

**HUMAN CAPITAL DEFLATORS ACROSS TIME:
SPANISH HIGH SCHOOLS 1860-1970***

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1) INTRODUCTION.

Education is a long-term investment, much longer nowadays than at the beginning of the twentieth century. Thus, the educational stock available at a certain time does not depend upon investments made that same year, or a few years before. It depends upon all investments previously made by surviving cohorts at any given year; that is to say for a period of approximately 50 years. It is also made up of widely different investments, ranging from basic literacy skills to advanced scientific research, hence the need of estimating the educational stock according to level of education.

Literacy and primary school enrolments provide alternative estimators of human capital at the lower level. While schooling measures an educational input, usually in number of years of study completed or expenditures made, literacy may be taken to measure the output of primary schooling. For higher educational levels, such as secondary and university studies, there is no similar alternative between educational inputs and outputs. Yet, there are obviously differences in performance, although they are hard to measure in the absence of direct controls of output such as the PISA and TIMMS tests, designed and jointly administered by the OECD and the participant countries. These tests for 17-years-old have shown that years of schooling do not produce the same level of skills in reading and mathematics, nor similar levels of knowledge acquired in different countries or regions. Similar results have been reached by a less-known and less-widespread tests regarding adult population, the ALL project. A given number of years of schooling at any educational level do not necessarily produce comparable levels of human capital. Both skills and knowledge acquired by the students depend upon the efficiency of the schooling system. Today, Finland stands out as the most efficient school system among OECD countries according to 17-year-old students' tests results for

reading and maths (PISA and TIMMS particularly); Spain is among the least efficient among the OECD countries. Politicians and educators are now looking at “success stories,” such as Finland since the 1990s, trying to identify the traits that make for efficient schools. Traditional explanations attributing efficiency to investment-per-student or class-size have given way to new interpretations in which curricular contents, school governance, and teachers’ selection and promotion processes are stressed. It seems fair to conclude that educational levels, one of the most common estimators of human capital, are difficult to compare across countries and throughout the centuries, and that quality appears to be as important as quantity when measuring human capital.¹

In this paper we shall address some of the problems concerning long-term and cross-country comparability of educational indicators at the high school level. Using an in-depth analysis of Spanish secondary school legislation from 1821 to 1953, on the one hand, and curricular and teacher data on the two main historical High Schools of Madrid, the **Instituto Cardenal Cisneros** (formerly known as **Noviciado**) and the **Instituto San Isidro** (heir to the 16th century Jesuit **Colegio Imperial**, and since 1767, following the expulsion of the Jesuits from Spain, the **Reales Estudios**)² between 1860 and 1921, on the other. In order to have an estimator of “quality”, we shall try to identify patterns of “good” or “bad” schooling which might have influenced the final results, that is to say, the human capital accrued to students. To do this, we shall construct a “high-school standard value index” which we shall then apply to long-term series of enrolment rates and human capital stock as estimated by Núñez [2005].

¹ De la Fuente and Doménech (2006), De la Fuente and Ciccone (2002), *Education at a Glance* (several years)

² Both high schools were established anew in 1845, together with 24 others all over the country, Martínez Alfaro (2010) en Ruiz Berrio (ed). p. 210. A few years later, Vallespinosa y Bustos, then director of San Isidro, considered that it was “the first in the Kingdom as to the number of students.” Memoria 1867, p. 10.

2) THE SPANISH STOCK OF HUMAN CAPITAL 1832-2000.

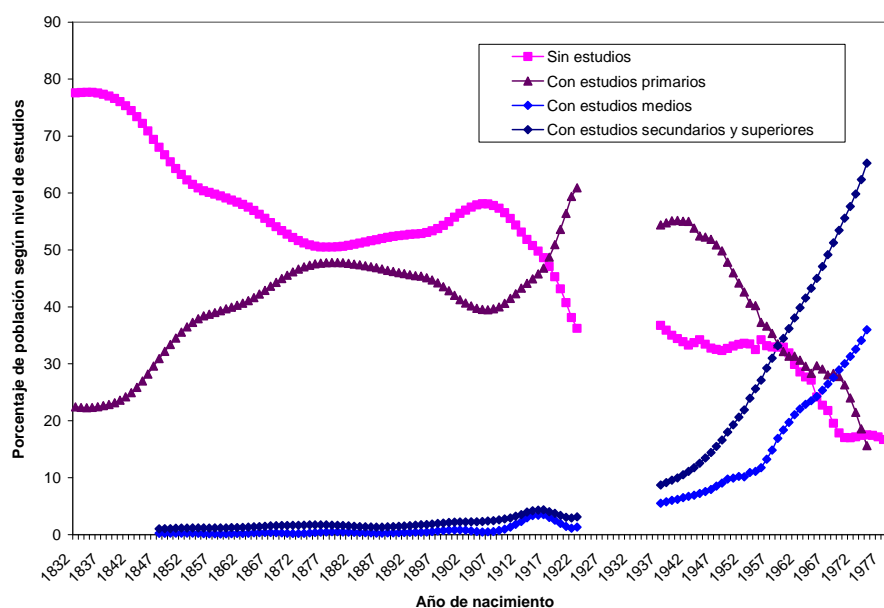
Well into the 20th century, illiteracy and lack of primary schooling were the most pressing educational problems in Spain (Graph 1). Illiteracy levels of 50 percent in 1900 were high by European standards and became an obstacle to economic growth.³ By contrast, higher education had reached European levels (and maybe standards) and was central in the 19th century educational debate. In 1860, France had 15 students enrolled in high school per 10.000 inhabitants. Spain had 14 that same year. The figures for 1930 were 27 in France and 32 in Spain.⁴ Though less than 5 percent of the cohorts born before the Spanish Civil War received higher education, almost 80 percent of the population with high school diplomas went to the University. Law and Medicine were the disciplines that attracted a disproportionately high number of university students, Engineering and Sciences enrolling considerably lower numbers. Low mathematical skills among high school graduates have been considered a reason for these low numbers.

