



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 1 of 13: National Report on Approaches in Flemish Policy (Belgium)

Authors:

Dr. Hilde Van Houte, *Artevelde University College, Belgium*
Kirsten Devlieger, *Artevelde University College, Belgium*
Dr. Marijke Desmet, *Artevelde University College, Belgium*

Reviewer:

Prof. Dr. Pascal Verhoest, *Research director, Artevelde University
College, Belgium*

www.creative-little-scientists.eu



The project CREATIVE LITTLE SCIENTISTS has received funding from the European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 289081.



National Report on Approaches in Flemish Policy (Belgium)

Project Information

Project no. 289081
Project acronym: CreativeLittleScientists
Start date of project: 01/10/2011
Duration: 30 months
Project title:

Creative Little Scientists: Enabling Creativity through Science and Mathematics in Preschool and First Years of Primary Education

EU Strategic Objective

Funding scheme: FP7/ CP/ Capacities
Call ID: FP7-Science-In-Society-2011-1
Topic: SiS.2011.2.2.3-1 Science and mathematics-related activities carried out in pre-school and in the first years of primary school: their link to the development of creative skills

Information about the deliverable

Dissemination level: **PUBLIC**
Due date of deliverable: August 2012
Actual submission date: 30/09/2012
Deliverable title:

D3.2 Report on Mapping and Comparing Recorded Practices

Contact Information

Coordinator

Ellinogermaniki Agogi, Greece:
Dr. Fani Stylianidou

Lead partners for this deliverable

Institute of Education, University of London, UK
Dr. Esmé Glauert, Dr. Andrew Manches

Website: <http://www.creative-little-scientists.eu>

This document reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Copyright © 2012 by CreativeLittleScientists Consortium. All rights reserved.



The project CREATIVE LITTLE SCIENTISTS has received funding from the European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 289081.

Table of Contents

Executive Summary	4
1. Aims of national report.....	12
1.2 Defining terms	12
1.2.1 Policy	12
1.2.2 Curriculum	12
1.2.3 Creativity	13
2. Overview of National early years Education provision and policy	14
2.1 Some general information about the Belgian educational system	14
2.2 Early years education provision and policy in the Flemish Community	15
2.3 Current policy issues or priorities in (early years) education in Flanders	20
3. Research Questions and Methodology	22
3.1 Research Question	22
3.2 Method	23
3.2.1 Data selection	23
3.2.2 Survey tool	24
3.2.3 Completion of the Survey Tool	25
3.2.4 Context of policy messages	25
4. Approaches to Teaching, Learning and Assessment	26
4.1 Rationale or Vision	26
4.2 Aims and Objectives	29
4.3 Content	31
4.4 Learning Activities	32
4.5 Teacher Role / Location	34
4.6 Materials and Resources	35
4.7 Groupings	35
4.8 Time	36
4.9 Assessment	36
5. Approaches to Teacher Education	40
5.1 Initial teacher education	40
5.2 Continuing professional development	41
6. Summary	43
6.1 Limitations	46
6.2 Implications	47
6.2.1 In-depth field study	47
6.2.2 Policy recommendations	47
7. References	49
Appendix A: Survey Ratings: Analysis of Approaches to Teaching and Learning	51



Executive Summary

This report describes policy issues in the Flemish 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 Flemish 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 (details can be found in both policy reports).

This report discusses in greater detail the findings from policy in the Flemish 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

	Flemish Community <i>Freedom of education</i>	French Community <i>Freedom of education</i>
core curriculum – objectives – vision of the educational system	<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 creative functioning 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 development of the personal core. 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 general development through goals aimed at learning to communicate and collaborate; the acquisition of independence; creativity and problem solving 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 specific goals: 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>Separate objectives for pre-primary education irrespective of the vision on the core curriculum is formulated for</p>	<p>Mission Decree of 24 July 1997</p> <p><i>Vision and general objectives</i></p> <ul style="list-style-type: none"> • To promote self-confidence and personal development of all pupils; • 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; • 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. <p>Pre-primary education is specifically designed to</p> <ul style="list-style-type: none"> • develop awareness of the child of his or her 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 <p>Primary education is officially expected to pursue the following overall objectives:</p> <ul style="list-style-type: none"> • 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. <p><i>Socles de compétences</i>: in the French Community the 'socles de compétences'</p>

	<p>elementary education to form a bridge between pre-primary and primary education. General objectives are general for pre-primary and primary education.</p>	<p>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>Science and mathematics</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"> - The children develop basic competences that enable them to explore themselves and their environment each time further and more profound. - The children develop interest for the live of people now, and in the past, here and elsewhere in the World. - The children develop a basic attitude of openness and respect towards nature, people and society. - The children develop basic skills to cope independently with information. <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"> - The children attain some basic mathematical concepts, know-how and skills that are needed to function adequately in society and / or necessary for the further study career. - The children are able to relate 	<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 topics. Mathematics is not limited to the transmission of knowledge. From the</p>

	<p>and use the acquired mathematical knowledge, understanding and skills in meaningful concrete situations, but also in other learning areas and outside school.</p> <ul style="list-style-type: none"> - The children understand the language of mathematics, both in mathematics lessons and beyond. - The children develop a research-oriented attitude that will help them in detecting and investigating various mathematical relationships, patterns and structures. - The children use valuable search strategies to solve mathematical problems. - The children learn to guide their own mathematical thinking and learning and to reflect on it. - The children develop an adequate, constructive and critical attitude towards mathematics in general. - The children develop a positive attitude towards mathematics as a learning area at school. <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>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>Creativity</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 the vision of the core curriculum is stated that schools should emphasize active learning and broad education.</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"> • develop awareness by the child of his own potential and promote self-expression through creative activities <p>Problem solving is mentioned in the overall objectives of primary education.</p> <ul style="list-style-type: none"> • to gain a mastery of the basic

	<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>mathematical tools for problem-solving.</p> <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>Learning activities Teacher role Location Grouping Time</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>The school year starts at the 1st of September and ends at the 30th of</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"> - 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 - uses communication and information technologies, insofar as they are tools for the development, empowerment and individualization of learning pathways. <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 (collaborative work, initiative of the children, new ideas, brainstormings, ...)</p> <p>The school year starts at the 1st of</p>

	<p>June.</p> <p>children have to follow 28 to 29 teaching periods of 50 minutes each per school week.</p>	<p>September and ends at the 30th of June.</p> <p>children have to follow 28 teaching periods of 50 minutes each per school week.</p>
Assessment	<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>
Quality control	<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 design and type of quality system is up to the schools. <i>Pedagogical Advisory Services</i> are appointed to provide</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"> - 'The missions of the <i>Inspection</i> 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

	<p>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>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"> - The "Inter-Network" Character of the Inspection. - A "counseling and pedagogical service or support cells" were created in each network.
<p>Initial teacher education</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>Continuous professional development</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 professional profile is a common profile for all teachers (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>
---	---	---





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 Flemish 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 Flemish 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 Flemish 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 Flemish Policy (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'.



The project CREATIVE LITTLE SCIENTISTS has received funding from the European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 289081.

2. Overview of National early years Education provision and policy

The text in this section is based on:

- Education, Audiovisual & Culture Executive Agency 2010. Flemish Eurydice report 2010. *Organisation of the Education System in the Flemish Community of Belgium 2010* [pdf] European Commission. Available at: <http://eacea.ec.europa.eu/education/eurydice/documents/eurybase/eurybase_fu_II_reports/BN_EN.pdf> [Accessed 3 November 2011]
- Entiteit Curriculum 2007. *Conferentie na peilingsproeven wereldoriëntatie domein natuur. Verslag en aanbevelingen*. [online] Brussels: Entiteit Curriculum. Available at: <<http://www.ond.vlaanderen.be/publicaties/?get=nl>> [Accessed 3 November 2011]
- Geyer, F. 2009. *The educational system in Belgium*. [pdf] 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].
- Ministerie van Vorming en onderwijs 2010. *Ontwikkelingsdoelen en eindtermen voor het gewoon basisonderwijs. Informatie voor de onderwijspraktijk*. Brussel: Vlaams Ministerie van Vorming en Onderwijs
- OECD 2011. *School Evaluation in the Flemish Community of Belgium 2011*, OECD Reviews of Evaluation and Assessment in Education, OECD Publishing. Available at: <<http://dx.doi.org/10.1787/9789264116726-en>> [Accessed 2 July 2012]
- SLO 2008. *Core Affairs, Flanders –Belgium*. [pdf] Enschede: AXIS Media-ontwerpers. Available at: <http://www.slo.nl/downloads/Webversie_core_affairs_LR_Belgi_def.pdf> [Accessed 5 June 2012]
- www.ond.vlaanderen.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 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.

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 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 Flemish Community is explained in the sections below.

2.2 Early years education provision and policy in the Flemish Community

In Flanders education for children from 6 to 18 years of age is compulsory. It is full-time until the age of 15 or 16, and in principle includes six years of primary education. Before primary education children may attend pre-school education from the age of 2.5 up to the age of 6. Early education from 2.5 years is free, with supplementary investments given to schools catering for substantial family diversity. Flanders makes significant investments in social exclusion and priority education programmes.



