

# Historical movements in public compulsory mathematics curricula<sup>1</sup>

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In the following, our focus will be on compulsory schooling in France with a few glances elsewhere. Listen to this:

“ Thus, the teacher will avoid all idle questions which have no application in any profession or whose sole interest lies in preparing for studies the student will never undertake or in just arousing curiosity or exercising the mind [...] let us primarily exercise the minds of our students with questions which touch upon the needs of everyday life. ”

Does it sound familiar? Welcome to the past!

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## France 1850 -1881

### *1850 - The Second Empire : The retrograde “Return to essentials ”*

After the notable progress made between 1789 and 1848 in democratising the teaching of what was known as the “savoirs mathématiques”, the position of the Second Empire (1850-1870) was expressed in the “Loi Falloux” and that of its spokesman Adolphe Thiers : “*We should not try to educate the poor*”<sup>ii</sup>, but “*bring primary teaching back to what is essential in it*”, “*Reading, writing, counting, that is what must be learnt; as for the rest, it is simply superfluous*”. These guidelines translate into

- in general, a parade of abstractions, in the manner of our 1855 introductory quote
- for the particular case of mathematics, which interests us here, a division of the curriculum into compulsory and elective subjects : thus, it necessarily contains “*calculations with weights and measures*” while “*beyond this, it may also include : arithmetic applied to practical operations [...]; surveying , levelling, line-drawing ...*” (Article 23 of the law [Falloux] of March 15, 1850). Which moreover means that geometry as such disappears, since it is reduced to the skills mentioned in the elective subjects.

## France 1882 - 1910

### *1882 – The « loi Ferry » on mandatory instruction*

The first article of this law proclaims “*Article 23 of the law of march 15, 1850, is hereby revoked*” and, for the first time mandates the teaching of “*the elements of the natural sciences, physics, and mathematics, their applications to agriculture, hygiene, the industrial crafts, manual work, and tools of the principal trades*”

Ferdinand Buisson, the director of elementary schooling under Jules Ferry presents it as follows:

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<sup>1</sup> Lecture for the Joint Finnish-French Conference “*Teaching mathematics beyond the PISA survey*”, Paris, October, 6-8, 2005. French version: <http://michel.delord.free.fr/comp-fr.pdf>

*Primary instruction, as defined by the law of March, 28, 1882, is no longer that rudimentary teaching of reading, writing, and arithmetic with the privileged charitably offered the disinherited classes: it is a national instruction encompassing all aspects of human knowledge, a truly complete education, physical, moral, and intellectual; it is the wide base on which the whole edifice of human culture will henceforth rest.<sup>iii</sup>*

Further more, even the supposedly “practical” subjects are not studied with a view toward preparing for a profession, but for their value as a part of “*intellectual education*”. The example of “*travaux manuels*”, i.e. crafts aimed at developing manual dexterity (in which geometry appears in another role that it plays in drawing lessons), is particularly telling :

*Like any other subject in the curriculum, in fact, “Travail manuel” in primary school can be no more than a means toward a general education. Just as school cannot presume to train artists or writers, it cannot presume to train workers or artisans; here, teaching can be only theoretical, and the teacher's role is more that of an initiator than that of indoctrinator or practitioner. It would be just as childish to want to turn 10 to 12 year old kids into cabinet makers or locksmiths or fitters as it is to try teaching them literary history, philosophy, or mathematics.<sup>iv</sup>*

### **1887- Article Education in the Dictionnaire Pédagogique**

*It would be a specious parallelism, though readily invoked these days, to present general and vocational education as the two faces of the same object. It is important not only to distinguish these two forms of education, but to establish between them a difference of nature and essence: one molds the human being, the other trains a person for a certain function in society; only the first one is education in its proper sense, the second one is an artificial and specialized complement, whose aim is not to perfect the individual but to impart skills whose exercise will assure a career.( Ferdinand Buisson)*

