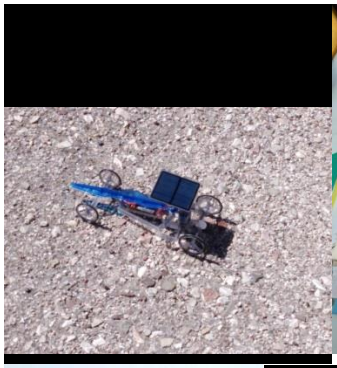
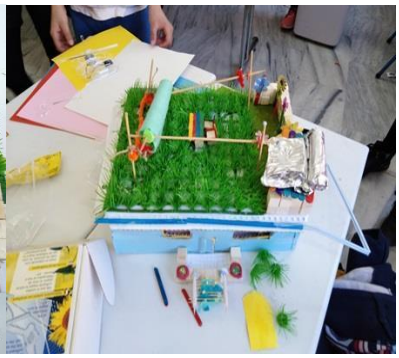
ECO-LOGICAL CITY

A CROSS-CURRICULAR PROJECT INVOLVING MATHS, PHYSICS, LANGUAGE, ROBOTICS/ICT& ART







Class: 25 students

Teachers: Mainstream teacher, Art teacher, ICT teacher

Time frame: 3 teaching hours each week for 4 months

Method of work: Group work

Subjects involved: Language, Mathematics (Algebra-Geometry), Physics, Arts, Robotics, ICT

Resources: Internet**,** computer, projector, Lego WeDo 2.0, recycling materials

Objectives:

MATHEMATICS: Students learn to:

Draw parallel and vertical lines

Construct a square, a rectangular, a circle and a triangle

Measure the perimeter and the area of a rectangular and a square

PHYSICS: Students learn about:

The Green Energy (wind energy, hydraulic power, photovoltaic panels)

The bioclimatic houses

Methods of saving energy

Energy conversion

LANGUAGE: Students practise on:

Writing a leaflet about ways to save energy

Following written instruction

ARTS: Students practise on:

Motor skills

Being creative by using plain materials

Exposing their work

Working together/collaborating

Communicating their message through their project work

Showing their concern for the environment, respect for people with special needs,

compliance with traffic rules

ROBOTICS: The students learn how to construct and program a Lego WeDo 2.0, DriverlessSmartBus and find out the benefits of autonomous transportation & mass media and get sensitized towards electrification

ICT: The students use the Internet to collect information and the Word to compose a leaflet

Procedure

During the first lesson, as a warm –up activity, the students are asked to say what comes to their mind when they hear the terms "green energy, ecological houses". The students come up with ideas like "planting, taking care of the environment, no littering or polluting, saving water, recycling, using bicycles instead of cars,etc". Their ideas are written on the board. Then they are challenged to form 5 groups of five, with a view to becoming 'researchers' and discovering more about the two above-mentioned terms. After the groups are formed, the students watch an eleven minute ppt/video and are instructed to take specific notes (fill in information in a 'guided' worksheet), because after the presentation they will have to construct an ecological city which will be consisted of bioclimatic houses (dimensions of the city: 1mx2,5m). The students watch https://www.youtube.com/watch?v=AvxTkd1jkzU , whereas the teacher stops it at particular points to focus students' attention on the main issues presented and explain the hard parts. As it stands to reason, the 11' presentation takes 3 to 4 teaching hours to complete.

As long as the notes are taken, the students are invited to discuss, decide and write down their ideas about what they are going to make, what materials they will need, which ecological elements will include in their construction, who will bring each material and so on. They have to seek for more information about the ecological houses on the internet during the ICT teaching hour, with the appropriate guidance by the ICT teacher. Furthermore, they are instructed to visit particular sites on the net and are also provided with proper books, in order to find out about the watermills and windmills which produce electrical power. With a view to giving them a hint, the students watch https://www.youtube.com/watch?v=aGhCIPL99zU https://www.youtube.com/watch?v=CAiZJrfYQ8Y and start getting familiarized with the terms "green energy" and "energy conversion".

The next step is for the students to give shape to their ideas. After they have finished, the students come up with the construction of 4 two- storeyed - houses made of entirely recycling (garbage to be) materials.

Outside the houses have:

- Insulation between the two brick-walls
- Light colors to reflect the hot radiant of the sun during the summer

- Double glaze-windows
- Minimum north-facing glazing — to reduce heat loss
- Good levels of daylight
- Passive solar orientation — glazing oriented south for light and heat
- Rainwater harvesting
- Solar water heating
- Growing plants on the roof to regulate temperature, ‘quieten’ the house, and to produce oxygen
- Planting a deciduous tree in front of the house for natural shadow in summers

The houses inside have:

- Ceiling fans instead of air-conditioning
- A window above the sink for natural light
- Low-energy consuming kitchen-appliances
- Shower instead of a bathtub in the bathroom
- Laptop instead of a computer
- Low-energy consuming bulbs
- Big windows with curtains

When the houses are over, the students “design” their city. In the middle of the city they put a park with a solar carousel and swings. On the left and the right side of the park they place the houses. Perimetrically of the city they have a road, with traffic lights, which leads to an airport with a solar helicopter and a solar airplane. On the street there is a solar car moving. They also make bus stops for the Lego WeDo 2.0 bus, which moves and stops after it is programmed by the students. On the pavements of the street students put “tiles” for the blind people to follow and they place traffic signs where needed. They also make bicycles, garbage-cans, recycling-bins.

Through the construction of the wind generator and the solar car, helicopter etc. the students learn about the conversion of the energy and how it can be used. They also have to measure the perimeter of their city, and find out the area of the houses. In order to cut out the “road” and the “pavement” they have to use their knowledge on drawing parallel and vertical lines. In the end, the students are challenged to make a leaflet with all the ways a citizen can use to save energy and thus show respect to the environment.

Upon completing the design of their city, the students explain why it is named Eco-Logical. A city with reason (logic), apart from being designed with ecological awareness, would also show respect to the people with special needs and would have citizens who would always comply with the traffic rules.

The project will be presented on May 9th in the “Science Festival”, which is held every year by the “Open University of Patras”. All the students will have the opportunity to show what they have constructed and explain what they have learned. More importantly, they will distribute their leaflets in an effort to sensitize the citizens towards protecting our planet, as it is the only one we have!