UNIVERSITÀ DEGLI STUDI
DI GENOVA

CHEMISTRY IS ALL AROUND NETWORK

518300-LLP-2011-IT-COMENIUS-CNW

Genova Conference Report

Successful Educational Experiences and Didactic Guidelines in Science Teaching

Second Conference on the thematic area: Successful Experiences

Dipartimento di Chimica e Chimica Industriale

University of Genova

Genova (Italy)

23rd - 24th October 2014

Lifelong Learning Programme

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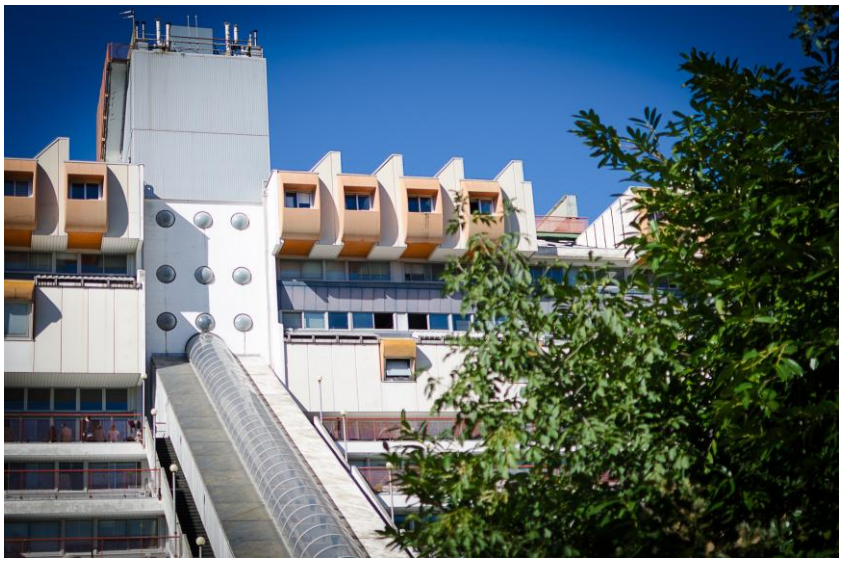
Introduction

The International Conference *Successful Educational Experiences and Didactic Guidelines in Science Teaching* took place in Genova on 23rd and 24th October 2014 at the Department of Chemistry and Industrial Chemistry of Genova University.



The aim of the conference was to present the work done by experts, teachers and students of primary, middle and high school in eleven different countries: Belgium, Bulgaria, Czech Republic, Greece, Ireland, Italy, Poland, Portugal, Slovak Republic, Spain and Turkey. The conference was not only addressed to scientific experts in chemistry and school teachers, but it was open to all people interested in scientific training.

The Conference was funded by the 518300-LLP-2011-IT-COMENIUS-CNW Chemistry Is All Around Network project resources. It was part of the prescribed 3th year activities of the *Chemistry Is All Around Network* project and was the second conference on the thematic Successful Experiences, but also the final conference of the project.

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Genoa (Italian, Genova) is a historical port city in northern Italy, the main town of the Region of Liguria. Genova today, as a tourist attraction, is often shadowed by cities such as Rome or Venice, even though it has a long history as a rich and powerful trade centre. However, with its multitude of hidden gems behind cozy alleyways, excellent cuisine (notably fish and seafood), renovated old port, beautiful sights (including one of Europe's biggest aquariums), and its position as the European Capital of Culture in 2004 have made the birthplace of explorer Christopher Columbus an enticing place which is gradually becoming more included in the touristic market. With pastel-colored terracotta-roofed houses, artistic churches, lovely seaside villas, and also several luxurious boutiques, Genoa is a must see if you want to experience the "quintessential" Italy.

