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## Virtual Meeting Networking Activity on “Students’ Motivation”

Meeting held 4 October 2012 at 15:50 CET

The video of the meeting is available on this Internet address:

<http://flashmeeting.e2bn.net/fm/b82ba0-15839>

### Participants

#### Partners

Lorenzo Martellini (Pixel), Sara Ciabattini (Pixel), Zlata Selak (INFOREF), Julien Keutgen (INFOREF), Milena Koleva (Technical University of Gabrovo), Zdenek Hrdlicka (Institute of Chemical Technology), Dionysios Koulougliotis (Technological Educational Institute), Dimitrios Nikolopoulos (Technological Educational Institute), Marie Walsh (Limerick Institute of Technology), David Sutton (Limerick Institute of Technology), Magdalena Galaj (WSInf), Maria Maddalena Carnasciali (University of Genova), Laura Ricco (University of Genova), Filomena Barreiro (Instituto Politécnico de Bragança), Olga Ferreira (Instituto Politécnico de Bragança), Murat Demirbaş (Kırıkkale University), Elif Tuğçe Karaca (Kırıkkale University), Ömer Faruk Şen (Kırıkkale University), Hüseyin Miraç Pektaş (Kırıkkale University)

#### Teachers

Divna Brajkovic (Belgium), Maria Nikolova (Bulgaria), Ilka Boyanova (Bulgaria), Katusha Stancheva (Bulgaria), Katerina Salta (Greece), Diane Condon (Ireland), Monika Pawluś (Poland), Marco Rametta (Italy), Adília Tavares da Silva (Portugal), Luísa Fernandes (Portugal), Antonio Jesus (Spain)

### Minutes

As an introduction Professor Maddalea Carnasciali introduced the theme of the meeting saying that what came out was an interesting workshop.

### Teachers’ opinions

#### Belgian teachers

The Belgian workshop took place on the 26<sup>th</sup> of September in Liège and involved around twenty teachers and the representatives of chemistry education in Belgium. Two great topics were developed: the students’ motivation and the ICT resources. In the first case the participants discussed about the publications added by the partners to the portal and a presentation of the national summary text made by the Belgian expert team. For the second topic the debate focused on the existing resources, the teachers expectations and the tools that should be considered to stimulate students’ interest, such as new interactive resources with flash, 3D Screencast, tablet, Interactive book and e-learning platform. Some teachers suggested the idea of new lessons sequences to optimize chemistry learning. About students’ intervention what emerged was a general disaffection for chemistry learning among the other sciences. Belgium finds itself in a catastrophic situation: less students graduate in chemistry with respect to the past years. At European level we can find quite the same situation because of the negative stereotypes that originated from this subject. Then the idea that chemistry is too difficult to study, the unknown career prospects and the few contacts with companies all play an important role in disaffecting students from studying sciences and chemistry in particular. The secondary education provides a way of teaching chemistry that is too abstract, very few experiments take place and the time is too short. In Belgium records are the same: fewer students attend secondary school, class groups are too large, teachers are the same for all the scientific subjects (biology, chemistry and physics). What can be



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done to increase motivation? It should be clarified the epistemic approach to chemistry, explaining why the symbolism is used, provide more experimental chemistry and use ICT tools. Finally, the teaching method should be improved: teachers are not all trained as chemist, students do not have to feel that was they have been thought is far from their reality (substances used for example are often not familiar to them), so teachers have to provide analogies and examples from daily life. The main conclusions view chemistry has a difficult science that is why children need support, especially in the initial stages, to rightly approach to it. The solutions proposed to teachers in Belgium are creating new ICT resources that fit with the students' level and to create new lessons sequences.