Graph 1 Educational level for Spanish cohorts born between 1832 and 1984

³ Núñez (1992, Chapter 5) and (1990).

⁴ Núñez (1992, Chapter 8).

Gráfico 1 Peso relativo de la enseñanza secundaria, por generaciones nacidas en



Source Graph 1: Núñez (2005).

Even though it had a relatively minor impact on the stock of human capital, secondary education dominated the Spanish educational debate during most of the 19th century, as it did in other continental European countries. It also drew a significant amount of attention from scholars in the late 20th century. Most debates on secondary education have centered on the issue of public versus private education, an important one since most of the students were enrolled in private schools. Less attention has been paid to curricular changes and its possible impact upon the stock of human capital. However, PISA and TIMMS results, among others, suggest that the curriculum matters. Usually any increase in the time devoted to skills-acquisition is time detracted from other subjects of study; more arts and crafts may mean less mathematics, sciences or history since overall-time devoted to courses has a limit that cannot be increased. Furthermore, the legal system may provide general broad guidelines –such as a minimum of maths or languages– or be extremely precise as to what must be taught, when and how in order to complete the high-

school degree. Thus, we will now examine the educational legal system in Spain between 1821 and 1953 as regards curricular changes.

A new schooling system took shape during the 19th century. Spain followed the Continental Europe model of high state intervention in education, a gerschenkronian approach, as opposed to the liberal Anglo-Saxon one consolidating in the United Kingdom and the United States. State intervention resulted in the establishment of highly centralized educational systems, clearly structured in different levels, with well defined access and selection processes, for both teachers and students, as well as graduation requirements to gain professional habilitation. Curricula were increasingly detailed.

Laws regulating secondary education were frequent, maybe too frequent, in 19th and 20th century Spain. Ministers of education complained regularly about the inefficiency of the legal system due to the large number of norms coexisting at any given time. In 1901 the count of Romanones spoke of a “true crisis” requiring a new Education Bill to replace all previous norms, while barely two years later Allendesalazar, who had replaced him as Minister of Public Instruction, considered that very few people could “distinguish between what was extant (in vigor) and what had been abolished [*lo vigente de lo derogado*],” and complained against the ease with which “laws are modified or abolished without time for experience to show what is useful and what isn’t [*se transforma ó deroga la legalidad vigente sin dar tiempo á que la experiencia demuestre su ineficacia ó su bondad.*]”⁵ Amós Salvador, Minister in 1911, answered “who knows” when a Deputy asked him which law was in vigor.⁶ He had motives to doubt. Between 1821 and 1938 25 “plans” or “reforms of plans” regarding the high school system had been approved, and between 1875 y 1936 a dozen more were discussed though not finally

⁵ Decree of 12 April 1901 establishing new reforms in official education, and Royal Decree of 29 May 1903.

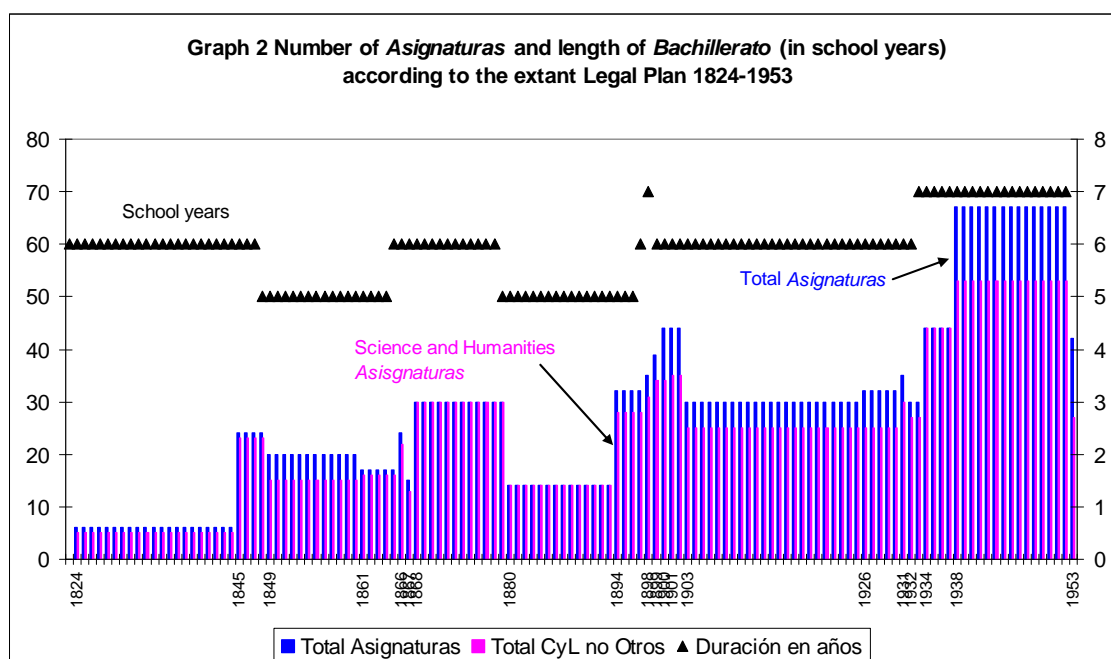
⁶ Cited in Prats (2002).

