LIVING STEM

Key concept

Ecosystem

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#livingSTEM

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CONCEPT: Ecosystem

1- BRIEF DESCRIPTION OF THE CONCEPT

The concept of ecosystem is essential in the sense that it embodies the idea that all living things are linked, sometimes in unexpected ways, and that damage to one element can throw the balance of the whole system off.

The ecosystem is the biological ensemble that is located in a given area. It also includes the chemical factors and non-living elements that compose it. Usually, ecosystems are defined in a practical, partly arbitrary way, the limit is where a drastic change in the ensemble occurs. For example: a forest is an ecosystem. Around it, there are fields, which are another ecosystem. The earth in its entirety could be considered as an ecosystem, limited by “space” in which the ensemble is very different. Depending on the study, the ecosystem limits will change. Our planet’s ecosystem is currently being threatened by climate change.

2- Activities of the LivingStem project that may be related to this concept

Depending on what you wish to emphasize in the video: more importance on the ecosystem itself, or more on the ecological footprint that affects he ecosystem, different activities can be linked with the subjects;

Gamification System Activities: The activity **“Terrarium”** is interesting in the sense that a small ecosystem is being created. Pupils could reflect and observe nature to try and determine what elements would need to be in this

ecosystem for it to work, and then to create it with the supervision of the teacher.

Gamification System Activities: "Building an insect hotel". In the context of ecosystem, it is interesting to analyse one particular aspect of an ecosystem, namely insects. The pupils would see how their presence or absence influences the ecosystem and draw conclusions on the balance of an ecosystem and its functioning.

Gamification System Activities: For a more comprehensive look, it could be interesting to make the activity **"web of biodiversity"** and see how each element interacts with the others.

The Ideal Kitchen Garden Game: Designing a permaculture garden needs to take into account the links and relationships of elements and plants in order to create the most efficient garden. The garden can become a specific ecosystem as well.

Gamification System Activities: "Designing an eco-sustainable city", is also an interesting activity to link with the ecosystem, and how to make it sustainable and balanced in a distinctly "artificial" environment.

Gamification System Activities: "Climate change and UN's global goals": what can we do? It is also an activity that can be put in link with the importance of the ecosystem and how to protect its balance.

Another activity that could be done would be a simulation of a natural ecosystem with different elements playing their part and seeing the consequences of removing one element might have (like a domino effect).

3- Methodology proposal for the implementation of the activity described above

Observation is key here. Pupils will need to observe and document their observations in order to emulate nature and to be able to distinguish the special links and relationships between elements.

Once they observed and understood these links, they will need to recreate them inside specific areas in order to obtain more yield.

They will also reflect on the importance of our ecosystems and how to preserve them by reducing our ecological footprint.

All observations and the unfolding of the experiments will be documented with a video.

While filming, it is possible to establish a general structure to the videos beforehand so that at the moment of filming, you may have a consistent format. Here is an example:

Make the video as an interview in a TV show (you can even invent a name)

- “Today let’s explore ... (*insert subject*)”
- Brief explanation of the concept
- What the pupils will do as an experiment (or hypothesis)
- The different steps of the process and why
- What are the results?
- What is the conclusion?
- “Thank you for watching!”

4- Children involvement in the activity:

The pupils will be the ones to observe, explain their observations, and work in a scientific manner to reproduce small-scale ecosystems.

The videos will allow the viewer to follow the whole process, from important observations to the accomplishment of a recreated working ecosystem.

Teachers will accompany pupils by explaining them the different biological, chemical, and physical processes that allow ecosystems to work as natural networks of life and energy.

Pupils will work in small groups of 3 to 4 pupils, in which a person will be designated to record the whole process. This position of filmmaker will need to be taken in turns by the pupils so that all pupils will be able to participate in the tasks and the video making process equally. All of this under proper supervision of the teacher of course.

The teacher can choose to film the whole process themselves if they want to.

5- Links between this concept and science (STEAM) and permaculture:

An ecosystem regroups a plethora of elements that interact in a wide variety of ways. The different interactions and nature of those elements can be explained through the different subjects pertaining to Science in general. To be more specific here: Biology, Physics and Chemistry.

Chemistry:

The chemical components in the ground such as Calcium, Magnesium for example, are essential nutrients for plants. Other chemical reactions such as

photosynthesis or composting play a major role in the good functioning of a natural ecosystem.

Physics:

In the case of physics, multiple elements enter in play in an ecosystem, which mechanisms can be explained into this class.

For example: Proper use of gravity while designing the permaculture garden will create special conditions for irrigation in order to water the crops.

Capillarity is also a phenomenon that can have an impact on an ecosystem's functioning, as groundwater goes back to the surface and irrigates terrain as well and can be explained by physical rules.

Biology:

Photosynthesis, composting, plant reproduction, etc, are all biological processes that are at the heart of the functioning of an ecosystem and can be explained in the context of Biology class through those activities.

Permaculture:

The observation of nature and how the innerworkings of self-sufficient ecosystems work, and the emulation of those observations in the most efficient way possible, are at the heart of the Permaculture philosophy. Permaculture aims at reproducing those natural mechanisms and to optimize the design of the garden in order to help the positive relationships form between elements and allow plants to thrive. The concept of ecosystem and its natural balance and sustainability is essential in the Permaculture philosophy.