Conference Organization

The Conference was a two-day event including the 23rd October, the afternoon, and the 24th October, the whole day. Partner presentations were focused on national experiences collected through the *Chemistry Is All Around Network*. Presentation of Italian teachers were centered on personal successful experiences and all school levels were considered thanks to their contributions. Three invited lecturer enriched the conference and strengthened its objectives:

Laurinda Sousa Ferreira Leite (Universidade do Minho – PT) presented dilemmas and challenges in science teaching in schools

Elena Ghibaudi (Università di Torino - IT) and Alberto Regis (SENDS Storia ed Epistemologia per una Nuova Didattica della Chimica – IT) talked about the use of ICT for improving concepts comprehension

Silvija Markic (University of Bremen – DE) presented: “Linguistic heterogeneity: challenge for modern chemistry education?”

In addition to the oral session, one poster session, preceded by flash presentations from the authors, concluded the conference.

The detailed conference programme, as well as the composition of the scientific and organizing committees, is available both on the conference web site (http://chemistryisnetw-ge.comoj.com/) and as appendix to this document.

The conference web site is organized in the following sections:

Home
Programme
Registration
Call for papers
Commettees
Venue

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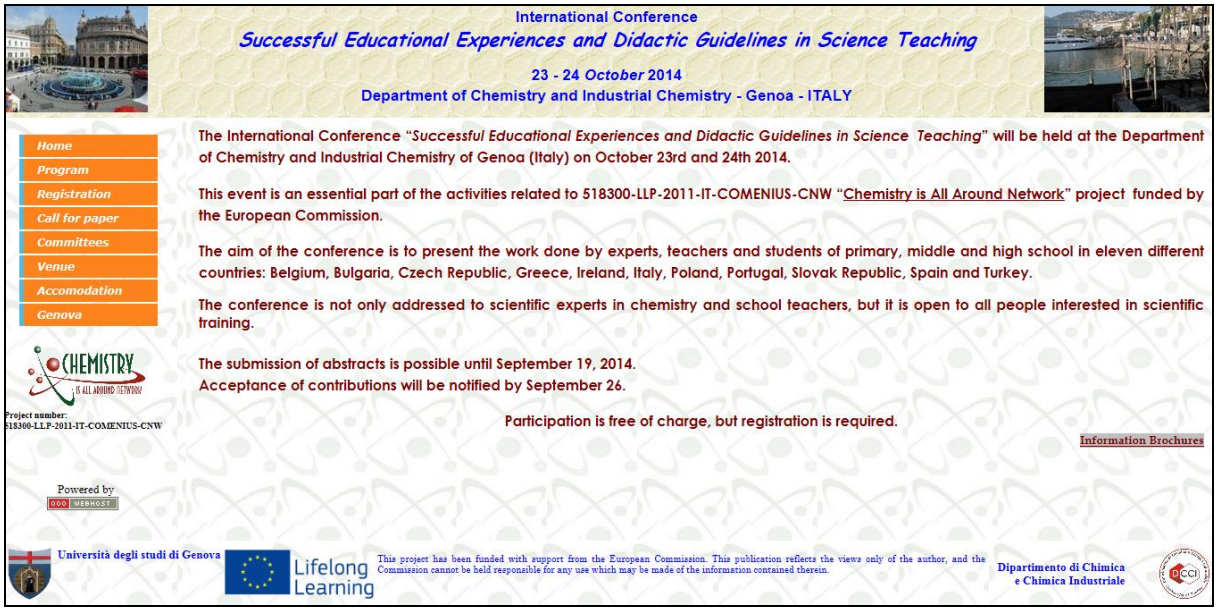
Accomodation
Genova tourist information



Conference Participants

Around 90 people participated from a number of European countries, with the largest representation from Italy. European participants were the representative persons of the Countries involved in the project, few of them accompanied by teachers as testimonials of national successful experiences. Moreover we cannot forget the two foreign experts in science education that kindly accepted the invitation to share their experience with the project network: Laurinda Leite and Silvija Markic. Italian participants were representatives from universities, schools, educational companies and public authorities, but also upper secondary school students attended the conference.

