

Initiatives in Chemistry Teacher Training in Italy: Significant Testimonials

M.M.Carnasciali and L.Ricco

Department of Chemistry and Industrial Chemistry

University of Genoa

ITALY

Training of science teachers: national scenario

In order to be included as science/chemistry teacher in the Italian school system, the training is different depending on the school grade.

Primary school teachers have to get the degree in “Sciences of Primary Education”

At **lower secondary school** the science teacher is also the math teacher. It is needed to get a generic scientific degree as math, physics, biology, natural sciences, chemistry, informatics etc.



Training of science teachers: national scenario

A little more specific is the request at **higher secondary school**: only people graduated in chemistry, pharmacy or chemical engineering can teach chemistry if it is foreseen as a separate subject.

At the lyceum, chemistry is integrated with natural sciences and can be taught by people graduated in natural sciences, biology, geology, chemistry, pharmacy and few others.



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Training of science teachers: national scenario

The degree in a specific discipline is the first requirement to teach at **secondary school**, but it is not the only one: since 2012 a one-year postgraduate course, named **TFA (Active Formative Training)**, has to be attended in order to get a teaching qualification. This qualification is compulsory, but not sufficient, to get a permanent role of teacher at school. Without it, only temporary contracts can be obtained.



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Training of science teachers: national scenario

For what concerns **in-service training**, it is sporadic and not compulsory. The most significant is represented by national projects financed by the Ministry of Education, University and Research (MIUR) and provided by Universities, or courses provided by INDIRE (National Institute of Documentation for Innovation and Educational Research) or by Regional School Offices.



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The Scientific Degrees Plan (PLS)

PLS is the most active and widespread project at national level about Science (Chemistry, Physics, Mathematic and Materials' Science). It is addressed to teachers and students of upper secondary school and financed from the Ministry of Education since the first edition, in 2005.

From 2010 to 2012, only for Chemistry, **2910 teachers** participated in the project.

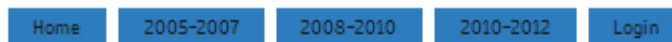
The activity about teachers training is monitored by IARD, a national institute interested in sociological research.



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The Scientific Degrees Plan (PLS) in Liguria



Università di Genova
Piano Lauree Scientifiche
Area Chimica - Sezione Liguria



<http://www.chimica.unige.it/pls/it/>

Our institution, the Department of Chemistry and Industrial Chemistry in Genoa, has been the local coordinator of PLS-Chemistry for the Liguria Region since 2005. The activities that are carried out within the project are designed to provide a form of continuous training, especially for teachers not graduated in Chemistry.



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The Scientific Degrees Plan (PLS) in Liguria

The part devoted to the laboratory is usually the most popular, not only for the enthusiasm of the students but, overall, because teachers find an help for their activities.

The collaboration between teachers and university researchers enabled to organize many laboratory activities, carried out both at the Department and at school.

In particular, a path on the theme of polymers, called “**Fantastic Plastic**”, had the university as first location, and was then brought in all the schools involved in the project, as a travelling laboratory, to support the teachers’ work.

Now, the same teachers are working alone in their laboratories.



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Fantastic Plastic

Crosslinking of PVA: the birth of Skifidol®



+ borax
➔



Nylon 6,6



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A path about the topic of **carbohydrates and proteins** was planned for students of the fourth year and carried out at school: the task of teachers was to introduce biochemistry before the foreseen practical activities. The latter, under the guidance of the university staff, experiences were realized about the bread-making with an interdisciplinary approach, because biology (yeast and cellular breath) and math (realization of graphs) were complementary to chemistry.



The Scientific Degrees Plan (PLS) in Liguria

The discussion of the results in the classroom, and the production of the scientific report completed the work.

This path had a great success, both because students worked with motivation, and because teachers received support and valuable material to improve themselves in a field where they feel weak.



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This experience shows that teachers training and students' motivation are strongly tied, and both are related to the production of good resources.

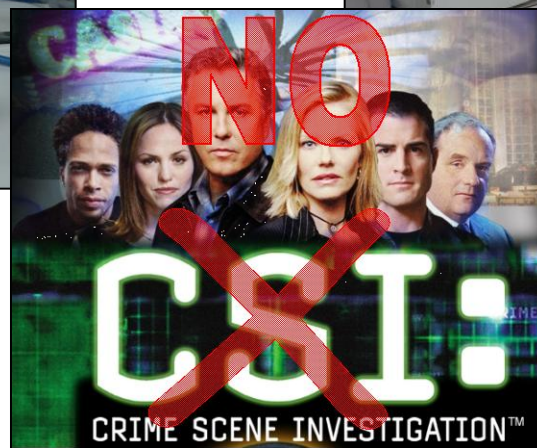


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Widely appreciated are also some activities carried out in collaboration with the world of job: the Scientific Police, the Aquarium of Genoa and enterprises of the chemical sector agreed in showing their working reality to students and teachers, while university provided laboratory experiences closely related.