### **1907 – 1910 Charles-Ange Laisant, mathematician: Opposing a problematic tendency toward a kind of scholastic overemphasis on verbal teaching, without falling into the trap of utilitarianism**

*There are high schools which teach the system of measures without having a single measuring instrument: yard-sticks, measuring-cups, weights, etc. So, if you are planning to enrol your child in a middle or high school, for instance, just ask to be shown the material for teaching weights and measures, the surveying instruments, etc. If you are told that there is nothing of all that in the house, leave at once and never come back.<sup>v</sup>*

*In science, the question “What can this be used for?” is the most insane and futile that could be asked. The best of all answers to it is “How could we know?” [“You never know”]. Measuring a science by its usefulness is almost an intellectual crime.<sup>vi</sup>*

## **1911 - France: a first slide toward "realism"**

### **1911 - Article Education in the new Dictionnaire Pédagogique**

*Every profession, in fact, constitutes an environment sui generis, which requires particular aptitudes and specialised knowledge, and where certain ideas, customs and ways of seeing things hold sway; and since a child must be raised with an eye toward the function it will be called on to perform, education, from a certain age onward, cannot remain the same for everyone in its care. That is why we see it diversifying and specialising in all civilised countries; and this specialisation begins earlier and earlier. (Emile Durkheim)*

## 1918 - USA: From subject matter to social adjustment

### The Cardinal Principles of Secondary Education<sup>vii</sup>

1. Health.
3. Worthy home membership.
4. Vocation.
5. Citizenship.
6. Worthy use of leisure.
7. Ethical character.

**Why is there no item 2?** Because it was added *after*<sup>viii</sup> the first draft, in the form of

2. Command of fundamental processes.

*Fundamental Processes are writing, reading, oral and written expression, and math. It was decided that these basics should be applied to newer material instead of using the older ways of doing things.*

The preliminary report had said only: *Subject values must be tested in terms of the laws of learning and the application of knowledge to the activities of life, rather than primarily in terms of demands of any subject as a logical organized science.*<sup>ix</sup>

## 1932 - Antonio Gramsci: Prison Notebooks<sup>x</sup>

### **On Education**

*The tendency today is to abolish every type of schooling that is “disinterested” (not serving immediate interests) or “formative” — keeping at most only a small-scale version to serve a tiny élite of ladies and gentlemen who do not have to worry about assuring themselves of a future career. Instead, there is a steady growth of specialised vocational schools, in which the pupil’s destiny and future activity are determined in advance.*

...

*For in this period what is learnt, or the greater part of it, must be — or appear to the pupils to be — disinterested, i.e. not have immediate or too immediate practical purposes. It must be formative, while being “instructive” — in other words rich in concrete facts. In the present school, the pro-found crisis in the traditional culture and its conception of life and of man has resulted in a progressive degeneration. Schools of the vocational type, i.e. those designed to satisfy immediate, practical interests, are beginning to predominate over the formative school, which is not immediately “interested”. The most paradoxical aspect of it all is that this new type of school appears and is advocated as being democratic, while in fact it is destined not merely to perpetuate social differences but to crystallise them in Chinese complexities.*

## France 1928 - 1958

**1928 – A. Marijon et P. Leconte, Chief inspectors of Instruction Publique: Report of the 1928 teacher training courses**

*The perfection to which our pedagogy of calculation [arithmetic] has risen is, in many respects, more appearance than reality. The utilitarian point of view all too often hides the educational one.*

**1955 – Henri Canac, headmaster of “Ecole Normale Supérieure” of St Cloud: Computing exercises and intellectual education**

*“We owe the people nothing but results”, says one of Goethe's characters haughtily. And let repetition provide what intelligence cannot obtain. Our pupils are young, and true mathematical reasoning is beyond their reach; on the other hand, they are a cross-section of the population, predominantly individuals with a medium talent for the game of intelligence. Let us furnish them, as quickly and accurately as possible, with “mechanisms” which will enable them to face “the great variety of concrete problems they will encounter in their lives, their professions, and their obligations as citizens.” ... (Inst. off. de 1938)  
Such is the lure of a certain "realism".<sup>xi</sup>*

