



## **CREATIVE LITTLE SCIENTISTS: Enabling Creativity through Science and Mathematics in Preschool and First Years of Primary Education**

### **D3.2 Report on Mapping and Comparing Recorded Practices**

#### **ADDENDUM 2 of 13: National Report on Approaches in Policy in Wallonia (Belgium)**

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## Table of Contents

<b>Executive Summary .....</b>	<b>4</b>
<b>1. Aims of national report.....</b>	<b>12</b>
1.2 Defining terms.....	12
1.2.1 Policy.....	12
1.2.2 Curriculum.....	12
1.2.3 Creativity.....	13
<b>2. Overview of National early years Education provision and policy.....</b>	<b>14</b>
2.1 Some general information about the Belgian educational system .....	14
2.2 Early years education provision and policy in the French Community.....	15
2.3 Current policy issues or priorities in (early years) education in the French Community.....	19
<b>3. Research Questions and Methodology .....</b>	<b>21</b>
3.1 Research Question .....	21
3.2 Method.....	22
3.2.1 Data selection .....	22
3.2.2 Survey tool .....	23
3.2.3 Completion of the Survey Tool .....	24
3.2.4 Context of policy messages .....	24
<b>4. Approaches to Teaching, Learning and Assessment .....</b>	<b>25</b>
4.1 Rationale or Vision .....	25
4.2 Aims and Objectives .....	27
4.3 Content.....	28
4.4 Learning Activities .....	29
4.5 Teacher Role / Location.....	31
4.6 Materials and Resources .....	32
4.7 Groupings.....	32
4.8 Time.....	32
4.9 Assessment.....	33
<b>5. Approaches to Teacher Education.....</b>	<b>36</b>
5.1 Initial teacher education .....	36
5.2 Continuing professional development .....	39
<b>6. Summary .....</b>	<b>40</b>
6.1 Limitations.....	43
6.2 Implications.....	44
6.2.1 In-depth field study.....	44
6.2.2 Policy recommendations.....	44
<b>7. References.....</b>	<b>46</b>
<b>Appendix A: Survey Ratings: Analysis of Approaches to Teaching and Learning .....</b>	<b>48</b>

## Executive Summary

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This report describes policy issues in the French community of Belgium concerning early years, creativity mathematics and science education. This report is one of 13 European national policy reports that are contributing to the Creative Little Scientist Project deliverable (D3.2 Report on Mapping and Comparing Recorded Practices) mapping and comparing policy approaches across Europe.

In order to map the key messages in policy of the Flemish and the French Community, as well as allow comparisons with other nations, both reports (report of the Flemish and of the French Community) draw upon a survey instrument used to rate the extent to which certain approaches, and the role of creativity is emphasised across relevant policy documents in this area. The survey tool was designed drawing on two key sources. Firstly, approaches were distinguished according to nine curriculum themes: Rationale, Aims, Content, Learning Activities, Teacher Role / Location, Materials and Resources, Groupings, Time, and Assessment. Secondly, specific approaches within these dimensions were identified from prior work in this project (the D2.2 Conceptual Framework and D3.1 List of Mapping and Comparison factors). The ratings given from the survey were then discussed in sections within this report that drew upon other sources / commentaries to interpret approaches with the particular context of education and policy in the French Community.

In this summary the situation of the Belgian educational system is discussed and a brief comparison between the Flemish and the French community concerning early years, creativity, science and mathematics education is made.

This report discusses in greater detail the findings from policy in the French Community, and importantly the implications, not only for the fieldwork planned in the next project phases, but for policy recommendations.

### **Some general information about the Belgian educational system**

The Belgian constitution (article 24) guarantees the principle of freedom of education, which comprises freedom of choice and the so-called pedagogical freedom, namely the right to autonomously establish schools. There exists also not *one* Belgian educational system but in fact three separate systems with distinct characteristics: the French Community, the Flemish Community and the German-Speaking Community. Since 1989, the Flemish community is responsible for all educational matter and the administration of education in its language region, with the exception of the beginning and the end of compulsory education, the minimum attainment levels for the granting of a certificate and the pension system. The first two exceptions were made to secure a minimum of coherence among the educational systems within the Communities.

**Differences and commonalities between the educational system in the French and the Flemish community**

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	<b>Flemish Community</b> <i>Freedom of education</i>	<b>French Community</b> <i>Freedom of education</i>
<b>core curriculum – objectives – vision of the educational system</b>	<p>Decree on Elementary education of 25 February 1997</p> <p><i>Vision and general objectives</i></p> <p>In Flanders the essence of elementary education - early childhood and primary education - is to prepare pupils for critical and <b>creative functioning</b> in society and for the development of their personal life. The children’s diversity in personality, talents and background have to be taken into account.</p> <p>Emphasis is put on some fundamental elements in development of a child.</p> <p>The <b>development of the personal core</b>. Basic characteristics such as self-esteem, motivation and initiative are woven as a thread through the whole of the development aims and attainment levels.</p> <p>The <b>general development</b> through goals aimed at learning to communicate and collaborate; the acquisition of independence; <b>creativity and problem solving</b> interaction with the world and self directed learning. These goals can be found in all learning areas as well as in the cross-curricular themes, implicitly or explicitly.</p> <p>The <b>specific goals</b>: specific learning area goals.</p> <p><i>Development aims</i> (pre-primary education) and <i>attainment levels</i> (primary education). Development aims are formulated for the end of pre-primary education and attainment levels are formulated for the end of primary education (12 years). No specific levels are indicated for young pupils (8 year, 10 year), this is the domain of the organising bodies.</p>	<p>Mission Decree of 24 July 1997</p> <p><i>Vision and general objectives</i></p> <ul style="list-style-type: none"> <li>• To promote self-confidence and personal development of all pupils;</li> <li>• To enable all pupils to acquire knowledge and the abilities that they need to acquire throughout their lives and to play an active part in economic, social and cultural life;</li> <li>• To prepare all pupils to become responsible citizens, contributing to a democratic, mutually supportive, pluralist and open to all other cultures, society;</li> <li>• To provide all pupils with equal opportunities for social advancement.</li> </ul> <p>Pre-primary education is specifically designed to</p> <ul style="list-style-type: none"> <li>• develop awareness of the child of his or her own potential and promote self-expression through <b>creative activities</b></li> <li>• develop socialization</li> <li>• develop cognitive, social, emotional and psychomotoric competencies</li> <li>• identify difficulties and disabilities of children and provide the necessary remedial</li> </ul> <p>Primary education is officially expected to pursue the following overall objectives:</p> <ul style="list-style-type: none"> <li>• to prioritise learning how to read, with the emphasis on deciphering, written work and communication;</li> <li>• to gain a mastery of the basic <b>mathematical tools</b> for <b>problem-solving</b>;</li> <li>• to enable children to attain the overall objectives of compulsory education via a range of educational activities.</li> </ul>

	<p>Separate objectives for pre-primary education irrespective of the vision on the core curriculum is formulated for elementary education to form a bridge between pre-primary and primary education. General objectives are general for pre-primary and primary education.</p>	<p><i>Socles de compétences:</i> in the French Community the ‘socles de compétences’ concern the different subjects: French, mathematics, initiation to science, modern languages, physical education, education through technology, artistic education, initiation to history and geography including social and economic life. They include also cross curriculum competencies and subject-related competencies. For each competency and in each of the phases (at ages 8, 12, and 14), an achievement level is indicated: raising awareness of exercising the competence, certifying it, or further developing it.</p>
<p><b>Science and mathematics</b></p>	<p><u>Science</u> is not a separate learning area, but part of the learning area world orientation.</p> <p>Specific content isn’t formulated, some domains are mentioned.</p> <p><i>Goal of World orientation</i></p> <ul style="list-style-type: none"> <li>- The children develop basic competences that enable them to explore themselves and their environment each time further and more profound.</li> <li>- The children develop interest for the live of people now, and in the past, here and elsewhere in the World.</li> <li>- The children develop a basic attitude of openness and respect towards nature, people and society.</li> <li>- The children develop basic skills to cope independently with information.</li> </ul> <p><u>Mathematics</u> is a separate learning area.</p> <p>Strategic objectives are formulated and specific mathematical domains.</p> <p><i>Goal of Mathematics education</i></p> <ul style="list-style-type: none"> <li>- The children attain some basic mathematical concepts, know-how and skills that are needed to function adequately in society</li> </ul>	<p><u>Science</u> is a separate learning area. In this area competences are formulated which are linked with know-how (skills in science) – there is a link with inquiry based education (and the different phases in a research). Specific content is formulated.</p> <p><i>Goal of Science education</i></p> <p>to solve a complex situation through the implementation of a scientific approach.</p> <p>Science learning covers both the development of specific and transversals competences and the acquisition of knowledge skills. Science learning proposes methodologies which are appropriate for youth, so they take ownership of them and will use them in different circumstances. The progressive construction of knowledge and skills is the paradigm of any scientific approach. The study of sciences offers a certain specificity because for young people it opens up their natural environment and puts them in direct contact with real objects, natural phenomena and the living beings.</p> <p><u>Mathematics</u> is a separate learning area.</p> <p>Cross circular objectives are formulated and specific mathematical domains.</p> <p><i>Goal of Mathematics education</i></p> <p>The mathematical thinking is first (initially) developed through objects, situations and observations in real live, questions concerning mathematical</p>

	<p>and / or necessary for the further study career.</p> <ul style="list-style-type: none"> <li>- The children are able to relate and use the acquired mathematical knowledge, understanding and skills in meaningful concrete situations, but also in other learning areas and outside school.</li> <li>- The children understand the language of mathematics, both in mathematics lessons and beyond.</li> <li>- The children develop a research-oriented attitude that will help them in detecting and investigating various mathematical relationships, patterns and structures.</li> <li>- The children use valuable search strategies to solve mathematical problems.</li> <li>- The children learn to guide their own mathematical thinking and learning and to reflect on it.</li> <li>- The children develop an adequate, constructive and critical attitude towards mathematics in general.</li> <li>- The children develop a positive attitude towards mathematics as a learning area at school.</li> </ul> <p>In the early years the focus is on discovery, experimentation, observing, play, corner work, collaboration, project work, excursions,... and teachers are advised to integrate all learning areas because the everyday world is not divided in learning areas.</p>	<p>topics. Mathematics is not limited to the transmission of knowledge. From the first years of elementary education to the end of the first level of secondary education, the use of imagination, the stimulation of reflection and the development of critical thinking about observations, are important elements for pupils to understand and explore their environment. This document presents two types of skills: General or transversal competences and competences related to mathematic tools and approaches. It is in the resolution of problems that the student develops mathematical skills, acquires deep knowledge and develops a confident and active personality.</p> <p>In the early years (pre-primary education) the focus is on discovery, exploring, observing, play, ... and an integral approach is promoted.</p>
<p><b>Creativity</b></p>	<p>In education in Flanders there is a focus on supporting children in the development of their personal life and on preparing them for critical and creative functioning in society. So creativity is mentioned in the vision or the rationale of the core curriculum.</p> <p>Aspects such as creativity, problem solving and sense of initiative are incorporated implicitly or explicitly in the development aims, attainment levels and cross-circular themes.</p>	<p>In education in the French community there is a focus on supporting children in the development of their personal life (and self-confidence), on preparing them for critical and responsible functioning in society.</p> <p>Creativity is specifically mentioned in the Mission Decree in article 12 concerning pre-primary education.</p> <ul style="list-style-type: none"> <li>• develop awareness by the child of his own potential and promote self-expression through creative activities</li> </ul>