approved in the Cortes. Those plans that were approved had a life span of 4.75 years on average between 1824 y 1938. Had they all been implemented in the high schools, no plan would have had time to be fully applied before being replaced by a new one, since it took five to six years to complete a high school degree. Only five Plans for the *Bachillerato* were valid for longer than five years: the Plans by Calomarde (21 years from 1824), Pidal (7 years beginning in 1845), Ruiz Zorrilla (1868: 12 years), Lasala (1880: 14) and Bugallal (1903: 23). Three Plans were valid for just about five years: Bustos (1861), Callejo (1926), and Villalobos (1934); and two others, for four years, Moyano (1857) and Groizard (1894). Legal changes in education tended to concentrate in periods of political upheaval: from the mid-1840s to the mid-1870s, including the 1868 Revolution, the First Republic (1873-1874) and the Restoration of the Constitutional Monarchy in 1875; around the 1898 crisis; and finally in the 1930s with the Second Republic and the Civil War.

Secondary education in the 19th century had its roots in the Old Regime *Minor Faculties* that prepared students for entry into the University. In due time, this preparatory program became a degree, the *Bachiller* (*Bacalauréat* in France, *Abitur* in Germany). Secondary education also included what came to be known as *Applied Studies* (what would be called “professional studies” today), originally taught in the same High Schools, which later on were taught at separate new institutions, among others the *Escuelas de Comercio* and the *Escuelas de Artes y Oficios*. The educational bills we are going to study mainly concern the *Bachillerato*, although some of them also dealt with *Applied Studies*. The information regarding these curricula touches upon two crucial aspects: the study topics or subjects, *Asignaturas*, and the amount of school-time assigned to

each of them during the five to seven years it took to complete a degree of *Bachillerato* (Graphs 2 and 3).⁷

During the 19th and early 20th centuries, most Plans organized the *bachillerato* into two cycles of 6 years –7 after the 1934 Plan and only 5 after a few others. The number of *Asignaturas* as well as the schooling-time required tended to increase as the different plans unfolded (Graph 2). On average, there were 30 *asignaturas*: there were only 6 until 1844, 20 between 1845-1867 and 1880-1897, and between 30 and 34 in 1868-1879 and 1898-1937 respectively. The longest curricula corresponded to the final period beginning with the 1934 Plan (44 *asignaturas*) and reaching a peak with the 1938 Plan (67).



Source Graph 2: *La Gaceta de Madrid*.

⁷ We are working with a total of 25 Plans of which we have detailed information about *Asignaturas*, 871 in all, and only 20 for which we also have calendar assignments. The total number of *Asignaturas* refers to those the high schools had on offer which is usually larger than the number the students had to take to complete the degree, since there were at least two optional fields, *Bachiller* in Sciences and *Bachiller* in Humanities (Plans of 1845, 1894, 1926 y 1953). All Graphs take into consideration this distinction.

Changes in the denomination of the *Asignaturas* were so frequent as to make it almost impossible to follow them. However, it does not appear that these nominal changes were actually significant and implied deeper “innovations” than the mere appearance (or disappearance) of specific topics or the fact that some of these might increase (or decrease) their relative weight within the curriculum.⁸

Generally speaking, though, and once equivalent names have been applied to the original ones, there is a clear pattern in the definition of the *Bachillerato* curriculum. There is a noticeable increase in the number of *Asignaturas* primarily based upon the splitting of large and comprehensive subjects into smaller and more defined topics. Initially a common subject, History and Geography, became *Historia de España* and *Historia Universal*, on the one hand, and *Geografía de España* and *Geografía Universal*, on the other. Something similar happened with other subjects.⁹ This explains why it is important to consider, together with the number of *Asignaturas*, the amount of time devoted to each of them in the Plans. To measure the scope of these frequent changes we have grouped the *Asignaturas* in two large overlapping blocks of “knowledges”, Sciences and Humanities, and two further blocks of “skills,” Mathematics and Languages. According to recent definitions of functional literacy these skills are needed to access knowledge.

⁸ There are “funny topics” in that list, some of them appearing only once in a Plan, like *Uranografía y Geología* (1873), *Dialéctica y Ontología* (1824), *Ética y Derecho usual con Economía Política* (1898), *Cosmología y Teodicea* (1873), *Sociología y Ciencias Éticas* (1894), *Geografía y Cronología* (1821), *Terminología Científica, Industrial y Artística* (1926), *Organografía y Fisiología Humanas* (1894). Some other times, the topic name is preceded by vaguely defining qualifications, as “*Nociones de ...*” or “*Elementos de ...*”, even the sequence in which it must be taught, as in *Francés de 1º*, *Gimnasia 2* and *Fisiología e Higiene 3*.

