers, teachers or the local community in a participatory discussion.

The school is in charge of inviting citizens and stakeholders, collecting feedback and improving the final design of the regeneration project.

Duration: 1 hours

Activities and methods:

Organization of events open to stakeholders to present the Freeland project, the results of the laboratories performed by the students and their regeneration project. These events can be outdoors, at the place, and the students can suggest some attractive activities for the youth of the neighborhood (e.g. day and night events where participants are invited to feel and score the level of comfort regarding noise, air and light pollution)..

Evaluation by the public to understand the value and the sustainability of their initiative, and list of stakeholders interested to actively in the project.

Resources needed: Projector, computer, other materials for the entertaining activities planned by the students.

Cross-curricular links: Civic education, Art, Science

Step 5: Project delivery & civic engagement plan announcement

The students plan the civic engagement of their own regeneration project.

Schools with stakeholders propose a civic engagement plan or actions to solve the problems of the place through an approach based on actions, civic engagement and, if possible, urban regeneration principles.

Suggested civic engagement plan:

- One day and one night event to involve friends, families and local institutions to test the level of comfort in the area.

Duration: 1 hour

Activities and methods: photographic reports, maintenance activities, organization of art or music events in the place.

Tips and tricks: If no practical activities can be performed, students can make a plan.

Resources needed: paper, pen, camera, practical experience.

Cross-curricular links: Civic education

Additional reading materials:

- *Noise pollution:* https://www.eea.europa.eu/en/topics/in-depth/noise
- *Air pollution:* https://www.eea.europa.eu/en/topics/in-depth/air-pollution
- *Light pollution* *https://en.wikipedia.org/wiki/Light_pollution*

Appendix:

- Laboratory: “Shed light on light pollution ”
- Laboratory: “Noise detectives”
- Laboratory: “What is in the air?”

Sources:

- *See FREELAND Methodology*