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518300-LLP-2011-IT-COMENIUS-CNW

Chemistry Is All Around Network "Workshop on Successful Experiences" Genova, Italy, March 26th 2014

Agenda

Timetable of the workshop: 10.00 – 18.00

- Presentation of national activities born to support CIAA_NET objectives
- Focus on teachers' and experts' personal successful experiences
- Discussion on teaching resources tested at national level
- Planning of future work

Participants

Carnasciali Maria Maddalena (DCCI - University of Genova)

Ricco Laura (DCCI - University of Genova)

Alloisio Marina (DCCI - University of Genova)

Antiga Roberto (ISA 6 La Spezia)

Ghibaudi Elena (University of Torino)

Pavan Anna (I.C. Savona IV)

Pitto Anna (Cassini Lyceum – Genova)

Rametta Marco (Cassini Lyceum – Genova)

Rebella Ilaria (I.C. Savona IV)

Regis Alberto (SENDS Group – University of Torino)

Zamboni Nadia (I.C. Cogoleto – Genova)

Zunino Rosalia (I.C. Voltri 1 – Genova)

The workshop on "Successful experiences" took place in March, the 26th, at the Department of Chemistry and Industrial Chemistry of Genoa

It gathered experts, teachers (also from associated schools) and university staff involved in the project "Chemistry Is All Around Network".

The workshop started with the welcome to the participants by Ms Carnasciali who presented a brief update on the activities of the project. Experts and teachers were reminded that the project is in the midst of the third and final year and it is essential to achieve tasks with students of the schools involved, either directly or as associated schools.

In particular, the trial of ICT resources, chosen both among those uploaded to the portal and other new, is the key point of the work of this third year. Therefore Ms Carnasciali has informed the participants that the project has highlighted the different requirements in terms of chemical teaching in schools. For example, from discussions held during the last year workshop, it was found that:

"it is important to have the opportunity to experiment different approaches and methods under the guidance of experts in order to avoid numerous mistakes due to the lack of experience"



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"the discussion on ICT resources has highlighted the difficulties that currently schools have in using them the lack of teacher training in using digital tools and applications.

Teachers feel obliged to use them but they do not know how to make them effective for learning. "

Accordingly, teacher suggestions were transferred to some activities of the National Plan project Scientific Degrees (PLS)-Chemical Area in order to give a concrete answer to the needs expressed in the framework of the European project (EP).

The workshop started presenting two of them.

Presentation of national activities born to support CIAA_NET objectives

The first PLS activity is presented in a course held by Prof. Alberto Regis, who has the role of expert in the CIAA_NET project and the role of training Chemistry teachers in his life. The training course is about the chemical bond and it is characterized by the design of spreadsheets by the collaboration of the teachers involved and Prof. Regis

The worksheets will be given to students to guide them through their learning of this difficult topic, so as to guarantee them an active role and to provide motivations and satisfactions. Alberto Regis, presenting the course, underlines that teachers need to learn how to use the learning based on easy tasks, useful for increasing students' motivation, but above all, they need to learn how to build by themselves the tools they will use.

The second PLS task is about using ICT in teaching Chemistry: the goal is not only to encourage teachers to introduce ICT resources, but to help introducing them in a meaningful way, so that they are not disconnected but used in synergy with other educational approaches, from the traditional lesson to the lab.

For this task has been chosen a very simple but effective resource that provides in-depth prompts and concerns a traditional subject of the secondary school curriculum: the periodic table of the elements. The site tavolaperiodica.it is introduced to secondary school students during a two-hour lesson that takes place entirely in a computer classroom.

The activity combines the resource with different teaching approaches: discussion in small groups, the deduction based on video observation, references to history, contact with samples of real substances in ordinary or less ordinary use, small experimental demonstrations, etc.

This activity does not presume to set up a "model lesson" on the periodic table, but simply wants to demonstrate how a digital resource can be "naturally" integrated with the traditional teaching, providing in-depth insights, or clarifying the contents, or showing a way to convey the attention where the traditional lesson struggles.

The initiative is showing a positive effect on teachers, who claim to have received many suggestions and the urge to introduce tavolaperiodica.it in their own teaching.

Focus on teachers' and experts' personal successful experiences

Roberto Antiga, a teacher of our associated lower secondary school, presented a significant experiment created with his class on the topic of thermal conductivity. Students have designed and built a lab activity to study the thermal conductivity of four materials: iron, aluminium, copper and wood.