Structure of the national education system 2011/12

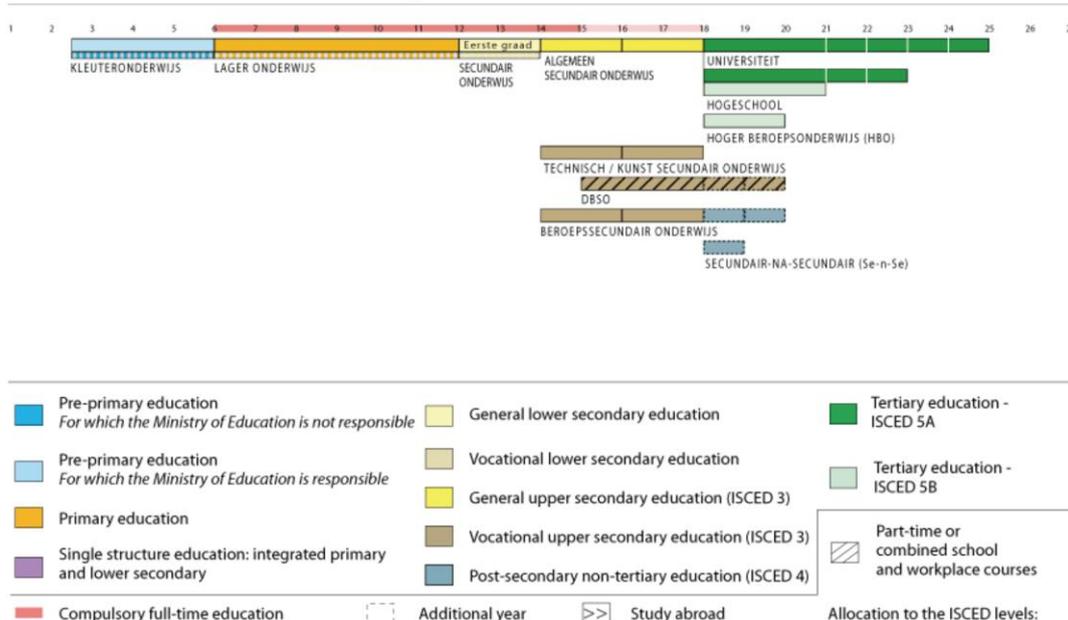


Figure 1 Structure of the educational system in the Flemish Community (Europydia, 2012)

The Decree of March 2009 introduced the obligation for parents to send their children at least one year (minimum 220 halve days) to pre-primary education before entering into primary education. Because of this obligation children should have better knowledge of Dutch language speaking when entering primary education.

Evidence from research showed that children who participate not long enough in Flemish pre-primary education have a considerable disadvantage at the start of primary education and this causes problems with other subjects that are very difficult to remediate during the following years.

It is also possible to have home or private tutoring. However, home tutoring cannot be concluded with a recognised certificate. To achieve this, it is required to take an exam by the examining board of the Flemish Community. Schools, however, are able to award official qualifications. To do so they must meet certain conditions set by the Flemish authorities, including: following a core curriculum and allowing the Flemish authorities to assure their quality (this is done via the Inspectorate).

Due to the freedom of education, schools in the French Community have full autonomy in criteria for clustering children together. The CERP report on the Educational System in Belgium describes this autonomy of schools in Belgium is described in detail (Florian Geyer, 2009: p 6-7). The autonomy of schools in the Flemish region is even more explicit than the autonomy of schools in the French region.

*'Schools in the **Flemish-speaking community enjoy full autonomy** in the following fields: 1)Numbers of hours per subject 2) timetabling of subjects over the week, 3) textbooks, 4)methods, 5) content of teaching programmes, 6) subjects offered as*

options, 7) compulsory subjects in addition to minimum curriculum, 8) continuous assessment of pupils, 9) decisions about whether pupils should redo a year, 10) content of certifying examinations, 11) school rules (in primary education), 12) expulsion and suspension criteria (in primary education), 13) criteria for grouping pupils together (in primary education) 14) allocation of the 'overall' school budget (in primary education), 15) allocation of the budget for ongoing operational resources, 16) acquisition of teaching materials, 17) acquisition of computer equipment, 18) acquisition of movables, 19) ongoing maintenance, major repairs, 20) appointment of school head, 21) recruitment for teaching vacancies, 22) recruitment to replace absent teachers, 23) termination of teachers' employment, 24) numbers of hours of teachers' presence at school per week, 25) planning of in-service training, 26) seeking donations and sponsorship, 27) service provision and fund raising, 28) loans, 29) use of private funds to acquire operational goods and services, 30) use of private funds to acquire movables, 31) use of private funds to employ non-teaching staff, 32) use of private funds to acquire immovables and 33) use of private funds to employ teaching staff.

Schools in the **Flemish-speaking community** enjoy **limited autonomy** in the following fields: Number of hours per year, 2) number of hours per week, 3) start and end of lessons, 4) school rules (in secondary education), 5) expulsion and suspension criteria (in secondary education), 6) criteria for grouping pupils together (in secondary education), 7) salary adjustments for overtime work and 8) number of teaching hours per week.

Schools in the **Flemish-speaking community** have **no autonomy** in the following fields: 1) Number of days per year, 2) duration of a period, 3) criteria for selecting pupils at enrolment (in primary education), 4) allocation of the overall school budget (in secondary education), 5) acquisition of immovables and 6) definition of the number of teaching posts.

The Decree on Elementary Education of 25 February 1997 created the Flemish core curriculum and stipulated the vision of this core curriculum. According to this decree: 'On the basis of a pedagogical project, schools must create an educational and learning environment in which pupils can experience a continuous learning process. This environment must be adapted to the development progress of the pupils. Elementary education is responsible for the education of all pupils and must continue to permanently guide as many pupils possible through continuous attention and broadening of that care.'

The core curriculum exists of attainment levels and development aims. The attainment levels are in fact minimum targets with regard to knowledge, insight, skills and attitudes for students to demonstrate by the end of primary education. Development objectives are minimum objectives which the educational government regards as desirable at the end of pre-primary education.



These final objectives (primary education) and developmental aims (early childhood education) can be found in an official document (Ministerie van Vorming en onderwijs, 2010). In the first chapter of this document the vision regarding the developmental aims and final objectives is described as well as some basic principles for practices in elementary education. More concretely, in early childhood education as well as in primary education the emphasis is laid on a) a broad core curriculum in which the child's personal development takes centre stage, on b) active learning, on c) care for every pupil and on d) coherence. In the next sections we will elaborate on these basic principles and on the vision.

There are only 5 areas of learning for nursery education (physical education, art education, language (Dutch), World orientation, mathematics) and 6 areas of learning for primary education (physical education, art education, Dutch language, French language, World orientation, mathematics). In primary education there are also 3 cross-curricular themes: learning to learn, social skills and ICT.

In early childhood education these themes are immediately integrated in the developmental objectives of the 5 areas. There has to be a flowing line in the learning process from early childhood education right through to the end of compulsory education. Since 2006 a major revision of the core curriculum has been made for cross curricular objectives, ICT, mother tongue, foreign languages, world orientation (domains of nature and technology). In elementary education the domain nature in the learning area world orientation is seen as science. The attainment levels and the development objectives of science (world orientation – nature) and technology in elementary education have been revised in order to match better with the competence “science literacy” and “technological literacy”. They were implemented in September 2010.

In defining the core curriculum, different actors are involved. New proposals about the curriculum are formulated by the Flemish Ministry of Education and Training on the basis of scientific research and concepts, in collaboration with stakeholders such as teachers and pedagogical advisers. Afterwards the Flemish Education Council, in which all relevant stakeholders are presented, gives advice about these proposals. Once this has happened, the Flemish government has to decide whether it approves or not the proposal. Finally the Flemish parliament has to discuss and ratify the new curriculum. The core curriculum is thus part of the parliamentary procedure.

While the learning outcomes (development aims) determine what the pupils minimally have to know and be able to do, they do not define how these objectives are to be reached. The schools are totally free in this respect. There is room for diversity and difference in approach. It are the ‘organising bodies’ - school boards or the educational umbrella organisations - that draw up a curriculum (curricular objectives, pedagogical project, ...) based on the core curriculum.





Most schools in Flanders belong to an educational network and they most frequently choose to use the curriculum developed by the different umbrella organizations within the networks. These umbrella organizations have their own Pedagogical Advisory Service which offer educational and methodological support to schools.

The Inspectorate takes the attainment levels of the core curriculum into account during the school audits while respecting the schools' pedagogical freedom. Concerning the cross-curricular objectives the Inspectorate looks whether schools produce enough efforts. The government monitors the implementation of attainment levels and development aims via the Inspectorate's evaluation of schools' curricula and their results. The government, by way of the Inspectorate, will not make any judgement about the attainment levels of individual pupils. This is, and should remain, the responsibility of the school, in this case the council of teachers, which will deliberate about the performances of individual pupils on the basis of internal evaluations and give their final appraisal. The council of teachers will not only base their deliberation and evaluation on the development objectives or attainment levels, but also on curricular objectives and any other objectives from the school's own pedagogical project.

