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## Chemistry is All Around Network Workshop on Teacher Training Gabrovo (Bulgaria), 17 May 2013

### Minutes

#### Participants

Workshop on Teachers training under the Chemistry is all around Network Project was held on 17.05.2013 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, teacher – Professional Mechanoelectrical High School, Sevlievo; Rossitza Dimkova, teacher - Professional Mechanoelectrical High School, Sevlievo; Radka Krasteva, teacher – Vocational School in Electronics and Chemical Technologies, Pleven; Daniela Petrova, teacher, Vocational School in Electronics and Chemical Technologies, Pleven; Mariya Nikolova, teacher – Aprilov National High School, Gabrovo; Peter Rachev, teacher – Vocational High School in Electrotechnics and Electronics, Gorna Oriahovitz; Galina Kirova, teacher - Vocational School in Electronics, V. Tarnovo; Katusha Stancheva, expert – Regional Inspectorate of Education (Ministry of Education, Youth and Science) – Gabrovo; Assoc. Prof. Milena Kirova, expert - Sofia University; Hristo Kolev, expert – Sofia University, Sofia; Assoc. Prof. Samir Naimov, expert, Plovdiv University; Assoc. Prof. Milena Koleva, project manager – Technical University of Gabrovo.

#### Minutes

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

- Introduction of participants;
- Project "Chemistry is all around Network", thematic area "Teacher training" - future activities
- Lecture: Qualification of Bulgarian chemistry teachers – current situation, problems and solutions
- Chemistry teachers training: Bulgarian and European realities - presentation of teachers' and experts' comments on papers available on project portal;
- Discussion:
  - Teachers competences: modern student oriented pedagogical approaches;
  - Methodology to teach specific topics: Use of simulations - pros and cons.



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- Final remarks, conclusions

Participants in the meeting briefly presented themselves and the school or organization that they represent as well as the process of teaching of chemistry in their school.

**Milena Koleva**, contact person for the project "Chemistry is all around Network" for TU - Gabrovo, presented to the participants the main results achieved related to "Student's motivation" thematic area, during the first project year, the future activities to be performed as well as the commitment of teachers and experts in them.

**Assoc. Prof. Milena Kirova**, expert in the field of chemistry teachers training and teachers' ICT competences from Sofia University presented lecture "Qualification of Bulgarian chemistry teachers – current situation, problems and solutions". She presented some of the problems concerning Bulgarian teachers' qualifications (and particularly of those teaching Chemistry and Natural Sciences), such as: lack of adequate legal framework to support teachers' training, insufficient financial aid to stimulate their desire to improve their qualifications etc. The role of the training climate and the scientific competences in the formation of contemporary teachers' pedagogical skills was also presented.

The lecturer drew comparisons between the teacher qualification systems of other European countries highlighting the good practices implemented in Portugal and Poland.

After the lecture teachers and experts presented their comments on the publications and articles available on the Teachers' training section of the project portal: The use of information and communication technologies by Portuguese teachers; Polish Education Reform and Resulting Changes in the Process of Chemical Education; Specifics of chemistry lessons at non-chemical secondary vocational schools; Information and communication technology and the problem of teacher training: myths, dreams and harsh reality; Improving pre-service elementary teachers' education via a laboratory course on air pollution: one university's experience; Evaluation of the impact of the training program in teaching experimental science: a nationwide study; Chemistry teachers' perceptions on laboratory applications: Izmir sample; Teachers' pedagogical competence as a prerequisite for entering the profession; Case study on mentoring in initial teacher training of science teachers in Ireland etc.

The presented publications and the comments concerning them served as a basis for discussion "Teachers' ICT competences - student oriented pedagogical approaches. Methodology to teach specific topics: use of simulations - pros and cons".

Some of teachers' opinions are listed below:





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### **Krasimira Tomeva**

I got acquainted with the teacher training systems in Poland, the Czech Republic, Italy and Slovakia and I have teaching experience in Bulgaria. It turned out that we have many of the problems for teacher training in common. The transition from traditional to modern schooling introduces new challenges for teachers. On one hand they are related to the inventing of suitable didactic materials and testing data base, on the other with the organization and navigation of the teaching process. With teachers who are in their early careers, these problems probably result from the lack of experience or methodology discrepancies and classroom management.

The major problem, however, remains the strengthening of students' interest in the subject - it is especially relevant in schools that are not closely specialized in chemical education. The use of traditional approaches is the main tool to do that: creating presentations, assignments and practical examples of their use, extensive use of practical exercises; designing of stereoscopic 3D - materials, use of portable laboratories, virtual experiments, providing information about substances with relevance to life, using modern technical means - interactive board, multimedia etc., as a communication tool and to ignite students' imaginations. For this purpose, teachers need to acquire skills related to the use of interactive tools and application of ICT (software and hardware) for training purposes, and along with it - certain skills and proficiency in foreign languages. All these would be useless supported with appropriate pedagogical skills (use of techniques to provoke students to activities for acquiring knowledge, and practices and methods for teamwork), improving pedagogical diagnostics (the videos we offer information about specific teaching situations, analysis of video tutorials) and good communication skills to present in an accessible and interesting way complex and abstract concepts. Improvement of the qualifications and skills of the teachers could be achieved by: creating a comprehensive plan for career development of teachers, participation in activities outside of school and work projects, development of online training modules and workshops.