### **Bulgarian teachers**

The first workshop held at the Technical University of Gabrovo on the 21 of September. The meeting was divided into two sessions in relation to the argument concerned. The first one was about motivation and comments on the project from experts and teachers; the second one dealt with the comments on interactive teaching materials and the process of education. Firstly, the results achieved within the project were presented; then the person responsible for the project (Milena Koleva) commented on the expected outcomes and on the future activities to be implemented. Teachers and experts expressed their own opinion on the publications and articles on students' motivation, available on the project website and this served as the basis for the discussion. The conclusions were the follows: to grab students' attention what is important is the teachers' personality; one big problem, especially for Bulgarian people, is the limited access to the labor market. It is important to bring chemistry closer to real life providing concrete examples while teaching and to include more laboratory lessons in the courses. The inclusion of the science in the process of teaching Chemistry at school is another way to attract students' attention and motivate them. During the second session teachers and experts discussed about the possibility of using ICT tools to attract students to study chemistry. The main conclusions drafted during the meeting are that the use of interactive materials requires an adequate level of technological and English knowledge and more time to be spent during lessons on these instruments. Both these elements are missing in Bulgarian schools. A big problem with chemistry teaching is the lack of connection between this abstract subject and the real life. To sum up, the main reasons for the lack of motivation in learning chemistry are: the idea of chemistry as a theoretical subject, lessons are monotonous and not so interesting, knowledge is not practical enough. There are also more practical problems to be solved, such as the lack of multimedia lessons and of laboratories facilities. The possible solutions are to stimulate students interest providing them an education more involved in concrete life and using modern internet technologies to stimulate today's internet generations.

### **Czech teachers**

The Czech workshop took place on August 29<sup>th</sup>. Significant problems concerning students' motivation in studying chemistry arose in the Czech Republic. Several reasons can explain the unpopularity of this subject, for example: at elementary/high school teaching is too abstract; it appears to be difficult to transfer chemistry into real life. Then there are too many technical lectures and old books with abstract examples. Another problem with chemistry is the general idea that it is not a leading sector in economy, also because of the restrictions, originated in UE, regarding the emission of harmful substances. However, chemistry should be seen as a developing science, whose orientation is now adapting to the new perspectives. The possible remedies to students' lack of motivation are still discussed: teachers should provide more examples from daily life and innovative way of teaching (the use of ICT tools can help with it); international exchange of students could be a useful practice. Finally the reputation of this subject should be increased providing open-air fairs or motivating lessons on chemistry right in primary and secondary schools.

### **Greek teachers**

The workshop took place on September 22<sup>th</sup> and was composed by 11 teachers and 5 scientific experts. During the first part of this study they discussed about the publications and the teaching resources of the project portal. This material contained a list of factors that are considered responsible for the students' lack of motivation in learning and studying chemistry: the abstract structure of chemistry courses (students want to study things related to daily life and to professional career); the personality of teachers and their approach to the subject and the career prospects. The Irish model is symbolic: although more funding in the infrastructure



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was provided, it has not increase motivation of students. It means the whole organization of the education system should be revised. Several teaching resources were very interesting and useful to improve students' motivation and skills and teachers' commitment to the subject. Others were a little bit difficult and provided too much material to be downloaded. In the 2<sup>nd</sup> part of the workshop they discussed students' motivation through teachers and experts experiences: at primary school level teachers have to meet the pupils interests: they never mention the word "chemistry", so chemistry concepts remain unfamiliar to them. In lower secondary school students can be easily motivated; in upper secondary schools students already made their choice and if it doesn't belong to a field related with chemistry they appear to be far from chemistry logic. Teachers should commit themselves more in motivating students with new approaches. Students that study chemistry at university usually show a great interest in this subject or develop it throughout the years. In Greece two types of PhD students can be found: the ones who are intrinsic involved in learning chemistry and the ones that only want to get the degree and a permanent job. Family too plays an important role in helping students to develop special interests. The current economic crisis brought students to be more self-regulated and responsible to develop their own motivation and interests in learning.