⁹ *Física y Química* became two independent topics, while *Ciencias Naturales* became *Historia Natural*, *Geología*, *Botánica*, *Biología*, *Zoología*, *Astronomía* even *Mineralogía* or *Cosmología* depending upon the Plan.

Table 1 Bachillerato's Asignaturas according to Education Plans 1824-1953					In percentages								
	Large Knowledge Areas	Knowledge and Skill Subjects	Knowledge Topics	Asignaturas	Total	Large Knowledge Areas		Knowledge and Skill Subjects		Asignaturas			
						% of Science and Humanities	% including Religion and Gymn						
Science and Humanities	Science	Natural Sciences	Natural Sciences	Natural Sciences	74					50%			
			Physics and Quemistry	Physics and Quemistry	66					45%			
			Fisiology e Higiene	Fisiology e Higiene	7					5%			
		Total Natural Sciences		147				52%		100%			
		Mathematics	Mathematics	Arithmetics and Geometry	97				34%		100%		
		Tecnichal topics			39				14%		100%		
		Total Science			283		38%	32%	100%				
	Humanities	Moral and Political Sciences	Moral and Political Sciences	Economics	Economics	5					7%		
				Filosofy	Filosofy	56					78%		
				Law	Law	11					15%		
			Total Moral and Political Sciences			72				16%		100%	
		Geography and History	Geography and History			113				25%		100%	
						83					71%		
		Languages	Spanish	Spanish	Spanish Literature	Spanish Literature	34					29%	
					Total Spanish		117				26%		46%
			Classical Languages	Classical Languages		65				14%		25%	100%
			Modern Laquates	Modern Laquates		73				16%		29%	100%
			Total Languages			255				56%		100%	
			Tecnichal topics	Tecnichal topics	Materias Complementarias	12						75%	
			Tecnichal topics	Tecnichal topics	Tecnichal topics	4						25%	
		Total Humanities			456		62%	52%	100%				
		Gimnastics	Gimnastics	Gimnastics	47								
	Religion and Espiritu Nacional	Religion	Ideology			71							
					14								
Total Religion and Espiritu Nacional					85								
	Total Religion y Gimnastics			132			15%						
Total				739		100%	100%						

Source Table 1: La Gaceta de Madrid.

Table 1 summarizes the most important curricular changes by subject matter, while Graph 3 shows when the main changes took place between 1821 y 1953. Science represented 32 percent of the total and the Humanities 52 percent, while Religion and Gimnastics the remaining 16 percent.¹⁰ Science included two large knowledge areas, Natural Sciences, and Physics and Chemistry, and one skill area, Mathematics (*Aritmética, Álgebra y Geometría* 34 percent of all Sciences). Humanities also included three large areas: two knowledge areas, with Geography, History and Philosophy [son 3], and one skill area, Languages (Spanish, Classics –with Latin, Greek and sporadically Hebrew – and Modern -- French, German and English). Language skills acquisition amounted to 56 percent of all Humanities, 25 percent Classic and Modern Languages each, and Spanish the remaining 50 percent. Considering exclusively Science and Humanities, that is to say, excluding Religion and Gimnastics whose presence was more erratic in the curricula, on average the first field represents 38 percent

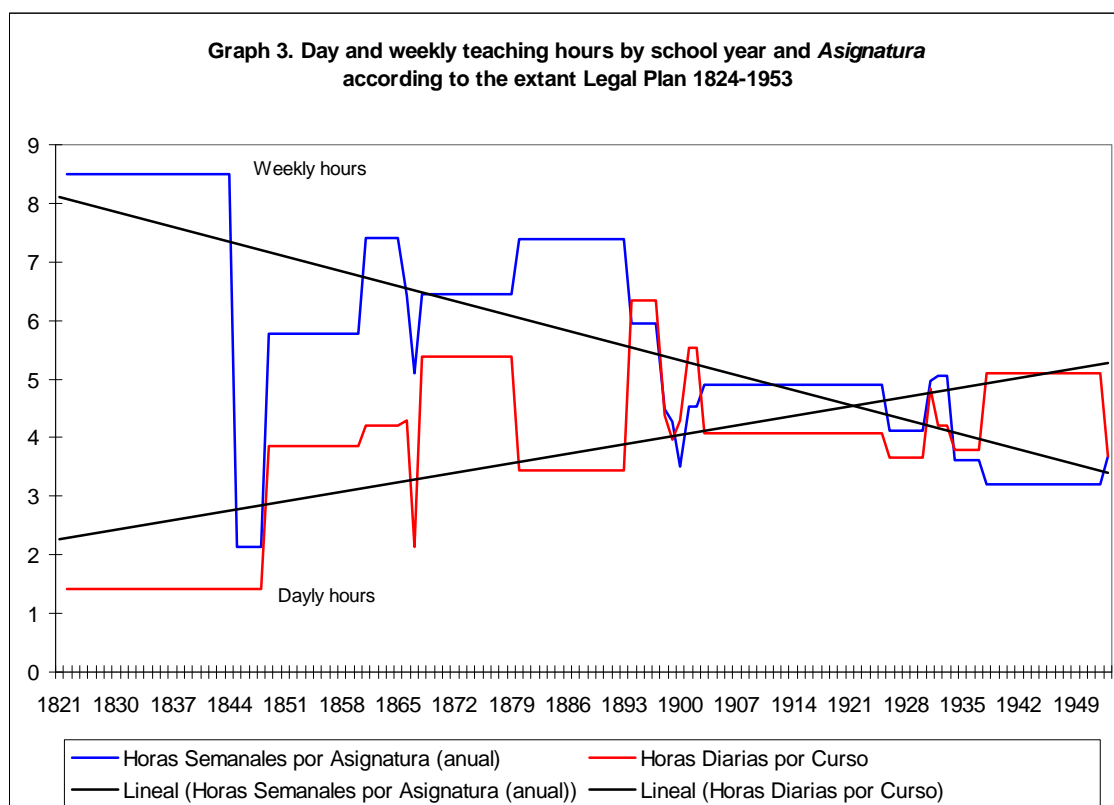
¹⁰ The large number of “names” for a single *Asignatura* gives us an idea of the chaotic nature of the different Plans. There were 51 different names for Geography and History, 21 for Religion, 47 for Spanish and 34 for Mathematics.