	<p>In the vision of the core curriculum is stated that schools should emphasize active learning and broad education.</p> <p>In pre-primary education there is a focus on play, exploration, discovery, fantasy, creation, ... In primary education there is a focus on problem solving strategies, experiments, exploration, creation, ...</p>	<p>Problem solving is mentioned in the overall objectives of primary education.</p> <ul style="list-style-type: none"> <li>• to gain a mastery of the basic mathematical tools for problem-solving.</li> </ul> <p>The competences (objectives) formulated in the learning domain science have a tight link with inquiry based education. However no specific inquiry based activities are mentioned in the socles de compétences. The cross circular competences described in the learning domain mathematics are competences necessary for pursuing problems.</p> <p>In the Mission Decree is stated that schools should emphasize activities that stimulate discovery, production and creation.</p>
<p><b>Learning activities</b></p> <p><b>Teacher role</b></p> <p><b>Location</b></p> <p><b>Grouping</b></p> <p><b>Time</b></p>	<p>Due to the freedom of education organising bodies of educative institutions are free in choosing pedagogical and didactical methods.</p> <p>However in the core curriculum 4 principles are incorporated, amongst them</p> <p><i>Active learning</i> includes solving a problem together with a fellow pupil, organizing one's own work, being given the change to explain one's own working method, learning about the working methods of others, asking for extra information, checking one's own solutions, and being given the change to explore one's own aspects of active learning. Learning is an active and constructive process. In order to get this process going, children should dwell in a rich and challenging learning environment. Moreover, they should be given the change to pick up their own learning process.</p> <p><i>Broad education</i> includes that children should be given the chance to develop competencies in situations that are realistic to them. Children should learn from a world that is familiar to them. Different aspects of their development should be appealed to.</p>	<p>Due to the freedom of education organising bodies of educative institution are free in choosing pedagogical and didactical methods. However in the Mission Decree these organising bodies are advised to ensure that schools (amongst others)</p> <ul style="list-style-type: none"> <li>- puts students in situations that encourage them to mobilize transversal as well as disciplinary competences including knowledge and know-how (skills);</li> <li>- emphasizes activities that stimulate discovery, production and creation;</li> <li>- emphasizes theory and practice, including the construction of concepts from practical activities</li> <li>- balances individual and collective working time, develop the ability of making efforts to achieve a goal</li> <li>- uses communication and information technologies, insofar as they are tools for the development, empowerment and individualization of learning pathways.</li> </ul> <p>In the documents based on the results of the non-certifying tests after the first phase, learning activities and teaching approaches concerning mathematics and science in early years (up till 8 years) are described. These documents describe guided inquiry approaches, in which creativity is emphasized</p>

	<p>The school year starts at the 1<sup>st</sup> of September and ends at the 30<sup>th</sup> of June.</p> <p>children have to follow 28 to 29 teaching periods of 50 minutes each per school week.</p>	<p>(collaborative work, initiative of the children, new ideas, brainstormings, ...)</p> <p>The school year starts at the 1<sup>st</sup> of September and ends at the 30<sup>th</sup> of June.</p> <p>children have to follow 28 teaching periods of 50 minutes each per school week.</p>
<b>Assessment</b>	<p>In Flanders it is not the Ministry of Education and Training that works out student assessments. The schoolteachers make their own tests to assess the development of their students (both formative and summative). The team of teachers within a school decides whether a student can move along to a next level or not. So there is freedom of evaluation and assessment. On the level of schools it is impossible to describe the purposes of assessment and the ways of assessing.</p> <p><i>National Assessment Programme (NAP) – Flemish pupil monitoring system</i></p> <p>NAP is a periodical sample survey to monitor the implementation of the Flemish attainment targets at the system level.</p> <p>These surveys are done at the end of primary education (12 year).</p>	<p>Assessment is one of the fields where educational freedom is guaranteed for each type of school. Each organizing body may, in compliance with laws, decrees, and orders, define the type of assessment that will be adopted and the manner in which the results will be communicated. However, Art. 15 of the Missions Decree makes formative assessment mandatory.</p> <p>The decree of 2 June 2006 significantly modified the system of assessment in the French Community of Belgium by the creation of <i>CEB (certificat d'études de base)</i> and <i>non-certifying external evaluations</i>.</p> <p>Since the school year 2008-2009, all pupils enrolled in the sixth year of ordinary primary education have been subject to the common external test leading to the <i>certificat d'études de base (CEB)</i>, so that all pupils are evaluated and certified on the same basis.</p> <p>However, because of the pedagogical liberty the system thus conserved the final decision regarding success and failure for the local educational team.</p> <p>The non-certifying external evaluations are jointly organized under the direction of the steering commission by the administration (steering and inspection service) and the University of Liège. In the month of November of each school year, all students from the 2nd and 5th years of primary school (7 and 11 years old) as well as 2nd year secondary school students (14 years old) participate in a non-certifying external evaluation.</p>
<b>Quality control</b>	<p>The Decree on Quality of Education (2009) states that each school is responsible for providing good quality education. So, schools carry the major responsibility for the quality of education they deliver. The choice of</p>	<p>The decree on the reform of inspection (8 March 2007) introduced three main novelties (Mangez et al, 2009; 33-34):</p> <ul style="list-style-type: none"> <li>- 'The missions of the <i>Inspection</i> essentially consisted in "the evaluation and monitoring of the level</li> </ul>

	<p>design and type of quality system is up to the schools. <i>Pedagogical Advisory Services</i> are appointed to provide external support to schools.</p> <p>The <i>Inspectorate</i> is tasked with conducting external quality control of schools and must provide advice to the Flemish authorities on the inclusion of schools in the recognition. The inspection uses the CIPO framework.</p>	<p>of studies” relative to the core of competences that had been defined as pedagogical objectives. Within educational establishments, moreover, the inspection service was to evaluate observance of programs, the coherence of practices (in particular, evaluation), the adequacy of teaching materials, the choice of continuing education for teachers, the pedagogical aspects of positive discrimination measures and the detection of mechanisms of educational segregation.</p> <ul style="list-style-type: none"> <li>- The “Inter-Network” Character of the Inspection.</li> <li>- A “<i>counseling and pedagogical service or support cells</i>” were created in each network.</li> </ul>
<p><b>Initial teacher education</b></p>	<p>In Flanders anyone who has obtained a diploma of secondary education is free to follow higher education.</p> <p>The main standards to be achieved in initial teacher education can be found in the Decision of the Flemish Government of 5 October 2007 on teacher education. The learning outcomes of initial teacher education are described as basic competences. There are <i>3 groups and 10 subgroups of competences</i>. In addition, 8 attitudes are filled in to complete the list of teacher competences.</p> <p>The initial teacher education programme for early childhood teacher and the primary teacher is an integrated teacher training of 180 credits and takes 3 years. The professional bachelor training programme is offered at a college of higher education. In the training, a work placement of 45 credits is included. In Flemish initial teacher education for early childhood and primary teachers the concurrent model is used. Colleges of higher education organise the practical component in co-operation with schools, centres or institutions in the form of pre-service training.</p> <p>Teacher educators: In the colleges of higher education teacher educators who are lecturers have at least a Master's degree. Teacher educators who are practical lecturers have at least a Bachelor's degree.</p>	<p>Initial teacher education to become pre-primary or primary school teacher is accessible to holders of the upper secondary education certificate (CESS) or qualifications recognised as equivalent (decree of 5 August 1995, Article 22).</p> <p>In the French Community of Belgium the decree ‘Décret définissant la formation initiale des instituteurs et des régents’ adopted on 12 December 2000 defines <i>thirteen competencies</i> to be developed as part of initial training for pre-primary, primary and lower secondary teachers.</p> <p>The initial teacher education programme for early childhood teacher and the primary teacher is an integrated teacher training takes 3 years. The professional bachelor training programme is offered at a university college (haute école). A minimum timetable and total hours are fixed.</p> <p>The know-how have to be based on the link between theory and practice (the concurrent model is used). It is acquired at professional training workshops and by taking part in teaching practice internships.</p> <p>Teacher educators: CAPAES (Certificat d’Aptitude Pédagogique Approprié à l’Enseignement Supérieur) established by the Decree of 17 July 2002 and amended by the Decree of June 2, 2006, is the only educational title required to teach in university colleges and higher education of social promotion (type short and long).</p>



<p><b>Continuous professional development</b></p>	<p>In Flanders to be able to function as a fully-fledged beginning teacher, each graduate must have acquired the relevant basic competences - description of knowledge, skills and attitudes. These basic competences enable the teacher to grow into the professional profile. This <b>professional profile is a common profile for all teachers</b> (Decision of the Flemish Government of 5 October 2007) and is based on archetype functions described in the Decree of 1996 concerning teacher training and in-service training.</p> <p>The schools themselves now have the responsibility and the financial resources for conducting their in-service training that is consequently demand-driven (Decree of 2009 on quality of education).</p>	<p>Since the Decree of 11 July 2002, every teacher has to follow 6 half-days of professional development each year.</p>
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## 1. Aims of national report

This main aim of this National Report is to map existing approaches, as recorded in public policy documents and official statements of policy, to the teaching, learning, and assessment of science and mathematics in the early years and to teacher education in early years mathematics and science, in the French Community. This report has been prepared as part of Work Package 3.2 of the *Creative Little Scientists* project (D3.2 Report on Mapping and Comparing Recorded Practices) which aims to map and compare policy within and between European partner countries. The main research question for this phase of the project was: *How is teaching, learning and assessment of science and mathematics conceptualised? What role does creativity play in these?*

In order to analyse policy documents of the French Community, this report draws upon previous reports delivered in the Creative Little Scientists Project, the D2.2 *Conceptual Framework* and D3.1 *List of Mapping and Comparison factors*, which identified key dimensions pertinent to the role of creativity in early science and mathematics. As well as providing a structure for this report and facilitating comparison with other European policies, these frameworks help identify inconsistencies and tensions in the key policy messages within policy of the French Community.

### 1.2 Defining terms

Three terms often used in this report that would benefit from defining are: Policy, Curriculum, and Creativity.

#### 1.2.1 Policy

The term policy is used in this report to refer to policy texts, which Ozga (2000, p.33) defines as any “*vehicle or medium for carrying and transmitting a policy message*”. However, in accordance with the aims of this report, policy will be examined according to messages in formal written documentation. This may include either statutory requirements or guidance.

#### 1.2.2 Curriculum

The term curriculum is often used to refer to different aspects of educational policy. In a narrower sense it refers to the content and activities prescribed. In contrast, the term can be used to capture the wider aspects of educational policy. For example, Alexander (2010, p.250) refers to the curriculum as ‘what is intended to be taught and learned overall (the planned curriculum); what is taught (the curriculum as enacted); what is learned (the curriculum as experienced)’. In a similar way, Van den Akker (2007) describes three levels of curriculum policy: what is intended (the ideal and formally written), what is implemented (perceived and enacted by practitioners) and what is attained (experiences and outcomes of learners). In this light, policy texts are an element of the intended or planned curriculum: what is formally written.





*National Report on Approaches in Policy in Wallonia (Belgium)*

### 1.2.3 Creativity

As reported in the *Conceptual Framework* (D2.2), the *Creative Little Scientists* project indicates a focus on little c, or personal, or everyday, creativity, i.e. 'purposive imaginative activity generating outcomes that are original and valuable in relation to the learner'. In the Review of Science and Mathematics education in pre-school and early years of primary school (Task 2.2), an appendix to the *Conceptual Framework*, the following definition is used in relation to creativity in Science and Mathematics: 'generate alternative ideas and strategies as an individual or community, and reason critically between these'.



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## 2. Overview of National early years Education provision and policy

The text in this section is based on:

- Education, Audiovisual & Culture Executive Agency 2010. Eurydice report French Community 2009/2010. *Organisation of the education system in the French Community of Belgium. European Commission 2009/2010*. Available at: <[http://eacea.ec.europa.eu/education/eurydice/documents/eurybase/eurybase\\_fu\\_II\\_reports/BF\\_EN.pdf](http://eacea.ec.europa.eu/education/eurydice/documents/eurybase/eurybase_fu_II_reports/BF_EN.pdf)> [Accessed 3 November 2011]
- Geyer, F. 2009. *The educational system in Belgium*. CEPS special report thinking ahead for Europe. Centre for European policy studies (CEPS).
- Mangez, C., Maroy, C., Cattonar, B., Delvaux, B. and Mangez, E. 2009. *The construction of steering and evaluation policy in French-speaking Belgium: a cognitive approach*. Rapport de recherche, Université catholique de Louvain. Available at: <http://www.knowandpol.eu> [Accessed 7 July 2012].
- Voos, C. and Beckers, J. 2008. *Savoirs scolaires et compétences, les difficultés de cadrage d'une réforme en Communauté française de Belgique*. In Audigier, F. and Tutiaux-Guillon N. (dir.). *Compétences et contenus : les curriculum en questions*. Bruxelles : De Boeck, 51–64.
- [www.enseignement.be](http://www.enseignement.be) (the website gives access to all decrees mentioned)

### 2.1 Some general information about the Belgian educational system

The Belgian constitution (article 24) guarantees the principle of freedom of education, which comprises freedom of choice and the so-called pedagogical freedom, namely the right to autonomously establish schools. There exists also not *one* Belgian educational system but in fact three separate systems with distinct characteristics: the French Community, the Flemish Community and the German-Speaking Community. Since 1989, the French community is responsible for all educational matter and the administration of education in its language region, with the exception of the beginning and the end of compulsory education, the minimum attainment levels for the granting of a certificate and the pension system. The first two exceptions were made to secure a minimum of coherence among the educational systems within the Communities.