**1955 – Henri Canac : The so-called "practical" problems**

*In concluding, let us say that school work does not, and cannot pretend to, consist in making children routinely solve all the kinds of particular problems life may present them with: when stuck in a bind, they will pull themselves out as best they can, most often by following common custom and the empirical recipes of their professions.*

*The task of school is rather to exercise the child's mind with matters requiring reflection, often more schematic and abstract than situations in real life, but undoubtedly forming, through the clear and rigorous thought they encourage, the most effective preparation for the more or less unforeseeable difficulties life has in store.*

*“Exercise, says Alain<sup>xii</sup>, is an action whose purpose is the preparation for real action. I do scales, in order to be able to play a sonata. I learn fencing, in order to be able to fight. I learn English with a view toward speaking with others than my English teacher. It is in the nature of an exercise that it isolates the difficulties by separating one movement from all the others. “*

*When all is said and done, would not the best preparation for life be the most methodical intellectual exercise?<sup>xiii</sup>*

**1958 - J. Leif, Chief inspector of schools, R. Dézaly, Normal School headmaster: Introduction to computation in a famous Normal School textbook.**

*In fact, aided by success, the tendency to neglect the educational aspect in favour of practical utility and immediate efficiency seems to have inclined teachers toward too narrow a view of teaching. this subject. The Official Instructions of 1938, and above all those of 1945, as well as the guidelines for the C.E.P.E exam questions in computing, which heavily emphasised the practical and utilitarian character of teaching arithmetic in Primary School, have, at least in appearance, only reinforced this tendency.<sup>xiv</sup>*

## 60's/70's The New Math

A statement by Professor Warwick Sawyer in "Modern math" and its critics (written in 2001)

### **Modern Math completely useless**

*From the start Morris Kline maintained that modern mathematics was completely useless. He mentioned magneto-hydrodynamics and other parts of applied mathematics that it was sensible*

to study. The stuff coming into the schools about union and intersection was extremely trivial (as indeed it was).

He had some excuse for regarding modern work as useless. Dieudonne, a strong supporter of modern mathematics, in a speech made the following statements among others:

“Modern mathematics has no contact with reality.”

“In the past physics provided problems for mathematicians to work on, but to-day we have plenty of problems in mathematics itself.”

“None of the really new mathematics of this century has found any practical application whatever.”

”It should be studied as an art form.”

So Dieudonne and Morris Kline agreed that modern mathematics was useless. In fact both of them were wrong.<sup>xv</sup>

## XXIth Century - PISA

### *Mathematical literacy in PISA 2003*<sup>xvi</sup>

OECD/PISA mathematical literacy focuses on the capacity of 15-year-olds (the age when many students are completing their formal compulsory mathematics learning) to use their mathematical knowledge and understanding to help make sense of these issues and to carry out the resulting tasks.

The term "mathematical literacy" has been chosen to emphasize mathematical knowledge put to functional use in a multitude of different situations in varied, reflective and insight-based ways.

Of course, for such use to be possible and viable, a great deal of fundamental mathematical knowledge and skills are needed, and such skills form part of our definition of literacy. [...]

Thus the definition of mathematical literacy encompasses the functional use of mathematics in a narrow sense as well as preparedness for further study, and the aesthetic and recreational elements of mathematics.<sup>xvii</sup>

We do agree: For such use to be possible and viable, a great deal of fundamental mathematical knowledge and skills are needed in Mathematical Literacy for 15-year-olds (the age when many students are completing their formal compulsory mathematics learning) as preparedness for further study.

But, in that case, why do the D.E.P., French Public Authority for Assessment, notice:

*Certain areas [...] are absent from Mathematical Literacy and hence are not tested by PISA: algebra, deductive reasoning, trigonometry (angles) and geometric objects.*<sup>xviii</sup>

This knowledge will only be available at best to a very exclusive part of the society. It seems we have come back to 1850.