In this way, the attainment levels and development objectives help increase the transparency of education, so not only parents and pupils but also others become familiarised with what is learned in school. Teachers and schools consequently receive reference points in order to assess their own view and daily practice. Nonetheless, according to international assessments (OECD, 2011), there are some worrying inequities among Flemish schools: outcomes are strongly influenced by student and school background. This report also makes some critical reflections about the lack of performance levels to be achieved after the minimal attainment level (in all subject areas).

To guarantee quality of education in all Flemish schools, the Flemish government has recently developed policies to promote school improvement. The Decree on Quality of Education in 2009 clarifies that schools are responsible for providing good quality education and for monitoring their achievements. There have been several efforts to stimulate school self-evaluation (provision of evaluation tools and student assessments), however the choice of design and type of quality system is up to the schools. According to the OECD report (2011) schools vary widely in their policy-making capacity. In this report some critical reflections are made concerning the freedom of schools and the quality control of education in Flanders:

- There is no guarantee that process evaluation focuses on the quality of teaching and learning and its impact on student outcomes.
- The Inspectorate does not have information on student performance before it conducts its preliminary investigation, and indeed, may only see information from self-evaluation activities if a school decides to present this to the inspectors. School self-evaluation and school inspection are not aligned and the Inspectorate may not



be fully aware of the schools' own evaluation and planning cycle, its priorities and interpretation of recent developments.

The framework (CIPO; Context, Input, Process and Output) the inspectorate uses is empirically grounded and comprehensive, but lacks objective criteria to judge "quality". It's also a challenge for the inspectors to make their judgements more uniform.

- The attainment levels do not provide sufficient stimulus for schools to strive for excellence and continuous improvement. There is no guidance on different performance levels to be achieved beyond the minimum, resulting in a high degree of variability between schools.
- The OECD review team formed the impression that many Flemish educators find it difficult to understand self-evaluation processes and determine effective ways to use data. Teachers and some school leaders struggle with data analysis and pulling together all of the student level data collected into a coherent whole.

Since 2002 the National Assessment Programme is introduced. The National Assessment Programme is a periodical sample survey to monitor the implementation of the Flemish attainment targets at the system level. The performance of pupils is examined in all anonymity by means of a survey amongst a representative sample of students at the end of an educational cycle and the results are calculated at education-system level. The survey can be used to evaluate or possibly review the attainment levels and can also be used to fine-tune the educational provision and the learning and teaching methods used and to gain an idea of the need for guidance and in-service training for teachers.

In 2005 a survey was done on the attainment levels of world orientation (nature). The recommendations published in the brochure about this survey, are only of an advisory nature. The document contains fourteen recommendations. Some of them are on the didactical level: join the experiential world of children, start from the environmental and living world of children, work with images, stories and entertainment, use understandable and accessible language, choose active work forms, encourage exemplary learning, teachers should have fascination for nature, schedule free space in the curricula, organize support, provision of training on demand. Based on the results of this survey the attainment levels of world orientation (nature) were changed and implemented in 2010.

2.3 Current policy issues or priorities in (early years) education in Flanders

Strategic and operational objectives of the current Flemish minister of education (some of them have a specific link with mathematics, science, early years or the reflective and research skills of teachers. Emphasis is also laid on the quality of education and on talent based education.).

- Strategic objective 1. To form open, versatile and strong persons.



- Strategic objective 2. Give opportunities to each talent.
 - o **Operational objective 2.2. Maximize the participation in pre-primary education**
- Strategic objective 3. To stimulate the learning of Dutch and foreign languages to be able to participate in the globalised society
- Strategic objective 4. To prepare students for a successful start on the labour market
 - o **Operational objective 4.8 Stimulation of careers in science and technology.** This operational objective is linked with the new action plan for *the stimulation of careers in mathematics, science and technology (2012 – 2020)*. Since the beginning of 2012 there is much to do about STEM-education (in preschool, primary and secondary education) in Flanders.
- Strategic objective 5. The teacher is recognized as key figure in the formation of open, versatile and strong personalities
- Strategic objective 6. To strengthen the societal interwovenness of education with local, regional and international networks strengthened
- Strategic objective 7. To ensure that each educational institutions can offer excellence (see also OECD, 2011)
- Strategic objective 8. To invest in sustainable and modern infrastructure



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 Flemish 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 Flemish community. One of the first challenges, therefore, was to identify what was 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.

As there is only one major policy document for early years (early childhood education and primary education) in the Flemish community – document on the core curriculum of the Flemish Community- the analysis in general was based on this document.

Due to the freedom of education organising bodies and teachers in the Flemish community have freedom in choosing their own teaching approaches, didactical practices and assessment strategies.

In addition also Decrees concerning elementary education and teacher competencies were used as well as the new advisory report on STEM.

Ministerie van Vorming en onderwijs, 2010. <i>Ontwikkelingsdoelen en eindtermen voor het gewoon basisonderwijs. Informatie voor de onderwijspraktijk.</i> Brussel: Vlaams Ministerie van Vorming en Onderwijs.	Statutory Core curriculum of the Flemish Community
Flemish Government 2012. <i>Action plan for the stimulation of careers in mathematics, science and technology, 2012 - 2020</i>	Guidance – Flemish plan for the future concerning STEM Published by the Flemish government. Plan will have an impact on education in Flanders – especially secondary education
Entiteit Curriculum 2007. Conferentie na peilingsproeven wereldoriëntatie domein natuur. Verslag en aanbevelingen. [online] Brussels: Entiteit Curriculum. Available at: < http://www.ond.vlaanderen.be/publicaties/?get=n > [Accessed 3 November 2011]	Advisory Critical perspective and recommendations concerning world orientation (nature)
Ministerie van de Vlaamse Gemeenschap, Departement Onderwijs 2007. <i>Beroepsprofiel en Basiscompetenties van de leraren. Decretale tekst en memorie van</i>	Statutory



toelichting. Brussel: Afdeling Informatie en Documentatie.	Decree on the basic competencies of teachers
Vlaamse overheid 2008. <i>Een nieuw profiel voor de leraar kleuteronderwijs en lager Onderwijs. Hoe worden leraren daartoe gevormd?</i> Brussel: Vlaams Ministerie van Onderwijs en Vorming.	Information paper Linked with the decree on the basic competencies of teachers
Ministry of Education and Training Flemish Community 2009. <i>National report 2009 of the Flemish Community (Belgium). Education and training 2010.</i> Ministry of Education and Training Flemish Community 2011. <i>National report 2011 of the Flemish Community (Belgium). Education and training 2020.</i>	Reports More information in English about the developmental aims and attainment levels of technology and science + basic competencies of teachers
Education, Audiovisual & Culture Executive Agency 2010. <i>Flemish Eurydice report 2010. Organisation of the Education System in the Flemish Community of Belgium 2010</i> [pdf] European Commission. Available at: < http://eacea.ec.europa.eu/education/eurydice/documents/eurybase/eurybase_full_reports/BN_EN.pdf > [Accessed 3 November 2011]	Report General information about education in Flanders.
www.onderwijs.vlaanderen.be	Official website of the Flemish Government of education and professional development.
Ministerie van de Vlaamse Gemeenschap, Departement Onderwijs 1997. <i>Decreet basisonderwijs</i> . Brussel: Afdeling Informatie en Documentatie.	Decree - statutory

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 Flemish 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 Flemish 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 Flanders the essence of elementary education - early childhood and primary education - is to prepare pupils for critical and **creative functioning** 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. The essence of elementary education is translated in development aims and attainment levels which indicate more concretely what is considered desirable and achievable for children in elementary education.

In the development of the development aims and attainment levels, attention is paid to some fundamental elements in development of a child.

The **development of the personal core**. Basic characteristics such as self-esteem, motivation and initiative are woven as a thread through the whole of the development aims and attainment levels.

The **general development** through goals aimed at learning to communicate and collaborate; the acquisition of independence; creative and problem solving 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.

The **specific goals**: specific learning area goals.

In the attainment levels and development aims 4 principles are incorporated, a translation of these can be found in the Flemish Eurydice report 2010.

- **A Broad curriculum**: in nursery and primary education the emphasis is laid on a broad core curriculum in which the **child's personal development** takes centre



stage. Moreover, here the foundations for further education and proper social integration are laid. Intellectual development but also attitudes and values are important.

- **Active learning:** the development aims and attainment levels provide children with the opportunity to **seek solutions, acquire experiences, gain insights...** during class in conjunction with the teacher and fellow-pupils. These are the 'basic competences': the formulated objectives are true to life and can be applied in children's daily lives.
- **Care for every pupil:** the school's first concern is that every child acquires the necessary basic competences. All children are entitled to that minimum. However, it also allows for diversity. The personal development of each child is very much the focal point.
- **Coherence:** a fourth important characteristic is the coherence between the **areas of learning** themselves. **Children do not see a compartmentalized reality.** For that reason, there are only 5 areas of learning and 3 cross-curricular themes. This is called horizontal coherence. Alongside this, we speak of vertical coherence. There must be a flowing line in the learning process from nursery school right through to the end of compulsory education.

