Situation in France – also valid to some extent for other influential countries in Europe such as Germany

- 50 years ago : France used to have high performance in primary / secondary education, with almost 100% population ending primary school, though only small % of population went to high school
- Today :
  France performs extremely poorly according to PISA OECD 2006 study for science proficiency level (lags behind Finland, Canada, Korea, China, ...) - Germany and U.K. also quite weak !!
- in France, 65 % of population reaches end of high school, but the current average level of Baccalauréat (final exam) is extremely weak (it was still of a very high level 30 years ago)
- Students are discouraged from entering science curriculum
  - in the last decade, 50 % less students in science at university
  - not enough engineers / industry technicians
  - teachers' background is now quite weak, especially in maths
  - too many students in sports, arts, psychology, medecine
  - we still have very good PhD level but very few students

Setup

- Nursery school : ages 3 - 6
- Primary education : grades 1 - 5 (ages 6 – 11)
- Secondary education : grades 6 – 12 (ages 11 – 18)
  « collège » grades 6 – 9 (ages 11 - 15)
  « lycée » grades 10 – 12 (ages 15 - 18) = high school
- University : 18 + (Bologna system = LMD)
  Licence : 3 years, Master : 2 years, Doctorate : 3+ years
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Main steps of reforms in education

- 1970 : new maths (set theory / abstract linear algebra)
  rather successful at high school level, but disaster in primary and lower secondary education (also ineffective new pedagogy for counting, reading, grammar at primary level)
- 1975 : « collège unique » : no more differentiation of pupils between general studies / technical studies from grade 6
- 1989 - 1992 : « pedagogical revolution » = pure nonsense !

Comparison of primary curricula 1920-1970 versus 2002

Subject	Scheduled in grade X			Official recommendations
	1920 - 1970	in 2003	delay	Legend — roman : end of primary curriculum in 2002 — *italics* : maximal requirements in 6th grade in 1995. — [....] : our comments.
Operations on whole integers				
Addition of 2 digit numbers	1	2	1 year	« at the end of grade 3, only the technique of addition can be required » (curriculum 2002.)
Subtraction of 2 digit integers	1	4	> 2 yrs	
Multiplication/division by 2 & 5	1	4	> 2 yrs	
Multiplication by 2 digit number	3	6	> 3 yrs	« compute the product of two integers (3 digits by 2 digits) with paper and pencil. » In 2001, 46,2% of 6th grade pupils could not multiply 64 ×39 canceled from 6th grade national tests since 2002 !!!
Division of integer by 2 digit integer	3	5*	> 2 yrs	[* but with restriction] « dividend < 10 000 »
Division of arbitrary integers	4	never	?	
Operations on decimal numbers				
Multiplication of decimal numbers	4	6	2 yr	[Canceled from primary curriculum in 1995]
Division of decimal by integer	4	6	2 yr	[Canceled from primary curriculum in 2002] *« cannot be required at the end of primary school »*
Division of two decimal numbers	5	never	?	[Canceled from primary curriculum in 1980]

Results of such a policy (French national tests circa 2000) :

— in 2001, 46.2 % of 6th grade pupils could not multiply 64 ×39 ;
canceled from 6th grade national tests since 2002 !

— in 2002, 62.7 % of 7th grade pupiles cannot multiply 9.74 × 3.5 ; 74.2 % cannot divide 178.8 by 8.

What has been done in France ?

- France is centralized, so one way of attack is just to convince administration in Paris that things go wrong !
- GRIP (French acronym for Interdisciplinary Group for the Study of School Standards) created in 2003. Members of the GRIP association are teachers of various levels from kindergarten to university ; I am the current president.
- activity focused on evaluating and modifying the existing curricula - in our view, the main issue involved in the crisis of education
- link theory and practice, by assessing the proposed curricula through experimentation in class
- seeking for international cooperation
- link theory and practice, by assessing the proposed curricula through experimentation in class, at most fundamental levels of primary school
- SLECC program = Reading, Writing, Counting, Computing
  National network of primary schools (5 year program)
  60 classes in France in 2007, official stamp from Ministry since 2005

SLECC program (mostly at primary level)

The SLECC program includes a drastic reform of mathematics education for primary school, but viewing it from just a mathematical perspective would greatly reduce its scope and value. In fact, its sphere of activity covers all other disciplines, in particular their relation to mathematics : links with scientific activities are certainly involved, but the main concern is to develop links between language and mathematics from the very beginning of learning, i.e. in France from the last year of nursery school (5-6 year pupils).

The foundation of the SLECC curriculum is the exact opposite of a general trend in pedagogy introduced at the end of the 60's *which has led to sacrifice the contents of the primary school curriculum under the fallacious principle that a pupil learns better if there is less to learn :*
the elimination of certain links in the logical chain of knowledge leaves the remaining notions more difficult or even impossible to learn.

Main principles of SLECC pedagogy :

1) simultaneous teaching of reading and writing : the “phonics” method called "writing-reading" disqualifies from scratch the decades-long debate of *"whole language reading",* simply because there cannot be any *"whole language writing"* !
2) simultaneous teaching of counting and calculating - more precisely the simultaneous teaching of the 4 arithmetic operations along with numbering.
3) strong interplay between various disciplines
4) No fake opposition between memorizing and understanding, which are necessary to each other.
5) Strong insistence on pencil and paper algorithms of the four arithmetic operations, including decimal numbers (no calculators !)
6) operations on “pure” numbers and “concrete” numbers are taught simultaneously = beginning of physics and dimensional analysis
7) concrete manipulation in geometry : paper, scissors, ruler, compasses, angles ... Even formula for area of disc can be proved in 4th grade !

Results

- Pupils keep quiet because they are busy
- Systematic methodology creates confidence, pupils feel safer
- Pupils realize better when they are in difficulty, so that parents accept better when a child has to repeat a level
- Random pupils completely outperform pupils of standard classes, even in areas which have many immigrants and social problems

Reactions from society and institution

- Politics + ideology = School wars !!
- Faced to school disaster, government has started to consult our associations and now supports SLECC openly
- A lot still has to be done (lack of adequate training of most teachers after 3 decades of insane teaching practices, strong political opposition of certain teacher trade unions, and of former « pedagogical gurus » ...)