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MOTIVATION OF BULGARIAN STUDENTS TO STUDY CHEMISTRY: PROBLEMS AND SOLUTIONS

Lifelong Learning Programme

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1. Bulgarian School education system: Structure characteristics, tendencies

According to the way of funding

- State schools
- Municipal schools
- Private schools

According to the level of education offered

Grade schools:
- Primary stage
- Elementary stage

Secondary schools:
- high schools
- profiled high schools
- vocational schools
- special schools
- schools of arts

According to the content of training

- Vocational schools
- Comprehensive schools
- Special schools

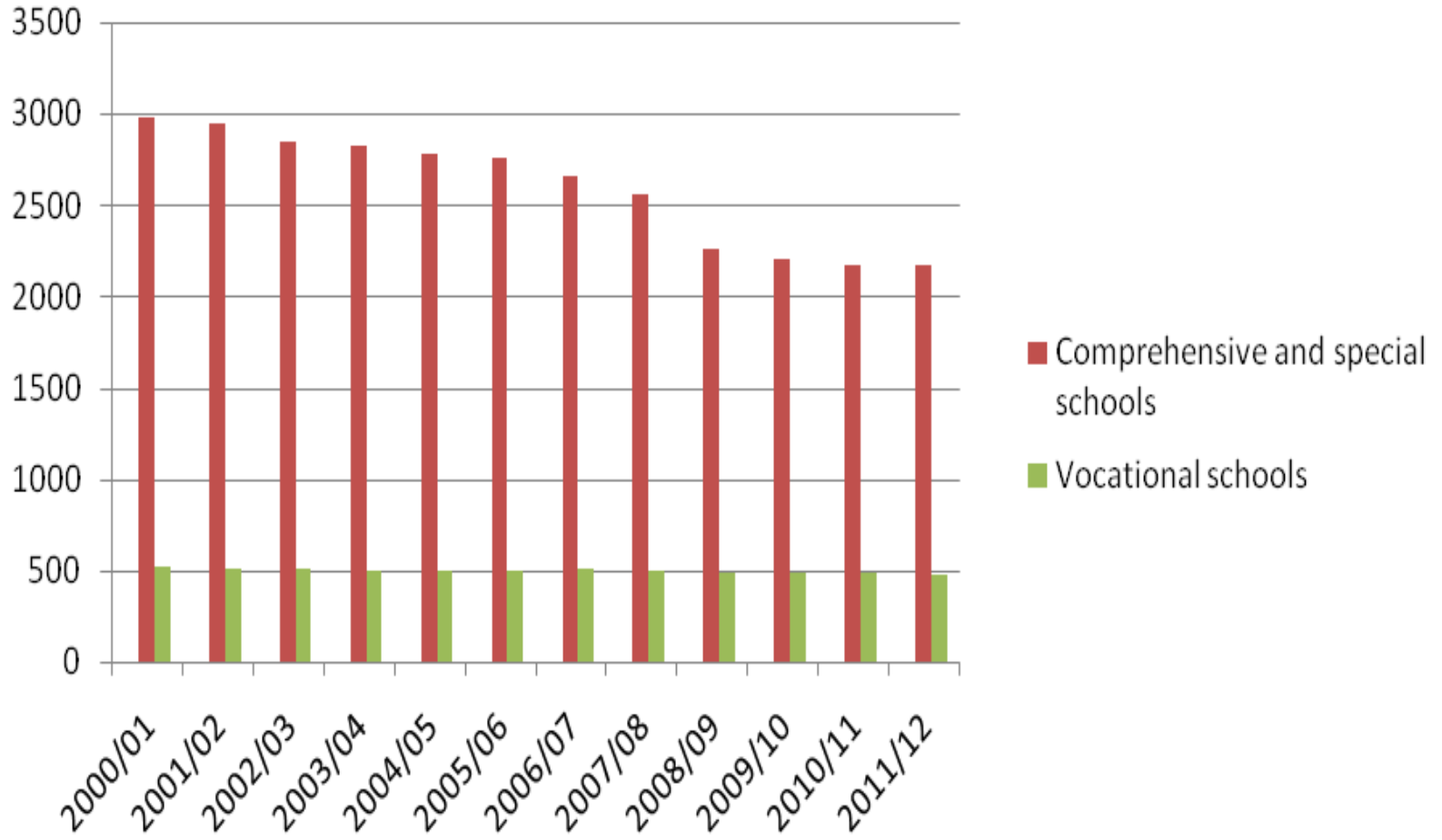
Present status of Bulgarian school system