What issues / tensions / policy criticisms exist?

In the book "Core Affairs, Flanders –Belgium" (SLO, p. 71) there are some critical thoughts about the implementation of this core curriculum in Flanders.

'In Flanders, the laying down of a core curriculum based on attainment levels and development objectives, and the procedures and evaluation methods used, are extremely pupil-friendly. The system is not driven by tests, but rather by concrete attainment levels and a strongly recommended method of self-evaluation by means of assessments and good parallel tests. Pupils will receive a high-quality education with minimum pressure and maximum opportunities. This was, in short, the government's intention. However, historic achievements and the slogan 'pedagogical freedom' quickly overshadowed this vision. The different Nets (educational umbrella organisations), in a strongly denominational Flanders, kept an iron grip on the contents of their education. The benefits of a core curriculum threatened to disappear as a result. Schools continued to use their Nets' curricula, which, in addition to the attainment levels, contained a Net-bound curriculum that was based on their pedagogical project.'

In the National Assessment Programme concerns were raised concerning the curricula of the educational umbrella organizations, questioning handbooks based on these curricula, ... Currently method schools - Freinet, Steiner, Experiential, ... - become more and more popular.





In what ways is the role of creativity emphasised?

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.

What are the main differences between science and mathematics in preschool and school?

Based on the vision of the core curriculum science is not an area of learning but is part of world orientation. Children have to be oriented to the world in a broad way since the world is no compartmentalized reality, especially not in the domains of science, technology, society, geography, ...

In the book on the attainment levels and developmental objectives published by the Ministry of Education' (Ministerie van Vorming en onderwijs, 2010) a description of the purpose of world orientation and mathematics in elementary education (primary as well as pre-primary education) can be found.

World orientation:

- The children develop basic competences that enable them to explore with trust themselves and their environment each time further and more profound.
- The children develop interest for the live of people now, and in the past, here and elsewhere in the world.
- The children develop a basic attitude of openness and respect towards nature, people and society.
- The children develop basic skills to cope independently with information.

Mathematics

- The children attain some basic mathematical concepts, know-how and skills that are needed to function adequately in society and / or necessary for the further study career.
- 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.
- The children understand the language of mathematics, both in mathematics lessons and beyond.
- The children develop a research-oriented attitude that will help them in detecting and investigating various mathematical relationships, patterns and structures.
- The children use valuable search strategies to solve mathematical problems.
- The children learn to guide their own mathematical thinking and learning and to reflect on it.
- The children develop an adequate, constructive and critical attitude towards mathematics in general.
- The children develop a positive attitude towards mathematics as a learning area at school.





Education in mathematics and world orientation starts in pre-primary education, which means that in preschools children are helped to develop competencies which lead to problem solving and self-efficacy in order to manage their way in real life. Therefore it is important that children themselves, based on their explorative and inquisitive attitude, can have the opportunities to become more competent in the world of nature, technology, society, time and space.

In nursery education children have to be provided with a rich and stimulating environment in order to stimulate mathematical skills and reasoning. This means that they must have the opportunity to count, to arrange, to compare, to measure, to construct in different situations with different materials linked with their every day life.

4.2 Aims and Objectives

What are the key summary points?

During early childhood education the stimulation of the child's personality is the primary aim, along with the development of its social skills and its cognitive and emotional development. In addition to developing the independence of the child and encouraging co-operation, nursery education also successfully attempts to get the children to pick up a number of basic learning skills. The development of psychomotor and language skills is also regarded as a priority.

Developmental objectives have been formulated for five learning areas: physical education, musical education, Dutch, world orientation (nature, people, society, technology, time and space) and an introduction to mathematics.

At the end of primary education attainment levels have to be reached. Attainment targets are formulated for the same five areas of learning: physical education, musical training, language, world orientation (nature, people, society, technology, time and space) and mathematics. French is added to the language learning area and attainment targets are also formulated for three themes that go beyond these areas of learning: learning to learn, social skills and ICT. In nursery education these three cross-circular themes are automatically integrated in the five learning areas. Aspects of creativity and a sense of initiative are integrated in the cross-circular attainment levels.

What issues / tensions / policy criticisms exist?

The development aims and the attainment levels of **nature and technology** have been revised in order to match better with the competences "science literacy" and "technology literacy". They were implemented in September 2010.

Since the beginning of 2012 there is also a new action plan for Action plan for the stimulation of careers in mathematics, science and technology (2012 – 2020).

Most probably this new action plan will have an impact in the future on science education and on the core curriculum.



In what ways is the role of creativity emphasised?

In the development aims and the attainment levels of the different learning areas as well as in the cross-circular themes, goals aimed at learning to communicate and collaborate; the acquisition of independence; creative and problem solving interaction with the world and self directed learning, can be found, implicitly or explicitly.

Science and mathematics education in preschool and school?

In the table below we try to explain which objectives, mentioned in the questionnaire can be found in the Flemish core curriculum. As you will notice some of them are in fact general objectives of the core curriculum, others are a combination of several attainment levels or development aims, some belong not to the learning area of world orientation,....

	Development aim	Attainment level
To know and understand the important scientific ideas (facts, concepts, laws and theories)	Combination of several attainment targets of the learning area world orientation domain nature and technology – however there is a specification of these scientific ideas. In the development aims the word common is often mentioned.	Combination of several attainment levels of the learning domain world orientation nature and technology – however these attainment levels are more specific so there is a specification of these scientific ideas (living and non-living nature).
To be able to ask a question about objects, organisms, and events in the environment	Development aim in the area of learning language	Attainment level in the learning area of language – attainment level of the cross-circular theme learning to learn
To be able to employ simple equipment and tools, such as magnifiers, thermometer, and rulers, to gather data and extend to the senses.	Development aim in the learning area of world orientation domain technology	Attainment level in the learning area of world orientation domain technology – cross-circular theme ICT
To know and understand the important scientific processes		Combination of several attainment levels of the learning area world orientation nature (living and non-living nature)
To be able to communicate investigations and explanations	Development aims in the core curriculum area of learning language, physical activity and musical training	Attainment level in the learning area of language – attainment level in the cross-circular themes learning to learn and ICT
To have positive attitudes to science learning	General objective of the learning area of world orientation	General objective of the learning area of world orientation + general objective of the cross-circular theme learning to learn
To be interested in science	General objective of the learning area of world orientation	General objective of the learning area of world orientation
To be able to plan and conduct a simple investigation	Objectives is formulated more open: Children show a explorative and experimental approach to know more about nature (living and non-living).	Attainment level of the learning area of world orientation domain nature

To have positive attitudes to learning	General key idea of the core curriculum.	General key idea of the core curriculum.
To be able to collaborate with other children	General key idea of the core curriculum -	General key idea of the core curriculum – attainment level of the learning area word orientation domain society + general objective of the cross- circular theme social skills

Since not all objectives, mentioned in the questionnaire, specifically belong to the learning area of world orientation several other attainment levels or development aims can also be mentioned. They can be found on the following link: <http://www.ond.vlaanderen.be/curriculum/index.htm>

However, some additional interesting attainment levels and development aims to be mentioned are the ones that stimulate the information skills of the children.

At the end of nursery education children are able to consult, with the help of an adult, uncomplicated information sources to know more about nature.

At the end of primary education pupils are able to consult several information sources.

At the end of primary education pupils are able to acquire and process information.

As for mathematic education several other attainment levels and development aims are described in the core curriculum based on the general objectives for mathematics education in elementary education (see rationale or vision).

4.3 Content

What are the key summary points?

As mentioned before Flanders disposes are only five learning areas in nursery and primary education - physical education, musical training, language, world orientation and mathematics. Additionally in primary education there are three cross-circular areas or themes – social skills, learning to learn and ICT. In nursery education these are integrated in the development aims of the different learning areas.

Science education is part of world orientation which consists of the domains nature, technology, people, time, space and society. In primary education a seventh domain is added – use of sources. In the domain nature the key themes in nursery and primary education are living and non-living nature, health, environment and general skills in science. In the domain technology the key themes are key components of technology, technology as a human activity, technology and society.

Mathematics education in nursery education consists of three domains – numbers, measuring and geometry. In primary education there are three additional domains – strategies in mathematics, problem solving skills and attitudes towards mathematics.



Some of these domains are specifically linked with creativity e.g. problem solving skills, general skills in science

No specific content in the different domains is suggested in the core curriculum, this is left to the school or the umbrella organisations.

What issues / tensions / policy criticisms exist?

No new issues or tensions.

In what ways is the role of creativity emphasised?

In the learning area mathematics the domain problem solving skills is specifically described in the core curriculum.

What are the main differences between preschool and school?

