Three water places in comparison project

1. Country

Italy

2. Name of the programme?

Three water places in comparison: observation and study of three water ecosystems to show similarities and differences and to emphasize their uniqueness.

3. Age of the children involved?

From primary school to University.

4. Teaser/short introduction

This activity is important because it gives a practical explanation about the ecosystem concept that is often taught only on the theoretical level. In particular it highlights the aquatic ecosystems and their micro-organisms which are usually unknown.
The aim of this activity is to observe and to compare three different aquatic ecosystems to highlight their similarities and differences. The three chosen places are a small natural lake, an artificial pond and a tank with a low flow of water. The student's work follows some phases:

- Observation of the environment on a macroscopical level
- Sampling of the water of the three different places
- Identification of sampled organisms
- Discussion among the learners of the results

5. What is the frame?

Everything around us is the result of a dynamic balance and adaptative relations, indeed environments differ from each other in a coherent way, as well as the organisms that living in. The alterations of this balance could bring important impacts on biodiversity. Presence of each organism is important to a correct maintenance of the environment.

6. What are the goals of the programme?

- To acquire scientific contents related to ecology.
- To bring students to the observation and the study of three aquatic ecosystems to highlight similarities and differences among them in order to exalt their uniqueness.

- To understand how and why each ecosystem is unique and different from the other two and how this is the result of adaptative relations.
- To stimulate the students towards a feeling of respect, responsibility and awareness regarding the conservation of natural resources.
- To establish an emotional relationship with the environment and, consequently, provide students a sense of respect towards it.

7. What values are promoted in the programme?

Learners understand the importance of cooperation for comprehension of world. They observe and discuss together to arrive to common explanations, understanding to listen and to respect other opinions. Moreover they realize how environment could be breakable and the importance to respect this, not only for present, but expecially for the future and the future generations.
According to the hand model:

- respect for nature and care for the state of our planet
- respect for future generations

8. Which competencies are promoted that empower learners to shape a sustainable future?

- The students through observation and comparison of their own results can develop their ideas and opinions in an independent and conscious way. So the learners are themselves the authors of their learning
- Thanks to the discussion, the learners understand the importance of teamwork: they understand how can be constructive a sharing of ideas and to respect the others opinions.
- The students, through basic scientific knowledge transmitted by this experience, can take awareness of the uniqueness of environments and of the organisms that live in. They understand the importance of their own relation with nature, in a perspective of conservation and respect.

According to the hand model:

- inspire learners to be curious, reflective and critical thinkers
- enable learners to cooperate, participate and take responsibility
- enable learners to become concious of interconnectedness - you, me and the world around us

9. Which of the specific scientific concepts does the programme relate to?

- In this case-study rises the concept of *stability* in an ecosystem (the close interconnections between biotic and abiotic factors, the peculiarities of each ecosystem and how these are the result of an *interdependence* among all components).
- Another concept transmitted by this case-study is *change* through the observation of typical species composition of an habitat. In this project learners are invited to observe species through an *evolutionary* key, emphasizing *adaptations* of organisms in the three different

habitats.

10. Which ecological problems are involved, if any, and how? (Refer to mindmaps of 9 planetary boundaries)

Through this activity rises the *biodiversity loss* issue: species present in an environment are important for the maintenance of the same environment. Students are made aware of the fact that the loss of a species is a negative event not only for that species but, in a complex system like an aquatic ecosystem, it'll be consequences on all organisms that interact directly and indirectly with that species.

11. Transferability: which different areas of learning are included and how?

This activity stimulates personal skills of learners, like observation and draw capabilities, they test directly themselves. Moreover learners are surrounded by environments that they want to study, so their experience is real and they are straight related with these. They can also understand that as the environment is regulated by many interconnections, also the human society is regulated by similar mechanisms.

According to the hand model:

- encourage active transfer during and after the experience
- related to the natural environment
- related to the learners themselves

12. What educational strategies (learning models, methods, etc.) are used in your programme?

The students learn through a firsthand experience: during this activity the learners can explore the environment, can collect samples and they have the possibility to identificate sampled organisms by themselves. This experience stimulates the students to make questions about the differences among the places and the relationship among organisms. In this way their curiosity became the driving force of learning.
A facilitator starts a discussion and drives the learners asking them to compare the three places. The point is to bring the students to realize the differences among habitats in a simple and direct way. It's important the spontaneity of dialogue and the research of causes and effects, not the correctness of the answers: the doubts are like open doors for the future knowledge.

13. How is the programe evaluated? How do you know the programme achieved its educational goals?

The discussions and the student's final works don't give a complete analysis of the learning degree achieved, but they show their attempt to explain phenomena and understand the relationships between components of an ecosystem.
One of criteria used to evaluate the innovative educational practices is the actual number of joining people: this project has obtained a good success, with many classes and a lifetime of several years.

14. Describe the programme.

The program takes place at three water places put in comparison. These places are characterized by different abiotic parameters that distinguish one from the each others (temperature, light, solutes). The project's area called "laghetto delle vergini" (the little lake of the virgins), is located few kilometers from Milan. The ecosystems chosen for the project are: a little lake surrounded by a hardwood forest, a small artificial pond regularly topped up, and two tanks of water with a low current.

Before the outdoor experience, teachers are provided with a Guide describing the planned work, goals and objectives, and disciplinary contents. The Guide also contains suggestions to present the activity to the students and guidelines to develop in class the treated themes.

The program develops with five phases:

1. Analysis with senses.

The three ecosystems are compared through a sensorial exploration: the students compare some water characteristics observing the appearance and the movement, touching with hands and smelling samples.

2. Measure of temperature and sampling of water

The students sample the water and compare the detected temperature of different points for each ecosystem.

3. Microscope observation

The observation and recognition of micro-organisms are made thanks to a microscope connected with a monitor: everyone can observe and give his opinion. This is the base for a collaborative learning.

4. Drawings of organisms

A *Guide for the observation and the study of the aquatic micro-organisms* is given to each student for the recognition of the micro-organisms. Thanks the guide, the learners draw a picture of the recognized organisms and choose to highlight some characteristics.

5. Discussion

A facilitator allows the comparison among the different observed places trying to outline the adaptations and characteristics of the collected organisms. The adult drives the discussion to make children understand that each ecosystem is unique as a result of different abiotic components and relationships between different organisms.

15. Included resources / materials / tools.

Annastella Gambini, Antonella Pezzotti, Valentina Borgo, "Tre luoghi d'acqua a confronto. Osservazione, analisi, relazioni." Congresso congiunto AIOL-SItE / joint AIOL-SItE meeting – Ancona 2007

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16. Photos or videos, logos