### **Irish teachers**

The workshop took place in Limerick on September 27<sup>th</sup>. They discussed upon the material uploaded in the project portal. The publications and the papers were of different quality and length. Some of them were really good and inspired in their reportage of well-conducted initiatives and research (for example X-science from Italy and POPUCH from the Czech Republic). Teachers' resources presented the same weak points, in terms of length and quality, as papers and publications. There have been difficulties with the translation of the partners' reviews. Some resources fit with chemistry promotion rather than teaching. It may be suggested to separate data according to the school levels. Some of the resources uploaded by Limerick Institute of Technology to the portal were familiar with some participants, some others not. Many will use these resources at school from now on. All participants agree that the quality of national materials is improving and that mapping to the national curriculum is an advantage. Teachers agreed with the idea of taking more interactive lessons and of asking students for additional work at home.

### **Polish teachers**

Polish teachers experimented some difficulties in carrying on the workshop, because one school closed. Another meeting is planned for the 18 of October. Teachers changed throughout the summer and now they are in search for new interlocutors. Everything will be uploaded on the Project Portal as soon as the polish workshop will be ready. We are looking for new partners to participate in the initiative that has already started. They need experts commenting on the results and giving their review.

### **Portuguese teachers**

The workshop was promoted by the Polytechnic Institute of Bragança on September 20<sup>th</sup>. The general idea is that chemistry is a difficult subject. Students' motivation in studying chemistry also decreased after implementation of the government measures, which provided some important changes: chemistry started to be an optional subject from the 12<sup>th</sup> grade, the programs planned were too long and difficult to be carried out by teachers and laboratories classes were reduced. Portuguese schools are well equipped thanks to the previous investments in the field of education. However an exception should be made for the basic school levels, where facilities exist, but the lack of basic knowledge doesn't allow taking advantage from them. The students' motivation can be improved by increasing laboratories classes, by providing everyday life examples and by having motivated teachers together with other forms of teaching resources. These non-interactive resources (such as movies or web data) are important as the role of teacher is to motivate students. Web resources that are available in an offline basis are welcomed. They have to stimulate the students' thinking/learning process. Teachers often prefer simulations followed by practical exercises. Phet is one of the resources most frequently used, except from the primary school level: here there is a lack of background knowledge and of digital materials. Experimental science teaching training is recommended in this early school level.

### **Slovak teachers**



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The workshop was attended by 7 teachers and 3 experts. One of the discussed topics was the system of teaching chemistry in Slovakian schools. The main problem with secondary schools is the attractiveness of facilities and the teacher's personality. Usually, people that continue studying chemistry (even at university) are well-motivated and for them what is more important is not only a good grade but also to learn more. Teachers often have difficulties in transmitting their motivation. Motivation is strongly related with the teacher's behavior and personality. Some concrete examples at Bratislava's school can prove it. Some possible measures that can improve students' motivation are the use of ICT tools (which, on the other hand cannot be a mean standing by itself). Especially today, as modern technology is more and more frequently used by the younger generations, it is recommendable to leave them out of the teaching methods. Furthermore, referring to concrete examples from daily life can help to make chemistry more attractive to students. Another important issue to be considered is that in these years laboratory costs have increased dramatically and schools do not have to money to cover them, so teachers have to look at other solutions. However, what happens sometimes is that the schools built under socialism are now better equipped than the new schools in terms of facilities. In Slovakia differences in school facilities are connected with the status of different internal regions. Bratislava, the capital, is performing the best. Some improvements have been registered since hundreds of teachers joined the National Project of the Ministry of Education EFTA, in which new textbooks and teaching aids were created for chemistry teachers. Another theme discussed during the workshop was the future teachers' training at the Slovakian University of Natural Science. The Department of Didactic Science found out some of the difficulties in motivating students to study chemistry: the availability of school laboratory facilities and new textbooks, the experience and didactic training of the teacher and the private motivation of the student. The teaching method, as Professor Prokša noted, is still a traditional one and by the end of the 90s students did not have classes such as communication and social skills. Nowadays they are considered essential to manage collective and individual dynamics within the classroom. To conclude, what Slovakia needs and actually has are skilled teachers using new approaches (like ICT tools) that since the last 10 years are available.