In the learning area world orientation the domains are the same in preschool and primary education, however the content selected by the teachers (linked with these domains) can vary. The only addition in primary education is the use of sources, which is integrated in the other domains in preschool education.

As for mathematics, the additional domains in primary education – strategies in mathematics, problem solving skills and attitudes towards mathematics – are integrated in the other domains in preschool education. In Flanders preschool education uses very integrated approaches.

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

Science and mathematics are two different learning areas in the core curriculum. The domains of these two learning areas are different. However teachers are advised to see these domains as part of the living world of children and to bring them integrated in the activities of children.

The domains in both learning areas science and mathematics are still very broad and teachers can select their own specific content linked with these domains.

4.4 Learning Activities

What are the key summary points?

Development aims and attainment targets determine what the pupils minimally have to know and be able to do. However, they 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.

However, as described in the 4.1. schools are obliged to follow the main vision of the core curriculum, which is: broad education, active learning, broad care and cohesion.

In the document on attainment levels and development objectives (Ministerie van Vorming en onderwijs, 2010) teachers can find what is meant by the concept of 'active learning'. Active learning 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.

As mentioned before (4.1. Rationale) teachers should also provide learning activities where there is a cohesion among different learning areas. Children do not see reality as a series of separate items. That is why there are only 5 (6) learning areas. A learning activity should provide opportunities to work on attainment levels or development objectives from different learning areas.

However, after national surveys on clusters of attainment levels, conferences were organised to gain insights in the results of the national surveys and to formulate recommendations. These recommendations are often at the level of learning activities and teacher role, which resulted in the recommendation (concerning world orientation) mentioned in the following section of this report.

Secondly, in the document of the core curriculum (attainment levels and development objectives) examples are given to attain the developmental aims or the attainment levels. We also used these examples to give a view on science and mathematics activities in preschool and primary school.

What issues / tensions / policy criticisms exist?

Freedom of education concerning learning and teaching approaches.

In what ways is the role of creativity emphasised?

The role of creativity is not specifically mentioned in the recommendations (Entiteit Curriculum, 2007) nor in the examples mentioned in the core curriculum concerning mathematics or world orientation.

The active learning activities mentioned in the recommendations and in the examples in the core curriculum can be seen as creative approaches, stimulating creative functioning of children.

Science and mathematics education in preschool and primary school

One of the key aspects, mentioned in the core curriculum, is that children should learn from a world that is familiar to them and active learning has to be stimulated in every day school life.

In the recommendations concerning world orientation - nature (Entiteit Curriculum, 2007) active learning activities are recommended, especially in primary schools. In nursery education these active learning activities are much more common since the influence of experiential education in Flanders. Active learning activities which are recommended, are: corner work, contract work, project work (project based learning), ateliers, excursions and





visits, experimentations and observations. Exemplary learning is also recommended, in these activities questions and ideas of children are stimulated. Interests of children are central.

In nursery education there isn't much difference between Mathematics and Science concerning recommendations or examples of learning activities. In preschool education in Flanders an integral approach is common.

In primary education there is a recommendation of project work and ateliers with integration of different learning areas. However, in primary education integration isn't common, for this reason there are also cross-circular themes.

4.5 Teacher Role / Location

What are the key summary points?

As mentioned before, schools in the Flemish community have an extreme freedom, they have room for diversity and difference in approaches. Consequently there are no regulations concerning the role of the teacher, his or her approaches and locations used. However in the main vision of the core curriculum 4 basic principles are described: broad education, active learning, broad care and cohesion.

Broad education 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.

In addition, in the document of the core curriculum examples are given to reach or attain the developmental aims or the attainment levels. We used these examples to give a view on science and mathematics learning and teaching approaches in preschool and primary school.

Secondly, after national surveys on clusters of attainment levels, conferences are held to gain insights in the results of the governmental surveys and to formulate recommendations. These recommendations are often at the level of learning and teaching approaches. In the report 'Conferentie na peilingsproeven wereldoriëntatie domein natuur. Verslag en aanbevelingen.' recommendations are described for world orientation – nature. Although these recommendations are advisory we also have mentioned them in the section below.

What issues / tensions / policy criticisms exist?

Freedom of education concerning learning and teaching approaches.

In what ways is the role of creativity emphasised?

The role of creativity (or the word creativity) is not specifically mentioned in the recommendations (Entiteit Curriculum, 2007) nor in the examples mentioned in the core curriculum concerning mathematics or world orientation. However, the teaching and learning approaches mentioned in the recommendations and in the examples in the core curriculum can be seen as creative approaches, stimulating creative functioning of children.





Science and mathematics education in preschool and primary school

One of the key aspects, mentioned in the core curriculum, is that children should learn from a world that is familiar to them and active learning has to be stimulated in every day school live.

In the examples mentioned in the core curriculum there is a difference in focus of preschool approaches and primary approaches. The focus in preschool education is on play, role play, fantasy play, explorations, experimentation, use of story books, integration, experiences, ...

In primary education play isn't mentioned in world orientation and mathematics, however also in primary education observations, experimentations, ... and recordings (not mentioned in the examples of preschool education) are highlighted.

In the report of the Entiteit Curriculum (2007) concerning world orientation – nature, several recommendations concerning teaching and learning approaches are specifically given and explained. Some of them are mentioned in the questionnaire: teaching science from stories or moving images or entertainment, working in small groups, physical exploration of materials (use of concrete materials), using outdoor learning activities, taking children on field trips, visits or excursions, building on children's prior experiences, fostering collaboration (cooperative learning; teacher and children), encouraging children to try out their own ideas in investigations, relating science to everyday life, using questioning as a tool in science teaching, Fostering autonomous learning (contract work), pay attention to language development of children (learning language functional and concrete).

Inquiry approaches as mentioned in the questionnaire, are not mentioned in the examples of the core curriculum nor in the recommendations.

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 schools (organising bodies) have to provide materials and resources which are necessary to reach the developmental aims and the attainment levels (decreet basisonderwijs 1997). In the decree of 6/7/2007 a list of materials which have to be provided for free is added. In this list several materials and resources are mentioned such as audio-visual resources, relevant library materials (e.g. story books), equipment and materials for hands-on exploration in the classroom (e.g. magnets, building blocks), calculator, ICT resources, multimedia materials, ...

4.7 Groupings

The school board has full autonomy when it comes to organising the education it offers. However the organisation of education has to be laid down in a school work plan. So, schools are free in stipulating the number of children in each classroom, in organising





classes of the same ages,... Teachers are free in choosing their groupings in the everyday classroom live.

In the examples mentioned in the core curriculum several settings are suggested such as group work, class activities, individual work, dual work.

4.8 Time

The school board has full autonomy when it comes to organising the education it offers, also with regards to the drafting of the timetables. However, according to the Decision of the Flemish Government of 17 April 1991, children have to follow 28 to 29 teaching periods of 50 minutes each per school week. They are evenly spread across the five workdays, from Monday to Friday. One half day in the week is school free - Wednesday afternoons (Decision of the Flemish Government of 17 April 1991). Classes commence at the earliest at 8 a.m. and end at 3 p.m. at the earliest and at 5 p.m. at the latest. Lunch breaks last at least one hour. Often classes in the morning and/or afternoon are paused for playtime. The school year starts at the 1st of September and ends at the 30th of June.

4.9 Assessment

What are the key summary points?

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.

Yet, assessment and evaluations are important elements for improvement and quality control. 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 design and type of quality system is up to the schools. Pedagogical Advisory Services are appointed to provide external support to schools.

The Inspectorate 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.

National Assessment Programme (NAP) – Flemish pupil monitoring system

NAP is a periodical sample survey to monitor the implementation of the Flemish attainment targets at the system level. The National Assessment Programme was introduced in 2002. The performance of pupils (at the end of primary education – 12 year) is examined in all anonymity by means of a survey amongst a representative sample of students at the end of an educational cycle and the results are calculated at education-system level.

In 2005 a survey was done on the attainment levels of world orientation (nature).





In the recommendations (Entiteit Curriculum, 2007) based on the results of this survey, assessment is mentioned. In world orientation there should be attention for product evaluation as well as process evaluation. Assessments should test the problem solving skills of children, should test their capability to use knowledge in investigations, ...

Schools are now able to administer parallel versions of these NAP tests as part of their own evaluation activities.

All registered primary schools can also use the Flemish pupil monitoring system (LVS). Schools can use this to monitor student progress in Dutch language and mathematics skills at different stages of their primary education.

Inspectorate

The Inspectorate uses an inspection framework (the CIPO framework).including quality indicators for school context (infrastructure, location, staff recruitment), input (student enrolment by type of programme, student socio-economic background, school staff and their educational career), processes and output (school career, that is, student progress and effective enrolment; outcomes, that is, subsequent education or career progression for students). The school must provide inspectors with a sample of student tests, examinations and portfolios from the previous two school years. Inspectors may consult school-held information from self-evaluation activities, if the school chooses to present this information during the inspection.

According to the OECD report (2011) schools vary widely in their policy-making capacity. In the OECD report (2011,p. 110 – 111) some critical reflections are made concerning the external inspection of the Flemish schools.

