

# SUCCESSFUL EXPERIENCE IN CHEMISTRY TEACHING IN THE CZECH REPUBLIC

**Marcela Grecová, Zdeněk Hrdlička**

Institute of Chemical Technology, Prague  
Prague, Czech Republic



Education and Culture DG

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## Introduction to the national situation

- Czech educational tradition is slowly followed by new innovative teaching methods and trends.
- The main teaching form is still a **frontal teaching** of big group of students/pupils (25 and more).
- Some teachers in Czech Republic still give information and let students be passive.
- Reportedly, the main reasons of that are the **economic situation** and **workload** of chemistry teachers and thus **low teachers` motivation**.



- In the frontal teaching form, **innovative components** could be successfully incorporated:

- brainstorming,
- mind maps,
- students argumentation,
- discussion,
- ICT.



- **Cooperative teaching** (learning) is also considered as classic teaching method. This form leads students to share, cooperate and support each other. This helps to understand the curriculum.

# Innovative methods in Czech science teaching

## *Inquiry-based teaching (IBSE)*

- Czech educational system also follows new trends (with a slight delay).
- IBSE approaches focus on **student`s inquiry** as the **driving force** for learning.
- Teaching is organised via questions and problems in a highly **student-centred** inquiry process.
- Students learn to explore the problem, to ask questions, to carry out their own research and experiments from that they discover the regularities.
- Pieces of knowledge are not delivered by the teacher but **found by students**.
- Students gain not only new data and information but also **enjoy good feelings**.
- National conference **SCIENTIX** (organized by **European Schoolnet - EUN**) - practical workshops, where the participants tested a variety of innovative teaching methods in practice.
- The main goal of this conference was that each teacher took particular **inspiration** for his teaching.

<http://www.dzs.cz/cz/eun/narodni-konference-scientix/>

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Education  
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Training

## ***Project education***

- Project education form helps to motivate students to learn chemistry and to enhance competences like: cooperation, discussion, formulation of questions, problem solving, create and find information (competences necessary for laboratory work)

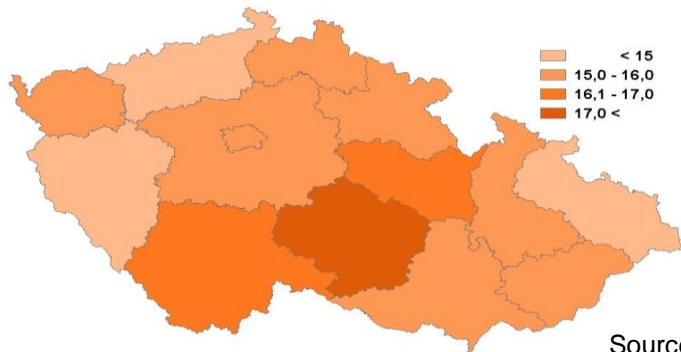
<http://www.projektovavyuka.cz>

## ***Open education***

- Students cooperate together.
- Weekly schedule informs about compulsory work and what is voluntary.
- It is not limited to the borderline of the school.



## ***ICT-supported chemistry teaching***



Source: [www.czso.cz](http://www.czso.cz)

- visualisation of information
- support of cooperative teaching forms
- of experiments enables e-learning and promotes
- support interdisciplinarity (ICT, English)

- powerpoint slides
- graphs, tables
- short videos of experiments
- virtual labs
- e-learning



- The institute supports innovative methods and trends, mediates information, initiatives for teachers, experts and schools.
- Focused on Montessori School, Waldorf School, intercultural schools, intuitive education etc.
- It provides an **online portal** with a list of successful schools which involved innovative teaching in their daily practice.