The schools in Belgium are subdivided into three networks: the public schools network, the public grant-aided schools network (provinces and municipalities) and the private grant-aided schools network. Each of them has a specific "organising body" (the municipalities, the provinces or municipalities, private institutions). In the French Community the following large teaching "networks" organize the better part of the educational supply: the network of the Communauté française de Belgique (the central political power in the francophone





part of the country), the network of communes and provinces (decentralized political powers) and the network of Catholic 'free schools'

In 1989, after the formation of the three community systems, the three Belgian executives, Flemish, French-speaking and German-speaking, and especially the three ministers in charge of education, agreed that there was a need to better understand the Belgian educational system and asked the OECD to prepare a report on the it. To accomplish this, experts and researchers at the national level conducted an important study and transmitted it to the three international experts; M. R. Haby, former French minister of national education, M. R.J. in't Veld de l'Université de Rotterdam and M. J.A. Tschoumy, Director of the Institut romand de Recherches et de Documentation Pédagogiques in Switzerland (Mangez et al., 2009). The result was a OECD report in 1991. Based on this report, the three experts submitted their own report in 1993. It stressed the "lack of steering" in the Belgian educational system, the limited availability of basic education to everyone, the inadequacies in educational research and the 'weak culture of evaluation' (Mangez et al., 2009). According to Mangez et al. (2009), this report widely circulated among public policy actors in the educational sector and sent shock waves through part of this sector. In the view of some observers, it was the publication of these reports that triggered the establishment of the soft steering structure for the educational system in the different communities. Since the educational system became part of the communities, policy after 1989 differs a lot in the Flemish and French community. Still, the networks are powerful in both communities. Policy in the French Community is explained in the sections below.

## **2.2 Early years education provision and policy in the French Community**

In francophone Belgium pre-school education (nursery schools) is attended by virtually all children from the ages of 2,5 years even though pupils are only subject to compulsory schooling from the age of 6 to 15/16 (full-time) or 18 years (part-time).



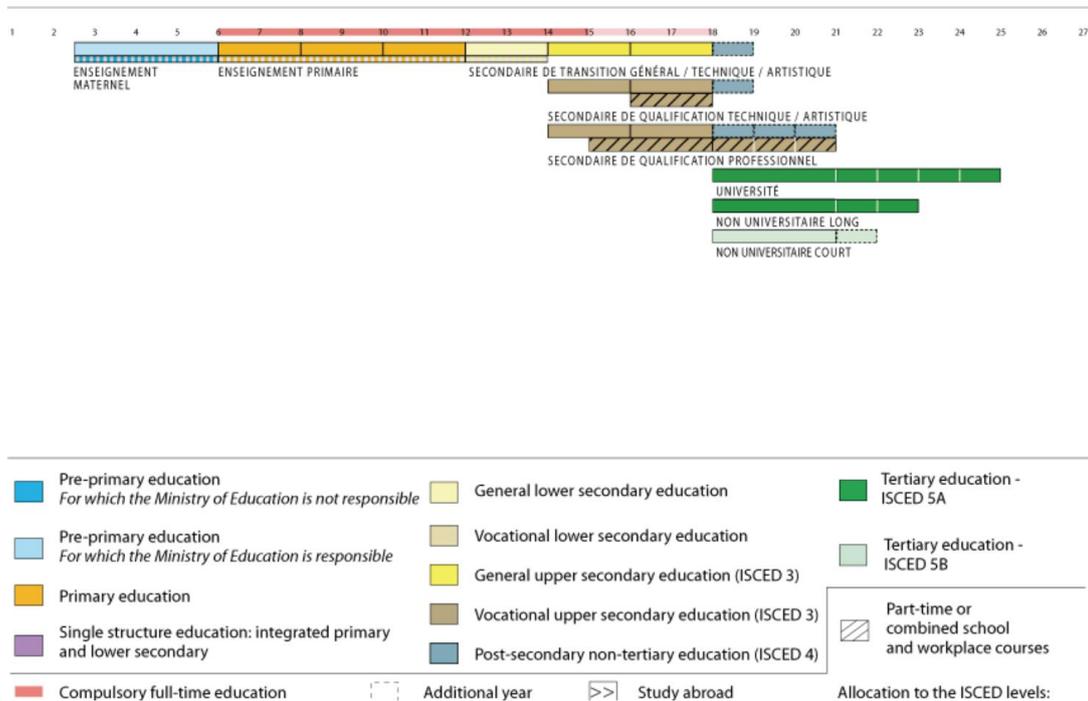


Figure 1 Structure of the educational system of the French Community (Europydia, 2012)

Education from 2.5 years is free, with special supports for low-income/ethnic areas and families. Schools with low-income children can receive increased funding for extra teachers and more intensive programmes. In pre-primary and primary education, textbooks and school stationery are supplied free of charge. Parents may nevertheless be asked for a financial contribution to cover meals, transportation or extra-school activities and child minding.

Due to the freedom of education, schools in the French Community have full autonomy in criteria for grouping children together. In the CERP report on the Educational System in Belgium the autonomy of schools in the French community is described in detail (Geyer, 2009: p 7-8). However, the autonomy of schools in the French community is less than those of schools in Flanders according to this report.

*'Schools in the **French-speaking community enjoy full autonomy** in the following fields:*

- 1) timetabling of subjects over the week,
- 2) textbooks,
- 3) methods,
- 4) continuous assessment of pupils,
- 5) decisions about whether pupils should redo a year,
- 6) content of certifying examinations,
- 7) school rules
- 8) criteria for grouping pupils together,
- 9) allocation of the budget for ongoing operational resources,
- 10) acquisition of teaching materials,
- 11) acquisition of movables,
- 12) seeking donations and sponsorship,
- 13) service provision and fund raising, use of private funds to acquire operational goods and services,
- 14) use of private funds to acquire movables and
- 15) use of private funds to employ non-teaching staff.



Schools in the **French-speaking community** enjoy **limited autonomy** in the following fields: 1) number of hours per subject (in primary education), 2) start and end of lessons, 3) content of teaching programmes, 4) subjects offered as options (in secondary education), 5) compulsory subjects in addition to minimum curriculum (in secondary education) 6) expulsion and suspension criteria, 7) acquisition of computer equipment, 8) ongoing maintenance, 9) recruitment to replace absent teachers, 10) termination of teachers' employment and 11) planning of in-service training.

Schools in the **French-speaking community** have **no autonomy** in the following fields: 1) number of days per year, 2) number of hours per year, 3) number of hours per week, 4) number of hours per subject (in secondary education), 5) duration of a period, 6) criteria for selecting pupils at enrolment, 7) allocation of the overall school budget, 8) acquisition of immovables, 9) appointment of school head, 10) definition of the number of teaching posts, 11) recruitment for teaching vacancies, 12) salary adjustment for overtime work, 13) number of teaching hours per week, 14) number of hours of teachers' presence at school per week, 15) loans, 16) use of private funds to acquire immovables and 17) use of private funds to employ teaching staff.'

As mentioned in the general overview, in the 1990s, the educational sector in French-speaking Belgium went through a crisis which favoured the emergence of a response in terms of a new paradigm for governing or "steering" the system (Mangez et al., 2009).

The Mission Decree of 24 July 1997 established the general objectives for all basic and secondary education. The Mission Decree obliges schools to develop the competencies of their pupils and accredit proficiency at key stages in their schooling. This Decree specifies the framework within teaching activities take place, organises the definition of the *socles de compétences*, the preparation of pedagogic tools and assessment instruments, as well as the control of study programmes.

The organisation of education in cycles and phases is being gradually set up throughout compulsory education. According to the Decree on the missions of school, the first phase covers children aged 2½ to 8 years. It is organised in two cycles: from admission in nursery school to 5 years, and from 5 years to the end of the 2nd primary school year. This second cycle of the first phase, straddling the end of pre-primary education and the beginning of primary education, aims to harmonise the transition from the pre-primary to the primary level. The *socles de compétences* are elaborated in accordance with the different phases.

Based on the Mission Decree working groups defined these *socles de compétences*. In 1999, the *socles de compétences* corresponding to elementary education and the first stage of secondary education were adopted. The *socles de compétences* concern the different subjects: French, **mathematics**, **initiation to science**, modern languages, physical education, education through technology, artistic education, initiation to history and





geography including social and economic life. They include cross curriculum competencies and subject-related competencies.

The *socles de compétences* are a formal system of reference that sets out, in a structured way, which competencies must be exercised until the end of the first eight years of compulsory education, and those for which proficiency must be attained at the end of each stage (at ages 8, 12, and 14), because they are considered necessary for social insertion and the pursuit of studies'. So, there are **no specific competencies** formulated for the end of the first cycle in the first phase (meaning for **pre-primary education, 4 years**). However, transition between the preschool and the school is taken in charge by the organisation of a common 5-8-year-old cycle.

Based on the *socles de compétences* the curricula are drawn up by the organising bodies of the educational institutions (schools) but need the approval of the government. As regards to the pedagogic methods, each organising body is free to choose the one that is considered best for the pupils. In addition: to take the individual pupil into account is not only a freedom, but an obligation foreseen by Article 15 of the 'Missions Decree': Each pupil must be allowed to progress according to his or her own pace of learning and schools must implement differentiated teaching methods and formative assessment to this end.

In March 2002 the 'steering' decree was adopted. This decree created for compulsory education, an Education Steering Committee chaired by the General Administrator for Education and Scientific Research. It is made up of the general education inspectors, education experts, the representative of the French Community education system, and representatives of the organising authorities, trade union organisations and parent associations. The committee had a relatively broad mission touching upon various aspects of education, assisting and supervising a series of initiatives in the area of steering.

The decree of 2 June 2006 on CEB and external evaluations, significantly modified the system of assessment in the French Community of Belgium. It institutionalized the non certifying external evaluations (after 2nd and 5th years of primary school) and it established a certifying test at the end of the sixth form of primary school. This common test is since 2009 obligatory. Topics for both evaluations are mathematics and science.

The decree on the reform of inspection (8 March 2007) introduced three main novelties (Mangez et al, 2009; p. 33-34):

- 'The inspection service was re-centered around pedagogical questions. Responsibility for administrative oversight of educational establishments was taken over by another service of the administration. A general inspection service was created consisting of a variety of services with ties to various levels (elementary, secondary) and types of establishment (specialized, artistic, social promotion, remote). The missions essentially consisted in "the evaluation and monitoring of the level of studies" relative to the core of competences that had been defined as pedagogical objectives. Within educational establishments, moreover, the



inspection service was to evaluate observance of programs, the coherence of practices (in particular, evaluation), the adequacy of teaching materials, the choice of continuing education for teachers, the pedagogical aspects of positive discrimination measures and the detection of mechanisms of educational segregation. It could also supply advice and information on these subjects. The inspectors were moreover charged with missions concerning the central steering of the system: support for external evaluations, the Steering Commission, continuing education, etc.

