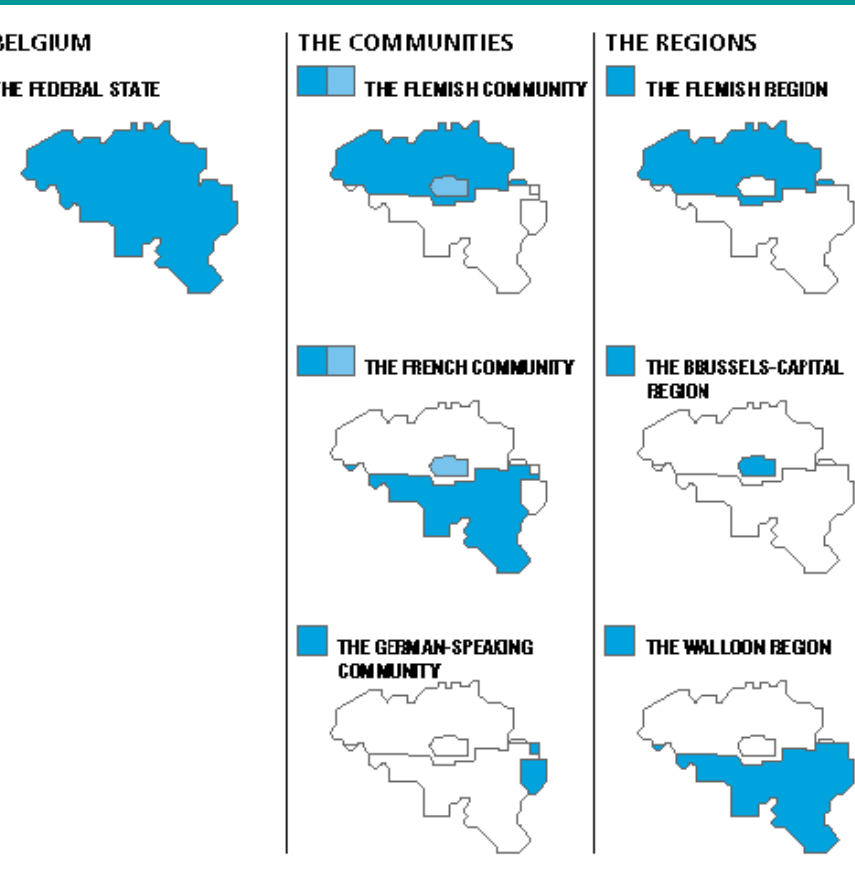


Secondary school education in the French- and German- speaking regions of Belgium