### ***Innovative training of future teachers of chemistry***

The aim is to allow prospective chemistry teachers to be in a **close contact** with pupils at primary and secondary schools through

- management of **students' projects** directly in chemistry lessons,
- tutoring **laboratory** lessons,
- organizing **Chemistry Olympiad** at schools and **excursions** to laboratories for pupils,
- chemistry **consultations for talented** secondary school pupils,
- preparation of natural science **competitions** and **popularizing events**

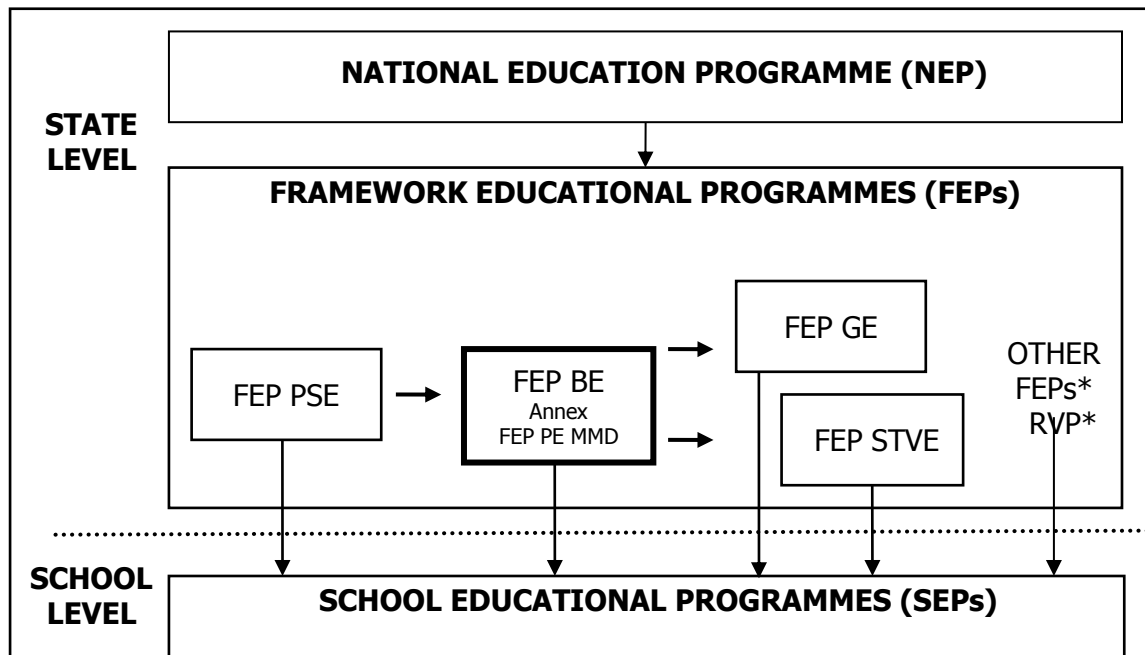


[ucitelchemie.upol.cz](http://ucitelchemie.upol.cz)

# Key competences and their development in chemistry education

National Education Development Programme for the Czech Republic (“White Book”)

- A new curricular system was introduced into the Czech education system (age 3 to 19).



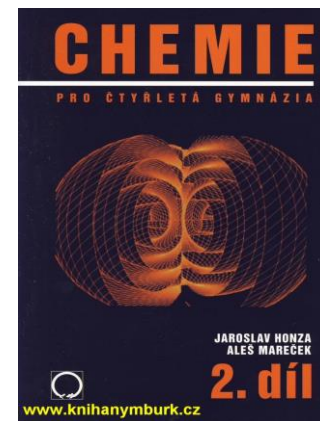
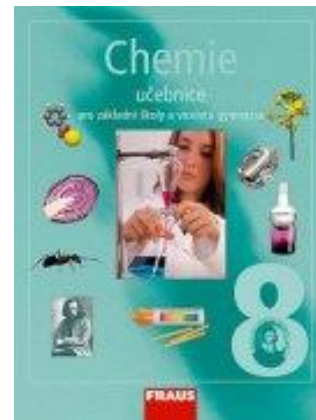
Chemistry is included in the area „Humans and Nature“ (Physics, Chemistry, Natural Sciences, Geography)

## Chemistry textbooks

Pupils and students often learn the curriculum from outdated textbooks that do not correspond with current knowledge. However, we would like to mention two successful textbooks:

- Chemistry for basic schools (8<sup>th</sup> and 9<sup>th</sup> grade by J. Škoda and P. Doulík (2006)
- Chemistry for secondary schools by J. Honza and A. Mareček (2008)

The main aim is to motivate pupils to study chemistry,  
not to discourage them from it.





