

## **Chemistry Teachers' Training in the Fédération Wallonie-Bruxelles (Belgium)**

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with contributions from

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### **Abstract**

*In Belgium, education is not a national matter. Belgium is divided in three territorial regions (Brussels, Flanders and Wallonia) and three communities based on the three official languages of the country (Dutch, French and German). Education is the responsibility of communities, in our case the French-speaking Community, officially called "Fédération Wallonie-Bruxelles" (referred to as FWB) as French is spoken in Wallonia and Brussels. In the FWB, teacher training depends on the Ministry of Upper Education.*

*Two approaches to teachers' initial training are organised:*

*The initial training of primary school (for pupils between 6 and 12 years old) and lower secondary school (12 to 15) teachers is called "régendat", or AESI. It is organised in non-university colleges, called in Belgium Hautes Écoles (HE) This training last three years and leads to a bachelor's degree with a professional orientation.*

*The AESS is the initial training of upper secondary school teachers (for 15 to 18 year old students). It is organised in universities in a five-year cycle and leads to an academic master with a didactic orientation, or in a six-year specialised academic master with extra training in didactics.*

*A project of structural reform of teachers' initial training is currently under consideration to change the composition of the upper education landscape. The project intends to extend the non-university training cycle in order to harmonise it with university training and to build new frames of reference of skills. All secondary school teachers would therefore be trained in the same way. This approach has to redefine the profession of teacher in its multiple missions: pedagogic, didactic and as a social and cultural partner.*

## **1. Initial training**

### **1.1 Lower secondary school teachers**

#### **A. Current organisation**

This initial training is the result of the decree "initial training of primary school teachers and régents" [1] of the 12<sup>th</sup> of December 2000, adapted after the decree "standardisation of upper education in the *Fédération Wallonie Bruxelles*" [2], commonly called the "Bologna decree", of the 31<sup>st</sup> of March 2004.

Access to initial training is not governed by a competitive exam or by the introduction of a personal dossier; anyone with a secondary school certificate can enter.



The training is organised in a three-year bachelor's degree with professional orientation. It is divided in sections (in our case, pedagogy) and sub-sections (sciences). It associates theory and practice as soon as the first year: there is a progressive and continuous interaction between academic knowledge, teaching skills, educational skills and supervised professional practice with the "target audience", that is 12 to 15 year old pupils and field teachers.

## B. Curriculum

This description is mainly based on the curricula of two of our partner schools that train teachers, HELMo [3] in Liège and ENCBW [4] in Louvain-la-Neuve. Although there may be some variations in other schools, they can be considered as representative of teacher training in Belgium.

The training can be divided in three kinds of activities: 1) common courses to all the sections of the school; 2) specific courses for one section; 3) practical activities in small groups. Courses related to the profession of teacher include educational practices, psychology, sociology, group management, ethics, French... Science courses are directly related to teaching practices with title such as "Chemistry and Didactics"; students learn not only sciences but also how to teach sciences. To these must be added internships in schools and practical training workshops (simulation of a lesson).

Computer technologies are not included in the official curriculum of initial training. However, specific initiatives are taken by schools to train future teachers to use ICT in class. For instance students can be asked to create a lesson on one given subject using ICT.

Certification is based on assessments by trainers each year during written, oral and practical examinations and throughout the year (for internships for instance). At the end of the cycle, an end-of-studies project, the dissertation, is produced and defended by the student.

It must be noted that chemistry is not taught as a separate subject in primary school and during the first cycle of secondary school (first two years, 12 to 14 year old students). Biology and physics are always taught in first and second years although the curricula of most networks (i.e. the authority that organises education) contain generic titles such as "sciences" or "scientific training". Chemistry is taught to all students in general education in the second cycle (third and fourth year) and third cycle (fifth and sixth year). Therefore, *régents* in science would only teach chemistry in the third year (14-15 year old students), at a basic level. For this reason, there are less credits and hours dedicated to chemistry than to the other two sciences in our reference schools. To teach in fourth, fifth and sixth year, a university master is necessary.

## 1.2 Upper secondary school teachers

### A. Current organisation

The universities organise the initial training according to modes defined by a decree of the 8<sup>th</sup> of February 2001 [5]. The AESS includes at least 300 hours of lessons and teaching internship and is spread on a complete academic year.

The AESS presupposes that the student has mastered the subject and achieved a scientific approach during the disciplinary Master, the great difference with training in AESI (which is centred on pedagogic content). 300 hours are meant to compensate the absence of pedagogic and didactic training from the curriculum of the disciplinary Master.



Since the “Bologna decree” [2] of the 31<sup>st</sup> of March 2004, pedagogic training has been integrated in the curriculum of the Master (didactic orientation). Thus, there are currently two ways to achieve the AESS: either the Master with a didactic orientation (in two years, following the three-year baccalaureate) or a master with another orientation (disciplinary, for instance) followed by an additional year with 30 AESS credits (therefore six years in total). It must be pointed out that the proportion of students in either way varies a lot according to the subjects but most programme managers agree that masters with a didactic orientation are not as successful as expected regarding the number and quality of students.