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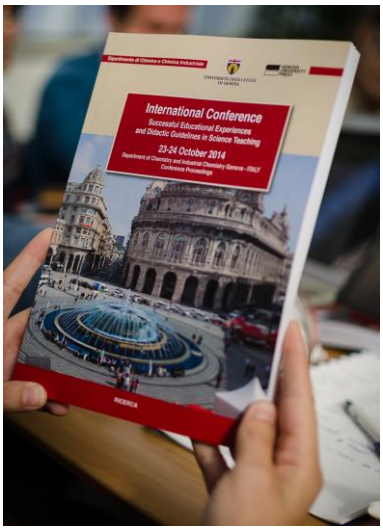
Conference Contents

All presented papers are included in the conference proceedings printed in paper format and provided to participants.



The participants were welcomed to the conference by Prof. Adriana Saccone, Director of the Department of Chemistry and Industrial Chemistry, by Prof.Maurizio Martelli, vice Rector of Genova University, that thanked Maria Maddalena Carnasciali for her contribution to University prestige with the project *Chemistry Is All Around Network* and by Prof.Giorgio Cevasco, spoken person for the Italian Chemistry Society and president of the Ligurian section, associated partner of the project.

The papers presented addressed successful experiences in chemistry/science education.

The following themes have been addressed by the invited lecturers:

Laurinda Leite (invited lecture). *Science teaching in schools: dilemmas and challenges*

Abstract. Science has been taught in schools for many years and it is acknowledged as a need for both individual and social life conditions improvement and science own development. However,

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science educators and politicians often complain about the low rates of attendance of science courses and teachers argue that students do not engage into science learning as they should. Ordinary citizens get perplex when they hear about the figures of the education budget, on one hand, and about teachers' dissatisfaction with school conditions and the low level of school achievements, on the other. After a brief discussion on students' motivation to and learning of science, the presentation addressed the place of science in the curriculum, the responsibility of curriculum and curriculum materials, as well as of teachers and teacher education on students' rejection of science courses and university science programmes. Finally, it made some proposals for attracting more students to science and to improving success in science courses.

Elena Ghibaudi and Alberto Regis (invited lecture). *Verticality in chemistry teaching: the use of ICT for improving concepts comprehension*

Abstract. The progressive reduction of experimental science teaching hours (at least in Italy) pushes towards drastic choices as regard to the teaching contents and focuses the attention on the main concepts and model of a discipline: this may represent a good chance for innovating the teaching contents as well as the didactic devices and the learning context (i.e. the way to manage the teacher-learner-knowledge relation). It is a matter of managing the teaching activity in order to:

1. Assure a 'didactic strategy continuity' between first and second school cycles as well as within each cycle. To this regard, an transdisciplinary spiral path able to tackle some crucial points of the scientific knowledge through a gradual introduction of more and more sophisticated and abstract concepts and models appears suitable.
2. Replace the frontal teaching with a teaching strategy based on problem-situations, that focuses on selected topics that may be tackled in-depth. This implies learning to be conceived as a social and cooperative process.

While adopting this perspective, the authors showed an example of how information technologies may help to enhance the effectiveness of didactic devices and learning contexts. They discussed three learning situations dealing with the phenomenon of dissolution and the building up of the concept of concentration, at three distinct level of conceptualization.

Silvija Markic (invited lecture). *Linguistic heterogeneity: challenge for modern chemistry education?*

Abstract. The presentation discussed a collaborative research and development project of science teachers, German as a Second Language teachers, and science educators. The project follows the model of Participatory Action Research in science education. It focuses on the development of teaching plans for early lower secondary school science lessons on different topics, e.g. matter

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and its properties. The teaching plans consequently implement the integration of content and language using the Content and Language Integrated Learning (CLIL) approach. All lessons are structured through cooperative and autonomous learning methods. The research focuses on the question: To what extent it is possible to simultaneously learn science, scientific language and the German language, if pupils work autonomously in cooperative learning settings? Data is collected through student feedback questionnaires, tests of pupils' knowledge and teacher feedback. The initial results show that it is possible to successfully teach content and language. Students were highly motivated and the lesson plans showed potential for improving students` learning of science subject matter, while simultaneously contributing to improvements in the learners' German language skills. The presentation provided insights into the structural elements of the lesson plan and reflects upon both the potential and the consequences of the cooperative, autonomous learning methods selected for this lesson plan.

