



518300-LLP-2011-IT-COMENIUS-CNW

Chemistry is All Around Network

National workshop

“Successful experience and good practice in teaching chemistry at school”

14.03.2014, Gabrovo (Bulgaria)

Minutes

Participants

Workshop on “Successful experience and good practice in teaching chemistry at school” under the Chemistry is all around Network Project was held on 14th of March 2014 in the conference room of the University Library of the Technical University of Gabrovo. It was attended by chemistry teachers from secondary schools associated of the Technical University - Gabrovo project, as well as representatives of universities and organizations as experts: Krasimira Tomeva and Rossitza Dimkova, teachers - Professional Mechanoelectrical High School, Sevlievo; Radka Krasteva and Daniela Petrova - teachers, Vocational School in Electronics and Chemical Technologies, Pleven; Ilka Boyanova – teacher, Aprilov National High School, Gabrovo; Mariya Nikolova – teacher, representative of “Ucha.se” Ltd – Sofia; Galina Kirova and Daniel Petkov – teachers, Vocational High School in Electronics, V. Tarnovo; Katusha Stancheva, expert – Regional Inspectorate of Education (Ministry of Education and Science) – Gabrovo; Assoc. Prof. Milena Kirova, expert - Sofia University; Albena Tzoneva – project technical assistance, Technical University of Gabrovo; assoc. prof. Milena Koleva, project manager – Technical University of Gabrovo.

Minutes

The meeting took place in accordance to the previously agreed **agenda**, as follows:

- Registration
- *Assoc. prof. Milena Koleva, contact person, TU - Gabrovo:* Project "Chemistry is all around Network", thematic area “Successful experience and good practice in teaching chemistry at school” – current and future activities
- *Teachers and experts involved in Chemistry is all around Project:* “Teaching chemistry at school: innovative approaches and good practice” (analyses and comments on papers and publication available on the project website)
- Discussions
- *Teachers and experts involved in Chemistry Network Project:* “Shared experience: testing of interactive educational materials in chemistry education at school”
- Discussions
- *Teachers and expert involved in Chemistry Network Project: Practical Team work* - Animation and interactivity trough presentation software – application of specific software in visualization of chemical educational content (under the methodological guidance of assoc. prof. Milena Kirova, Sofia University)
- Final remarks, conclusions

Milena Koleva, contact person for the project "Chemistry is all around Network" for TU - Gabrovo, presented the current and future activities under the 3th thematic area “Successful experience and good practice in teaching chemistry at school” as well as the commitment of teachers and experts in them.



During the first discussion “Teaching chemistry at school: innovative approaches and good practice” teachers and experts presented their comments on publications and papers available on the section “Successful experience and good practice” of the project portal.

Krasimira Tomeva and Rossitza Dimkova from Professional High School of Mechanics and Electronics - Sevlievo presented their comments on following publications: “Activity approaches by teaching chemistry - prove pedagogical experience from educational practice” (Slovak Republic), “Chemistry teachers inventions fair” and “High school science talents” (Czech Republic), and “English for chemistry: film bank” (Poland). They were impressed by the last paper – although it does not address issues related to the teaching of chemistry, it offers a very felicitous resource for work in school, at home, a team or autonomously. Although this is a resource for the development of language skills, it can be used by teachers of chemistry. The only limitation in application of the film bank comes from the necessity students to have enough good language skills, or be guided by a competent mentor, or the text to be translated in the user’s language.

Ilka Boyanova’s opinion is that the lack of language skills (in English or German) limits the application of large number of existing interactive materials in chemistry due to the misconception of specific chemical terminology. Possible solution of the problem could be the combined education as the paper describes – such an approach could improve significantly the quality of chemistry teaching at school.

Common teachers’ and experts’ opinion is that it would be very useful if such a “bank” of interactive educational materials in natural sciences were created in Bulgaria too – if the bank offers free access to all teachers, it could in high degree facilitate their application in large number of Bulgarian schhols.

Papers, which have taken attention of teachers from Aprilov National High School are „A Science Teacher Education Course in a Science Centre: A Successful Strategy to Empower Teachers to Master Museum Resources Exploration?” (Portugal), “English for chemistry: film bank” (Poland), „ÉCOLE NUMÉRIQUE” (Belgium) and „On-line chemistry education for talented students”. According to **Maria Nikolova** because of limited number of chemistry classes there is no possibility for individual work with talented students. In fact that approach is the “future of education” and in this term the experience of Czech Republic is very interesting and innovative.

Publication of Czech Republic „Talnet - a project for curious youth” was commented by **Galina Kirova** and **Daniel Petkov** from Vocational High School in Electronics - V. Tarnovo. They consider the project described in the paper important and it should be recommended to talented students from different countries with interests in the field of natural sciences. They also commented papers “Chemistry teachers inventions fair” (Czech Republic) and “Design, development and implementation of a technology enhanced hybrid course on molecular symmetry: students’ outcomes and attitudes” (Greece).