- **Total number of schools: 5164**
  - Comprehensive – 2166
  - vocational – 477
  - primary schools – 156

Negative tendency 1

- Reduction of schools number
- The reasons
  - Demographic crisis and decreasing number of children;
  - Reformation of Bulgarian education system

Number of Bulgarian schools including secondary ones 2000 - 2012



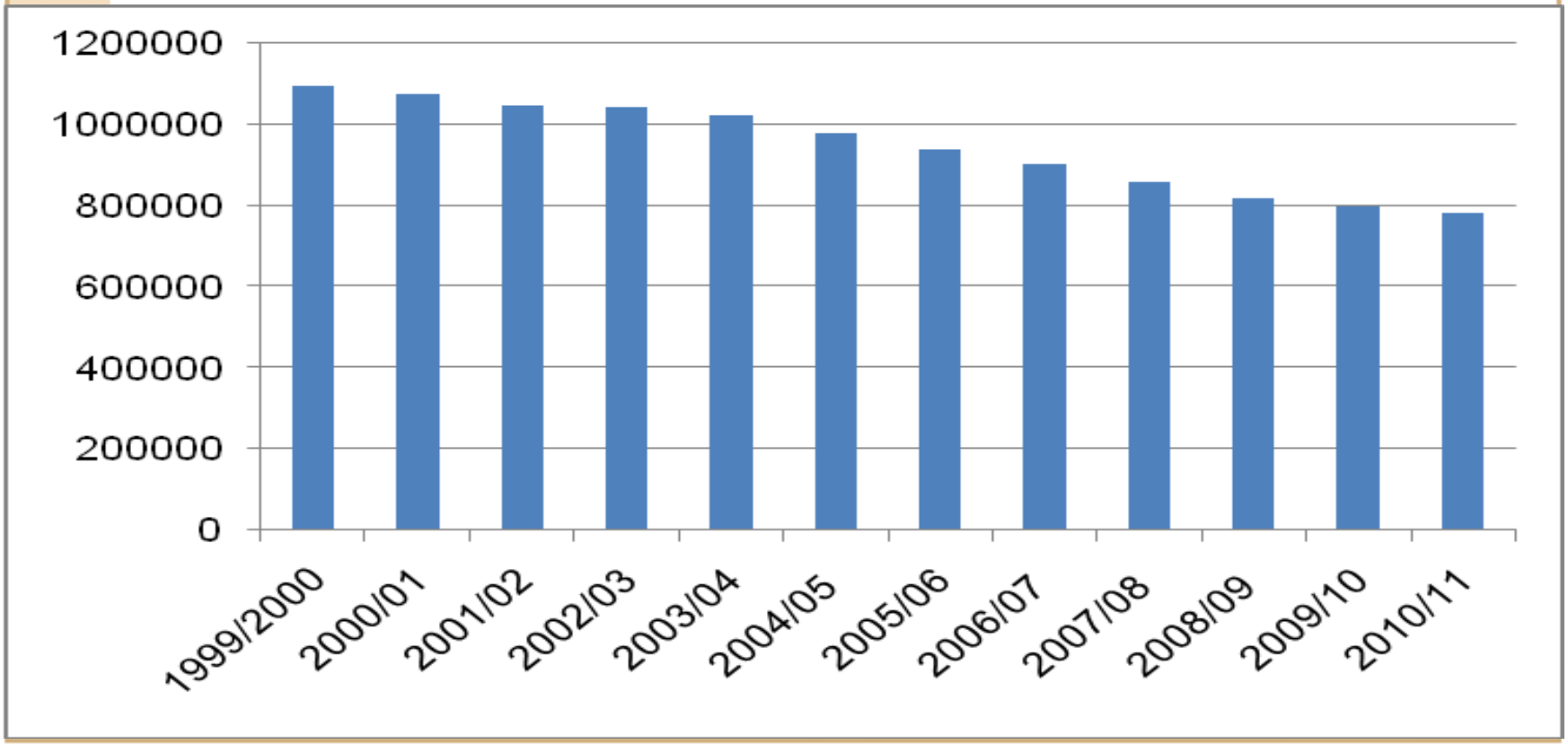
National statistical Institute data, Eurybase - Bulgaria