Partners presentations were focused on the national situations and on experiences built around the project:

Julien Keutgen (Belgium). *Successful integration of ICT in chemistry lessons*

Abstract. For the three years of the "Chemistry is All Around Network" project, the main focus of the Belgian working group was ICT, and particularly how to use ICT appropriately in class so that it can really motivate students and help them understand the topic (integrating experiments, interactions between students...). As planned in the project, teaching resources have been collected and reviewed since its beginning. Yet, Inforef and its teachers involved went further as they used this opportunity to create new resources and train teachers to use them. Different working groups of teachers were formed. Since late 2013, Inforef has organised the testing of those resources in the different schools involved in the project. The audience includes secondary school students of various levels and future science teachers.

Jérôme Kariger (Belgium). *An integrated use of the interactive whiteboard and experiments. A science dissertation, within the framework of the "chemistry is all around" project*

Abstract. The presentation described an experiment carried out in a 3rd year class, socio-educational transition, aimed to implement sequences that intelligently integrated the IWB and ICT resources in order to foster interactions in class to improve learning. At the end of this experiment, using questionnaires, it emerges that the structuration phase remains a key moment in the integration of concepts, even though they have been gradually discovered throughout the sequence. It also emerges that ICT really motivate students and therefore foster their involvement in the lesson. Finally, in spite of the objective targeted during the creation of the sequences, the IWB-students interactivity was not sufficiently encountered, showing that implementing this approach is difficult. At the end of this work, it can be concluded that the IWB integrates perfectly in the investigative approach carried out during science lessons, that adapting a "traditional" lesson to the IWB is not enough, but that the lesson needs to be rethought from top to bottom and that fostering students-IWB interaction is crucial.

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Milena Koleva (Bulgaria). *Successful experiences in chemistry teaching in Bulgaria: role of interactive teaching materials in teaching/learning process*

Abstract. The presentation dealt with successful experiences and good pedagogic practices in teaching chemistry at Bulgarian secondary schools in the context of the European educational policy for development of key competences for the young people. Basic strategies, approaches, new teaching methods and technologies as problem-based approach, experimental work, project-based activities and other were discussed as effective way to improve the students' scientific literacy and their motivation to study chemistry. Good practices in implementation of information and communication technologies in educational process using multimedia presentation, video-lessons, and interactive materials were described. The presentation paid special attention to the role of *Chemistry Is All Around Network* project, including networking activity and testing of interactive teaching resources, in sharing of successful experience and practice in chemistry teaching at school.

Zdeněk Hrdlička (Czech Republic). *Successful experience in chemistry teaching in the Czech Republic*

Abstract. The Czech education system has a long tradition, which is followed by changes and educational reforms. Czech society is changing and the educational system needs to respond this changes. The presentation discussed innovative methods in science teaching and key competences and their development in chemistry teaching. It also dealt with outcomes of the three/year process and highlighted the successful experience of its activities. Firstly, the project was focused on students` motivation, then on teachers training (pre-serving and lifelong learning) and the last year of the project was devoted to the examples of successful experience. Thanks to the activities a community of active science teachers who support and motivate their pupils/students to chemistry was created.

Dionysios Koulougliotis (Greece). *Successful experiences in chemistry teaching: has chemistry education research common ground with Greek school practice?*

Abstract. At first, a brief summary was presented about educational research related with the effects of different instructional strategies on chemistry learning by focusing on the two most common school instruction settings: the classroom and the laboratory. Then, significant insights were provided in regard with "what constitutes a successful experience in chemistry teaching" and proposals of good teaching practices and also for the conditions required for the successful implementation of a novel teaching approach were made. Practical laboratory work, the cooperative teaching approach (despite its difficulties in implementation), the exploitation of interdisciplinarity and the targeted use of ICT have been some of the proposed good practices. The main conclusion reached is that although Greek chemistry teachers are aware of the existence and importance of student-centered instructional approaches proposed by chemistry education research,

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they seem to face several obstacles during practical implementation and often ignore the circumstances under which these approaches are effective for students' meaningful learning.