## What is accentuated?

- **usability** of the acquired knowledge in practice
- **interdisciplinary** relations with other subjects (not only science-based)
- support of the curriculum by **individual experiences** of pupils and their **children conceptions**
- importance of real and virtual **experiments**
- direct **observation**, various ways of **modelling**, **visualisation**
- **individual work** of pupils (projects, searching of information)
- **generalizing approach** (induction of general principles from concrete things, phenomena, facts and knowledge)
- **motivation** to learn chemical phenomena and processes
- considerable empowerment of the **biochemistry**-related curriculum

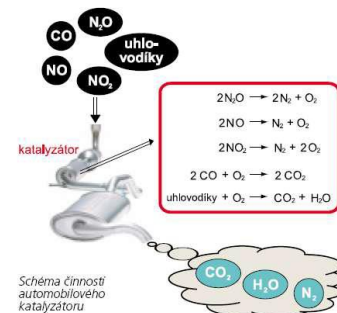
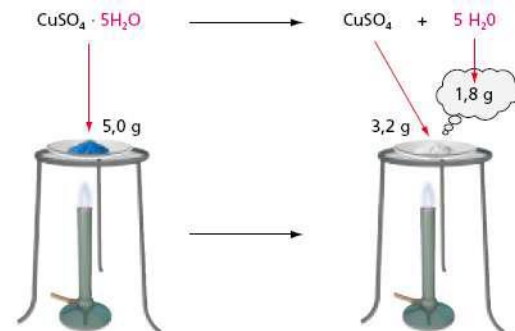


Schéma činnosti automobilového katalyzátoru



## What is suppressed?

- mechanical memorizing of **empty** and **useless facts**
- factual approach of chemistry teaching **without relation** of findings **with the real life**
- **too abstract** passages of general and physical chemistry
- **complex** nomenclature, calculations and chemical equations **without practical importance**
- mutual **isolation** of **inorganic** and **organic** chemistry
- **long commentary** passages in the textbook
- **understanding chemistry as theoretical and useless subject**



# Activities helping teachers to develop their skills

- journals and books
- conferences and lifelong learning programmes
- projects and portals
- **CIAAN project**
  - workshops for science teachers
  - teaching resources on the web portal
  - international conferences

The screenshot shows the homepage of the Chemistry Is All Around Us Network Portal. At the top, there is a banner with the text "CHEMISTRY IS ALL AROUND NETWORK" and a navigation bar with a search box and a "Log In" button. Below the banner, there is a "Welcome to the Chemistry Is All Around Us Network Portal!" message. The main content area is divided into several sections: "Students' Motivation", "Teachers' Training", "Successful Experiences", and "Teaching Resources". Each section contains a brief description and a list of links or resources. On the left side, there is a vertical menu with buttons for "Homepage", "Teaching Resources", "Students' Motivation", "Teacher Training", "Successful Experiences", "International Conferences", "Network", "Testimonials", "News Archive", "Links", "Project Infos", and "Contacts". At the bottom, there is a logo for the Lifelong Learning Programme and a disclaimer.



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## Conclusions

- Innovative teaching methods are slowly introduced to Czech educational system.
- Much time and effort will be required to implement them properly.
- The implementation depends on the (not only financial) support (from school directors, local, regional and state government, legislative etc.)
- Nevertheless, we have reported some examples of good practice in chemistry teaching.

# Thank you for your attention!



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