ACTIVE LEARNING INNOVATIVE FOR THE STUDY OF CLIMATIC VARIATIONS AND MICRO-CLIMATES IN SICILY

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Ordine Regionale Geologi Sicilia

REGIONE SICILIANA

SIAS

S.G.A.

ENEA

Digitized construction of agro-meteorological laboratory and entrepreneurial methodical for home automation systems development, applied to monitoring and control of micro-climates

Introduction and project objectives

In education to issues of environmental sustainability and the use of renewable energy resources, there are the existing laboratory teaching methodologies in Superior School "A. Volta" in Palermo (Italy) for acquisition, processing and control network of agro-meteorological data on the local area. The current station consists of two equal modular systems solar-powered, one positioned above the school building, the other inside the laboratory, where students can learn the operation of the plant. Also are downloaded, processed and compared parametric measurement data taken from the outdoor station. For the job prospects, the School started a few months ago an ambitious project financed by MIUR (Italian Ministry of Education) that updates the agro-meteo lab through the most innovative digital technologies in the field of mechatronics, domotic and sustainable energy, that are supported by the latest needs of scientific-educational multimedia. It is an educational training that intends to implement a data collection center agro-meteorological on "digital platforms," informational purposes and applications, on current issues of climate changes and their consequences in Sicily. This active learning will interconnect the data collected from the station weather and climate of the school with those locally and regionally, with "weather-climatic patterns" correlations that are implemented in the Mediterranean area (International Program "GAW-Global Atmosphere Watch"). For this reason were enabled synergies with two major public entities of scientific research and acquisition services-data (ENEA and SIAS-Agrometeorological Information Service, Sicily Region), both for energy efficiency of the School Station and agro-meteorological services to companies operating in the agricultural and environmental sustainability, high consideration themes in European Programming.

Metereologic Station installed on the school

Station equipment

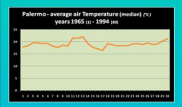
Microclimatic Station on the School, portable or fixes with the stand, acquires confined environmental hygr-thermic measures in stress class (warm) and confort class (temperate).

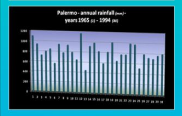

Microclimatic Station in the school lab

Students of electronics and Applied Science courses are executing a project of microclimate monitoring of study and working environment in the school, with the possibility of extending the service to other schools and to the territory. The data will be published in the appropriate web-site under construction.

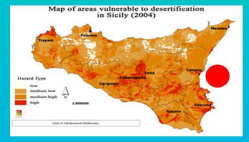
Examples of the most representative meteo data graphical analysis

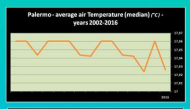
A first comparison between the data obtained in these years in the school station and those shown in SIAS historical data was made by students of the Institute to "calibrate" the acquired measurements with the equipment of the School Station. As an illustration and demonstration the following graphics are proposed. They are representative of thermometric conditions and rainfall averages in detail of the city of Palermo (Northern Sicily), about two time cycles: years 1965-1994 and years 2002-2016. It's possible to interpret the following considerations: 1) medium temperature conditions seem to be defined with overshoots compared with the average thirty-year, especially for the maximum temperatures; 2) the annual average rainfall is in sharp decline, as can be seen from a comparison of two precipitation diagrams. For the whole Sicily, therefore the results of the work carried out confirmed in recent years by SIAS and by ENEA on this Mediterranean Area, with a predisposition to permanent water deficit (dryness).

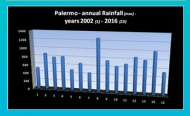




This would involve more complex process that consists in the gradual loss of fertility and productive capacity of soil (desertification). It will be possible in the path of training and learning in the future's classroom to be assumed to process local data with global data to study the evolution of the phenomenon.







Greenhouse Mini-company: creation of an entrepreneurial model in the school

Leafbox is an indoor greenhouse that recreates the ideal microclimate for the growth of any plant. This occurs through the use of sensors and devices, but the heart of leafbox is the complex software developed by the team, which allows all the sensors to be perfectly coordinated and functional.

A branch of training course in microclimatic control is the entrepreneurship education, carried out by a few years in School with the development of "experimental models" for the creation of "innovation clusters" to make entrepreneurial experience since school, creating/managing mini-companies. In the European Educational Program (Erasmus+ KA3) called "Innovation Cluster for Entrepreneurship Education (ICEE)", aimed at enhancing the students creativity and entrepreneurship, one of the mini-companies, created by students at the Institute, has developed and produced with innovative software a prototype automated system, a mini-greenhouse powered by solar energy, capable of recreating the habitat suitable for house plants, through the automated control of numerous agricultural micro-climatic parameters. Creating multimedia systems such as web platforms, advanced software and app, defines the most innovative tools in computer science outreach phases. This experimental approach incorporates the teaching methods that are defined by the curriculum of the "Liceo delle Scienze Applicate" that exists in the School, with the proposition of experimental models that besides being "learning models" can switch into "knowledge models" correlated with scientific and technical-scientific models that exist in the world of research.

The GreenHouse JA Company won the first regional competition among all businesses in Sicily and then the Italian business model Award conferred by Unicredit, a major Italian Bank.

Conclusions

The innovation of the project in progress involves the teaching methodology, the scientific contents and synergies with the partners, for the creation of a professional training path. It will be thus possible to create real start-up of young people who will provide support services to agriculture, environmental protection and environmental tourism in Sicily, in collaboration with institutional partner. Moreover, for "active citizenship", the issues of climatic changes and the hazard of desertification and tropicalisation must be scientific aspects that are part of the social culture in Mediterranean Europe increasingly in need of integration and exchange of "good pratices" teaching, scientific and socio-cultural.

The poster contains video and image sequences in Augmented Reality with Aurasma. Get Aurasma and framed pictures with your mobile.

Get Aurasma for Android

Get Aurasma for iOS

Aurasma is a free application to display in Augmented Reality

CLIMATIC VARIATION AND MIGRATION

According to UN estimates, by mid-century, 200 million people will be forced to leave their places of origin because of climate change (environmental migrants). Environmental issues cannot be separated from the social and educational strategy is fundamental so that the school faces the challenges of climate change and environmental migration, explaining to students these issues, because these grow up thinking that a solution is possible.

La Natura non distrugge, che per creare, e non crea, che per distruggere (Giacomo Leopardi - Storia dell'Astronomia, 1813)

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