Antonio Jesús Torres Gil (Spain). *Best practices using I pad as a teaching tool learning chemistry.*

Abstract. The use of new technologies becomes increasingly and more relevant role in Science learning. The practice with personal computers has passed to being experienced in virtual environments and social networks. But with the emergence of mobile technology in education, a new change has occurred. The portability of such devices opens many possibilities in the learning methodologies and gives easily access to information. The speaker described and evaluated two activities carried out with the IPad as a learning tool. The activities were developed with 35 students at 1st course of Upgrade School from an educational centre of Granada. While the first group of them used an app for molecular structures visualization and interactive applets available on internet, the second group experimented with early gas laws. The results show that the use of these learning tools along with appropriated methodological approaches can promote on students meaningful learning.

Marie Walsh (Ireland). *Teaching at the heart of learning: successful experiences and good practices in chemistry teaching in Ireland*

Abstract. Chemistry is all Around Us: our lives without Chemistry and the advances it has allowed in healthcare, hygiene, energy production, materials and technologies would be very different. In spite of this reality Chemistry as a school subject has suffered from negative perceptions, with even the word 'Chemical' inspiring negative reactions. It is also perceived as a mathematical and abstract subject, best-suited toonly the most academically able students. However, these perceptions are a disservice to Chemistry and its value for society as a whole. From the earliest stages of education we can instill an appreciation of Chemistry for its own sake, that may or may not lead to more students studying Chemistry as a subject at second and third level, but that will at least redress the balance to a more favourable and positive perception of the value of Chemistry. Teaching is at the heart of learning, and learning to teach and to continuously self-reflect and update knowledge and pedagogical methods is vital. This presentation surveyed successful experiences and good practices in Chemistry teaching in Ireland, describing the importance of the initial teacher education and continuous professional development. It also underlined the importance of connecting Chemistry Education Research with Chemistry in the Classroom.

Laura Ricco (Italy). *Successful experiences and development of key competences in chemistry education: the Italian context*

Abstract. As often teachers underline, textbooks are an essential tool and a good point of reference for students, but they are not sufficient to teach chemistry in a significant way. For this reason, teachers often look for sources from which to get updates on scientific knowledge, but also on teaching methodologies and on successful experiences. These considerations became even more valuable in 2012, when the New National Guidelines of the Italian school system established the framework of key

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competences for lifelong learning, defined by the European Parliament, as the reference horizon to work towards. The teaching for competences made essential to renew the teaching of disciplines, especially of sciences, away from the previous transmissive teaching and focusing on the action" in situation" of the student. The "Chemistry Is All Around Network" project is working to help teachers to update their teaching methodology. The project portal has a database of successful experiences to teach chemistry and provides numerous digital teaching resources, some of them tested in classroom. As an example, the testing of a site dedicated to the periodic table of elements, performed involving several students of secondary school, was described

Andrea Traverso (Italy). *Teaching chemistry, learn chemistry: what changes now?*

Abstract. The contribution presented the findings after the testing described during the previous Italian presentation, concerning the use of educational technology in the practice of teaching chemistry and science. The research used the shell survey instruments to collect qualitative data that can contribute to scientific reflection and reflection on teaching. The research has been conducted in a sample of high schools in Liguria (N = 6) and was conducted in the first part with a learning experience and then filling out a questionnaire from the students (N = 121) and participation in a focus group of teachers (N = 7) of chemistry and science.