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In this way teachers know better the context in which their students could work in the future.

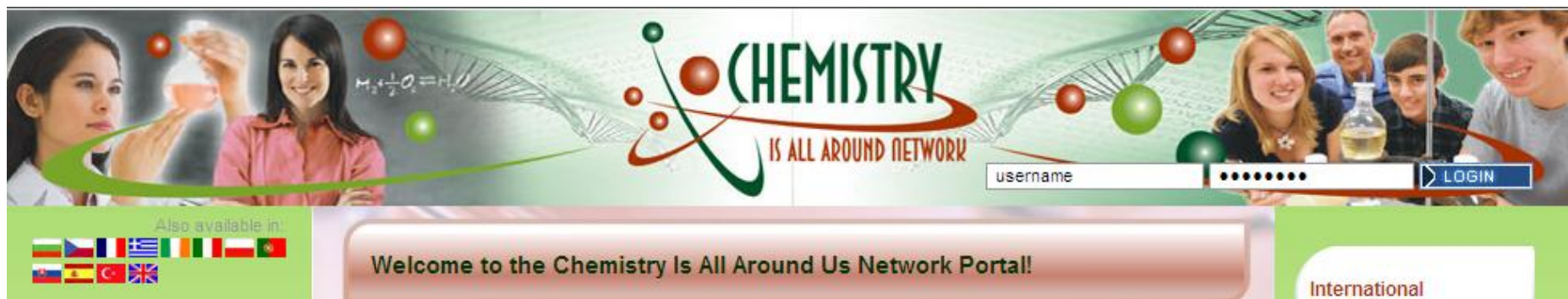


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The Chemistry Is All Around Network Project

The project provides a successful in-service training: within its activities, teachers involved can share their experience and discuss about their context of work, each other and with experts of teaching.



The screenshot shows the homepage of the Chemistry Is All Around Network Portal. At the top, there is a banner with the text "CHEMISTRY IS ALL AROUND NETWORK" in green and red. Below the banner, there is a login form with fields for "username" and a password field (represented by dots), and a "LOGIN" button. To the left of the login form, there is a section titled "Also available in:" followed by a row of flags representing various countries. Below the flags, there is a red button that says "Welcome to the Chemistry Is All Around Us Network Portal!". To the right of the button, there is a green button that says "International". The background of the banner features images of people in a laboratory setting, a DNA double helix, and a chemical equation $H_2 + \frac{1}{2}O_2 = H_2O$.

Moreover they contribute to select and validate ICT teaching resources, learning how to use this kind of tool which is relatively new and too often rejected by Italian teachers.

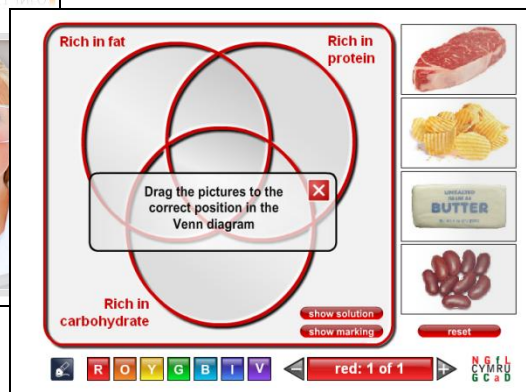
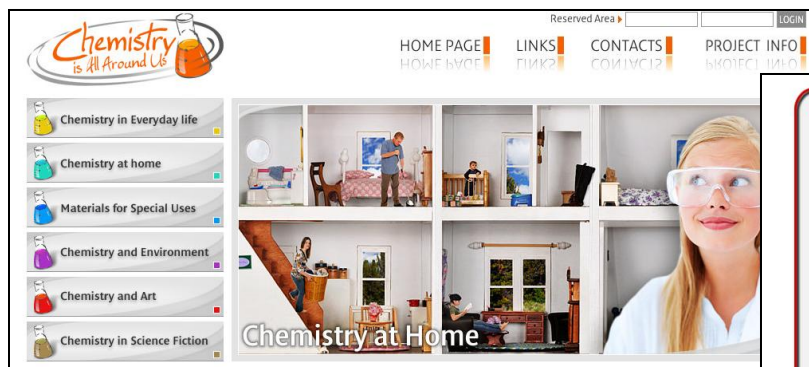


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The Chemistry Is All Around Network Project

The correct and fruitful use of the resources that were tested and of those that will be tested during the current school year will be described in specific papers, comprehensive of considerations and suggestions from the teachers.