Negative tendency 2

- The total number of students in Bulgarian schools decreases;

- The reason: Negative tendencies in Bulgarian political, economical and social development last 20 years

Total number of students in Bulgarian schools 2000 - 2011



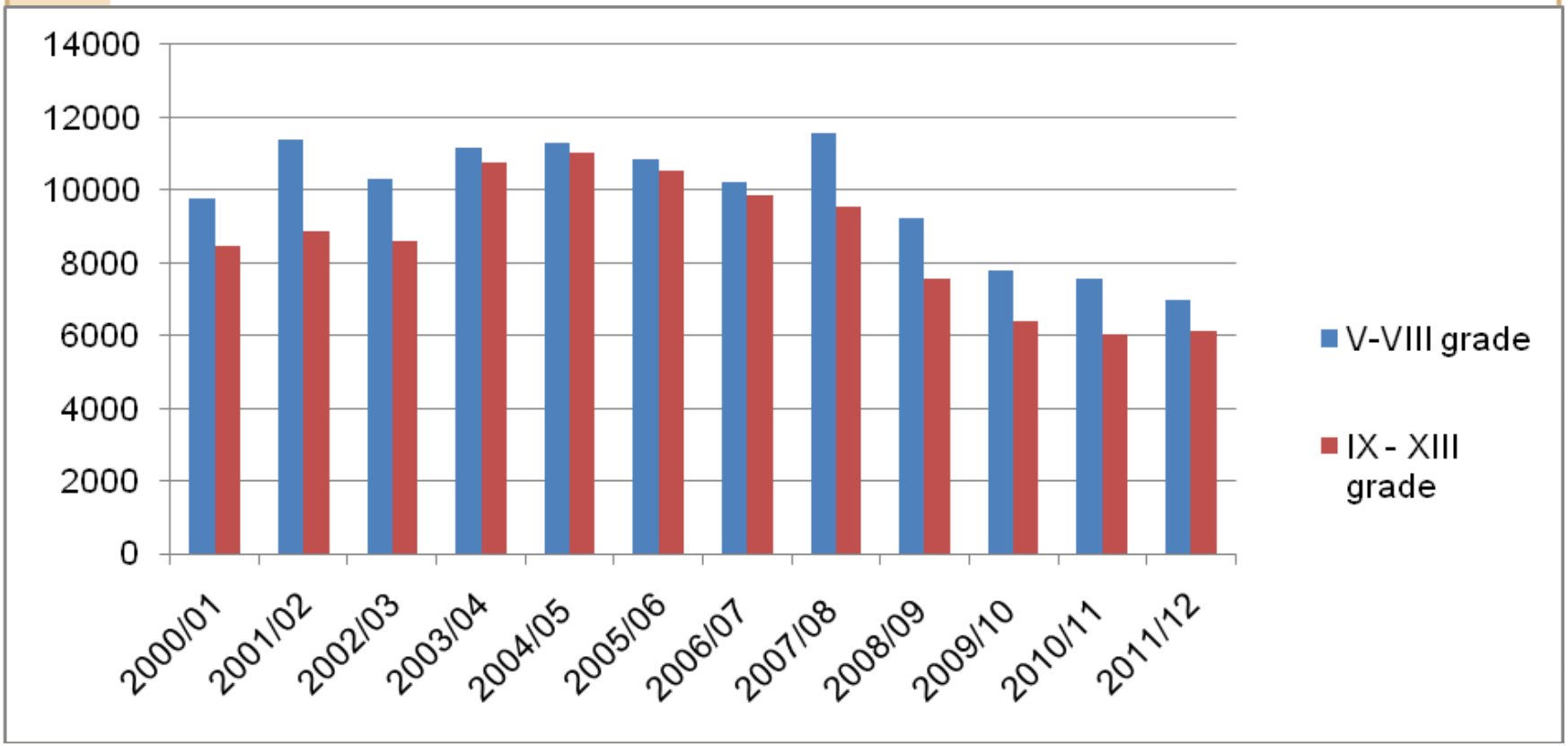
National statistical Institute data, Eurybase - Bulgaria