Current issues

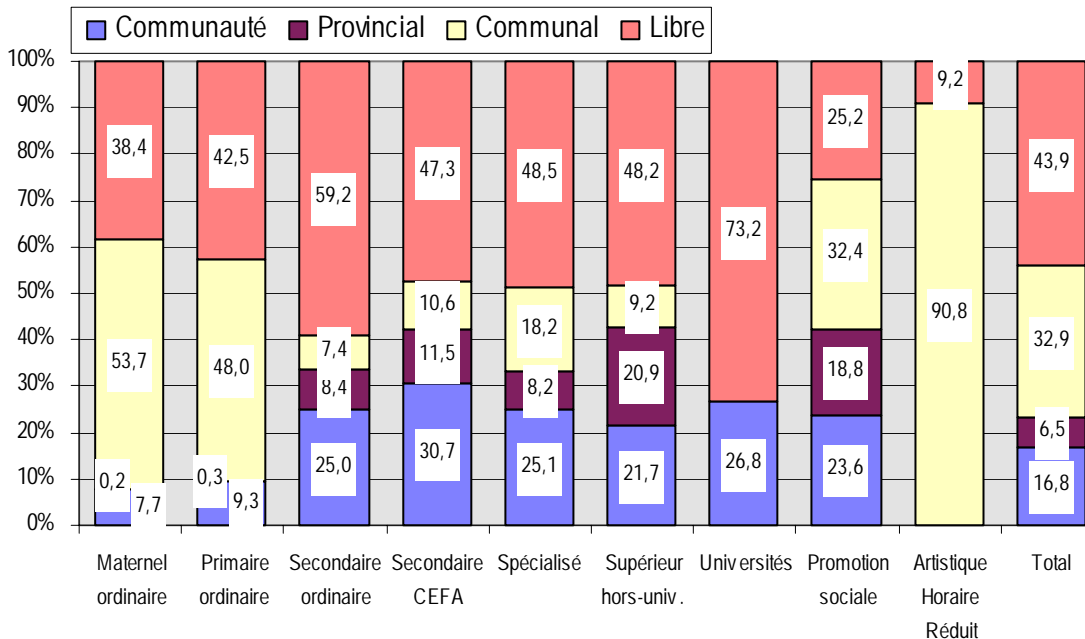
General Landscape



- Belgium is a federal state made of three communities (based on the language) and three regions (based on territory)
- Education is handed by the Communities since 1989
- Schooling is compulsory from the age of 6 to 18
- There are 3 education networks :
 - community schools
 - subsidized private schools (mainly catholic schools)
 - subsidized official schools (organized by communes and provinces).
- French-speaking Community
 - 3.358.560 citizens
 - 347009 students in secondary schools
 - Education budget: 4,3 milliards € for compulsory education
- German-speaking Community
 - 71.287citizens
 - 5186 students in secondary schools

A few statistics

Élèves/Étudiants : Part des réseaux par niveau d'enseignement



German speaking community (2005-2006)

General Secondary schools

- Community schools: 2291 students

- Catholic schools: 2895 students

Teacher associations

- Association Belge des Professeurs de Physique et de Chimie (ABPPC) (covers both French- and German-speaking regions) <http://w3.umh.ac.be/abppc/>
- PROBIO: Biology Teacher Association <http://www.probio.be/>
- FEGEPRO: Geography Teacher Association <http://www.fegepro.be/>
- SBPMef: Mathematics Teacher Association <http://www.sbpm.be/>
- Annual Three-Days Multidisciplinary Congress (« Congrès des Sciences ») (End of August) <http://www.congres-des-sciences.be/>

ABPPC : "Association Belge des Professeurs de Physique et Chimie"

Founded in 1962 by physics and chemistry inspectors and by teachers from all secondary teaching systems (pluralism)

At the moment secondary and university teachers are working together in this association

- publishes a bulletin every three months, which enables exchanges between teachers and favours the information
- organizes physics Olympiads, and take part in international and European Olympiads
- organizes every year a three day meeting at the end of august

Its action is limited:

- because it depends on voluntary work of the members
 - its mission is not to discuss about the curricula, the pedagogical methods, teaching training
- Moreover the Inspectors take part in the work of the association.

Didactical Issues

Course organization in the upper level secondary schools (4th-6th year)

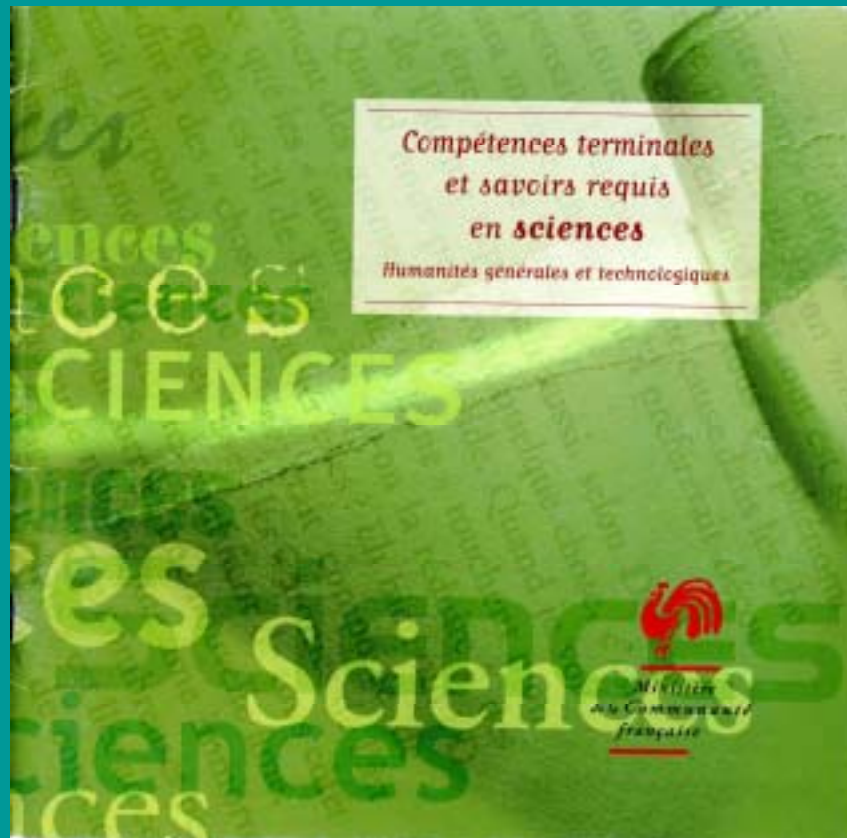
- 2 levels
 - Basic sciences (elementary level): 1 period/week for physics, chemistry and biology respectively
 - General sciences (advanced level; preparation for science-oriented university studies)
- Number of periods/week for **Chemistry** « **General Sciences** » (Community school network)