The documents will be available on the project portal, in order to provide an improvement for all portal users that need support in introducing digital tools in the teaching of chemistry.



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What teachers think

Some chemistry teachers were interviewed about their past and present training and about what they need to improve their skills. In particular, two categories of teachers were consulted:

- “**junior teachers**”, meaning people that attended the TFA for chemistry (upper secondary school) and got the qualification in July 2013. They have few years of experience in chemistry/science teaching, but only with temporary contracts
- “**senior teachers**”, meaning upper secondary school science/chemistry teachers with many years of experience.



What teachers think

Junior teachers think that a deep knowledge of chemistry is necessary but not sufficient to be a good teacher. Therefore, they appreciated the contribute of the TFA to their training, in particular for what concerns the courses about pedagogy and science of education and about special teaching methodologies such as the teamwork or the use of ICTs.



The evaluation was globally positive: they state that “**the experience will be the real engine of the improvement in teaching, but the experience is not sufficient without a suitable training, initial but also continuous**”.



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What teachers think

Senior teachers did not have initial training, apart the degree in a scientific discipline. Most of them teach science at the lyceum and have the degree in biology or in natural sciences.



They recognize that the lack of an initial training made more difficult their work and they can rely only on the experience acquired day by day. **Experience is not sufficient**, so they feel the need of attending courses to improve the approach with students and to apply an effective educational mediation between students and chemistry.



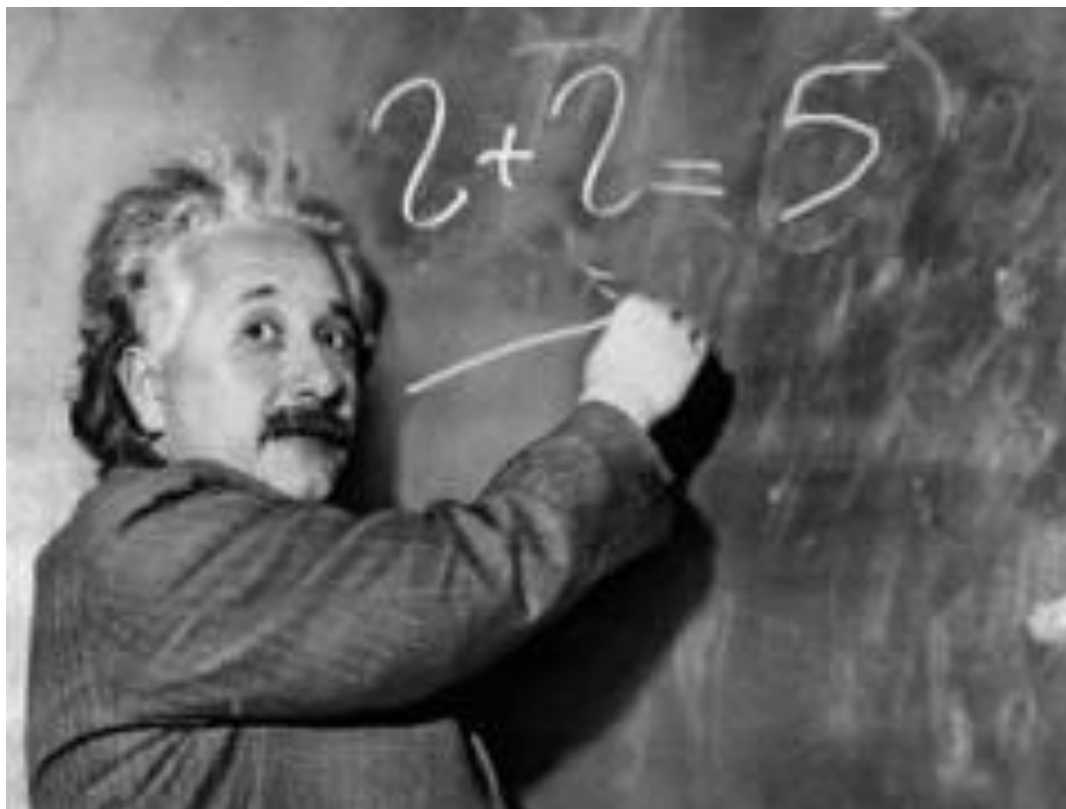
Conclusions

Italy provides an **insufficient training** to its science teachers, both with regard to initial training, and with regard to in-service training. Teachers themselves feel of not having good teaching, organizational, interpersonal and communication skills.

In the light of this situation, the system of teacher education is evolving, but with great difficulty: a functional and well structured system seems to be very far from the reality, also due to the lack of funds. It is worth to be mentioned that **activities addressed to teachers exist and are increasing** because the need of teachers to be continuously trained is increasing too, but their are not sufficient to guarantee a well planned training.



Thank you for the attention !



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