Negative tendency 3

- **Considerable number** of children dropped out the school system

- **Main reasons:**
  - social status and lack of finances;
  - going abroad;
  - lack of wish (mainly for ethnic minorities);
  - **lack of interest and motivation**

Number of students, dropped out from the school system (lower and upper secondary schools), 2000-2011



National statistical Institute data, Eurybase - Bulgaria

Major priorities for secondary school education in 2012/2013:

- Considerable decrease of the number of drop-outs providing free transportation, text books and food plus developing a wider scope of extra curricula activities;
- Sustainable school network;
- Improvement of the quality of educational process, modification of syllabi and curricula;
- Improvement of professional qualification of teaching staff - about 43000 teachers are due to pass professional appraisal and qualification courses;
- enforcement of the new Pre-school and School Education Act developed by the Ministry of Education and Science.

2. Main obstacles affecting the students' motivation to study of Scientific Subjects in schools

- Lack of precise vision and policy concerning the volume and quality of knowledge (theory and practice) at the different education levels;
- Shortage of financing for the educational and scientific institutions for modernization of the material base and for use of modern equipment;
- Lack of synchrony between the ICT-specialists and the teachers in elaboration and implementation of interactive education materials;
- No prospects for professional realization

3. Research activities on students' motivation to study Chemistry:

3.1. National network set up

- 5 Secondary schools involved:
  - 1 high school in Natural sciences and Mathematics;
  - 1 vocational school in Chemical technologies;
  - 2 vocational high schools of Electrotechnics & Electronics;
  - 1 Mechano-electrotecnical high school.

National network set up …

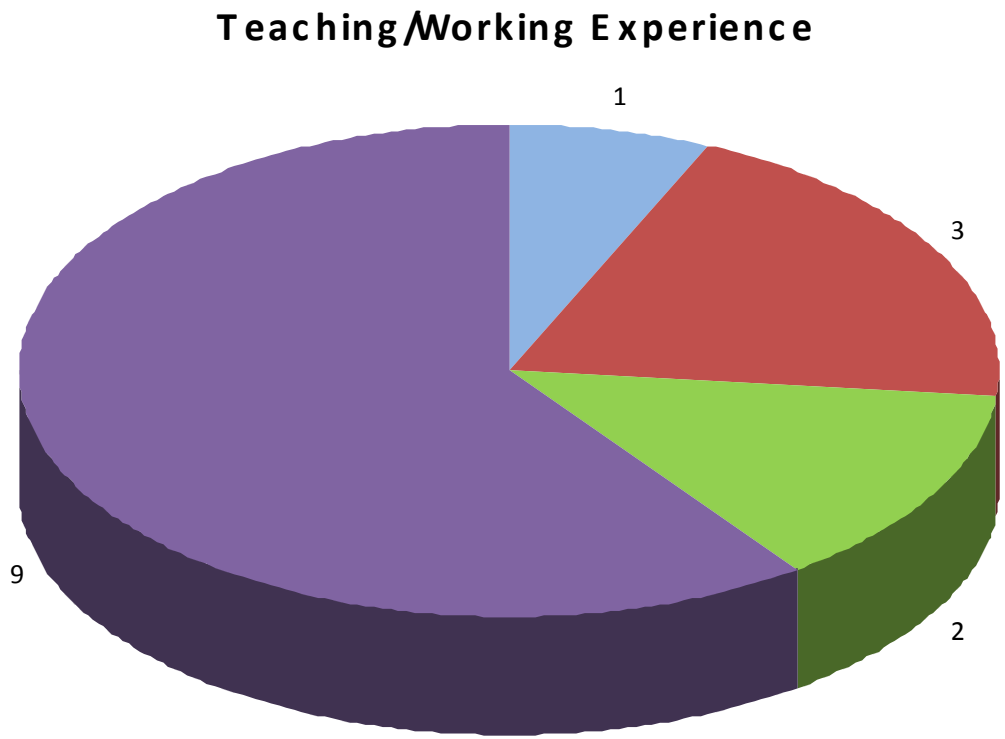
- 10 secondary school teachers (2 from each school):
  - Chemistry – 1;
  - Chemistry and Biology –3;
  - Chemistry and Physics -3;
  - Chemistry and Environment - 2;
  - English - 1.