- The “Inter-Network” Character of the Inspection: Until recently, only the primary school inspection service for the state funded networks was “internetwork” (the cantonal inspectors). Secondary school inspectors came exclusively from the teaching corps of the French Community network. Henceforth, the educational inspection would recruit on the basis of the same criteria in all networks. As civil servants, the inspectors would all have the same training and were to depend on an administrative service distinct from that responsible for education (in order to ensure their independence, in particular vis-à-vis the state network).
- A “counseling and pedagogical service or support cells” were created in each network. This involved strengthening and recognizing services that were already more or less strongly present in the various networks. Composed of teachers “on temporary assignment” or “on leave for missions”, the function of these services was to “advise and assist the teachers, pedagogical teams and schools in which the general inspection service has noted weaknesses and failings” by taking into account a “memorandum” prepared by the inspection services or the results obtained in external evaluations. Moreover, they are to “support the establishments in the construction of their establishment project”, put their “knowledge and pedagogical experience” in the service of the teams in order to “improve the quality of education”, support “the establishment of programs and pedagogical innovation”, “assist the groups of teachers who are collectively constructing pedagogical approaches”, participate in “the analysis of teacher training needs” and so on. According to the decree’s recommendations, these services were thus to collaborate with the inspection services but were to be hierarchically subordinated to the networks.’

### **2.3 Current policy issues or priorities in (early years) education in the French Community**

Label ‘Science in school’ 2013

To boost the interest of young people in science and technology and to fight against the aging of the scientific and technical population, it was decided – in the context of the “Space and education” project developed since 2007 in a partnership between the space agency European (ESA), the branch of compulsory education and Inspection ([www.enseignement.besciences-espace](http://www.enseignement.besciences-espace)) - to grant a “Science in school” label to schools.



*National Report on Approaches in Policy in Wallonia (Belgium)*

The objectives of this labeling: enhance the practices developed in the field of science or geography by these schools; encourage other schools to develop such projects; support the dynamics of these schools in formulating recommendations; to make science and technology accessible and attractive for pupils in basic education. The call for nomination is open to all schools of the Federation of Wallonia-Brussels (all networks, all types of education and combined levels). ([www.enseignement.be](http://www.enseignement.be))

School contract (Contrat pour l' école) of the French Community (minister of education) : common goal - Tirer chaque enfant vers le haut... (Take each child to the top ...)

*Objectives of the contract (2013):*

Objective 1 : Increase the education level of the school population

Objective 2 : Improve the performance of each child

Objective 3 : Increase the number of students 'à l'heure'

Objective 4 : Promote the social mix in each school and each sector

Objective 5 : Put the different sectors of education on a same level so that the choice of a sector is a positive choice

Objective 6 : Fight against relegation mechanisms that exist at the level of educational institutions

In the contract also 10 priorities are formulated amongst them; more teachers for our children, guide each youngster efficiently, provide students and teachers with tools of knowledge, etc.



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### 3. Research Questions and Methodology

#### 3.1 Research Question

The main research question for this Work Package, adapted for this National Report is:

*How is teaching, learning and assessment of science and mathematics in the early years conceptualised in policy in the Flemish Community?*

*The sub questions identified within this overarching research question were:*

- *What is the role of creativity in the way teaching, learning and assessment of science and mathematics in the early years are conceptualised in policy in the Flemish Community?*
- *What are the main similarities and differences between mathematics and science in the way teaching, learning and assessment of these areas in the early years are conceptualised in policy in the Flemish community?*
- *What are the main similarities and differences between pre-school and school phases in the way teaching, learning and assessment of science and mathematics in the early years are conceptualised in policy in the Flemish community?*

In order to examine how teaching, learning and assessment are conceptualised across policy in the French community, this report drew upon the framework of curriculum components ‘*the vulnerable spider web*’ (see van den Akker, 2007) that identifies the following key questions related to student learning:

- Rationale or vision: Why are children learning?
- Aims and objectives: Toward which goals are children learning?
- Content: What are children learning?
- Location: Where are children learning?
- Learning activities: How are children learning?
- Teacher role: How is the teacher facilitating learning?
- Materials and resources: With what are children learning?
- Grouping: With whom are children learning?
- Time: When are children learning?
- Assessment: How to measure how far children’s learning has progressed?

As well as factors relating to the curriculum, the *Conceptual framework* (D2.2) identified Teacher factors as a significant in teaching, learning and assessment approaches in the classroom. This is further indicated in the D3.1 *List of Mapping and Comparison factors* derived from the *Conceptual Framework*. Consequently, this project set out to examine Teacher factors addressed in policy, in particular the approaches documented in relation to both:



- Initial Teacher Education: What are the requirements for initial teacher education?
- Continuing Professional Development: What are the opportunities for Continuing Professional Development?

## 3.2 Method

This report addressed the research questions through an analysis of relevant policy documents in the French community. One of the first challenges, therefore, was to identify constituted relevant documents. The second challenge was to adopt an approach to analysis that could not only evaluate approaches across documents but could allow these to be compared to approaches in partner countries. This was addressed by use of a survey tool grounded upon prior work in the *Creativity Little Scientists* project.

### 3.2.1 Data selection

Policy documents were chosen that captured the different aspects of curriculum according to the nine dimensions identified by Van den Akker (listed in the previous section) in relation to early science and mathematics.

In the French Community the Mission Decree on education and the documents of the *socles de compétences* are essential documents in educational policy.

Due to the freedom of education organising bodies and teachers in the French community have freedom in choosing their own teaching practices and assessment strategies. However, in the French community there are several advisory documents on teaching and assessment strategies for the first phase of the *socles de compétences*. Two documents are published after the non-certifying test of children at the age of 7 years, in these documents approaches for science and mathematics are suggested.

Ministère de la Communauté française 2005. <i>Socles de Compétences - Formation mathématique</i> . Available at: <a href="http://www.enseignement.be/download.php?do_id=1653&amp;do_check">http://www.enseignement.be/download.php?do_id=1653&amp;do_check</a> [Accessed 3 November 2011]	Statutory Socles de Compétences for mathematics
Ministère de la Communauté française 2005. <i>Socles de Compétences - Eveil - Initiation scientifique</i> . Available at: <a href="http://www.enseignement.be/download.php?do_id=1654&amp;do_check">http://www.enseignement.be/download.php?do_id=1654&amp;do_check</a> [Accessed 3 November 2011]	Statutory Socles de Compétences for science
Education, Audiovisual & Culture Executive Agency 2010. Eurydice report French Community 2009/2010. <i>Organisation of the education system in the French Community of Belgium. European Commission 2009/2010</i> . Available at: <a href="http://eacea.ec.europa.eu/education/eurydice/documents/eurybase/eurybase_full_reports/BF_EN.pdf">http://eacea.ec.europa.eu/education/eurydice/documents/eurybase/eurybase_full_reports/BF_EN.pdf</a> [Accessed 3 November 2011]	Report More information in English about the education system in the French Community
<a href="http://www.enseignement.be/">http://www.enseignement.be/</a>	Official website of the educational system in the French Community.



Décret du 24 juillet 1997 définissant les missions prioritaires de l'enseignement fondamental et de l'enseignement secondaire et organisant les structures propres à les atteindre (décret missions). Available at: <a href="http://www.galilex.cfwb.be/fr/leg_res_01.php?ncda=21557&amp;referant=I01">http://www.galilex.cfwb.be/fr/leg_res_01.php?ncda=21557&amp;referant=I01</a> [Accessed 23 June 2012]	Statutory (Decree of the French Community)
<a href="#">Décret du 12 décembre 2000</a> définissant la formation initiale des instituteurs et régents. Available at: <a href="http://www.galilex.cfwb.be/document/pdf/25501_001.pdf">http://www.galilex.cfwb.be/document/pdf/25501_001.pdf</a> [Accessed 10 July 2012]	Statutory (Decree of the French Community)
Ministère de la Communauté Française, 2010. Piste didactiques (science), 2e année de l'enseignement. Administration Générale de l'enseignement et de la recherche scientifique service general du pilotage du système éducatif.	Didactical suggestions and examples of learning activities of the ministry of the French community concerning science for the early years up till 8 years (first phase)
Ministère de la Communauté Française, 2011. Piste didactiques (mathématique), 2e année de l'enseignement. Administration Générale de l'enseignement et de la recherche scientifique service general du pilotage du système éducatif.	Didactical suggestions and examples of learning activities of the ministry of the French community concerning mathematics for the early years up till 8 years (first phase)
Ministère de la Communauté Française. Piste pour la mise en place des cycles à l'école fondamentale à l'usage des enseignants et des directeurs d'école. Administration Générale de l'enseignement et de la recherche scientifique service general du pilotage du système éducatif.	Suggestions concerning formative evaluation, differentiation, ...

### 3.2.2 Survey tool

A survey tool was developed in order to quantify judgments about the extent to which particular approaches were emphasised in policy documents of the French community. Whilst quantifying approaches is problematic, this was considered important in order to support comparisons between European partners, as well as provide an informative representation of approaches within documents of the French Community.

The survey tool comprised of two main sections: one relating to Teaching, Learning, and Assessment approaches. This was subdivided according to the dimensions of curriculum described previously, namely: *Rationale; Aims; Content; Location; Learning activities; Teacher role; Materials and resources; Grouping; Time*. The other section focused on Teacher Education, subdivided into Initial Teacher Education and Continuing Professional Development.

The sections were comprised of a series of questions about approaches advocated in national policy. In each section researchers in partner countries were asked to provide background information or evaluate the extent to which particular approaches were, or were, not emphasised across policy documents, and also the extent to which the role of creativity is emphasised in these approaches. These approaches listed were carefully drawn from prior work in the *Creative Little Scientists* project, namely the D2.2 the *Conceptual Framework* and the D3.1 *List of Mapping and Comparison factors*, which drew attention to



significant approaches characteristic of creativity in early years science and mathematics. A summary of the emphasis ratings given for Scottish policy is presented in Appendix A; information on the background sections of the questionnaire are integrated into the main text of this report.

### **3.2.3 Completion of the Survey Tool**

The author of this report, one of the *Creative Little Scientists* project team, completed the Survey tool. Inter-rater reliability was not possible due to project limitations and the importance of the local expertise of researchers completing the survey tool for their national documents. Therefore, it was required that each project member completing the survey provided justifications for their responses alongside specific references to the policy documents to support judgements made. These justifications were assessed and discussed with the other project team members of the AUC team.

### **3.2.4 Context of policy messages**

A significant challenge of analysing and quantifying policy messages is that they need to be interpreted in relation to the particular national context: taking into account economic, political, geographic, historical factors for example. Consequently, the results of the survey analysis are interpreted within the broader background to current policy, drawing upon wider sources.





## 4. Approaches to Teaching, Learning and Assessment

This section summarises and reflects upon the findings from the policy questionnaire. The overarching aim is to draw out key messages and highlight any issue, tensions or criticisms that may exist for different aspects. Reflecting the questionnaire, the findings are reported under headings taken from van den Akker's framework of components (van den Akker, 2007) as follows:

- Rationale or Vision
- Aims and Objectives
- Content
- Learning Activities
- Teacher Role / Location
- Materials and Resources
- Groupings
- Time
- Assessment

### 4.1 Rationale or Vision

#### What are the key summary points?

In the French community, the Mission Decree of 24 July 1997 established the general objectives for all basic and secondary education:

- To promote self-confidence and personal development of all pupils;
- To enable all pupils to acquire knowledge and the abilities that they need to learn throughout their lives and to play an active part in economic, social and cultural life;
- To prepare all pupils to become responsible citizens, contributing to a democratic, mutually supportive, pluralist and open to all other cultures, society;
- To provide all pupils with equal opportunities for social advancement.

#### What issues / tensions / policy criticisms exist?

The general objectives of the 'Mission Decree' are stressed in the school contract and are still very important in current education policies of the French community: Tirer chaque enfant vers le haut... (Take each child to the top ...).

#### In what ways is the role of creativity emphasised?

In education in the French community there is a focus on supporting children in the development of their personal life, on the development of self-confidence. There is also a focus on preparing these children for functioning as responsible citizens in society. The development of responsible, self-confident persons is linked to creativity. Problem solving and creative activities are explicitly mentioned in the Mission Decree and in the *socles de compétences*.