## B. Curriculum

The future teacher starts with three-year bachelor studies in chemical sciences. The first year includes lessons of general chemistry along with other sciences (biology, mathematics...). During the next two years, the chemistry lessons are divided in several sub-sections (physical chemistry, organic chemistry, environmental chemistry...). Computer lessons may be taken as an option. When they choose the master with a didactic orientation, students have not only lessons in various branches of chemistry, but also in chemistry didactics. The master also includes courses that are not specific to sciences; such courses are common to all the masters with a didactic orientation, whatever the subject. Among these are courses of pedagogy, interdisciplinary approach, professional ethics, education sociology, school institutions... Their importance varies according to the university; courses of this kind are more numerous at the University of Liège than at the Catholic University of Louvain (the two main universities in Wallonia and our partners in this project). Seminars, on-site observation periods, internships and the final dissertation are also part of the didactic master. Chemistry didactics is taught along with biology, as those two subjects are often taught by a same teacher in secondary school. The future teacher will also take a third discipline as a minor option, which in most cases will be physics.

During the AESS, students are trained to create interdisciplinary lesson sequences in natural sciences using active learning and centred on the acquisition of skills. These sequences are created by small groups (three or four students), are based on secondary school curricula and aim to be as close as possible to the reality they will experience as teachers. The topic chosen is related to daily life so as to be motivating. The future teacher will also devise experiments and the prerequisites, produce documents for students and teachers and create concept maps.

Along with the theoretical and practical lessons, the AESS includes seminars, conferences and internships. Together, they aim to 1) understand and analyse the school institution, its framework and actors; 2) conceive, structure, plan, manage and assess teaching-learning situations; 3) think about one’s teaching practices and their context. The internship is assessed according to four axes: 1) mastering the disciplinary content and the French language; 2) teaching skills, related to the disciplines taught; 3) educational skills; 4) metacognitive skills.

## 2. In-service training

Every secondary school in the FWB is attached to one of the four networks: the one organised by the FWB, those of provinces and municipalities, the so-called denominational free network (mainly Catholic education: SeGEC) and the non-denominational free one (private education). Each network works in its own way but is subsidised by the FWB, provided that it respects a series of injunctions. The institution that provides in-service training depends on the network. There are various possibilities of in-service training for teachers:

- **Training.** Any staff member has to take only three days of training each year, divided between one day organised by a public benefit organisation, IFC (*Institut de Formation en cours de Carrière* –



Continuing training Institute, of which INFOREF is a partner recognised as a training organisation), two days organised by the network and/or the school. The subject is not compulsory; teachers can choose any training offer in a catalogue (disciplinary content, teaching skills, ICT...).

- **Asking support from educational advisors.** The request can be issued by a team of teachers, the headmaster, or be required after an inspection. Particular attention is paid to new teachers. Several organisations guide them while they are settling in the work.
- **Participating in working groups.** On the initiative of universities, schools or private individuals, teachers meet and discuss a given topic to share professional practices, ideas and experience.
- **Participating in coaching sessions.** Universities organise sessions to update knowledge.
- **Working together with “Advanced Technology Centres”.** These offer schools to train teachers and students to use material (e.g.: industrial material, ICT) which is too expensive for schools to purchase.
- **Consulting the Internet.** *Agrégations* and teachers associations work to create innovative lesson sequences, computer animations, spectacular experiments, and gather their information together on websites known to the teachers.

More specifically for chemistry teachers, the following initiatives can be mentioned:

The biology and chemistry didactics groups at the University of Liège organise in 2013-2014, with IFC, a common two-day training session for experienced science teachers focussing on how to optimise the supervision of the practicums of future teachers during their pre-service training.

One introductory conference to the “*Printemps des Sciences*” (science event [6]) is organised on a yearly basis in February. It is intended for secondary school teachers and for students in science didactics. It consists of two or three lectures given by university specialists but at an adapted level, on themes that can be addressed in secondary school classes and that favour an interdisciplinary approach. Themes of the previous years include: heavy rain and flood: “how can we limit the damage?”, “rare-earth metals”, “the evolution of matter”, “extreme temperatures” etc.

The “*Groupe transition*” of the University of Liège, in which the chemistry didactics group participates, has developed a website [7] covering basic chemistry knowledge. Its aim is to help students make a smooth transition from secondary school to higher education.

### 3. Initial training reform

An evaluation of teachers’ initial training was carried out in 2011-2012 [8]. It is the base of a reform that should be progressively applied starting from next year. The harmonisation of teacher training will be one of the results of this reform. Continuing training will also take place in a stricter framework than it does now.

The project decree plans to create an Academy of Research and Upper Education. This academy would oversee five poles, centred on the five French-speaking universities (Brussels, Liège, Louvain, Mons and Namur) around which would gravitate the other upper schools (“*hautes écoles*”). The organisation of the studies and the status of the student will also be changed.



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