- More than 200 students from the involved secondary schools

National network set up …

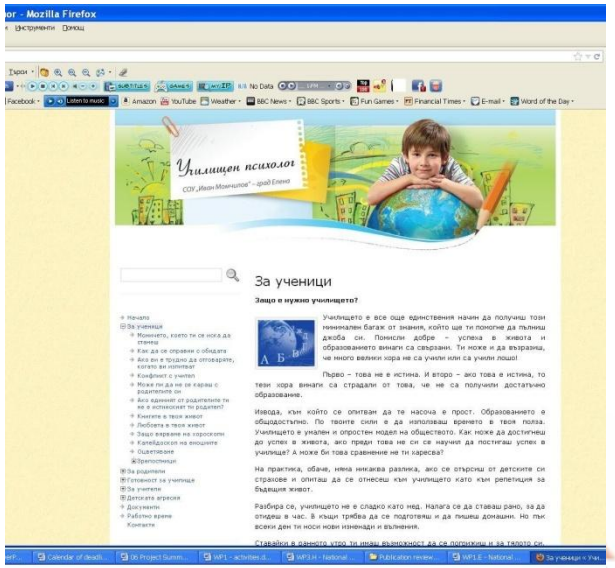
- 5 experts:
  - 2 University professors (scientists) - Research Laboratory of Chemistry education & Philosophy of Chemistry - Sofia University
  - 1 Iniversity professor (scientists) - Plovdiv University;
  - 1 young researcher (PhD student, chemistry teacher at the same time)- Sofia University
  - 1 Chief expert in Natural sciences and Ecology from Regional Inspectorate of Education (MEYS)– Gabrovo

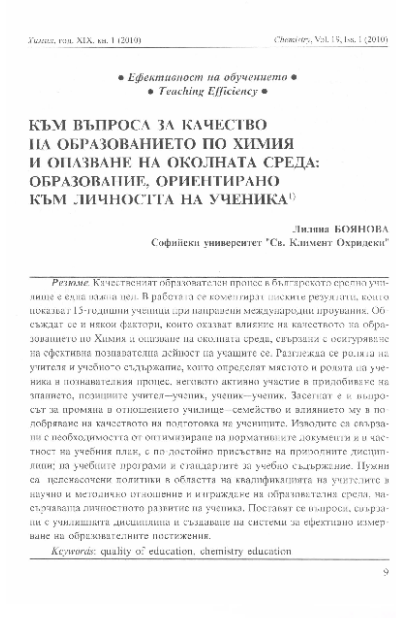
Distribution of teachers and experts according to the years of experience



3.2. Review of national publications on students motivation to study Chemistry

- national publications on students motivation reviewed and commented
  - Papers and magazine articles;
  - Websites;
  - Books.





КЪМ ВЪПРОСА ЗА КАЧЕСТВО НА ОБРАЗОВАНИЕТО ПО ХИМИЯ И ОПАЗВАНЕ НА ОКОЛНАТА СРЕДА: ОБРАЗОВАНИЕ, ОРИЕНТИРАНО КЪМ ЛИЧНОСТТА НА УЧЕНИКА[1]

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Review of national publications…

- Identified main obstacles to students' motivation to study Chemistry:
  - Academic style of course book content which is difficult to understand - knowledge should be grounded on and oriented to practical experience;
  - Depreciated material base and insufficient modern equipment - one of the most serious problems related with the study of Chemistry;
  - Lack of specialized literature written in easy to comprehend language;
  - Not enough training courses for teachers related to the interactive methods of teaching Chemistry

The result: No willingness and motivation to study Chemistry

Review of national publications…

- And some more reasons in addition …
  - Insufficient number of chemistry classes - there is no time for lab exercises;
  - Large classes with no possibility to be divided into groups during lab exercises - no possibilities for normally conducted lab exercises and ensuing progress check;
  - Too large lesson units- students are unable to extract the most relevant information;
  - Students are inadequately capable to cull textual information, read charts, diagrams, graphs and chemical equations

The result: No willingness and motivation to study Chemistry

Review of national publications…

- Identified possible approaches to motivate students to study Chemistry:
  - Improvement the organization of the educational process: making explanations easy to understand and support them with practical exercises; involving students in scientific activities at school but also outside school;
  - Developing tools and alternative teaching material relying heavily on ICTs to be used by teachers ;
  - Providing continuous training to Chemistry teachers;
  - Development of conditions for self-realization of young people.