### What are the main differences between preschool and school?

According to Article 12 of the Mission Decree. – Pre-primary education pursues all the General objectives set in article 6 of the Mission Decree and is specifically designed to:

- develop awareness by the child of his own potential and promote self-expression through creative activities
- develop socialisation
- develop cognitive, social, emotional and psychomotoric competencies
- identify difficulties and disabilities of children and provide the necessary remedial

Primary education is officially expected to pursue the following overall objectives:

- to prioritise learning how to read, with the emphasis on deciphering, written work and communication;
- to gain a mastery of the basic mathematical tools for problem-solving;
- to enable children to attain the overall objectives of compulsory education via a range of educational activities.

### What are the main differences between science and mathematics?

Specific rationale or vision of science education (mentioned in the introduction of the document on the *socle de compétences* of science):

Science learning covers both the development of specific and transversals competences and the acquisition of knowledge skills. Science learning proposes methodologies which are appropriate for youth, so they take ownership of them and will use them in different circumstances. The progressive construction of knowledge and skills is the paradigm of any scientific approach. It, in effect, enables students, regardless of their age and level of study, to be the first actors in their learning process, using situations that encourage them to get involved in research. The study of sciences offers a certain specificity because it opens for young people their natural environment and puts them in direct contact with real objects, natural phenomena and the living beings. (Ministère de la Communauté française, 2005).

Specific rationale or vision of mathematics education (mentioned in the introduction of the document on the *socle de compétences* of mathematics):

The mathematical thinking is first (initially) developed through objects, situations and observations in real life, questions concerning mathematical topics. Mathematics is not limited to the transmission of knowledge. From the first years of elementary education to the end of the first level of secondary education, the use of imagination, the stimulation of reflection and the development of critical thinking about observations, are important elements for pupils to understand and explore their environment. This document presents two types of skills: General or transversal competences and competences related to mathematic tools and approaches. It is in the resolution of problems that the student develops mathematical skills, acquires deep knowledge and develops a confident and active personality. (Ministère de la Communauté française, 2005b)





## 4.2 Aims and Objectives

### What are the key summary points?

For all networks, for all schools for all classes, the *socles de compétences* define basic competencies. Unanimously approved by the democratic parties of the Parliament of the French community, the *socles de compétences* are the basis contract between school and society. School programmes must define the most appropriate methods to achieve the competencies defined in the *socles de compétences*.

These *socles de compétences* foster the development of thinking, i.e. education that has meaning, as opposed to mechanical exercises or the simple recitation of subject matter. They embrace the different disciplines: French, mathematics, modern languages, physical education, education through technology, science, artistic education, initiation to history and geography including social and economic life. They include cross-curriculum competencies and subject-related competencies.

The *socles de compétences* are a formal system of reference that sets out, in a structured way, which competencies must be exercised until the end of the first eight years of compulsory education, and those for which proficiency must be attained at the end of each stage (at ages 8, 12, and 14), because they are considered necessary for social insertion and the pursuit of studies. In accordance, for each competency and in each of the phases (at ages 8, 12, and 14), an achievement level is indicated: raising awareness of exercising the competence, certifying it, or further developing it. There are however no specific levels formulated for the end of pre-primary education.

Several of the learning outcomes (see table) mentioned in the questionnaire are enclosed in the *socles de compétences* of science. However, sometimes the level don't have to be reached at the end of the first phase (8 year).

In the section below the main goals of the *socles de compétences* of science and mathematics are translated.

### What issues / tensions / policy criticisms exist?

Several of the learning outcomes mentioned above can also be found in the *socles de compétences* of history and geography and technology. There is however no linkage between mathematics, science, technology, history and geography. The structure of the documents differs a lot. The latter is also mentioned by Jacqueline Beckers and Catherine Voos (2008). According to them the development of the new reference systems (*socles de compétences*) took place within the framework of disciplinary groups working in a relatively heterogeneous way, without any common conceptual framework. For them it is very unclear how knowledge and competences interact in a number of reference systems. They also state that only a minority of disciplines succeeded in defining "families of tasks". Therefore, these authors do not feel certain that the reference systems are coherent and clear enough to guide the design of curricula and teaching practices.





**In what ways is the role of creativity emphasised?**

In the competences (the objectives) the word creativity is not specifically mentioned however cross circular competencies such as solving, investigating, reasoning and arguing, should stimulate creativity.

**What are the main differences between preschool and school?**

There are no separate goals for pre-primary education. However, in the documents (of the *socles de compétences*) the level to be attained after first phase (the age of 8 years) is mentioned.

**What are the main differences between science and mathematics?**

Main goal of the *socles de compétences* of science is: to solve a complex situation through the implementation of a scientific approach.

So, there is a link with inquiry based science education.

Sub goals are:

- Capture a complex reality
- Investigate the different possibilities/options for research
- Structure the results, disclose them, validate them, synthesize them

The sub goals are further divided in objectives which are linked with a specific phase or cycle.

Main goals and structure of the *socles de compétences* of mathematics are:

Four major cross-curricular competencies interact in the resolution of problems:

- analyzing and understanding a message
- solving, reasoning and arguing
- applying and standardizing
- structuring and synthesizing.

These competencies are specified by a non-exhaustive list of approaches. Each competency has aspects of communication in it. This, indeed, is essential to build a relationship to knowledge. Communication tools allow the pupils to register their reflection during group work, to use the contributions of others and to help build a collective knowledge.

The competencies linked with the mastery of mathematics are situated in 4 domains: numbers, geometry, sizes – measurements and processing of data

Not all competences (or objectives) in the area of science and mathematics are mentioned, they can however be found on <http://www.enseignement.be>.

### 4.3 Content

**What are the key summary points?**

As mentioned before in the French Community the *socles de compétences* concern the different subjects: French, mathematics, initiation to science, modern languages, physical education, education through technology, artistic education, initiation to history and





geography including social and economic life. They include also cross curriculum competencies and subject-related competencies. For each competency and in each of the phases (at ages 8, 12, and 14), an achievement level is indicated: raising awareness of exercising the competence, certifying it, or further developing it.

**What issues / tensions / policy criticisms exist?**

No new issues or tensions.

**In what ways is the role of creativity emphasised?**

The cross circular contents (objectives) are linked with creativity.

**What are the main differences between preschool and school?**

In the *socles de compétences* of science and mathematics no difference is found between pre-primary education and the first years of primary education. Levels to reach (and content) are formulated towards the end of the first phase (8 years).

**What are the differences, if any, between science and mathematics?**

Science and mathematics education are two separate areas.

In the *socles the compétences* of science specific contents are described: living organisms, energy, materiel, air, water and earth, humans and environment and history of life and science. These contents are further specified and linked with different phases.

In the *socles the compétences* of mathematics, cross circular competences are described and 4 domains linked with mathematics. The cross-circular subjects are:

The 4 domains are: numbers, geometry, sizes – measurements and processing of data

## 4.4 Learning Activities

**What are the key summary points?**

The *socles de compétences* do not define how these objectives are to be reached. Because of the freedom of education (article 24 of the Belgian Constitution) schools are totally free in this respect. There is room for diversity and difference in approach.

The Missions Decree requires each school to develop its own plan to meet its pedagogical and educational goals.

However, in Article 8 of the Mission Decree, the following directions, concerning learning activities, can be read. To achieve the main objectives, the knowledge and know-how, the French community, for education that it organizes, or any other organising body, for subsidized education, have to ensure that each educational institution (school):

- puts students in situations that encourage them to mobilize transversal as well as disciplinary competences including knowledge and know-how (skills);
- emphasizes activities that stimulate **discovery, production and creation**;
- emphasizes theory and practice, including the construction of concepts from practical activities

- balances individual and collective working time, develop the ability of making efforts to achieve a goal
- integrates orientation in the educational process, by informing pupils about professions and programmes
- enforces pupils to participate in all activities related to the certification organized by the establishment, and to perform the tasks arising from these activities
- uses communication and information technologies, insofar as they are tools for the development, empowerment and individualization of learning pathways.
- improves the taste of culture and **creativity** and encourages participation in cultural and sports activities (by working with stakeholders)
- teaches with respect to the personality and beliefs of each pupil, schools have the duty to reject both moral and physical violence and to implement the democratic practices of responsible citizenship
- participates in the life of his neighborhood or his village, of its municipality, and it integrates smoothly stimulating the democratic debate

#### **What issues / tensions / policy criticisms exist?**

Freedom of education concerning learning and teaching approaches.

#### **In what ways is the role of creativity emphasised?**

In article 8 of the Mission Decree concerning educational approaches the words creativity, discovery, production, creation, ... are mentioned.

The teaching and learning approaches such as play mentioned in the documents of the *Administration générale de l'Enseignement et de la Recherche scientifique* can be seen as creative approaches, stimulating creative functioning of children.

As mentioned the previous section problem-based and inquiry approaches with focus on initiative of the children, ideas of the children and collaborative work are emphasized in the documents concerning didactical approaches.

#### **Science and mathematics education in early years**

Although there is freedom of education, the Gouvernement -in terms of the **Administration générale de l'Enseignement et de la Recherche scientifique** - provides several documents and ministerial circular letters ([www.enseignement.be](http://www.enseignement.be)) with pedagogical and didactical suggestions for teachers.

All these documents can be found on the website [www.enseignement.be](http://www.enseignement.be).

In a document of the *Administration générale de l'Enseignement et de la Recherche scientifique* the role of 'play', as important didactical practice in mathematics education in early years (pre-primary education), is promoted<sup>1</sup>. The document mentions 5 essential paradigms of 'play': amongst them pleasure, freedom, and creativity.

<sup>1</sup> L'entrée dans les mathématiques à l'école maternelle. Outil d'accompagnement aux pratiques de classe (2009)



In another document<sup>2</sup> of the government concerning pre-primary education the role of play, the role of observation, the role of experimentation and discovery, the role of communication, ... is highlighted. Several locations are described as corners or places to play, to move, to observe, to construct, to experiment, to read (in picture books), ... No separation is made between the different areas in education. So, an integral approach is promoted in pre-primary education by the Gouvernement

In the documents based on the results of the non-certifying tests after the first phase (Communauté française, 2010 and 2011), learning activities and teaching approaches concerning mathematics and science in early years (up till 8 years) are described. These documents describe guided inquiry approaches, in which creativity is emphasized (collaborative work, initiative of the children, new ideas, brainstormings, ...)

The suggested teaching and learning approaches concerning mathematics and science are very similar.

#### 4.5 Teacher Role / Location

##### **What are the key summary points?**

In the French Community due to the pedagogical freedom there is room for diversity and difference in approaches. So there are no regulations concerning the role of the teacher or specific location. See also article 8 of the Mission Decree mentioned in 4.4.

Although there is freedom of education, the Gouvernement -in terms of the Administration générale de l'Enseignement et de la Recherche scientifique - provides several documents and ministerial circular letters ([www.enseignement.be](http://www.enseignement.be)) with pedagogical and didactical suggestions for teachers.

All these documents can be found on the website [www.enseignement.be](http://www.enseignement.be).

##### **What issues / tensions / policy criticisms exist?**

Freedom of education concerning learning and teaching approaches.

##### **In what ways is the role of creativity emphasised?**

The teaching and learning approaches such as play mentioned in the documents of the *Administration générale de l'Enseignement et de la Recherche scientifique* can be seen as creative approaches, stimulating creative functioning of children.

As mentioned the previous section problem-based and inquiry approaches with focus on initiative of the children, ideas of the children and collaborative work are emphasized in the documents concerning didactical approaches (Ministère de la Communauté française, 2010 and 2011).

##### **Science and mathematics education in early years**

See 4.4 Learning activities – science and mathematics education in early years.

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<sup>2</sup> Grandir à l' école maternelle' (2007)



#### 4.6 Materials and Resources

Because of the freedom of education schools are free in choosing their own materials and resources to reach the attainment levels and development aims.

However, in the documents provided by the Administration générale de l'Enseignement et de la Recherche, several materials and sources are mentioned for early years (up till 8 years). For example in the document<sup>3</sup> of the Administration générale de l'Enseignement et de la Recherche scientifique different materials are described or suggested such as mirrors, a box with sand, a box with water, location rich in stimulating materials such as atelier, school garden, ..., library in the classroom with displays, selected books, photos, images, portfolios. Also in the documents concerning 'piste didactique' several materials and resources are mentioned.