and the second one 62 percent. This suggests that there was some bias against Sciences in Spanish high school curricula. If only skill-providing subjects, mathematics and Spanish language, are considered, though, there is more equilibrium in the curriculum: 13 percent and 16 percent respectively, with a total weight of hardly 30 percent of the combined Science and Humanities topics. If Modern Languages are considered to be skill subjects, as we think they should since they give access to knowledge produced in other countries, this fragile equilibrium breaks down in favour, once again, of Language skills (26 percent) as opposed to Mathematical skills (13 percent). Considering Modern Languages as skill-providing subjects –as Spanish language– rises the skill-imparting languages to 40 percent of the reduced curriculum (excluding Religion and Gymnastics). There is some tension between the Humanities and the Sciences, and between skill- and knowledge-providing *Asignaturas*, in the 19th and early 20th century process of definition of the Spanish *Bachillerato*. To some extent this tension can be considered to be the consequence of the fact that high schools derived from the Old Latin Schools or Minor Faculties, that prepared students for access to the University.¹¹

As the number of *Asignaturas*, the time required for the completion of the *Bachillerato* was also increasing. The expansion roughly corresponded with those periods of more frequent Plans in the revolutionary years of the 1860s, the 1898s crisis and the 1930s Second Republic and Civil (Graph 2). From an average of 9 hours per week until mid 19th century, the school calendar jumped to 21 between 1845 and 1867, further expanded to 32 during the revolutionary years from 1867 to 1879, and was reduced to 25 after the 1880 Plan. From then on, in spite of frequent changes in the name and number of *Asignaturas* according to each new Plan, the school calendar remained stable between 26

¹¹ A more detailed analysis of curricular changes regarding *Asignaturas* by areas in Núñez and Moreno Castaño (2011).

and 28 hours per week until the 1938 Plan, which increased the hours to 31. Apparently a maximum of 5 around hours daily and 6 days a week had been agreed upon by regulators. In a standard plan, lasting 5-years, this would make for an average of 150 per week to obtain the *Bachillerato*.



Source Graph 3: *La Gaceta de Madrid*.

Graphs 2 and 3 reveal an increase in the regulation of the *Bachillerato* during the second half of the 19th century and the first half of the 20th. This could have meant a loss of freedom and autonomy of High Schools and teachers to organize their teaching. It also could have meant less discretion on the part of the students to decide what to study. Daily course hours remained fairly stable around 4 and 5 with a slightly positive tendency—a minimum of 1-2 and a maximum of 6—, while hours per *Asignatura* shifted in the opposite direction, from 9 to 3. Greater regulation meant a more detailed curriculum

and, consequently, a larger number of *Asignaturas* and less hours assigned to each of them. It did not necessarily imply an increase in curricular contents. The original subject matters, organized around large knowledge-imparting and skills-developing areas, hardly changed in absolute terms; the long-term gains in Science implied similar long-term losses in the Humanities, which lived an unstable equilibrium around a 40/60 percent respectively.¹²

We might tentatively conclude that there was an excess of regulation in the secondary education which led, by the sheer number of bills and norms produced, to legal indefiniteness and institutional instability. Furthermore, it appears that regulation resulted in a significant increase in the number of *Asignaturas* required to graduate as a *Bachiller*, though this increase did not result in a similar one in the time devoted to each subject matter.

3) HOW WERE THE NEW HIGH-SCHOOL LEGAL PLANS IMPLEMENTED AT THE INSTITUTOS CARDENAL CISNEROS (1885-1936) AND SAN ISIDRO (1860-1920).