4. Review of national ICT- based teaching resources and materials to teach Chemistry

- Type of the reviewed Chemistry teaching resources :
  - Online courses - 5
  - Downloadable software - 4
  - Web sites - 6
  - Downloadable materials – 10
- Level of Chemistry knowledge:
  - Basic - 7
  - Medium - 14
  - Advanced – 1
- Level of education:
  - Primary school - 2
  - lower secondary school - 10
  - upper secondary school - 14

National ICT- based teaching resources…

- Pedagogical approach
  - Cooperative learning - 7
  - Problem solving - 2
  - Peer education - 3
  - Experimental learning - 4
  - Other (discussion, home schooling, self-education) – 5
- Subject area:
  - Life chemistry - 7
  - Environmental sciences - 8
  - Material Science - 1
  - General Chemistry - 12
  - Food science - 4

“www. Ucha.se”

- **Type:** Website (http://www.ucha.se), Online course, Downloadable material
- **Authors:** Darin Madzharov, Maria Nikolova
- **Level of Chemistry Knowledge**: Basic
- **Subject Area**: All subject areas
- **Target group level:** Primary, lower and upper secondary school
- **Pedagogical** Approach: Problem solving, Peer education

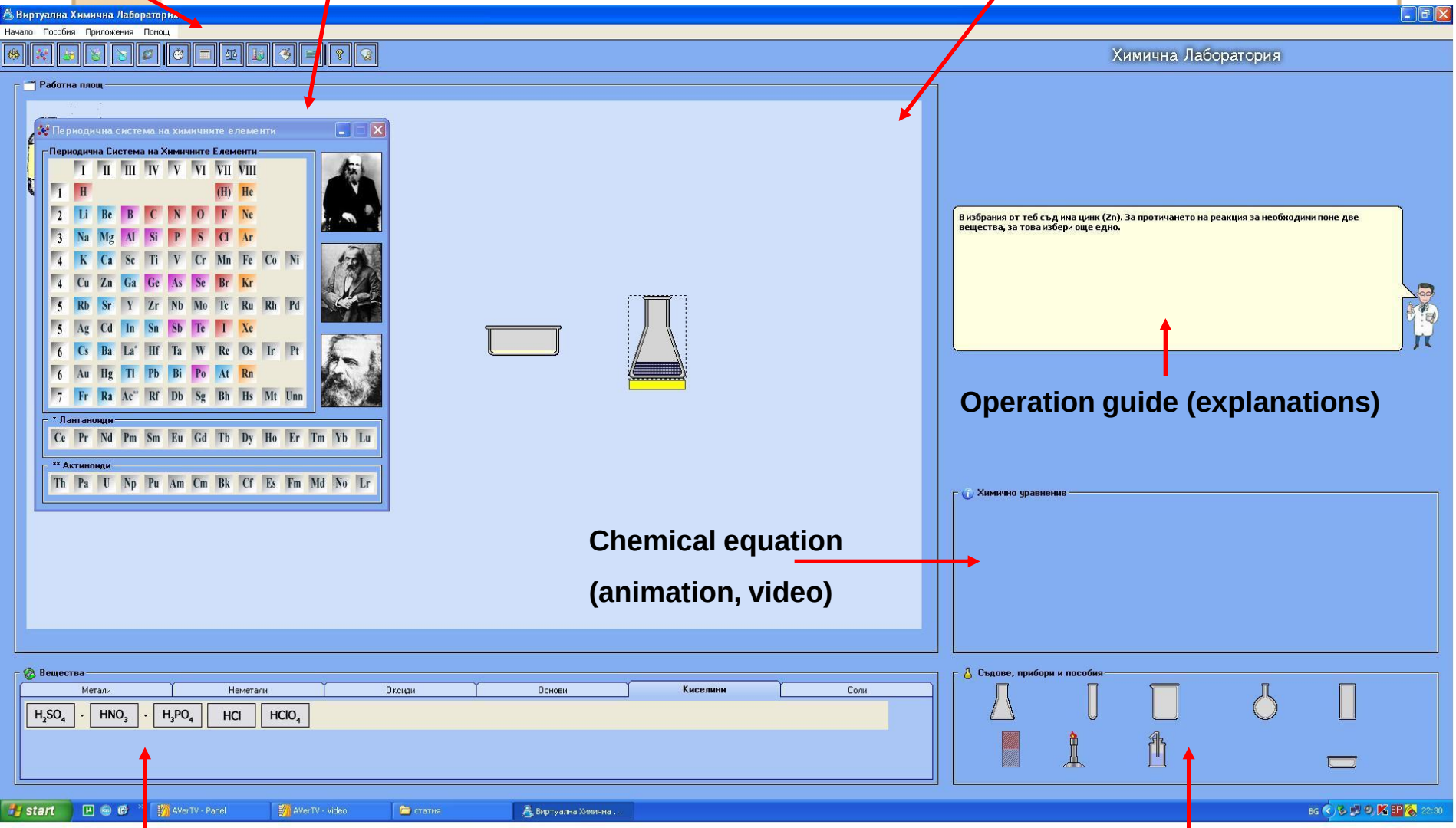
The best Bulgarian web-site in category “Education and Science” for 2012