Each primary school has been equipped with a multimedia centre, and thanks to agreements between the French Community, the Walloon Region, the federal government, and the access provider, each school can have access to the Internet under very favourable terms. Since 2002, schools also have the possibility of benefiting from the ADSL technology, by installing a new modem provided by the French Community and subscribing to a contract with an access provider.

#### 4.7 Groupings

Due to the freedom of education, schools in the French Community have full autonomy in criteria for grouping children together.

However, in Article 8 of the Mission Decree, the following direction, concerning grouping, can be read. To achieve the main objectives, the knowledge and know-how, the French community, for education that it organizes, or any other organising body, for subsidized education, have to ensure that each educational institution (school):

- balances individual and collective working time, develop the ability of making efforts to achieve a goal

In documents (see references) of the Ministry of the French community group work, tutoring, individual work and class work (presentation of group results) is mentioned.

#### 4.8 Time

In the French community the school year generally begins on September 1 and ends on June 30 of the following year. In the current school curriculum, a school year consists of 182 days of classes spread over 37 weeks. The government may define the number of class days between 181 and 183. He government also fixes the free days of vacation days.

To organise assessment tests, classes may be suspended for a maximum of 10 days per year in the 5th and 6th primary years; and for a maximum of 5 days per year in the 2nd and 4th primary years. On these days, pupils are expected to attend school normally. Classes can be

<sup>3</sup> Grandir à l' école maternelle' (2007)





suspended for a maximum of 6 half-days in elementary education to enable teaching staff members to attend training days.

In pre-primary and primary education, pupils attend school for 28 periods of 50 minutes per week. Every school providing pre-primary education must organise at least two weekly 50-minute periods of psychomotor education.

In primary education, the weekly timetable also must include two (50-minute) periods of physical education (including swimming), two periods of philosophy courses, zero to five periods of modern language courses (depending on the year of study and the geographic area).

#### 4.9 Assessment

##### What are the key summary points?

Assessment is one of the fields where educational freedom is guaranteed for each type of school. Each organising body may, in compliance with laws, decrees, and orders, define the type of assessment that will be adopted and the manner in which the results will be communicated. However, Art. 15 of the Missions Decree makes formative assessment mandatory. The *socles de compétences*, which translate into concrete terms the concept of study level, are meant to help the teaching staff responsible for pupils in a cycle to put into practice continuous formative assessment and school report assessments, and to prepare the pupils for certificative assessment (at the age of 12).

The Decree on the missions of school created a Committee on Assessment Tools relating to the *socles de compétences*, which is responsible for producing sets of standardised assessment tests corresponding to the *socles de compétences*. Assessment tools prepared under the supervision of committees consisting of representatives of various organising bodies provide examples to the teachers which enable them to assess the skills of pupils at the different phases of compulsory education. These assessment tools are directly intended for the use of schools and teachers and are made available to them for illustration purposes: they indicate the type of assignments which should be set for pupils and the level expected at a given point. The tools are available together with a guide on the website <http://www.enseignement.be>.

The decree of 2 June 2006 significantly modified the system of assessment in the French Community of Belgium by the creation of CEB and non-certifying external evaluations.

##### The CEB

Before it was implemented, there was no compulsory external assessment leading to the issue of a certificate. Since the school year 2008-2009, all pupils enrolled in the sixth year of ordinary primary education have been subject to the common external test leading to the *certificat d'études de base* (CEB), so that all pupils are evaluated and certified on the same basis. The common external test relates to the mastery of the skills expected on the completion of the second phase of compulsory education (*socles de compétences*) and





must include questions on French, mathematics, introduction to science and introduction to history and geography, including social and economic life.

#### *The non-certifying external evaluations*

The non-certifying external evaluations are jointly organized under the direction of the steering commission by the administration (steering and inspection service) and the University of Liège. In the month of November of each school year, all students from the 2nd and 5th years of primary school (7 and 11 years old) as well as 2nd year secondary school students (14 years old) participate in a non-certifying external evaluation. These evaluations respectively address reading / written expression, **mathematics and sciences**. These external evaluations have no impact on the students, but supply information to educational teams and the leaders of the system concerning the level of student advancement.

#### *The general inspection report*

The French Community of Belgium recently published its general inspection service report of 2010-2011 (Le rapport général de l'inspection 2010-2011 apporte sa contribution au pilotage de notre système éducatif : apporter les enseignements d'une lecture externe des pratiques mises en œuvre sur le terrain des écoles et des centres PMS)

The report is based on the results of 2000 school visits carried out by 300 inspectors during the past year. The report identifies three areas that require attention, amongst them mathematics: mathematics is still an important cause of failure for students. Mathematics teaching is found to lack consistency from one level to the next, meaning that the content of a given level does not always sufficiently prepare students for the requirements of the next. Reflection to improve maths education will therefore be ongoing.

#### **What issues / tensions / policy criticisms exist?**

Some critical reflection on the national assessment. According to Mangez et al. (2009; p. 59), '... this common exam was in fact a hybrid measure. Indeed, the local judgment of teachers and the class council continued to predominate and a student's success could be decided by the latter, even in the event that he failed the CEB. Pedagogical liberty is a right inscribed in the Belgian constitution and many actors see to it that educational policies do not weaken it. In the name of this principle, the system thus had to conserve the final decision regarding success and failure for the local educational team. The confidentiality of results is also a Belgian particularity enjoying universal consensus.'

#### **Role of creativity**

No specific information is found. Creativity could have a role in formative assessment. In the 'outils d'évaluation' self-initiative and ideas of children (new ideas) are mentioned. The first tests are very open tests.

#### **Assessment concerning science and mathematics in early years**

Assessment is one of the fields where educational freedom is guaranteed for each type of school. Each organising body may, in compliance with laws, decrees, and orders, define the type of assessment that will be adopted and the manner in which the results will be





*National Report on Approaches in Policy in Wallonia (Belgium)*

communicated. However, Art. 15 of the Missions Decree makes formative assessment mandatory.



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## 5. Approaches to Teacher Education

### 5.1 Initial teacher education

Initial teacher education to become pre-primary or primary school teacher is accessible to holders of the upper secondary education certificate (CESS) or qualifications recognised as equivalent (decree of 5 August 1995, Article 22). They are also accessible to students who do not hold any of the qualifications which authorise access to higher education but can provide proof of having passed:

- either the special exam for admission to engineering science (complete exam)
- or the admission exam organised by a university in the French Community.

In the French Community of Belgium the decree 'Décret définissant la formation initiale des instituteurs et des régents' adopted on 12 December 2000 defines thirteen competencies to be developed as part of initial training for pre-primary, primary and lower secondary teachers:

- using knowledge of the human sciences for an accurate interpretation of situations encountered inside and outside class and for better adaptation to the school population;
- maintaining effective partnership relations with institutions, colleagues, and pupils' parents;
- understanding their role within the school and functioning in the profession as defined by the relevant laws;
- internalising the disciplinary and interdisciplinary knowledge that underpins teaching work;
- mastering the disciplines' didactics, which guide teaching work;
- demonstrating a broad general culture in order to awaken pupils' interest in the cultural world;
- developing the relational skills commensurate with the profession's requirements;
- understanding the ethical issues associated with day-to-day teaching practice;
- working in a team in the school;
- developing, testing, evaluating and refining teaching aids;
- maintaining a critical and autonomous relationship with past and future scientific knowledge;
- planning, managing and evaluating learning situations;
- maintaining a reflective view of one's own practice and organising one's own continuing training.

To obtain the title of teacher of pre-primary education, student teachers must succeed in studies of short type higher education (Bachelor), pedagogical category '**section normale précolaire**'. To obtain the title of teacher of primary education, student teachers must





succeed in studies of short type higher education (Bachelor), pedagogical category '**section normale primaire**'.

The professional bachelor training programme is offered at a university college and has a duration of 3 years.

According to the decree of December 2000, the teaching activities in the different professional bachelor programmes (preschool, primary or secondary teacher education) to form teachers (preschool, primary or secondary) have the same axes:

- Socio-cultural studies (at least 120 hours);
- Socio-affective and relational studies (at least 120 hours);
- Disciplinary and interdisciplinary studies (at least 1020 hours);
- Educational studies (at least 180 hours);
- Scientific approach and research attitudes (at least 45 hours);
- Know-how (at least 780 hours).
- Professional identity-building interdisciplinary activities (at least 80 hours).

Additionally, the university colleges have a minimum of hundred and twenty hours at their disposal which are reserved for teaching activities that they are completely free to determine.

The know-how have to be based on the link between theory and practice (the concurrent model is used). It is acquired at professional training workshops and by taking part in teaching practice internships. The professional training workshops offer students a series of activities which are designed to develop methodological skills and a reflective attitude towards those skills. They enable the students to try out, observe and analyse the various components of the profession. They integrate discipline-specific and general didactics in the context of activities organised both in the field and at the haute école. Teaching practice is arranged in all three study years. In the first year, it consists of participatory observation activities, with the student accompanying the internship supervisor. They may gradually lead to the student taking over a class, in close collaboration with the internship supervisor. In the second and third years, the student properly takes charge of a class. Students should ideally undertake their teaching practice in teams of at least two people at the same site (Decree of December 2000).

Professional identity-building interdisciplinary activities are always coupled with teaching practice or a practical activity. They include the compilation of a career plan, training in neutrality, the school's openness to the outside world, the teacher's identity, professional ethics and the teacher's dossier.(Decree of December 2000).

The final dissertation is a personal and original written work in which the third-year student uses his/her knowledge in the specific context of the subject he/she has chosen to discuss and of the research that he/she conducts in this connection. The paper is presented orally. (Decree of December 2000).



The minimum timetable and total hours for the pre-primary, primary and secondary sections are fixed.

Activités d'enseignement	1°	2°	3°	À déterminer	Total
<b>1. Connaissances socioculturelles</b>					120
Approche théorique et pratique de la diversité culturelle et la dimension de genre*				30	30
Initiation aux arts et à la culture			30		30
Philosophie et histoire des religions	30				30
Sociologie et politique de l'éducation			30		30
<b>2. Connaissances socio-affectives</b>					120
Psychologie de la relation et de la communication	30				30
Psychologie du développement	30	30			60
Techniques de gestion de groupe et expression orale		30			30
<b>3. Connaissances disciplinaires et interdisciplinaires</b>					1020
<b>a) Connaissances transversales</b>					
Maitrise orale et écrite de la langue française*	45	30		15	90
Utilisation de l'ordinateur et apport des médias et des TIC en enseignement		30	30		60
<b>b) Les savoirs disciplinaires et la didactique des disciplines</b>	330	330	210		870
<b>4. Connaissances pédagogiques</b>					180
Etude critique des grands courants pédagogiques			30		30
Evaluation des apprentissages		30			30
Différenciation des apprentissages, notions d'orthopédagogie et détection des difficultés d'apprentissage et leur remédiation			30		30
Pédagogie générale	30				30
Psychologie des apprentissages	30	30			60
<b>5. Démarche scientifique</b>					45
Initiation à la recherche, notions d'épistémologie des disciplines, préparation au TFE*		30		15	45
Travail de fin d'études					

CAPAES (Certificat d'Aptitude Pédagogique Approprié à l'Enseignement Supérieur) established by the Decree of 17 July 2002 and amended by the Decree of June 2, 2006, is the only educational title required to teach in haute écoles and higher education of social promotion (type short and long).

So, teachers at hautes écoles in the French Community must acquire an higher education teaching proficiency certificate: this consists of the examination by a CAPEAS committee appointed by the minister for higher education of a professional and educational dossier which is formed at the end of a training course based on the specific skills that need to be acquired by teachers working in higher education. Access to the CAPAES training is only possible for teachers in service in a haute école or institute of higher education of social promotion.

For teachers functioning in haute écoles, this title should be acquired in the six years from the day when they are engaged as temporary or in a vacant position. Teachers who are in the condition to be appointed in higher education (TDI in a vacant position) and who are holder of a pedagogical title received before 09/01/2002 in haut école and before



31/08/2006 in social promotion education, are exempt from the obligation to obtain the title.