‘The components of the CIPO (Context, Input, Process, Output) inspection framework are empirically grounded and are also used in the methodologies of other inspectorates. Further, the CIPO inspection framework is comprehensive, for example checking key processes: school leadership and development of school vision, school staff quality and management of staff; logistics and well-being; and educational policy, including curriculum, coaching, counselling and evaluation. The examination of a school’s output focuses on learning results, school career, outcome and satisfaction and forms the basis for the inspector’s judgement on the school. Although there is a general concept of what constitutes a good school, which also has an empirical foundation, there are no clear reference standards or demarcation points above which a school is sufficient, good, or excellent. In the absence of clear standards for output and the other components of the CIPO inspection framework, inspectors face a challenge to apply objective criteria in forming their judgements. Without an objective, external norm for quality, there is a risk that schools adjust the norm to suit their own interest, thus putting students at risk.’

What issues / tensions / policy criticisms exist?

In the OECD document (2011) some other critical reflections are made concerning assessment and evaluation.





- There is no guarantee that process evaluation focuses on the quality of teaching and learning and its impact on student outcomes.
- The Inspectorate does not have information on student performance before it conducts its preliminary investigation, and indeed, may only see information from self-evaluation activities if a school decides to present this to the inspectors. School self-evaluation and school inspection are not aligned and the Inspectorate may not be fully aware of the schools' own evaluation and planning cycle, its priorities and interpretation of recent developments.

The framework (CIPO; Context, Input, Process and Output) the inspectorate uses is empirically grounded and comprehensive, but lacks objective criteria to judge "quality". It's also a challenge for the inspectors to make their judgements more uniform.

- The attainment levels do not provide sufficient stimulus for schools to strive for excellence and continuous improvement. There is no guidance on different performance levels to be achieved beyond the minimum, resulting in a high degree of variability between schools.
- The OECD review team formed the impression that many Flemish educators find it difficult to understand self-evaluation processes and determine effective ways to use data. Teachers and some school leaders struggle with data analysis and pulling together all of the student level data collected into a coherent whole.

In this OECD report (2011, p. 112 - 116) several policy recommendations are made, some of them are also interesting for the development of the guidelines in the *Creative Little Scientists* project.

- Promote the use of evaluation and assessment for improvement and strengthen related professional development.
- Strengthen information flow for use in school evaluation
- Further clarify common goals and expectations to promote excellence and improvement. Developing a clearer set of criteria describing how students typically progress through their learning in each subject area. Assessment based on these learning progressions could be used to identify different levels of proficiency and to measure growth in student performance, that is, emphasising student improvement and not just whether or not they have achieved minimum standards.
- Strengthen consistency and coherence of different elements of school evaluation. There is a need to better integrate self-evaluation and inspection.
- Recognise the key role of school leaders in self-evaluation and strengthen their policy-making capacity
- Ensure school self-evaluation focuses on the quality of teaching and promotes professional development





National Report on Approaches in Flemish Policy (Belgium)

- Extend collegial practice both within and among schools
- Clarify the criteria for inspection judgements on the quality of education
- Go further in improving the inter-rater reliability of inspection reports
- Ensure regular and meaningful feedback to schools on key CIPO inspection framework indicators
- Devise ways to improve the public use of inspection results



The project CREATIVE LITTLE SCIENTISTS has received funding from the European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 289081.



5. Approaches to Teacher Education

5.1 Initial teacher education

In Flanders anyone who has obtained a diploma of secondary education is free to follow higher education. One of the consequences of this open-access system is that relatively high numbers of people enter the higher-education system. Yet, measures are being taken to boost the higher-education intake even further.

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 3 groups and 10 subgroups of competences (National report 2009 of the Flemish Community "Education and training 2010"). Each subgroup is divided in several sub-competences which are level specific. There is a difference between early childhood teacher education and primary teacher education. In table 1 an example is given for the basic competence 3: The teacher as a (subject – content) expert. In the same table the corresponding competences in the professional profile are described.

Responsibilities with respect to the learner

1. The teacher as a guide of learning- and development processes
2. The teacher as an educator
3. The teacher as a (subject - content) expert
4. The teacher as an organiser
5. The teacher as an innovator / researcher

Responsibility towards the school/ the educational community

6. The teacher as a partner of parents
7. The teacher as a partner of the school team
8. The teacher as a partner of the external community
9. The teacher as a member of the educational community

Responsibility with respect to the society

10. The teacher as a participant of the cultural community: Socio-cultural field, Socio-economic field, Philosophical field, Cultural-aesthetic field, Cultural-scientific field

In addition, 8 attitudes are filled in to complete the list of teacher competences. They affect decision-making ability, ability to form relationships, how critical people are, their eagerness to learn, ability to organise, desire for teamwork, sense of responsibility, creativity, flexibility and ability to make appropriate and correct use of language.

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.

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.

A few years ago VELOV (The Flemish Association of Teacher Educators) decided to investigate the possibilities of drawing up a professional standard for teacher educators. In the booklet 'The Flemish Teacher Educator Development profile' (VELOV, 2012) the Flemish teacher educator development profile is presented and discussed. 10 sections in this profile are described.

- The fundamentals of being a teacher educator
- The teacher educator as a supervisor of learning and development processes
- The teacher educator as a supporter and supervisor of personal, social and interactive processes
- The teacher educator as a teacher education specialist (an expert in teacher education didactics)
- The teacher educator as a content expert
- The teacher educator as an organizer
- The teacher educator as an innovator and researcher
- The teacher educator as a member of a teacher education team
- The teacher educator as a partner for external stakeholders and as a member of the educational community
- The teacher educator as an involved and critical social participant

In the booklet these 10 sections are further explored and elaborated. How this profile has to be used is discussed in the last chapter. Some interesting reflections are made.

Tensions and issues in policy

The Flemish Education Board were asked by the Flemish government to develop a teachers' professional qualifications dossier. In this dossier the competencies of a teacher have to be formulated (they have to be formulated much more in competencies than the standards). These competencies will serve as basis for initial teacher education. Discussions with important stakeholders have to reveal whether there has to be one or more qualification dossier (preschool, primary school and secondary school education).

The work will be completed in the autumn of 2012.

5.2 Continuing professional development

As mentioned earlier, 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 **professional profile is a common profile for all teachers**



(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. The purpose of the teacher's professional profile is to bring about a better connection between professional training and professional practice. The professional profiles and the specific attainment targets for teachers express what requirements education and society place on experienced and beginning teaching staff.

In addition, continuing teacher training courses are intended to allow teachers to acquire the necessary qualifications for a particular aspect of the teacher's profile for which they have not been trained (Decree of 16 April 1996).

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).

Table 1: Competency 3 Teacher as content expert

3. Teacher as content expert - early childhood teacher education	3. Teacher as content expert - primary teacher education	3. Teacher as content expert – professional profile of a teacher (early childhood, primary and secondary teacher)
3.1. The teacher has mastered the basic knowledge of the learning contents, including at least the development aims, and he is able to follow recent developments on contents and skills in the learning areas physical education, world orientation, Dutch and mathematical initiation.	3.1. The teacher has mastered the basic knowledge of the learning contents, including at least the development aims and attainment levels, and he is able to follow recent developments in the learning areas, French, Physical Education, Dutch, World orientation and Mathematics and the cross-circular themes learning to learn, social skills and ICT.	3.1. The teacher is able to broaden and deepen the basic knowledge of the learning contents, including at least the development aims and the attainment levels.
		3.2. The teacher can monitor, analyse and process the latest developments on content and skills from the learning areas or disciplines.
3.2 The teacher is able to offer the knowledge and skills relating to learning area in an integrated manner.	3.2 The teacher is able to use the knowledge and skills relating to learning area an disciplines in an integrated manner.	3.3 The teacher is able to use the knowledge and skills relating to learning area an disciplines in an integrated manner.
3.3 The teacher is able to situate the own offer in the whole of the curriculum with a view on the guidance and orientation of children.	3.3 The teacher is able to situate the own offer in the whole of the curriculum with a view on the guidance and orientation of children.	3.4 The teacher is able to situate the own offer in the whole of the educational offer with a view on the guidance and orientation of children, in particular the neighbouring levels and special education and the teacher is aware of the existing forms of integration between mainstream and special education.



6. Summary

Approaches in policy Flemish Community.

The Flemish education system does not impose a curriculum, but sets out **attainment levels and development aims** –the Decree on Elementary Education of 25 February 1997. According to this decree: *‘On the basis of a pedagogical project, schools must create an educational and learning environment in which pupils can experience a continuous learning process. This environment must be adapted to the development progress of the pupils. Elementary education is responsible for the education of all pupils and must continue to permanently guide as many pupils possible through continuous attention and broadening of that care.’*

Attainment levels are minimum objectives with regard to knowledge, insight, skills and attitudes, which the educational government regards as necessary and attainable. Development aims are minimum objectives which the educational government regards as desirable. Final objectives and developmental objectives are used by the Flemish government for quality control.