Magdalena Galaj (Poland). *Educational methods and teaching materials used in chemistry teaching in Polish schools*

Abstract. Contemporary schooling in Poland faces many obstacles with regards to teaching scientific subjects. Teachers have to be flexible in applying different methods and techniques in order to make students interested in learning and exploring technical issues. The speaker presented different ways and latest trends in Polish school in teaching chemistry. Starting from brief description of the educational system and how the chemistry is taught in a Polish school the speaker presented experiments, educational games and laboratory tasks; everything to facilitate students' progress.

Filomena Barreiro (Portugal). *Learning guides: tools to mediate student's learning*

Abstract. Some orientations were proposed to assist the construction of learning guides that can effectively support the exploration of digital interactive simulations, guiding students through their learning process by helping them to organize and structure knowledge. Then, a case study related to the Radioactivity thematic was presented. A short summary of the learning guide developed is provided and the results of its application in the classroom context were presented. The students'

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opinion about the digital resources used was also collected by means of questionnaires. A vast majority of students (>90%) found the digital resources used interesting and more efficient than books, considering that they promoted the interaction with a fellow student, centring the discussion on chemistry themes. 70.8% thought that the resources used facilitated their understanding of the studied concepts. Evidence gathered suggests that the use of digital resources mediated by the teacher and by learning guides can enhance significant learning.

Eva Jahelková (Slovakia). *Education of chemistry at the 1st independent high school in Bratislava, Slovakia. From general education to key competencies*

Abstract. Education of Chemistry at the 1st Independent High School differs from the ones at other schools in Slovakia. Several equal bases support the education generally. The first one is the pedagogical and psychological art of the teacher who has the freedom to create the curriculum of the subject and choose the method of teaching. The second is connection of education with real life. Then there is the definition of the basic content and need of complex view when studying a phenomenon. The last but not the least is the specialization of the study. It is important to see and train the cognitive abilities of the student while choosing method in education process. All the abilities are categorized as key competencies and as shown many of them are suitable for training in chemistry classes. They can be used as motivation. There are several methods for the key competencies training e.g. to learn from experience, to contextualize the facts, to solve the problem and the student should learn as well to be responsible for own learning.

Murat Demirbaş (Turkey). *Using conceptual change texts in chemistry education*

Abstract. Concepts and concept teaching are very important in constructivist approach. Literature was reviewed for implementations of conceptual change to eliminate misconceptions in science teaching in this study and the results of some research which was implemented were mentioned. According to literature review, the importance of conceptual change implementations was stressed.

Maria Maddalena Carnasciali (Italy). *Successful experiences in chemistry teaching in Europe: the transnational report*

Abstract. The Trasnational Report summarizes all the national reports on successful experiences in chemistry teaching, that is the research area of the third year of the project. It is divided into sections, as follows:
1. National sources of successful experiences
2. Examples of successful experiences
3. The impact of the project on successful experiences:
a) Sharing successful experiences in a local context: the national workshops
b) Setting new successful experiences: testing of ICT teaching resources
c) Sharing successful experiences in an international context: the conferences

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4. Conclusions
During the presentation all the sections were briefly described.

Also Italian teachers, from different schools gave their precious contribution to the conference with oral and poster presentation about personal successful experiences:

Ilaria Rebella, primary school teacher. *The process of teaching-learning: from the Master in Didactic of Science to the classroom*

Nadia Zamboni, lower secondary school teacher. *Antarctica in Cogoleto. An experience of integrated curriculum on Polar Sciences in a lower secondary class*

Caterina Bignone, primary school teacher. *Maths and natural products for health personal care*

Roberto Antiga, lower secondary school teacher. *Development of an experimental device to check the conductivity in some sample materials*

Finally, Italian university researchers and experts in science teaching, presented posters and oral contributions:

Antonella Lotti, researcher in science of education. *Problem Based Learning to teach sciences in elementary, middle and high school: the IN-FORMA project*

Andrea Basso, university professor. *Who killed Miss Scarlet?*

Anna Maria Cardinale, university researcher. *Project Life-RICICLOLIO: a synergy between public and private for the environment and for a positive image of chemistry*