Established in 1845, the **Instituto Cardenal Cisneros** and the **Instituto San Isidro** were the two public High Schools of Madrid until 1918, when the **Instituto Escuela** was established. The Instituto Escuela was part of an innovative project of the *Junta para la Ampliación de Estudios* a body devoted to research and teaching and inspired by the Institución Libre de Enseñanza.¹³ New public High Schools were established in the 1930s under the Second Republic (1931-1936), some to be closed soon afterwards. Both *Institutos* (Cardenal Cisneros and San Isidro) had students in the *Bachillerato* and in *Estudios Aplicados*, the latter only until 1887. After that date, and only for a few years, students were allowed to register in a few *Asignaturas* of the no longer

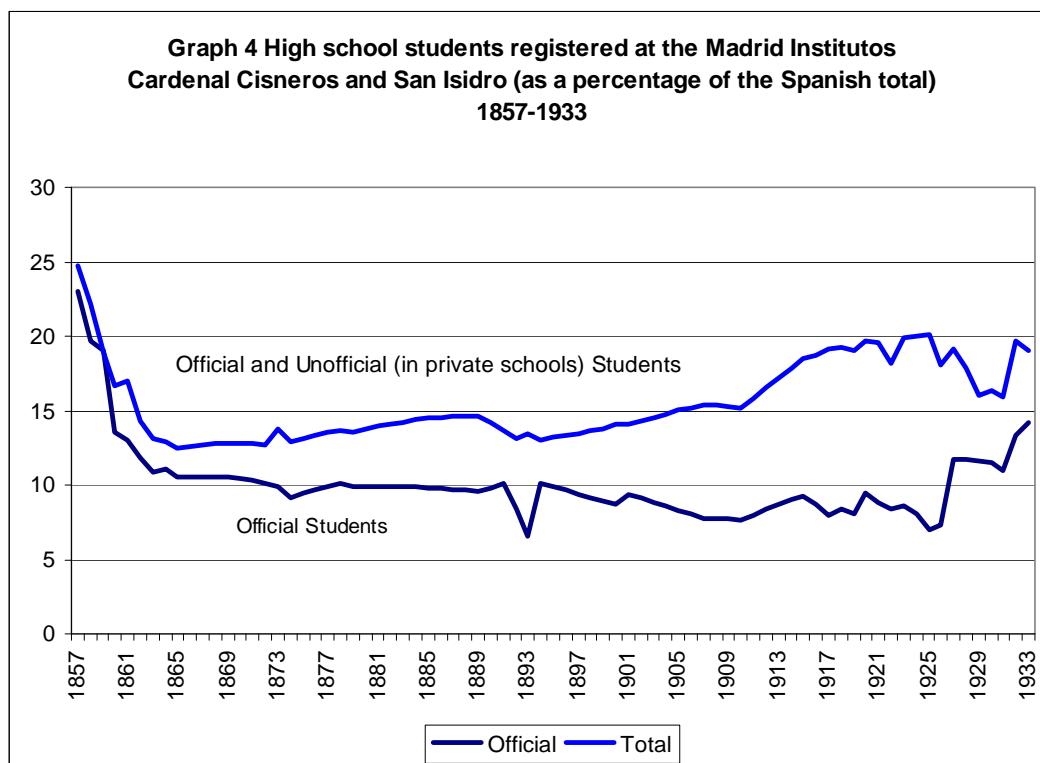
¹² The CEIMES research Group financed by the Comunidad de Madrid, is studying the curricular contents and teaching materials of several Madrid Institutos.

¹³ Martínez Alfaro (2010)

offered *Estudios Aplicados*, such as Modern Languages, Shorthand, Topography and Measurement, Political Economy, Writing or Law.¹⁴

Between 1862 and 1910, high school students in Madrid were around 12-15 percent of the Spanish total (Graph 4). In the 1920s the figure rose, to an average of 20 percent. In the early 1930s it came down again to 15 percent, as new *Institutos* were being established all over the country, some of them in Madrid. The official Cisneros and San Isidro students were around 5 percent of the total each throughout the period. These numbers make them representative of secondary education in Spain, in spite of the peculiarities associated to being the leading *Institutos* in the country.

¹⁴ Art 1 decreto 26 december 1868, Memoria de 1870, p. 9-10. As in all Spanish public high schools of this period, there were two (three) main types of students: regular ones, *alumnos oficiales*, attending classes and taking the final exams, and free students, *alumnos no oficiales*, who were schooled in private institutions or at home and only took the final yearly exams at the *Institutos*. High school teachers, *Catedráticos*, had thus two clearly defined tasks: to teach, train and grade their own regular students, and to grade non-official ones. The exams took place at the end of the school-year, usually in June, and quite often required extra teachers to help the *Catedráticos* grade unofficial students.

