Teacher-Scientist-Partnership

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IPSAA Vetrone/ IIS Alberti

Products

1. Short description of the module (abstract)

The project has been developed in two vocational high schools from Benevento. The structure of the project and the features of those two school which have much in common, allowed us to explore the same topic from complementary points of view. The topic proposed has been the sod seeding system (SSS): an emerging technique in opposition to the traditional agronomic ones. The Vocational School for Agriculture "IPSAA Vetrone" was involved in measurements concerning crop productivity in sustainable agriculture; the Technical School for Chemistry and Environment "IIS Alberti" analyzed the ecological side concerning CO_2 fluxes.

2. Preconditions

IIS Alberti, founded in 1909 is the most ancient high school in the Benevento province. It includes several specific courses of study. Among those, the one dedicated to the chemistry and environment has been chosen to be involved in TSP project. The curriculum of the last 3 years of study plans scientific subjects such as Maths, Physics, Physical Chemistry, Chemical analysis, Organic Chemistry, Chemical and Industrial processes. students have already been involved in a project concerning environmental quality monitoring. Those projects consist in monitoring PM10 pollutants in the urban area and the quality of water of the city rivers. So TSP got well included in the school curriculum offering the possibility of interaction with other subjects too. In particular "Agriculture vs. Green house effect" project has been a chance for deepening and reflecting on carbon cycle in the agro environment. Further this was the starting point for move the focus on the green house effect phenomena, its significance and its contentment.
The Vocational School for Agriculture "IPSAA Vetrone" is a professional school founded in Benevento during the 60's. Its main purpose is to train technicians skilled in agricultural technical knowledge and processes, in particular those concerning environmental and the territory. The main subject are agronomy, agronomic engineering, entomology, agronomic chemistry, animal husbandry, and food industries techniques (oil and wine).

Since 2003 the Institute of BioMetereology (IBIMET) of the National Research Council (CNR) and the Foundation for Climate and Sustainability (FCS)are leading, in the province of Benevento, a range of researches aiming to test and implement sustainable process for Rural Development. In the frame of these activities, IBIMET and FCS develop a vein of research concerning experimentation and dissemination of sustainable agronomic systems. Among these, a special attention is paid to the Sod Seeding System (SSS). The SSS is a sustainable agronomic technique that improves farm productivity in a more eco-friendly way, without impoverishing soil. Further the SSS has the potential to reduce CO_2 emissions deriving from agricultural activities by reducing energetic inputs and improving soil organic carbon storage. In the field of the SSS activities, IBIMET and CNR involved farmers, associations, citizens and, since 2007, also two technical-vocational schools of Benevento: the Technical School for Chemistry and Environment "IIS Alberti" and the Vocational School for Agriculture "IPSAA Vetrone". In the sphere of the TSP project the SSS technique has become an opportunity for these schools to approach and deepen the green house effect theme and to understand its relations with the primary sector.

3. Attainment targets

Targets for students:

a. Understanding of the carbon cycle
b. Monitoring CO_2 dynamics in the air-plant-soil system
c. Cognition of the green house effect
d. Learning the scientific method
e. Getting more achievements on the carbon cycle in agriculture
f. Getting skills they will (probably) use in their future professional life

Targets for teachers:

a. Make student aware about the green house effect
b. Make the "green house effect" theme and the TSP project become a chance to teach different concepts belonging to the curriculum subjects
c. Test the efficacy of new educational strategies and method approach
d. Comparison with researcher/scientist who would have carried new information, methods and thematic approach into school
e. Getting new contributions and material for their teaching
f. Integrate the theoretical lessons with an experimental phase supported by the scientist
g. The possibility to approach to long term project methodology
h. Advantaging of the international perspective of the projects that open the possibility of exchange between students

Targets for scientist:

a. Test and enhance the efficacy of methods and techniques concerning science dissemination among young generations
b. Consider the teachers' experience to point out element of interest to communicate to pupils
c. increasing the sphere of contacts to transfer the results to the local community

4. Sequence of activities

A. First meeting with scientist and with other involved schools

In 2005 IBIMET and FCS involved the vocational schools for Agriculture an d Environment "IPSAA Vetrone" disseminating the didactic activities concerning conservation agriculture carried out in the same district.
In 2007 "IPSAA Vetrone" became partner, with FCS, of the TSP project.
Again in 2007, during a meeting for the beginning of a new school year organized by the provincial school office chief in the presence of all school directors, FCS-IPSAA group had the chance to grow even more thanks to the inlet of "IIS Alberti". From that meeting ahead, the didactic pattern "Sustainable agriculture vs. Green house effect" took shape. In 2008 the didactic pattern, supported by IBIMET too, joined the CS+ network.

Further, in 2008 "IIS Alberti installed on its building a weather station equipped with a VAISALA, an instrument that that measures CO_2 concentration in the atmosphere. That way, the school is a spot in the European monitoring network for carbon dioxide survey.

B. Theoretical activities

Some lessons were spent in a brainstorming about the green house effect and the global climate changes. Students of the age of 17 showed a great enthusiasm during those discussions. Moreover, nearly all of them learned skills about the green house effect and were able to recall the whole discussion that lead the issues.
Some other lessons were spent to let students' "green consciousness" grow. Indeed, during the lesson students and researcher read different types of publication concerning the topic: from the disseminative ones to the scientific others. This activity had the effect of raise their curiosity and more to develop enormously their critical thought.
To complete the "green consciousness pattern", a game has been played: each student had to give a score to themselves for every daily eco-friendly action made. On the average they hit a good level even if they complained about the habits they were not not able to change in such a few time.