Michel Delord, le 25/09/2005

Thanks to Klaus Hoechsmann

## Notes de fin

<sup>i</sup> De la direction à donner par les instituteurs à leur enseignement - février mars 1855 - p. 137. In Recension par *Philippe Nabonnand*, du livre de Renaud d'Enfert, *L'enseignement mathématique à l'école primaire de la Révolution à nos jours* [REE] in *Gazette des mathématiciens*, Janvier 2005.  
<http://michel.delord.free.fr/rec-denfert.pdf> . Texte complet pages 137 à 140 de [REE].

<sup>ii</sup> René Kieffer et Christophe Muller, *La loi Falloux : l'école, entre Mouvement et Réaction, enjeu de société*,  
[http://www.laicite-laligue.org/laligue/laicite-laligue/rubriques/mieux\\_comprendre/passion/alsace\\_moselle/loifalloux.pdf](http://www.laicite-laligue.org/laligue/laicite-laligue/rubriques/mieux_comprendre/passion/alsace_moselle/loifalloux.pdf)

<sup>iii</sup> Ferdinand Buisson, Article *Instruction publique* of the *Dictionnaire Pédagogique*.

<sup>iv</sup> Albert Muhlemann, *Le travail manuel à l'école primaire et au Certificat d'Etudes*, Bibliothèque d'éducation, 15, rue de Cluny, Paris. Extraits consultables à :  
<http://michel.delord.free.fr/muhlemann.pdf>

<sup>v</sup> In Charles-Ange Laisant, *L'initiation mathématique*, Hachette, paris, 1910  
Extraits à <http://michel.delord.free.fr/lais-init1.pdf>

<sup>vi</sup> Charles –Ange Laisant, *La Mathématique Philosophie Enseignement*, Bibliothèque générale des sciences, Gauthier-Villars, Paris, 1907 (page 121)

<sup>vii</sup> <http://www.nd.edu/~rbarger/www7/cardprin.html>

<sup>viii</sup> "The first draft of cardinal Principles failed even to include the phrase "command of fundamental processes" (i.e. reading, writing and arithmetic) which in the final version was the only allusion to academic goals." .E. D. Hirsch Jr, *The schools we need and why we don't have them*, Double Day, 1996, p. 48

<sup>ix</sup> E. D. Hirsch Jr, *Cultural Literacy*, 1987, reprint Vintage books, p. 119

<sup>x</sup> <http://www.marxists.org/archive/gramsci/editions/spn/problems/education.htm>

<sup>xi</sup> Extrait de *L'enfant et le nombre, Eléments pour une pédagogie du calcul élémentaire*, Didier, 1955.  
<http://michel.delord.free.fr/leif-introcalc.pdf>

<sup>xii</sup> Alain : *Définitions*, Gallimard, éditeur, 1953.

<sup>xiii</sup> Extrait de *L'enfant et le nombre, Eléments pour une pédagogie du calcul élémentaire, op. cit.*

<sup>xiv</sup> J. Leif , R. Dézaly, *Pédagogie Spéciale, Deuxième fascicule, L'enseignement du calcul, Leçons de choses et Sciences appliquées*, Librairie Delagrave, Paris, 1958.  
Extraits à <http://michel.delord.free.fr/leif-introcalc.pdf>

<sup>xv</sup> <http://www.marco-learningssystem.com/pages/sawyer/electricians.html>

<sup>xvi</sup> Direction de l'évaluation et de la prospective, Note d'évaluation 04.12, décembre 2004.  
<http://www.educ-eval.education.fr/pdf/eva0412.pdf>

<sup>xvii</sup> *The Pisa 2003 Assessment Framework* (pages 24-25).  
<http://www.pisa.oecd.org/dataoecd/46/14/33694881.pdf>

<sup>xviii</sup> Direction de l'évaluation et de la prospective, Note d'évaluation 04.12, décembre 2004.  
<http://www.educ-eval.education.fr/pdf/eva0412.pdf>