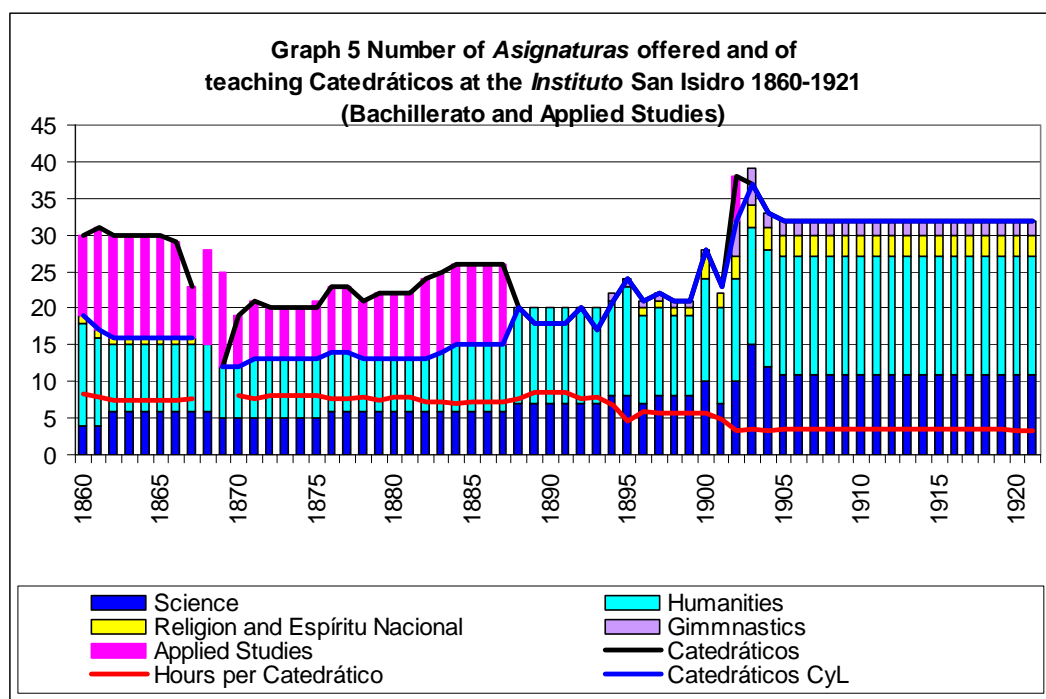


Source Graph 4: Data for the **Cardenal Cisneros** are from the *Libros de Registro de Matrícula*; those for the **San Isidro** from Núñez and Moreno Castaño (work in progress).

The different Plans applied at the **Cardenal Cisneros** between 1885 and 1936 show that, first, *Bachillerato* and *Applied Studies* only coexisted during the first few years; second, that several different Plans lasting between 5 and 7 years were being taught at the same time; and third, that the number of different *Asignaturas* taught yearly increased in time and fluctuated between 24 and 35.¹⁵ Why were some Plans applied and not others? How did the *Institutos* decide which Plan to apply and when, and which one not to apply? The **San Isidro** records between 1860 and 1921 give us further clues to these questions. As the **Cisneros**, the **San Isidro** imparted both degrees: *Artes Aplicadas*, until 1887, and *Bachillerato*, throughout the period (Graph 5). Before 1868, each

¹⁵ Moreno and Núñez (2010).

degree represented about 50 percent of the 30 *Asignaturas*. Between 1870 and 1887, the total number of *Asignaturas* declined to less than 25, an average of 15 of them from *Bachillerato*. After 1887 only *Bachillerato* remained with an average of 20 *Asignaturas*, 32 after 1903. As in **Cisneros**, annual peaks in the number of total *Asignaturas* reflected the coexistence of several Plans that year (i.e. 1899 to 1905). The number of *Asignaturas* available to students at each *Instituto* increased throughout the period –from less than 15 to more than 30–, as did the number required by law to complete the *Bachillerato* degree.



Source Graph 5: estimated from the *Memorias del Instituto San Isidro*.

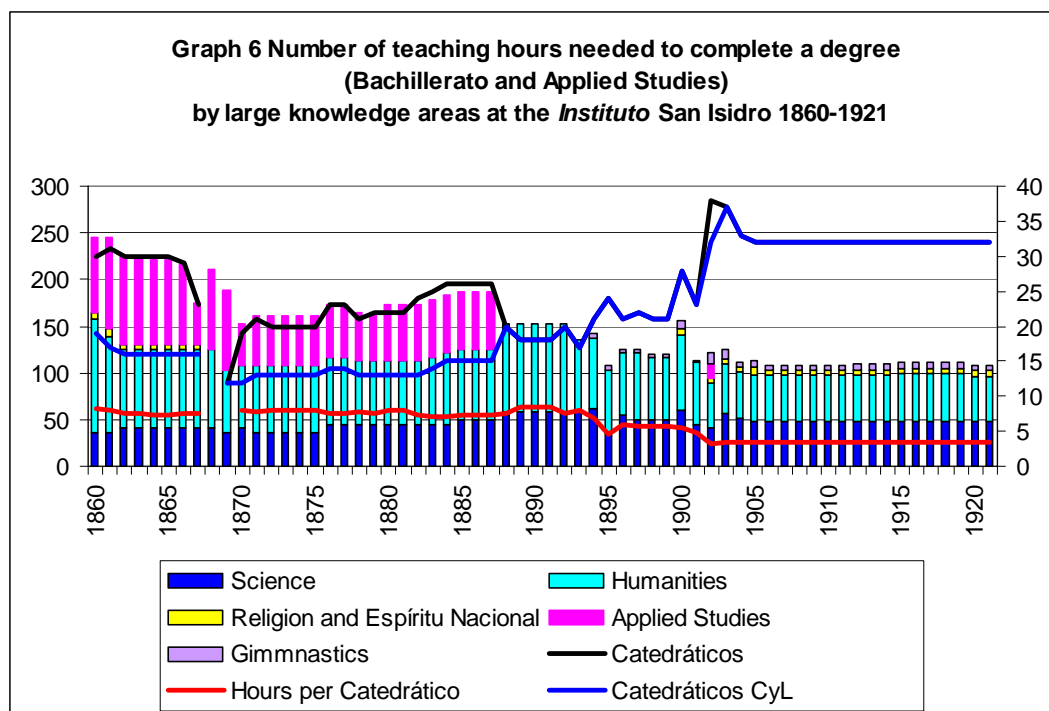
Yet, not all Plans seem to have been implemented immediately or completely. Only those of 1858, 1861, 1880 and 1903 were –four out of thirteen. Surprisingly, some *Asignaturas* were introduced either before being mandated by a new Plan or even when they belonged to a different Plan from that being applied. The reason why this happened is clear: typically, an *Asignatura* is included in the “*Instituto Plan*” –not necessarily the “legal Plan” – if and when

there is a *Catedrático* –a high-school teacher– available. This explains the almost exact coincidence of both series –*Asignaturas* and *Catedráticos*– shown in Graph 5.