The teacher may decide to spread his/her training across several years (6 years), and in this case he/she will be required to pay the registration fee only once. Exemptions can be granted, depending on the teaching certificate already obtained. ([www.enseignement.be](http://www.enseignement.be)).

## **5.2 Continuing professional development**

Since the Decree of 11 July 2002, every teacher has to follow 6 half-days of professional development each year.

The Inspectorate runs two of the six half-days of compulsory training, while the other four half-days of training are attended at either network or institution level.

These half-days are divided into different levels:

- A common level: the content of the training themes is common for all networks. The IFC (Institut de la formation en cours de carrière) is responsible for the organisation of these courses.
- A level linked to the network: content of the training is specifically linked with educative and pedagogic project of the network.
- A particular level for each educative institution (school) or organising body: the content of the training is linked to priorities of the school.

The recent reform of the Inspection was accompanied by the creation of educational consulting and support services within the networks (provisions of the Decree of 8 March 2007). The school leaders may therefore apply to these support services to ask for a young teacher-specific assistance. The young teacher may benefit from the assistance of a "guardian". Unfortunately, too few schools are organising this follow-up. If such an organization does not exist in the school, the young teacher can choose a "guardian" itself (for example, an experienced colleague, a former mentor, one of his/her trainers).

The exchange networks of young teachers which provide services in several educative institutions, are also an interesting option. They provide the opportunity for young teachers to share their experiences and their solutions to educational problems.





## 6. Summary

### Approaches in policy French Community.

In the 1990s, the educational sector in French-speaking Belgium went through a crisis which favoured the emergence of a response in terms of a new paradigm for governing or “steering” the system (Mangez et al., 2009).

The Mission Decree of 24 July 1997 established the general objectives for all basic and secondary education.

- To promote self-confidence and personal development of all pupils;
- To enable all pupils to acquire knowledge and the abilities that they need to learn throughout their lives and to play an active part in economic, social and cultural life;
- To prepare all pupils to become responsible citizens, contributing to a democratic, mutually supportive, pluralist and open to all other cultures, society;
- To provide all pupils with equal opportunities for social advancement.

So, the Mission Decree obliges schools to develop the competencies of their pupils and accredit proficiency at key stages in their schooling. This Decree specifies the framework within teaching activities take place, organises the definition of the *socles de compétences*, the preparation of pedagogic tools and assessment instruments, as well as the control of study programmes.

The organisation of education in cycles and phases is being gradually set up throughout compulsory education. According to the Decree on the missions of school, the first phase covers children aged 2½ to 8 years. It is organised in two cycles: from admission in nursery school to 5 years, and from 5 years to the end of the 2nd primary school year. This second cycle of the first phase, straddling the end of pre-primary education and the beginning of primary education, aims to harmonise the transition from the pre-primary to the primary level. The *socles de compétences* are elaborated in accordance with the different phases.

Based on the Mission Decree working groups defined these *socles de compétences*. In 1999, the *socles de compétences* corresponding to elementary education and the first stage of secondary education were adopted. The *socles de compétences* concern the different subjects: French, **mathematics**, **initiation to science**, modern languages, physical education, education through technology, artistic education, initiation to history and geography including social and economic life. -They include cross curriculum competencies and subject-related competencies. The *socles de compétences* are a formal system of reference that sets out, in a structured way, which competencies must be exercised until the end of the first eight years of compulsory education, and those for which proficiency must be attained at the end of each phase (at ages 8, 12, and 14), because they are considered necessary for social insertion and the pursuit of studies’. So, there are **no specific competencies** formulated for the end of primary education. However, transition between the *école maternelle* and the school is taken in charge by the organisation of a common 5-8-year-old cycle.





The decree of 2 June 2006 significantly modified the system of assessment in the French Community of Belgium by the creation of CEB (*certificat d'études de base*) and non-certifying external evaluations.

Before CEB was implemented, there was no compulsory external assessment leading to the issue of a certificate. Since the school year 2008-2009, all pupils enrolled in the sixth year of ordinary primary education have been subject to the common external test leading to the *certificat d'études de base* (CEB), so that all pupils are evaluated and certified on the same basis. Science and mathematics are included in these tests.

Since the decree on the reform of inspection (8 March 2007), the mission of inspection is defined as follows "the evaluation and monitoring of the level of studies" relative to the core of competences that had been defined as pedagogical objectives (Mangez et al, 2009).

Early years teachers receive their training in haute écoles and they are trained in thirteen competences. These competencies are defined in the decree 'Décret définissant la formation initiale des instituteurs et des régents' adopted on 12 December 2000 and have to be developed as part of initial training for pre-primary, primary and lower secondary teachers. The same decree of 12 December 2000 reinforced the linking of theory and practice in initial teacher education. Various aspects of organisation, content, and teaching activities are instrumental in enabling students not only to acquire the reflexes of teaching professionals, but also to become theoreticians of their practices. The training model used is a simultaneous one. Teaching practice is organised during each of the three years of study.

The minimum timetable and total hours for the pre-primary, primary and secondary sections are fixed (decree of 2000). Specific content or types of teaching activities are also described in the decree as well as the dissertation.

According to the decrees of 17 July 2002 and 2 June 2006, CAPAES (Certificat d'Aptitude Pédagogique Approprié à l'Enseignement Supérieur) is the only educational title required to teach in haute écoles and higher education of social promotion (type short and long).

#### **Reflection upon any tensions identified within policy**

The *socles de compétences* of mathematics and science have a different framework. In the document of science content and know-how (as objectives) are described separately and teacher are support to link them in learning and teaching activities. For both levels for the different phases are indicated.

In the document of mathematics cross circular objectives are described (no levels are indicated). In the same document 4 mathematical domains are indicated. For each domain competencies are described and levels are indicated.

According to Jacqueline Beckers and Catherine Voos (2008) the development of the new reference systems (*socles de compétences*) took place within the framework of disciplinary groups working in a relatively heterogeneous way, without any common conceptual





framework. For them it is very unclear how knowledge and competences interact in a number of reference systems. They also state that only a minority of disciplines succeeded in defining “families of tasks”. Therefore, these authors do not feel certain that the reference systems are coherent and clear enough to guide the design of curricula and teaching practices.

The **national test** (CEB) is a hybrid measure since the results are confidential and due to the freedom of education, the local judgement of teachers and the class council is dominant. The latter was criticized by Mangez et al. (2009; p. 59), ‘Indeed, the local judgment of teachers and the class council continued to predominate and a student’s success could be decided by the latter, even in the event that he failed the CEB. Pedagogical liberty is a right inscribed in the Belgian constitution and many actors see to it that educational policies do not weaken it. In the name of this principle, the system thus had to conserve the final decision regarding success and failure for the local educational team. The confidentiality of results is also a Belgian particularity enjoying universal consensus.’

#### **Summary of the main differences between preschool and school**

In the *socles de compétences* of science and mathematics no difference is found between pre-primary education and the first years of primary education. Levels to reach (and content) are formulated towards the end of the first phase (8 years).

In the French community an integral approach is promoted by the Administration générale de l’Enseignement et de la Recherche scientifique in pre-primary education, see ‘Grandir à l’école maternelle (2007). The role of play, the role of observation, the role of experimentation and discovery, the role of communication, the role of working together... is highlighted.

#### **Reflection on key differences, if any, between science and mathematics**

Main goal of science (described in the *socle de compétences*) is to solve a complex situation through the implementation of a scientific approach.

In the *socles de compétences* of mathematics cross circular competences are formulated which are related to communication (e.g. argumentation) and the resolution of problems and they are linked with several of the competences formulated in the *socle de compétences* of science.

Since there is freedom of education, schools have the freedom to select learning activities, to arrange own timetables, to select their materials and resources. Schools and teachers only have to consider the guidelines which are described in article 8 of the Mission Decree. For example, schools have to emphasize activities that stimulate discovery, production and creation. They have to provide learning activities that emphasize theory and practice.

Suggested teaching and learning approaches concerning mathematics and science (*Piste didactiques science et mathématique*) are very similar. Problem-based and inquiry approaches with focus on initiative of the children, ideas of the children and collaborative work.





### Overview of ways in which inquiry-based and creative approaches are presented and related.

In education in the French community there is a focus on supporting children in the development of their personal life (and self-confidence), on preparing them for critical and responsible functioning in society.

Creativity is specifically mentioned in the Mission Decree in article 12 concerning pre-primary education.

- develop awareness by the child of his own potential and promote self-expression through **creative activities**

Problem solving is mentioned in the overall objectives of primary education.

- to gain a mastery of the basic mathematical tools for problem-solving;

The competences (objectives) formulated in the learning domain science have a tight link with inquiry based education. However no specific inquiry based activities are mentioned in the *socles de compétences*. The cross circular competences described in the learning domain mathematics are competences necessary for pursuing problems.

In the Mission Decree is stated that schools should emphasize activities that stimulate discovery, production and creation.

Suggested teaching and learning approaches concerning mathematics and science (Piste didactiques science et mathématique) are very similar. Problem-based and inquiry approaches with focus on initiative of the children, ideas of the children and collaborative work.

## 6.1 Limitations

In the French community there are a few important documents concerning the education in early years. These are the Mission Decree and the *socles de compétences*. These documents are statutory. In these policy documents no learning activities, methods, roles of teachers, materials and resources, ... are mentioned. Schools or organising bodies (organisateurs de pouvoir) are free to choose their own learning and teaching approaches, materials and resources, assessments, ... due to the freedom of education. However, at the end of primary education there is a national assessment.

The Gouvernement -in terms of the Administration générale de l'Enseignement et de la Recherche scientifique - provides several documents and ministerial circular letters ([www.enseignement.be](http://www.enseignement.be)) with pedagogical and didactical suggestions for teachers. Teachers are however free to choose their own teaching and learning approaches.

Secondly, it was impossible to analyse all these documents and circular letters in the given time.





To have a view on school curricula, learning and teaching approaches, assessments, outcomes of students, ... an in-depth research in several pre- and primary schools belonging to different networks or organizing bodies should be interesting.

Or if more time was provided an in-depth literature analysis of the documents on [www.enseignement.be](http://www.enseignement.be) could be done.

## 6.2 Implications

The findings from this report are intended to inform two further pieces of work in the project: firstly, in-depth field study examining the role of creativity in early years science and mathematics in classrooms; secondly, recommendations for policy.

### 6.2.1 In-depth field study

Through the in-depth study work in WP 4 we could notice how schools and teachers implement the vision of the Mission Decree, which is a strong vision integrating self-confidence, creativity, self-initiative, self-expression, ... of the individual child. We will also notice which goals they formulate (or curriculum they use) concerning the learning areas mathematics and science. During the in-depth field study competences of teachers can be observed as well as teaching and learning approaches concerning mathematics, science and creativity. Visits in classrooms and schools can also provide more information about the classroom environment and sphere, materials and resources. It will also be interesting to have a view on the pedagogical, self-evaluation and professional development plan of the school, as well as on the assessment and evaluation tools and criteria the schools use to measure progress of children in the learning areas mathematics and science.

### 6.2.2 Policy recommendations

- The vision and main goals of elementary education, written in the Mission Decree + the general objectives of pre-primary education.
  - To promote self-confidence and personal development of all pupils;
  - To enable all pupils to acquire knowledge and the abilities that they need to learn throughout their lives and to play an active part in economic, social and cultural life;
  - To prepare all pupils to become responsible citizens, contributing to a democratic, mutually supportive, pluralist and open to all other cultures, society;
  - To provide all pupils with equal opportunities for social advancement.
  - develop awareness by the child of his own potential and promote self-expression through **creative activities**
  - develop socialization
  - develop cognitive, social, emotional and psychomotoric competencies
  - identify difficulties and disabilities of children and provide the necessary remedial





The transition between pre-primary education and primary education by the organisation of a common 5-8-year-old cycle.