Nadia Parodi, university researcher. *Let's start with a questionnaire: check the students' scientific knowledge at the beginning of the university curriculum*

Giovanni Petrillo, university professor. *Museum&Lab projects at the Museo di Chimica – DCCI, Genoa University*

Elisa Sanguineti, university collaborator. *PROJECT PANN12_01162 "Human movement, microalgae and waste: renewable, unexploited and unknown sources of energy. Scientific patterns for sensitization and education of school kids"*

Riccardo Carlini, university collaborator and upper secondary school teacher.
The alcheMISTRY of the colour
Characterization of metallic materials: properties and applications

Conference evaluation

At the end of the conference the participants gave positive verbal evaluations about the organisation, the venue and the contributions presented.

The invited lecturers, experts in chemistry education, expressed their appreciation for the conference and the work done within the project by all partners.

Teachers thanked Maria Maddalena Carnasciali and the organizing committee for the opportunity given them to present their experience and to know the European scenario

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Conclusions

Science gives students the motivation to enhance their understanding of the world around them, encouraging curiosity and a critical outlook. Europe needs young scientists capable of innovation in a competitive society: not for nothing this is one of the objectives of the Lisbon process.But if it is crucially important for Europe that its young people should acquire proficiency and knowledge in science subjects, then it is even more necessary to train teachers to be able to keep up with the times; therefore, the training of science teacher trainers would merit particular attention on the part of policy-makers, but it does not seem to be a priority at this time in many countries.

The project Chemistry Is All Around Network is an excellent tool to contribute to the improvement of science teaching. The site of the project shows all the work that the partners have done in the past three years and the program of the conference demonstrated the will to change the teaching of science to attract and motivate young people.

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Appendix I

Scientific Committee

Marina Alloisio, Department of Chemistry and Industrial Chemistry of Genoa, Italy

Maria Filomena Barreiro, Instituto Politécnico de Bragança, Portugal

Andrea Basso, Department of Chemistry and Industrial Chemistry of Genoa, Italy

Anna Maria Cardinale, Department of Chemistry and Industrial Chemistry of Genoa, Italy

Maria Maddalena Carnasciali, Department of Chemistry and Industrial Chemistry of Genoa, Italy

Murat Demirbaş, Kırıkkale University Education Faculty, Turkey

Olga Ferreira, Instituto Politécnico de Bragança, Portugal

Zdenek.Hrdlicka, Institute of Chemical Technology, Prague, Czech Republic

Milena Koleva, Technical University of Gabrovo, Bulgaria

Dionysios Koulougliotis, Technological Educational Institute (T.E.I.) of Ionian Islands, Greece

Marie Walsh, Limerick Institute of Technology, Ireland

Organizing Committee

Marina Alloisio

Andrea Basso

Anna Maria Cardinale

Maria Maddalena Carnasciali

Anabella Covazzi Harriague

Concetta Ferraro

Federica Gastaldo

Massimo Ottonelli

Giulia Pigollo

Laura Ricco

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Appendix II

International Conference

Successful Educational Experiences and Didactic Guidelines in Science Teaching

23 - 24 *October* 2014

Department of Chemistry and Industrial Chemistry - Genoa - ITALY

Scientific Programme

October 23rd 2014

14.00-14.30	Registration
14.30-15.00	Welcome session
15.00-15.40	Science teaching in schools: dilemmas and challenges *Laurinda Sousa Ferreira Leite - Universidade do Minho - PT*
15.40-16.20	Verticality in chemistry teaching: the use of ICT for improving concepts comprehension *Elena Ghibaudi – Università di Torino; Alberto Regis - SENDS Storia ed Epistemologia per una Nuova Didattica della Chimica - IT*
16.20-16.40	Coffee break
16.40-18.10	Successful experiences in chemistry teaching: has chemistry education research common ground with Greek school practice? *K. Salta, D. Koulougliotis - EL*
	Teaching at the heart of learning: successful experiences and good practices in chemistry teaching in Ireland *M. Walsh - IE*
	Educational methods and teaching materials used in chemistry teaching in Polish schools *M. Smaga - PL*
	Successful experiences and development of key competences in chemistry education: the Italian context *L. Ricco, M. M. Carnasciali - IT*
	Teaching chemistry, learn chemistry, what changes now? *V. Pennazio, A. Traverso, D. Parmigiani - IT*