C. Practical activities

Practical activities took place both in the field and in the lab.

1. Lab activities
   Practical activities were leaded measuring CO_2concentration in small green houses. That made students able to get in touch with instruments and notions concerning the green house effect and "air-plant- soil" system. Further, students had a good experience in preparing and facing difficulties related to those activities.
   Measurements of CO_2 concentration were made on different kind of "green house systems": empty, with plants growing on artificial soil, with stable and scattered ground, with the whole system air-plant-soil. The aim of these activities has been to value the role of each element involved in the "agro-environment-green house effect system". Another purpose has been recreating and monitoring in the lab the effects of the soil mixing produced by plough. For the same reason, measurements have been made on rape seed plants collected during the field experiments.

2. Field activities
   In the field, the "Alberti" students had the opportunity to get close to agriculture theme, a topic normally not included in their school curriculum. In 2007/2008, students were involved in the attempt of monitoring CO_2 fluxes from soils managed with traditional an SSS techniques; the crop observed were vetch first, and corn then. In 2008/2009, students carried out the same experiment on a rapeseed crop, instead. That crop, in particular, let us face the theme of renewable energies from agrarian crops. From rape seed plants, indeed, it is possible to obtain bio-diesel, a green fuel. The "Vetrone" students took care of the agronomic measures concerning crop growth and productivity in the aim of testing the applicability of the SSS on a larger scale. So they faced the problem as real adult technicians.

5. Results

Dissemination activities

In 2007 students, during the first experimental sowing, showed other students (coming from the other schools of the province) the functioning of the instruments used to measure CO_2 concentration

and also explained the goals of the project. The same activity had been proposed again during the "Scientific week", that took place as a public event in Benevento. That activity tied students to the project and represented for teachers a way to value their ability to expound the concepts they gained during the project.
In 2008, in respect to the VAISALA installation on the roof of the school building, a seminar has been organized to popularize and introduce the new project to a new group of students.
Among dissemination activities, moreover, a chapter concerning "Agriculture vs. Green house effect" has been published on the 2nd CS+ Booklet.

6. Valuation of results

Teachers' views

Massimo Cappelluzzo, IIS Alberti vice-principal
"The CS+ meeting that took place in Pistoia during from 24th to the 30th of April 2009, has been very well organized.
Both the locations (Palazzo Puccini and Palazzo del Vescovo) have been useful by their position.
The activities have been a good chance to compare the work done by schools to a national and further to European level.
To the IIS Alberti school students, that experience had a special meaning: that wasn't just a "school trip" but a chance of cultural growth though the comparison with other students and they realized the real state of knowledge and the importance of communication skills.
As a matter of fact, students actually aren't able to communicate using the English language. There are two main reasons: one is properly due to the few hours the course they attend reserves for the language studies (just two hours a week); on the other hand, there are cultural reasons that don't encourage them to find the way to express themselves.
We (teachers) had the chance to compare our work with the other groups and find out that we had the right approach to the research chosen. We wanted to keep a high practice level as a concrete work for students to make hypothesis, find out data and understand their meaning. That kind of method make students feel like "scientists" as people who can touch natural phenomena, so they have found that experience very exciting and challenging.
On the whole, leaving out the difficulties due to communication skills, the teaching method developed during the project showed a good efficacy and should be a good beginning for future activities. The lacking of language skill had been an obstacle for teachers too, and that's why we decided to organize an English course for teachers (maybe using FSE or PON founds) so we will try to fill the skill gap."

Students´ views

"We had a really positive feeling about our experience of the CS+ meeting in Pistoia. There, we had the chance to make a objective comparison between students from other countries and us. As far as we had a common topic (monitoring CO_2), we find out many similarities in techniques used and achievements. The main difficulty we find, concerned the language skills: none of us were able to communicate in a good English. That could be due to the fact that we have just two English classes per week and also because many of us think that a foreign language isn't that useful. This experience made us change our mind: indeed, this lack of communication didn't allowed us to have a deeper involvement in some events (i.e. "International dinner"). Our purpose would be to make other experiences like the one we just had: for that reason we want to improve our English skills and we want our next experience to be a more useful and all-involving experience".

Scientists´ views

The activities gave us the chance to interact with teachers and students as a way to implement the projects and motivate the partnership. Talking to such a young and inexperienced audience has been positive and useful especially for other dissemination activities related to science communication: complicate concepts can be easily explained. Even if dissemination is basically secondary for scientists, is now emerging the importance of disseminative activity as a moral responsibility related to its sense of duty.
We learned al lot from teachers' experience with students.

7. Generalizations

Both researchers and teachers had to face recurrent difficulties and the bureaucracy slowness. The lack of founds often precludes the course of the activities and does not facilitate feedback.
Apart from concrete problems, teachers' enthusiasm is strongly motivated by students' feedback. Indeed, hands-on activities has been an excellent tool to let students get into the science world, to learn something more about topics and exhibit a strong will about deepening topics as well. This has been a chance for students who noticed their own attitudes, definitely the project promote a full growth of them.
In the future, in the aim to promote a long-life cooperation, fixing deadlines and more precise goals will be necessary.