The activity was held entirely in the classroom, being his school not equipped with laboratories; the necessary tools (hotplate, clamp and stand, thermometers) were provided by the teacher, while materials in the form of 4 bars were brought by the students.

The task was instructive and motivating because the boys did not follow a pre-given recipe, but they have designed this experience by themselves, debating and correcting mistake during the work. The data of the



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measured temperatures were discussed in class and reported on ppt presentations prepared to describe the activity.

Following the report by Roberto Antiga, the participants discussed the importance of a teaching laboratory where students can also be designers, and the benefits of joining this experimental activity to a simulation with the purpose of deepening.

The simulation should give the possibility to repeat virtually the experiment but choosing among several less common materials in order to obtain a meaningful comparison to discuss the properties of metals and non-metals. Then, the possibility of finding such a simulation or, even better, the opportunity to build it, was discussed.

Focus on teachers' and experts' personal successful experiences

During the afternoon session of the workshop, the participants were divided into 2 groups. The composition of each group was not accidental but chosen in order to have an expert and at least one exponent for each grade of school.

The first group, led by Elena Ghibaudi (the expert), discussed the subject of the properties of substances (simple and compound), and examined it vertically through the experience of the participants.

Particularly significant were the experiences presented by Anna Pavan (associated lower secondary school) who has pioneered the use of digital resources in supporting experimental activities, lectures or as a tool to organize group works.

Anna has used tavolaperiodica.it and some simulations taken from the site PhET (density and electrical conductivity) through LIM to show the resources chosen and to help students with the presentations of the work. The testing of these resources was successful: the class was motivated to work and to deepen the contents, moreover the learning improved.

The second group, led by Alberto Regis, discussed the topic of food, in this case also dealt vertically through the experience of participants: from simple macroscopic treatment of key nutrients carried in primary school we come to discuss how to set up principles of biochemistry at the upper secondary school.

In particular, Ilaria Rebella used the resource "software on food education" in the context of a treasure hunt organized in the classroom. Ilaria gave some words of caution about the use of the above resource: it is easy to use, with simple contents suitable for primary school, but it is necessary to pay attention because here and there in the text there are words that pupils can not understand: such as aminoacids and few others.

Nadia Zamboni (lower secondary school) talked about her experience with Biochemistry unit, an interactive resource organized in increasing levels of difficulty and dedicated to lipids, carbohydrates and proteins. Nadia associated to the resource simple hands-on activities in the classroom, building of worksheets and lessons to introduce the topic; she emphasizes that the resource could be useful for lower secondary school but it has to be used under the guidance of the teacher because some models that represent structure and properties of the above molecules can generate misunderstanding. Marco Rametta (upper secondary school) agrees with Nadia and adds that some sections of the resource could be used in upper secondary school as an introduction to biochemistry. The concepts of assembly and disassembly of macromolecules treated in Biochemistry Units connects well to the chemistry of nutrition, as well as the energy stored and returned as a function of these processes. Marco Rametta recommends, at level of upper secondary school, a molecular modeling program, ArgusLab, very useful to understand, for example, the structure of proteins.

At the conclusion of the discussions, both groups listed the pros and cons of the tools used. They agree that:
- digital tools should be interactive, so as to stimulate the active involvement of the student



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- a digital tool can not be an instrument of self-learning: it can not replace the teacher and can not replace the laboratory, but it can be a deepening or a help for students with special educational needs
- it is better to use a digital instrument that deals with few concepts in a clear and focused way
- digital resources can and should be interdisciplinary tools; for example, to learn foreign languages while studying science and vice versa
- attention to the representations of the microscopic level, that digital resources offer: they are powerful tools but they must be adapted to the user's level or they risk to distort completely what you want to convey.

Planning of future work

On the basis of the above considerations, experts and teachers discussed about the possibility of performing a teaching resource, as future and concluding work of the project. The resource should be organized in three levels of deepening and modeling: 1. suitable for primary school, 2. suitable for lower secondary school and 3. suitable for upper secondary school. It should include simulations with possibility of choosing among more variables and interactive questionnaires. The subject of the resource has been chosen considering the most dealt topics at school, the need of verticality starting from primary school and the personal experience of the participants. Accordingly, the agreed topic was solubility.



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