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October 24th 2014

8.30-9.00	Registration
9.00-10.30	Successful integration of ICT in chemistry lessons *J. Keutgen – BE*
	Best practices using Ipad as a teaching tool learning chemistry *A. J. Torres Gil - ES*
	Successful experience in chemistry teaching in the Czech Republic *M.Grecová, Z.Hrdlička - CZ*
	Problem Based Learning to teach sciences in elementary, middle and high school: the IN-FORMA project *A. Lotti, S. Sobrero - IT*
	Who killed Miss Scarlet? *A. Basso, M. Grotti - IT*
10.30-10-50	*Coffee break*
	Education of chemistry at the 1st Independent High School in Bratislava, Slovakia. From general education to key competencies *M.Smreková, E. Jahelková - SK*
	Best practice in popularization of chemistry in Czech Republic *H. Bartkova, M. Grecova, J. Svatosova - CZ*
	Project Life-RICICLOLIO: a synergy between public and private for the environment and for a positive image of chemistry *A. M. Cardinale, B. Santamaria - IT*
	Learning guides: tools to mediate student's learning *A. Silva, O. Ferreira, M.F. Barreiro - PT*
	An integrated use of the interactive whiteboard and experiments J. Kariger – BE
	The Use of Conceptual Change Texts in Chemistry Education *H.M. Pektaþ, M. Demirbaş, M. Bayrakcı - TR*
	Successful experiences in chemistry teaching in Bulgaria: role of interactive teaching materials in teaching/learning process *M. Koleva - BG*
13.00-14.30	*Lunch break*
14.30-15.10	Linguistic heterogeneity: challenge for modern chemistry education? *Silvija Markic - University of Bremen - DE*
15.10-16.00	The process of teaching-learning: from the Master in Didactic of Science to the classroom *I. Rebella - IT*
	Antarctica in Cogoleto. An experience of integrated curriculum on Polar Sciences in a lower secondary class *N. Zamboni - IT*
	Successful experiences in chemistry teaching in Europe: the Transnational Report *M.M. Carnasciali, L. Ricco - IT*
16.00-16.20	*Coffee break*

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16.20.17.00 *Flash presentations of posters*	*Maths and natural products for health personal care* *C. Bignone*
	Experience together ... young scientists at work!" *G. Capilli*
	Development of an experimental device to check the conductivity in some sample materials *R. Antiga*
	Let's start with a questionnaire: check the students' scientific knowledge at the beginning of the university curriculum *N. Parodi, A. M.Cardinale, R.Carlini*
	Museum&Lab projects at the Museo di Chimica – DCCI, Genoa University *G. Petrillo, A.M.Cardinale, B.Santamaria, R.Mosconi, M.Maccagno*
	PROJECT PANN12_01162 "Human movement, microalgae and waste: renewable, unexploited and unknown sources of energy. Scientific patterns for sensitization and education of school kids" *L.Bagnasco, V.Caratto, E.Sanguineti, B.Santamaria*
	The alcheMISTRY of the colour *R.Carlini, N.Parodi, G.Zanicchi, A.M.Cardinale, M.Pacenti*
	Characterization of metallic materials: properties and applications *R.Carlini, N.Parodi, A.M.Cardinale, G.Zanicchi*
17.00-18.00	*Poster session*

Lifelong Learning Programme

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Appendix III

Some informal moments of the conference

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Many thanks to Magdalena Galaj for the wonderful photos that show the work of the whole project team during the conference and that capture the harmony created among project partners during the three years of the project .

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