Radka Krasteva and **Daniela Petrova** – chemistry teachers from Vocational School in Electronics and Chemical Technologies, Pleven – consider that the practice described in “Chemistry teachers inventions fair” helps teachers to keep up with new teaching methods and to develop their own ways to apply this knowledge in the classroom. Through the personal experience of the teacher gained from visits to various scientific institutions, certain innovations in the field of chemistry can be successfully incorporated into school education. They consider this experience fully applicable in Bulgaria and hope Bulgarian teachers will have the similar opportunities to learn about the latest scientific advances and their application in practice. Other papers commented are: “Activity approaches by teaching chemistry - prove pedagogical experience from educational practise (Czech Republic), “Teaching of analytical chemistry in Polish universities” (Poland) and “Virtual chemistry laboratory: effect of constructivist learning environment” (Turkey). Related to the last paper **Daniela Petrova** commented that it presents very interesting practice in application of laboratory software in chemical. Her opinion, based on own experience, is that the application of such a product needs very good technical equipment, which is still missing in some Bulgarian schools. In addition, the method is more effective on the earlier level of chemistry education as an instrument for visualization of chemical substances and processes, and to develop students’ interest toward exploration. At the higher level of education real

chemical experiments should take place to motivate student and to make them fill like scientists in a real chemical laboratory.

The paper was commented by **Milena Kirova**, expert from Sofia University, also – her opinion is that the virtual chemical laboratory is an instrument to apply the constructivistic approach through “predict-observation-explain” strategy. There are number of good practices offered by the publications on the portal, but that one based on the collaboration “business - secondary school – university” could contribute in highest degree to the restoration of students’ motivation to study chemistry. In Bulgaria, there is an excellent example of such collaboration - between BASF and Sofia University (Faculty of Chemistry and Pharmacy), which in collaboration with Sofia University (Faculty of Chemistry and Pharmacy) using small portable chemical sets deliver practical training in schools without laboratory equipment. The initiative collects a huge interest and students are highly impressed.

According to both teachers and experts, among the partners’ papers on successful experience available on the project portal *Снопед* the most interesting are “English for chemistry: film bank” (Poland), „On-line chemistry education for talented students” (Czech Republic).

After the discussions of papers and publications on successful experience, teachers commented some aspects of experimental testing of interactive materials, available on the project portal in the chemistry classes. They were carefully identified by chemistry teachers at the end of the second project, on the basis of criteria like school profile, level of students’ knowledge, available technical equipment. Chemistry teachers approved products as PhET, Virtual chemical laboratory (<http://chemistry.dortikum.net>), <http://chemgeneration.com/bg/>, <http://www.learner.org/resources/series61.html>, <http://resursi.e-education.bg/zmon/action/goToProgram?id=Prog9.908> etc.). Some problems related to organization of testing, development of additional methodological and supporting materials, systemizing and analyzing of testing results, and getting feedback from the students were also discussed. Possibility to test some chemistry video-lessons developed on the educational platform “Ucha.se” in all schools involved in the national project network was commented.

The second part of the meeting was organized as practical workshop on application of specific software in development of educational content was held – teachers divided in small groups, with the methodological and technical support of the experts tried to develop a small part of school lesson related to “Chemical bonds”, applying animation.

At the end of the meeting participants agreed on the following:

1. Popularization of successful teaching experience and practices is a way to help the chemistry teachers in their efforts and contributes to restore the students’ motivation to study Chemistry. In this sense Chemistry Network Project plays important role because through the project network proved successful pedagogical experience and good practice to be shared with chemistry teachers from large number of schools in European countries.

2. Achievement of scientific literacy and development of key competences in natural sciences as final result is a complex process influenced by many important factors as: quality of educational plans and programs in terms of their volume and content; teacher’s role and methodological skills - to present the educational content, to apply innovative approaches to involve students in the educational process, to work individually with talented students, etc.; adequate technical support etc. It is important to popularize successful experience not only in application of ICTs to present the educational content in attractive and understandable way (although it is obviously one of the preferable approaches to enhance students’ interest to in chemistry) but this one related to development of methodological and didactic materials, evaluation of students’ knowledge and teachers’ training also.

3. Having in mind some specific features of Bulgarian education system, following partner’s practice could be successfully implemented and contribute to motivate students to study chemistry:



518300-LLP-2011-IT-COMENIUS-CNW

- Close collaboration „Business – University - school ” as instrument for motivation both students and teachers (good practice in Czech Republic and Poland) ;
- Development of internet-“bank” for exchange of tested in the practice interactive educational materials in chemistry, accessible by all chemistry teachers in Bulgaria;
- personal work with talented students, like in Czech Republic;

4. Based on the school profile, available technical equipment and students' language skills, suitable for testing in chemistry classes are interactive materials as PhET, <http://chemgeneration.com/bg/>, <http://www.learner.org/resources/series61.html>, Virtual chemical laboratory (<http://chemistry.dortikum.net>), <http://resursi.e-edu.bg/zmon/action/goToProgram?id=Prog9.908> etc. With the methodological support of experts these materials will be experimentally tested and testing results will be summarized, analyzed and delivered to the other project partners. Experimental Chemistry lessons will be held across the network of schools associated with the project with the help of the “Ucha.se” administrators as a result of the various, attractive interactive materials available there.