### **Mariya Nikolova**

Extremely useful experience presents a publication from Ireland - Mentoring in the training of young teachers from more experienced colleagues of theirs. Bulgaria also has a similar practice in using mentor teachers. The difference between the two systems is that in Bulgaria this activity is not linked to financial incentives and the work of mentors is not well paid which discourages them.

### **Peter Rachev**

The most striking fact from the Irish experience in mentoring is its duration - 16 weeks. In Bulgaria this period is much shorter which is obviously one of the reasons why this practice is so inefficient at the moment. Another positive impact is achieved by reporting the views of the teachers in the formation of the policy regarding training and qualifications. In Bulgaria so far no one has used this approach in creating the legal framework and organization of this process.





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### **Daniela Petrova**

Generally, there are no sufficiently effective training courses for teachers of chemistry. What should be done is to change and update the legal framework regulating the activities to improve the skills of teachers to provide effective, financially secure forms and activities for the organization of such courses - the results of an approach, which first motivates teachers might logically lead to higher motivation to study chemistry.

### **Galina Kirova**

Part of the publications address issues specific to education in many countries, namely: in the age of information and communication technologies, when swimming in a sea of information, we are faced with the problem of how to deal with it. In this respect, knowledge and skills to work with information and communication technologies are a mandatory component of the intellect of the modern teacher. Despite the undeniable advantages of computer and multimedia technology as an assistant to teachers, however, they only complement, enhance and enrich some of their basic functions, but they cannot replace them in the role of leader and organizers of the educational process.

### **Radka Krasteva**

Regarding the use of simulation to illustrate the complex chemical nature, *Specifics of chemistry lessons at non-chemical secondary vocational schools* explores the role of laboratory experiments in teaching Chemistry in the non-chemical secondary vocational schools in the Czech Republic. The idea is that the real experiment cannot be fully replaced by simulations. These are indispensable for the study of the processes as they make it possible to understand their course.

### **Milena Kirova**

In my opinion we need to distinguish between "simulation", "speculation" and "animation". In the absence of time to actually conduct the experiment, which is a common problem in teaching chemistry in school, simulations that allow chemical processes to follow in time are particularly useful. The problem is that sometimes they have a duration that does not allow the simulation to be carried out in school.

### **Daniela Petrova**

The use of real experiments in learning motivates students to a much greater extent than the use of simulations. The problems associated with this approach are several:

- some of the teachers must first motivate and persuade themselves to carry out the experiment and that it is effective – here lies and is demonstrated the negative impact of the conditions and methodology by which teachers themselves were educated - in many cases they are transferred to their approach as teachers;





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- a fear of the risks of real experiments and their results – any unsuccessful experiment would present the teacher into unfavorable light to the students;
- the limited time for experiments in class often, causes the teacher to eliminate them.

### **Samir Naimov**

Similar conclusions presents a study conducted in schools in Izmir (Turkey), which investigates the attitude of chemistry teachers towards laboratory classes. It shows that the majority of teachers prefer using experiments with predictable results. The relationship between the attitude to laboratory experiments and the experience of teachers is shown - the teachers with experience of over 26 years have a positive attitude. Some of the most common causes for neglect of the laboratory experiment are also mentioned and they largely match those you have already provided.

### **Hristo Kolev**

Since my job is related exactly to presenting the science in an appropriate way to students and a wider audience, I can say that the simulations have their place as they stimulate the imagination of the students and help them get better notion of the materials, structures and processes, especially when no possibility of real chemistry experiment exists.

I think the two approaches would contribute to a more effective learning process: in tandem with the work to increase the motivation of children to work with parents, teachers have to learn to make connection to real life when presenting the material - this will facilitate and motivate students' understanding of knowledge.

### **After the discussion participants in the meeting agreed on the following:**

1. The role of the teachers in the modern process of chemistry education for increasing the interest and motivation of students towards the subject is crucial. In order to perform it, however, teachers must constantly develop their pedagogic and communicative skills, to expand their competence, particularly those ones related to the use of modern technologies for educational purposes.
2. This raises some very important yet unsolved problems concerning qualification and expanding the competence of teachers, such as:
  - Developing a modern conception and updating the normative basis regulating the activities for teachers' qualification by considering and using teachers' opinion
  - Binding these activities with proper financial incentives, which will motivate teachers to improve their pedagogical skills.
  - Developing effective qualification courses for distance or online training which will enhance and motivate teachers to expand their competence;
3. Chemical laboratory is a unique environment in which students may participate in various activities.





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Teachers have several main tasks in this process: to put the student at the centre of learning process using proper methodological tools and approach; to include interesting experiments related to the everyday life of people and the environment; to help students develop abilities to make sense of the terms, to collect and analyze data, to form research skills. Tools which support the teacher in these tasks are contemporary ICT as well as the rich base of interactive products; when combined cleverly with real laboratory experiments, they would significantly contribute to the students' motivation for studying the subject. This sets the requirement for teachers to develop skills to select and use proper computer applications during learning process or to create ones by themselves using certain products. That is why it is necessary to establish an overall system for teachers' training to apply ICT in teaching chemistry.