The attainment levels are only provided for the end of primary education, there are no details of curriculum at earlier stages of primary education. Further, they describe a minimum content of knowledge, skills and attitudes that students should demonstrate by the end of primary education, but do not detail different levels of student proficiency or mastery of these different areas.

In early childhood education as well as in primary education the emphasis is laid on a) a broad core curriculum in which the child’s personal development takes centre stage, on b) active learning, on c) care for every pupil and on d) coherence.

For that reason, there are only 5 areas of learning for nursery education (physical education, art education, language (Dutch), World studies, mathematics) and 6 areas of learning for primary education (physical education, art education, Dutch language, French language, World studies, mathematics). In primary education there are also 3 cross-curricular themes: learning to learn, social skills and ICT. In early childhood education these themes are immediately integrated in the developmental objectives of the 5 areas. There has to be a flowing line in the learning process from early childhood education right through to the end of compulsory education.

Schools are entirely free in their approach as to how to reach the core curriculum or the objectives. Flemish schools are free to develop their own educational policies: curriculum, assessment, certification, self-evaluation activities. So, schools are able to award official qualifications. To do so they must meet certain conditions set by the Flemish authorities, including: following a core curriculum and allowing the Flemish authorities to assure their quality (this is done via the Inspectorate). The Flemish Inspectorate uses the CIPO inspection framework to do the external audit of schools. All school inspection reports are published on line.





To guarantee quality of education in all Flemish schools, the Flemish government has recently developed policies to promote school improvement. The Decree on Quality of Education in 2009 clarifies that schools are responsible for providing good quality education and for monitoring their quality.

Recently the development aims and the attainment levels of nature (world orientation) and technology have been revised in order to match better with the competences “science literacy” and “technology literacy”. They were implemented in September 2010.

Since the beginning of 2012 there is also a new action plan for *the stimulation of careers in mathematics, science and technology (2012 – 2020)*. This action plan is linked with the **strategic and operational objectives of the current Flemish minister of education**. Most probably this new action plan will have an impact on science, mathematics and technology education and on the core curriculum in the near future. Indeed, since the beginning of 2012 there is much to do about STEM-education (in preschool, primary and secondary education) in Flanders.

Secondly, in policy emphasis is on participation of young children in preschool education.

As for approaches in **teacher education**, 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. There are 3 groups and 10 subgroups of competences (National report 2009 of the Flemish Community “Education and training 2010”). Each subgroup is divided in several sub-competences which are level specific. There is a difference between early childhood teacher education and primary teacher education.

The professional profile is a common profile for all teachers (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. The purpose of the teacher’s professional profile is to bring about a better connection between professional training and professional practice.

Reflection upon any tensions identified within policy

In the book “Core Affairs, Flanders –Belgium” (SLO, p. 71) there are some critical thoughts about the implementation of this core curriculum in Flanders.

‘In Flanders, the laying down of a core curriculum based on attainment levels and development objectives, and the procedures and evaluation methods used, are extremely pupil-friendly. The system is not driven by tests, but rather by concrete attainment levels and a strongly recommended method of self-evaluation by means of assessments and good parallel tests. Pupils will receive a high-quality education with minimum pressure and maximum opportunities. This was, in short, the government’s intention. However, historic achievements and the slogan ‘pedagogical freedom’ quickly overshadowed this vision. The different Nets, in a strongly denominational Flanders, kept an iron grip on the contents of their education. The benefits of a core curriculum threatened to disappear as a result.





Schools continued to use their Nets' curricula, which, in addition to the attainment levels, contained a Net-bound curriculum that was based on their pedagogical project.'

Also in the OECD report (2011) some critical reflections are made about the quality of education in Flemish schools, e.g. because of no guidance on different performance levels to be achieved beyond the minimum attainment levels, there is a high degree of variability between schools.

Some of the critical reflections are related to teacher education.

'Teachers are well placed to play an active role in school self-evaluation, given that the basic competencies decreed for teachers include: facilitating learning and development via the assessment of student progress; innovating and researching; being a member of the school; and being an external partner. Flemish teachers are also expected to possess certain attitudes that are related to school self-evaluation, that is, they should: feel responsibility for whole school commitment; engage in fostering positive child development; and be self-critical, curious and co-operative. However, the OECD review team formed the impression that many Flemish educators find it difficult to understand self-evaluation processes and determine effective ways to use data. Although test development is part of teacher education and support is available, teachers and some school leaders struggle with data analysis and pulling together all of the student level data collected into a coherent whole. Difficulties with data interpretation can lead to unrealistic conclusions from self-evaluation.'(OECD, 2011: p. 110)

Some critical notes about the Flemish policy on teacher education

Simons, M., & Kelchtermans, G. (2008) argues that the Decree reflects the movement from a profession-oriented (expertise, responsibility and autonomy) to a market-oriented form (competency/effectiveness, responsiveness and flexibility) of problematisation of teaching and teacher education.

Summary of the main differences between preschool and school

At the end of early childhood education developmental aims are seen as desirable and at the end of primary education attainment levels have to be reached.

In the core curriculum only five learning areas are defined: physical education, musical training, language, world orientation (nature, people, society, technology, time and space) and mathematics. In primary education three cross-circular themes are added - learning to learn, social skills and ICT. These cross-circular themes are immediately integrated in the different learning areas in early childhood education. In Flanders an integral approach is common in preschool education, so no separate cross-circular themes are formulated. ICT is not integrated in the development aims of preschool education, there is no obligation to work with ICT in preschools.

Normally, primary education builds further on the knowledge, skills and attitudes reached in early childhood education.





In preschool education the focus is much more on play and imagination. In preschool and primary education active learning such as project based work, contract work, corner work, experimentations, observations, excursions, ... are important learning and teaching approaches. The development of language and language skills is specifically mentioned in the learning area of world orientation.

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

There are differences in aims and domains concerning the learning areas mathematics and world orientation. However in both learning areas inquiry, exploration, experimenting and problem solving are general aims.

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 4 basic principles which are processed in the development aims and attainment levels: broad curriculum, active learning, care for every pupil and coherence.

Examples provided for active learning activities in both learning areas are: project organised learning, contract work, corner work, ateliers, visits and excursions, observations, experimentations, problem solving activities.

In the core curriculum there is also a stress on integration of learning areas.

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

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.

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..

In pre-primary education there is a focus on play, exploration, discovery,... In primary education there is a focus on problem solving strategies, experiments, exploration, ... (examples in the core curriculum).

In the vision of the core curriculum is stated that schools should emphasize active learning and broad education. Active learning 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.

6.1 Limitations

In Flanders there is only one official policy document concerning the curriculum = core curriculum. In this policy document no learning activities, methods, roles of teachers,





materials and resources, ... are mentioned, only some examples (minor examples) are given. However schools (and teachers) are free to choose their own learning and teaching approaches, materials and resources, assessments, ...

In this document only minimal attainment levels (minimum standards) are described. Consequently, in Flanders, there is a great difference in school curricula and surplus goals reached by students at the end of primary education (in all subject areas, also in the areas of mathematics and world orientation). 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 umbrella organisations have to be done.

For the reasons mentioned above, it was difficult to fill in the used questionnaire and to analyse the document on the core curriculum with the provided questions (see also Appendix A).

Possible sources of bias could be (new) documents or tensions in policy which or not yet published or not available or easily available via current information networks.

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 will notice how schools and teachers implement the core vision of the core curriculum, which is a strong vision integrating inquiry, creativity, self-initiative, exploration, ... 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

- Use of separate objectives in pre-primary and primary education which are linked: use of development aims (pre-primary education) and attainment levels (primary education) with a broad vision on the development of children *'the essence of elementary education - early childhood and primary education - is to prepare pupils for critical and creative functioning in society and for the development of their personal life'* = pupil friendly.





The formulation of development aims specifically for the early years is very interesting to higher the quality of early childhood education.

However, there is has to be a clear set of criteria describing how students progress through their learning in different subject areas (in mathematics and science as well). The development of these criteria can help teachers in their every day assessment and evaluation work. Teachers could use these criteria to measure the growth in student performance and not just whether or not they have achieved minimum standards. (OECD, 2012)

- School evaluation (external but especially internal audits through self-evaluation) which is focused on the quality of teaching in all subject area (mathematics and science as well), can higher the quality of education and can prevent 'education to the test'. However; teachers and school leaders have to be prepared for analysing data from summative and formative evaluations – they also need to be prepared for selecting and using the most appropriate evaluation strategies.