- CAPEAS - Certificat d'Aptitude Pédagogique Approprié à l'Enseignement Supérieur  
According to the Euridyce website: The objective of the controlling authorities is to have teachers who enrol for the CAPAES develop the following fourteen competencies:
  - promoting students' success, taking account of the diversity of learning pathways;
  - facing up to the profession's responsibilities and ethical dilemmas;
  - working in a multidisciplinary team by sharing the collective responsibility for the training;
  - building a relational context with the students that is propitious to training;
  - anchoring the content and actions in the realities of the profession to which the training relates;
  - supporting the students in their theoretical and practical training as well as in the development of their career plans;
  - planning the courses and devising teaching methods appropriate for adults;
  - mastering and using training evaluation tools appropriate to the teaching given and being able to account for the choices made;
  - mastering disciplinary and interdisciplinary knowledge and being involved in its construction;
  - maintaining a critical and autonomous relationship towards knowledge related to one's discipline and research in education;
  - taking a reflective and interdisciplinary view of one's scientific knowledge and teaching;
  - keeping one's knowledge and practices up-to-date;
  - maintaining a policy to manage the quality of teaching;
  - being an active partner in the organisation and development of one's institution.

The formulation of these competencies is very interesting in the development of design principles concerning the role of the teacher educator.



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## Appendix A: Survey Ratings: Analysis of Approaches to Teaching and Learning

### Key

In general there was no distinction made between pre-school and school since the socles the competences comprises both pre-school and school age. The first phase is up to the age of 8 years.

When it concerns the first ages (first phase) up till 8 years an X is added in the table.

However when specific approaches for early childhood were mentioned in advisory documents and E is mentioned in the table.

Because of the freedom of education is was not always possible to give an opinion on a creativity emphasis or other statements and questions, so we decided to not rated them.

### Rationale or Vision

#### Ai. What are the purposes of science Education?

	Not Mentioned	Single Mention	Various Mentions	Emphasised
a. To provide a foundational education for future scientists and engineers	x			
b. To develop socially and environmentally aware and responsible citizens				x
c. To enrich the understanding and interaction with phenomena in nature and technology			x	
d. To develop more innovative thinkers	x			
e. To develop positive attitudes to science			x	
f. To develop important attitudes and dispositions as a foundation for future learning			x	

#### Aii. What is the emphasis, if any, on the role of creativity in the purposes of science Education? (Adapted from T survey Q23)

	Counter Creative Emphasis	No Creative Emphasis	Slight Creative Emphasis	Highly Creative Emphasis
a. To provide a foundational education for future scientists and engineers				
b. To develop socially and environmentally aware and responsible citizens				x
c. To enrich the understanding and interaction with phenomena in nature and technology				
d. To develop more innovative thinkers				
e. To develop positive attitudes to science				x
f. To develop important attitudes and dispositions as a foundation for future learning				x

## Aims and Objectives

### Ai. What views are indicated about the importance of the following science learning outcomes?

	Not Mentioned	Single Mention	Various Mentions	Emphasised
To know and understand the important scientific ideas (facts, concepts, laws and theories).				x
To understand that scientists describe the investigations in ways that enable others to repeat the investigations.				x
To be able to ask a question about objects, organisms, and events in the environment.				x
To be able to employ simple equipment and tools, such as magnifiers, thermometers, and rulers, to gather data and extend to the senses.				x
To know and understand the important scientific processes.				x
To be able to communicate investigations and explanations.				x
To understand that scientific investigations involve asking and answering a question and comparing the answer with what scientists already know about the world.				x
To have positive attitudes to science learning.				x
To be interested in science.				x
To be able to plan and conduct a simple investigation.				x
To have positive attitudes to learning.				x
To understand that scientists develop explanations using observations (evidence) and what they already know about the world (scientific knowledge).	x			
To be able to collaborate with other children			x	

### Aii. What is the emphasis, if any, on the role of creativity in the following science learning outcomes?

	Counter Creative Emphasis	No Creative Emphasis	Slight Creative Emphasis	Highly Creative Emphasis
To know and understand the important scientific ideas (facts, concepts, laws and theories).				x
To understand that scientists describe the investigations in ways that enable others to repeat the investigations.				
To be able to ask a question about objects, organisms, and events in the environment.			x	

To be able to employ simple equipment and tools, such as magnifiers, thermometers, and rulers, to gather data and extend to the senses.				x
To know and understand the important scientific processes.				x
To be able to communicate investigations and explanations.				
To understand that scientific investigations involve asking and answering a question and comparing the answer with what scientists already know about the world.			x	
To have positive attitudes to science learning.				x
To be interested in science.				x
To be able to plan and conduct a simple investigation.				x
To have positive attitudes to learning.				x
To understand that scientists develop explanations using observations (evidence) and what they already know about the world (scientific knowledge).				
To be able to collaborate with other children				x
n. Other				

## Content

### A. How are science and mathematics presented as learning domains?

	As its own learning area	Encompassed within other social sciences (e.g. geography)	Encompassed within more general understanding
science	Yes		
mathematics	Yes		Yes – transversal strategies

### B. What are the key science and mathematics topics/strands/themes?

	science	mathematics
1	Living organisms	Transversal competences
2	energy	numbers
3	materie	geometry
4	Air, water and earth	Sizes/measurements
5	Humans and environment	Processing of data
6	History of life and science	

## Learning Activities

### Ai. What activities are encouraged?

	Not Mentioned	Single Mention	Various Mentions	Emphasised
Observe natural phenomena such as the weather or a plant growing and describe what they see.				x
Ask questions about objects, organisms, and events in the environment.				x
Design or plan simple investigations or projects.				x
Conduct simple investigations or projects				x
Employ simple equipment and tools to gather data and extend to the senses.				x
Use data to construct reasonable explanations.				x
Communicate the results of their investigations and explanations.				x
Other				

### Aii. What is the emphasis, if any, on the role of creativity in the following activities?

	Counter Creative Emphasis	No Creative Emphasis	Slight Creative Emphasis	Highly Creative Emphasis
Observe natural phenomena such as the weather or a plant growing and describe what they see.				x
Ask questions about objects, organisms, and events in the environment.				x
Design or plan simple investigations or projects.				x
Conduct simple investigations or projects				x
Employ simple equipment and tools to gather data and extend to the senses.				x
Use data to construct reasonable explanations.				x
Communicate the results of their investigations and explanations.				x

**Teacher Role / Location**

**Ai. What learning/teaching contexts and approaches are mentioned?**

	Not Mentioned	Single Mention	Various Mentions	Emphasised
Open/unstructured play			E	
Role/Pretend play			E	
Drama		x		
Teaching science from stories				
Using history to teach science (e.g. transport, the work of scientists)		x		
Working in small groups				x
Physical exploration of materials				x
Using outdoor learning activities		x		
Taking children on field trips and/or visits to science museums and industry		x		
Integrating science with other curricular areas			x	
Building on children's prior experiences			x	
Fostering collaboration				x
Encouraging different ways of recording and expressing ideas – oral, visual, digital, practical				x
Encouraging problem finding – e.g. children asking questions				x
Encouraging problem solving – e.g. children solving practical tasks				x
Encouraging children to try out their own ideas in investigations				x
Fostering classroom discussion and evaluation of alternative ideas				x
Fostering imagination			x	
Relating science to everyday life			x	
Using questioning as a tool in science teaching				x
Using digital technologies with children for science teaching and learning			x	
Fostering autonomous learning			x	

**Aii. What is the emphasis, if any, on the role of creativity in the following learning/teaching contexts and approaches?**

	Counter Creative Emphasis	No Creative Emphasis	Slight Creative Emphasis	Highly Creative Emphasis
Open/unstructured play				
Role/Pretend play				
Drama				
Teaching science from stories				
Using history to teach science (e.g. transport, the work of scientists)				
Working in small groups				x
Physical exploration of materials				
Using outdoor learning activities				
Taking children on field trips and/or visits to science museums and industry				
Integrating science with other curricular areas				
Building on children's prior experiences				
Fostering collaboration				x
Encouraging different ways of recording and expressing ideas – oral, visual, digital, practical				x
Encouraging problem finding – e.g. children asking questions				x
Encouraging problem solving – e.g. children solving practical tasks				x
Encouraging children to try out their own ideas in investigations				x
Fostering classroom discussion and evaluation of alternative ideas				x
Fostering imagination				
Relating science to everyday life				
Using questioning as a tool in science teaching				x
Using digital technologies with children for science teaching and learning				
Fostering autonomous learning				

**C. What, if any, Inquiry Approaches are discussed?**



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	A (Open)	B (Guided)	C (Structured)	N/A
QUESTION: Children investigate scientifically oriented question		x		
EVIDENCE: Children give priority to evidence		x		
ANALYSE: Children analyse evidence		x		
EXPLAIN: Children formulate explanations based on evidence		x		
CONNECT: Children connect explanations to scientific knowledge		x		
COMMUNICATE: Children communicate and justify explanation		x		
REFLECT: Children reflect on the inquiry process and their learning				
Other Pupils formulate an hypothesis Pupils formulate ideas				

## Materials and Resources

### A. What materials are suggested?

	Not Mentioned	Single Mention	Various Mentions	Emphasised
Instructional materials (e.g. textbooks)				x
Audio-visual resources			x	
Relevant library materials (e.g. story books)			x	
Equipment and materials for hands-on exploration in the classroom (e.g. magnets, building blocks)			x	
Equipment and materials for hands-on exploration outside the classroom			x	
Computers			x	
ICT resources (e.g. computer applications)			x	
Other digital technologies (e.g. interactive whiteboard, camera)				
Budget for supplies (e.g. paper, drawing materials)				
Teaching support personnel (e.g. classroom assistant)				E
Other support personnel (e.g. technical support)				

## Groupings

### A. What groupings, if any, are suggested for teaching mathematics and science

	Not Mentioned	Single Mention	Various Mentions	Emphasised
Individual work			x	
Pair work		x		
Small group work				x
Whole class activities			x	

## Time

### A. How much time should be planned for teaching science and mathematics per week? (Adapted from T survey Q21)

	science	mathematics
Less than an hour		
1-2 h		
3-4 h		
More than 4 h		
N/A (Please explain)	x	x

Freedom of education. Timetables are free to be designed by the schools or organizing bodies.

## Assessment

### A: What purposes of assessment are included?

	Not Mentioned	Single Mention	Various Mentions	Emphasised
To identify areas for improvement in your science teaching			x	
To identify aspects of the science curriculum that could be improved				
To identify ways to improve child science learning			x	
To monitor regularly individual children's or cohorts of children's progress towards a set of desirable science learning outcomes				x
To inform parents of their child's progress in science			x	
To help group children for science instruction purposes				
To monitor year-to-year child progress in science				
To provide feedback to children about their progress in science			x	
To set targets with children for their own development in science			x	
Other				

### B. What importance is given to of the following priorities for children's assessment in science?

To assess the development of children's:

	Not Mentioned	Single Mention	Various Mentions	Emphasised
Knowledge and understanding of scientific ideas (facts, concepts, laws and theories)				
Knowledge and understanding of scientific processes				
Competencies necessary to carry out scientific inquiry			x	
Understandings about scientific inquiry (e.g. how science and scientists work)				
Positive attitudes and increase of interest in science			x	
Positive attitudes and increase of interest in learning science			x	

**C. What ways of assessing are advocated?**

	Not Mentioned	Single Mention	Various Mentions	Emphasised
Using checklists to record observations of children			X	
During classroom interaction			X	
Evaluating children's pictures, graphs etc which show their scientific reasoning		X		
Evaluating children's relevant gestures or physical activity	X			
Marking their homework				
Using authentic problem-based tasks			X	
Asking each child to reflect on their own learning and progress			X	
Using closed question tests	X			
Using open question tests	X			
Using questions in context			X	
Using portfolios (collection of evidence of children's work and progress)		X		
Children correcting each other's work and giving each other feedback		X		

**D. What Creative attributes are addressed in assessment?**

	Not Mentioned	Single Mention	Various Mentions	Emphasised
Sense of initiative		X		
Motivation	X			
Ability to come up with something new		X		
Ability to connect what they have learnt during your lessons with topics in other subjects	X			
Imagination	X			
Curiosity	X			
Ability to work together	X			
Thinking skills	X			
Other				