Virtual chemical laboratory

- **Type:** Downloadable software (http:/chemistry.dortikum.net/bg/download/)
- **Author:** Boyan Mihaylov
- **Level of Chemistry Knowledge**: Basic
- **Subject Area**: General Chemistry
- **Target group level:** lower secondary school
- **Pedagogical Approach:** Experimental learning
- **Pedagogical Value:** students acquire basic knowledge about working in a chemical laboratory without the risk of potential accidents

Supporting tools:periodic table, the solubility table, the oxidizing and relative activity table and even a glossary

virtual worktable



Operation guide (explanations)

Chemical equation

(animation, video)

Chemical substances (metals, oxides, acids etc.

Lab equipment

5. Workshop on students' motivation to study Chemistry

- Participants:
  - *Secondary school Chemistry teachers;*
  - *representatives of universities and organizations involved in the national network* as experts;
- Discussed problems:
  - Motivation: how to achieve it
  - Students' motivation to study Chemistry – problems and solutions;
  - use of interactive materials in the process of teaching as a tool to stimulate students' interest and increase their motivation to study Chemistry;
- Basis for the discussions:
  - publications on students' motivation and interactive teaching materials on Chemistry available on the CIAAN Project portal

Results from the workshop:

- Identified the main reasons for the lack of students motivation to study Chemistry:
  - Material is theorized;
  - Lessons are monotonous and uninteresting;
  - Knowledge is not practical and useful;
  - Lack of understanding of the material and hence difficulty in learning it;
  - Lack of laboratory facilities and possibilities for the visualization of processes, etc.

Results from the workshop…

- Defined possible ways to increase students' motivation
  - provoking students' interest by using more user-friendly and interesting materials;
  - more interesting and effective presentation of the material via multimedia lessons, games and exercises;
  - teaching to become a positive emotion for students;
  - Illustrate the material to its practical realization through industrial tours and visits to companies;
  - A change in the teaching approach designed to encourage practical work on the problems of motivation, project work and networking.

Results from the workshop…

- Offered suitable for school teaching interactive materials, based on the following criteria:
  - To be developed in a simple scientific language;
  - To not hinder students in using them;
  - To allow independent teamwork;
  - To enrich the theoretical knowledge and practical skills of the students.
- Examples:
  - ArgusLab
  - Chemoffice,
  - 50 Really Cool Online Tools for Science Teachers
  - A Química das coisas etc.

Conclusions

- Negative tendency of Bulgarian school education nowadays is the lack of interest among students to study Chemistry.
- Possible approaches to improve the teaching-learning process and to motivate students could be:
  - *Improvement the organization of the educational process;*
  - Developing tools and alternative teaching material relying heavily on ICT to be used by teachers;
  - *Providing continuous training to chemistry teachers*
  - *Development of conditions for self-realization of young people*
- Effective tool for the practical implementation of these approaches can be ICTs based products that allow linking the skills and interests of today's web – generation to Chemistry curriculum, updated with the achievements of science in this area.

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