Year	French-speaking Community	German-speaking Community
4th	2 + optional lab. work	2 + 1 (Lab. work)
5th	2 + optional lab. work	3 + 1 (Lab. work)
6th	2 + optional lab. work	3 + 1 (Lab. work)

- Different possible combinations of the science courses in the German-speaking community
- French-speaking community: all sciences on equal footing (2 periods Physics + 2 periods Chemistry + 2 periods Biology + 1 optional period Physics) but **some fluctuations are allowed depending on school project.**

Didactical Issues

Teach Competences rather than mere Facts!



Didactical Issues

Teach Competences rather than mere Facts!

- New law voted in 1997 (applied since 2001)
 - Competences and behaviours common to the three scientific disciplines
 - Specific learning outcomes and knowledge for each discipline
- The **basic science** courses promote competences which are necessary for developing a responsible citizenship
- The **general science** education is oriented towards the preparation of science-based higher studies
- We are in the ongoing process of implementing this new competence-based approach in the secondary schools
 - Develop appropriate teaching methods
 - Devise adapted teaching materials
 - Develop assessment procedures

General Sciences

Generic competences

Education must make students aware that:

- Science construction is based on models
- Sciences aim at improving the living conditions of mankind and environment
- Sciences are primarily experimental by essence
- Spontaneous mental representations have to be permanently confronted to well-established scientific models
- Sciences are interconnected to other disciplines to reach a global vision of reality
- Sciences emerge and develop in given cultural, socio-economical and technical environments
- Science favours a reflection about ethical commitment
- Science development requires a mix of inductive, deductive and analogous reasonings.

General Sciences

Generic competences

Adopt scientifically ethical behaviours

- Intellectual integrity
- Good balance between open-mindedness and scepticism
- Curiosity
- Will to work in a team-oriented way

General Sciences

Generic competences

The students are expected to become able to

- Understand basic concepts, models or principles
- Conduct a (limited) research project and use models
- Use defined experimental procedures
- Build up a logical argument
- Communicate information, ideas, problems and solutions
- Solve practical applications and analyze the results
- Make use of the adapted mathematical and computer tools
- Establish the link between their scientific background in a given discipline and that of another one (e.g., chemistry and biology)
- Establish the link between science in general and other disciplines (emergence of given scientific concepts in a given society)

Specific Competences in Chemistry

- How is matter built up?
- Matter at atomic and molecular scales
- Periodic properties
- Ionic model
- Cohesion of matter
- Perfect gas law
- Solutions
- The chemical reaction
- Elements of thermodynamics and chemical kinetics
- Main chemical reactions and properties of usual compounds
- Basic organic chemistry
- Applied chemistry

How to assess competences?

- A working group has been established to develop evaluation tools known as « evaluation matrices ». http://www.enseignement.be/@librairie/documents/EVAL/OUTILS/HGT/HGT_intro.pdf#search=%22%22Commission%20des%20outils%22%22
- An evaluation tool is based on a « complex task » requiring multiple competences. In the spirit of their initiators, such a task should be
 - Open
 - Original (unprecedented, at least to some reasonable extent)
 - Unguided (at least ideally)
- This requires the definition of adapted indicators for the different competences
- Libraries of complex tasks are under development for the various disciplines.

■ Examples

- Analysis of an experimental protocol
- Problem involving multiple tasks: using equations, transforming equations, making a graphical representation (either qualitative or quantitative or both), performing numerical applications ...
- Analysis of experimental data: plotting results, evaluating them using appropriate equations, comparing to the predictions of a model

■ Assessment takes into account specifically (non exhaustive list):

- Quality of language
- Logical reasoning
- Proper use of units
- Accuracy and precision (significant digits!) of the numerical results
- Origin of mistakes: misunderstanding of the scientific aspects related to the specific question to be answered, or difficulties with some prerequisites, in particular mathematical

■ The process is still in its infancy but is gathering momentum!

Thank you for your attention!