'Classroom observation should play a prominent role in teacher appraisal and feedback. There is also room for teachers to more systematically seek feedback from students on their teaching. In addition, the results of teacher appraisal should be connected both to self-evaluation and the school's professional development plan. This would bring a greater sense of coherence to the process and increase the connection for teachers. Teachers **need further support both in their initial education and their ongoing professional development to develop their competencies as researchers and innovators**, as well as becoming proficient users of data. Through access to research on effective pedagogy as well as effective schooling, teachers can gain deeper understanding of what a good school is and what it means to be part of a professional learning community – a school where collaborative enquiry and use of data for whole-school improvement is the norm.' (OECD, 2011: p. 114)

Extend collegial practice both within and among schools (OECD, 2001: p. 115)



7. References

- Alexander, R. J. (Ed.). (2010). *Children, their world, their education: Final report and recommendations of the Cambridge Primary Review*. Abingdon: Routledge.
- Education, Audiovisual & Culture Executive Agency (2010). *Flemish Eurydice report 2010. Organisation of the Education System in the Flemish Community of Belgium 2010* [pdf] European Commission. Available at: http://eacea.ec.europa.eu/education/eurydice/documents/eurybase/eurybase_full_reports/BN_EN.pdf [Accessed 3 November 2011]
- Entiteit Curriculum (2007). *Conferentie na peilingsproeven wereldoriëntatie domein natuur. Verslag en aanbevelingen*. [online] Brussels: Entiteit Curriculum. Available at: <http://www.ond.vlaanderen.be/publicaties/?get=nl> [Accessed 3 November 2011]
- Europydia (2012). *Structure of the Flemish Education System*. Available at: <https://webgate.ec.europa.eu/fpfis/mwikis/eurydice/index.php/Belgium-Flemish-Community:Overview> [Accessed 10 April 2012]
- Flemish Government (2012). *Action plan for the stimulation of careers in mathematics, science and technology, 2012 – 2020*
- Geyer, F. (2009). *The educational system in Belgium*. [pdf] 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].
- Ministerie van de Vlaamse Gemeenschap, Departement Onderwijs (1997). *Decreet basisonderwijs*. Brussel: Afdeling Informatie en Documentatie.
- Ministerie van de Vlaamse Gemeenschap, Departement Onderwijs (2007). *Beroepsprofiel en Basiscompetenties van de leraren. Decretale tekst en memorie van toelichting*. Brussel: Afdeling Informatie en Documentatie.
- Ministerie van Vorming en onderwijs (2010). *Ontwikkelingsdoelen en eindtermen voor het gewoon basisonderwijs*. Informatie voor de onderwijspraktijk. Brussel: Vlaams Ministerie van Vorming en Onderwijs
- Ministry of Education and Training Flemish Community (2009). *National report 2009 of the Flemish Community (Belgium). Education and training 2010*.
- Ministry of Education and Training Flemish Community (2011). *National report 2011 of the Flemish Community (Belgium). Education and training 2020*.
- OECD (2011). *School Evaluation in the Flemish Community of Belgium 2011*, OECD Reviews of Evaluation and Assessment in Education, OECD Publishing. Available at: <http://dx.doi.org/10.1787/9789264116726-en> [Accessed 2 July 2012]
- Ozga, J. (2000). *Policy Research in Educational Settings: Contested Terrain*. Buckingham, UK: Open University Press



SLO (2008). Core Affairs, Flanders –Belgium. [pdf] Enschede: AXIS Media-ontwerpers. Available at: http://www.slo.nl/downloads/Webversie_core_affairs_LR_Belgi_def.pdf [Accessed 5 June 2012]

Simons, M., & Kelchtermans, G. (2008). Teacher professionalism in Flemish policy on teacher education: a critical analysis of the Decree on teacher education (2006) in Flanders, Belgium. *Teachers and Teaching: Theory and Practice Special Issue: Politics and Policy in Teacher Education: International Perspectives*, 14 (4), 283-294.

van den Akker, J. (2007). Curriculum Design Research. In T. Plomp & N. Nieveen (Eds.), *An Introduction to Educational Design Research* (pp. 37-52). Enschede: Netherlands institute for curriculum development.

Vlaamse overheid (2008). *Een nieuw profiel voor de leraar kleuteronderwijs en lager Onderwijs. Hoe worden leraren daartoe gevormd?* Brussel: Vlaams Ministerie van Onderwijs en Vorming.

VELOV (2012). *The Flemish teacher educator development profile*. Available at: <http://www.elant.be/main.aspx?c=.ELANT&n=106734&ct=106734> [Accessed 12 July 2012].

VLOR (2012). Advies profiel van de leraar. [online] Available at: <http://www.vlor.be/advies/profiel-van-de-leraar> [Accessed 5 July 2012]

www.ond.vlaanderen.be



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

Key

E: Early (2,5 to 6 years)

P: Primary (6 tot 12 years)

Because of the freedom of education it was not always possible to give an opinion on a creative emphasis or other statements and questions, so we decided to not rate 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				E/P
b. To develop socially and environmentally aware and responsible citizens				E/P
c. To enrich the understanding and interaction with phenomena in nature and technology				E/P
d. To develop more innovative thinkers	x			
e. To develop positive attitudes to science				E/P
f. To develop important attitudes and dispositions as a foundation for future learning				E/P

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				E/P
c. To enrich the understanding and interaction with phenomena in nature and technology				E/P
d. To develop more innovative thinkers				
e. To develop positive attitudes to science				E/P
f. To develop important attitudes and dispositions as a foundation for future learning				E/P

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

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).				E/P
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.				E/P



To be able to employ simple equipment and tools, such as magnifiers, thermometers, and rulers, to gather data and extend to the senses.				E/P
To know and understand the important scientific processes.				P
To be able to communicate investigations and explanations.				E/P
To understand that scientific investigations involve asking and answering a question and comparing the answer with what scientists already know about the world.				
To have positive attitudes to science learning.				E/P
To be interested in science.				E/P
To be able to plan and conduct a simple investigation.				E/P
To have positive attitudes to learning.				E/P
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				E/P
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		area of learning = world orientation (nature, technics, people, time, space, society)	Transversal objectives and core objectives (principles in core curriculum)
mathematics	Yes		Yes – transversal objectives and core objectives (principles in core curriculum)

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

	science	mathematics
1	Living and non-living nature	numbers
2	Health	measuring
3	Environment	Space (initiation in geometry/E) – Geometry (P)
4	General skills in science	Strategies in mathematics (P)
5	Living and non-living nature	Problem solving skills (P)
6	Key components of technology	Attitudes towards mathematics (P)
7	Technology as a human activity	
8	Technology and society	

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.				E/P
Ask questions about objects, organisms, and events in the environment.				E/P
Design or plan simple investigations or projects.				E/P
Conduct simple investigations or projects				E/P
Employ simple equipment and tools to gather data and extend to the senses.			E/P	
Use data to construct reasonable explanations.			P	
Communicate the results of their investigations and explanations.			E/P	

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

No specific information concerning the different activities mentioned (so we have not rated them)

However in the main vision of the core curriculum 4 basic principles are described: broad education, active learning, broad care and cohesion.

Active learning 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. So, IN GENERAL, in the core curriculum the teachers are advised to design learning and teaching approaches with an emphasis on creativity (problem solving, critical thinking, ...)

	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.				
Ask questions about objects, organisms, and events in the environment.				
Design or plan simple investigations or projects.				
Conduct simple investigations or projects				
Employ simple equipment and tools to gather data and extend to the senses.				
Use data to construct reasonable explanations.				
Communicate the results of their investigations and explanations.				

Teacher Role / Location

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

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

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

No specific information concerning the different activities/context mentioned (so we have not rated them) However in the main vision of the core curriculum 4 basic principles are described: broad education, active learning, broad care and cohesion.

Active learning 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. So, IN GENERAL, in the core curriculum the teachers are advised to design learning and teaching approaches with an emphasis on creativity (problem solving, critical thinking, ...)

	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				
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				
Encouraging different ways of recording and expressing ideas – oral, visual, digital, practical				
Encouraging problem finding – e.g. children asking questions				
Encouraging problem solving – e.g. children solving practical tasks				
Encouraging children to try out their own ideas in investigations				
Fostering classroom discussion and evaluation of alternative ideas				
Fostering imagination				
Relating science to everyday life				
Using questioning as a tool in science teaching				

Using digital technologies with children for science teaching and learning				
Fostering autonomous learning				

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

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

Materials and Resources

A. What materials are suggested?

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

Groupings

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

	Not Mentioned	Single Mention	Various Mentions	Emphasised
Individual work			E/P	
Pair work			E/P	
Small group work			E/P	
Whole class activities			E/P	



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)	E/P	E/P



Assessment

A: What purposes of assessment are included?

	Not Mentioned	Single Mention	Various Mentions	Emphasised
To identify areas for improvement in your science teaching	E/P			
To identify aspects of the science curriculum that could be improved				E/P
To identify ways to improve child science learning	E/P			
To monitor regularly individual children's or cohorts of children's progress towards a set of desirable science learning outcomes	E			P
To inform parents of their child's progress in science		E/P		
To help group children for science instruction purposes	E/P			
To monitor year-to-year child progress in science				E/P
To provide feedback to children about their progress in science	E/P			
To set targets with children for their own development in science				E/P
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				E/P
Understandings about scientific inquiry (e.g. how science and scientists work)				
Positive attitudes and increase of interest in science				E/P
Positive attitudes and increase of interest in learning science				E/P

C. What ways of assessing are advocated?

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

D. What Creative attributes are addressed in assessment?

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