### Spanish teachers

The Workshop began with a project presentation and a calendar of the future activities. Then Teachers presented wall papers and reviews of publications on students' motivation in studying chemistry that have already been uploaded in the project portal. The main results were that the lack of motivated students in learning chemistry appears to be widespread all over Europe, although things are different for students from further countries. The way our schools teach science is very theoretical, it needs to be more understandable. ICT resources must be part of the teaching method in chemistry learning. Important initiatives that can bring students closer to scientific subjects are, for example, shown researches and experiments to link the scientific world with the classrooms and visits to science museums. Some reports were presented about the use of everyday science, like "Chemistry at home" (a greek contribution), that suggest to connect chemistry learning with real life (he method of "teaching science in context"). The possible solutions to the problem of students' motivation are: first of all, how to make chemistry understandable is the most direct way to motivate. Positive comments were made about the Portuguese website and other sources. Some meeting attendances considered it beneficial to participate in the project and in the meeting: they gave the possibility to listen to different points of view and to exchange ideas that is really enriching,

### Turkish teachers

There are some resources that could be useful at certain school levels, for example "An Introduction to Chemistry by Mark Bishop", "Science Kids", "Chemistry at Home", "X-Science" a paper from University of Genoa that is very creative and "ArgusLab 4.01" a useful tool for teachers.

The workshop held last Friday. The topics concerned were: curricula, students' motivation, how can teacher motivate students, the use of technology and laboratories. About the first one, what can be said it that chemistry is very difficult for the abstract concepts that are part of it. About teachers: often they can't use new technology effectively; they also find chemistry difficult, work very hard for low salary. Another key element in explaining the lack of motivation is the difficulty to find job in the chemistry field. The possible improvements could be to add videos and simulations to fix concepts. Then, a project for using technology should be set up: classes should be provided with internet and other technological tools. Laboratories are not used enough:



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chemistry should be taught there! What emerges is a lack of motivation for that. What to do to attract students: use connections with daily life, so that abstract concepts can make sense to them; connect daily knowledge with lessons and organize chemistry festivals. Until now not so many people cared about these initiatives. Finally chemistry needs more motivated teachers and students and new technologies.

### Italian teachers

The workshop held in Genoa on September 10<sup>th</sup> and involved 10 teachers and 6 experts. There have been some problems in finding the 20 resources in national language because they were often unsuitable for the poverty of the interactive material or for the inaccurate or trivial contents. In primary school it is difficult to find ICT tools: they are often of low quality, poor of scientific reliability and inadequate to the age concerned. In upper secondary schools the situation is better, but we have to improve. Lots of portals provide for scientific topics but they are structured in a chaotic way. It is better to have easier structures that can be used by students even with the teachers' help. Many interactive resources do not guarantee improvements in learning, because they do not concentrate on the "problem solving" aspect, which is important for the motivation of students that want to overcome the challenges they are facing during the training. The main interactive material used for scientific subjects comes from the United Kingdom or the United States or America, so English multimedia resources are more likely to be found. Some selected resources are good, but not the one addressed to the younger students. A questionnaire will be proposed to assess the effect of ICT tools on students' motivation. Results on students' motivation take long time to be evaluated, that is why they will be carried out at the end of the school year.

### Conclusion

The main conclusions that can be drawn are: ICT are useful and the teachers continue to play an important role (Juraj agree: "teacher's personality is important"). The participants from Greece commented that the main result is the need for a slogan to say what chemistry is about, taking the other subjects as examples (all have a slogan, physics for instance, etc.). More job opportunities should be available in the chemistry field. The participants from Inforef suggested that the right path is to go to the macroscopic level from the microscopic one. The Portuguese partners said that ICT are already used, so the most important thing is to make clear to students what chemistry is about and to understand that teachers need some experimental experience. Even more important is teachers' motivation in the subject in order to transfer it to the students. The Czech partner firmly agreed with that. The participants from Turkey added that teachers' motivation is important and then they have to use technologies and make connection with daily life. The Bulgarian partners concluded that the key to enhance motivation is having good teachers using contemporary teaching methods with references to daily life.

At the end, Professor Maddalena Carnasciali suggested all the members of the meeting to keep in touch with each other and to share ideas.



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