As Graph 6 also suggests, the increase in the number of *Asignaturas* did not carry a proportionate growth in the hours students needed to complete a degree –100 to 110 hours on average (about 25 hours per week per course).¹⁶ On the contrary, only in the 1860s, and between 1885 and 1900 was the total number of hours per week needed to obtain the *Bachillerato* above 120. Those were the years, however, when a larger number of courses on Modern Languages were offered, which evidently were not taken by all students at the same time.

Science represented 30 to 40 percent of the teaching load until the late 1870s, 40 percent during the following three decades, and 50 percent thereafter. At the **San Isidro**, Sciences and Humanities reached an almost complete equilibrium at the turn of the 20th century on the basis of the hours devoted to each knowledge area. It had not reached a similar equilibrium in the number of *Asignaturas*, however.

¹⁶ This Graph shows total hours per week needed to complete the *Bachiller* degree. This total has to be divided by the number of courses to obtain the hours per week each student had to enrol in per year, which oscillated, as we saw earlier, between 20 and 30.



Source Graph 6: estimated from the *Memorias del Instituto San Isidro*. Hours: left scale. Number of *catedráticos*: right scale.

4) BUILDING A “VALUE INDEX” FOR THE SPANISH HIGH SCHOOL (1857-1970).

In this section we shall estimate a “High-school value index” using data from the two previous sections on legal curricular changes and its implementation at the **Instituto San Isidro** in Madrid. This Index will be applied to Spanish secondary school enrolment rates between 1860 and 1970.

To estimate such a “high-school value index” (HSVI) we shall build, first, a “high-school standard value index.” This standard will be based upon Finland today, since most PISA and TIMMS results for the last years suggest its high school is among the most efficient in the world, especially, but not exclusively, as it refers to mathematical and linguistic skills. Data from the Finnish Ministry of Education for 2009-10 have been used to estimate the

relative role of skill- and knowledge-imparting subjects, as well as Science and Humanities topics, in the total numbers of week-hours needed to complete a high-school degree (Table 2). Surprisingly, the total hours required in present-day Finland is 151, a figure almost identical to the average for the Spanish high-school legal plans between 1845 and 1953 (150).¹⁷ This total of 151 week-hours has been considered the optimum number and the distribution of these hours, is as in [1]:

$$[1] \text{ IndexCompuesto(Composite Index)} = (151 - (|a-96|) + (|b-40|) + (|c-5|)) / 151$$

Where a stands for Skill-providing topics, mostly Maths and Languages, b represents Knowledge-imparting subjects, such as Sciences, Chemistry and Physics, or Geography, History and Philosophy, and c groups Religion and Civics. Gymnastics has been excluded since it was only formally incorporated late in the 20th century. Several variations of this Index have been estimated to better understand the peculiarities of the Spanish Legal System, and the way it was implemented at the San Isidro High School of Madrid (Graphs 7a and 7b. *IndexCompuestoRNegativo* considers the role of Religion and Civics to be negative, since these subjects were essentially political indoctrination, especially during the Franco regime. Thus, we have a first variation on [1]:

$$[2] \text{ IndexCompuestoRNegativo} = (151 - (|a-96|) + (|b-40|) + (c-5)) / 151$$

Hence we have created what we call *IndexC&L*, which excludes Religion and Civics as in:

$$[3] \text{ IndexC\&L} = (151 - (|a-96|) + (|b-40|)) / 151$$

¹⁷ Arts & crafts subjects have been excluded from our index, since they were only recently incorporated in most curricula, being mostly absent until the close of the 20th century.

and thus gives us a long-term perspective that concentrates on those traits of the curriculum most important for human capital building: skills and knowledge subjects.

Table 2:Finland Curriculum for 7-16 years old

Topics (Asignaturas)	Standard 1		Standard 2		Standard 2			
	Total 10-16 no others	%	Total 10-16	%	Maths	Languages	Sciences	Humanities
Mother tongue and literature	28	19	32	21			32	
Mathematics	26	17	30	20	30			
Skills	54	36	62	41				
A language 1)	16	11	16	11				
B language 2)	6	4	6	4				
Optional A language	12	8	12	8				
Second Language	34	23	34	23			34	
Languages	62	41	66	44		66		
Skills with 2ndL	88	58	96	64				
Biology and geography	10	7	10	7				10
Physics and chemistry	9	6	9	6				9
Health education	3	2	3	2				3
History and civics	10	7	10	7				10
Home economics	3	2	3	2				3
Knowledge	35	23	40	26				
CyL	123	81	136	90				
Sciences							22	
Humanities								13
Religion/Ethics	5	3	5	3				
Physical education	10	7	10	7				7
Elective subjects	13	9	9	6				0
Others	23	15	10	7				
Minimum number of lessons	151	100	151	100				

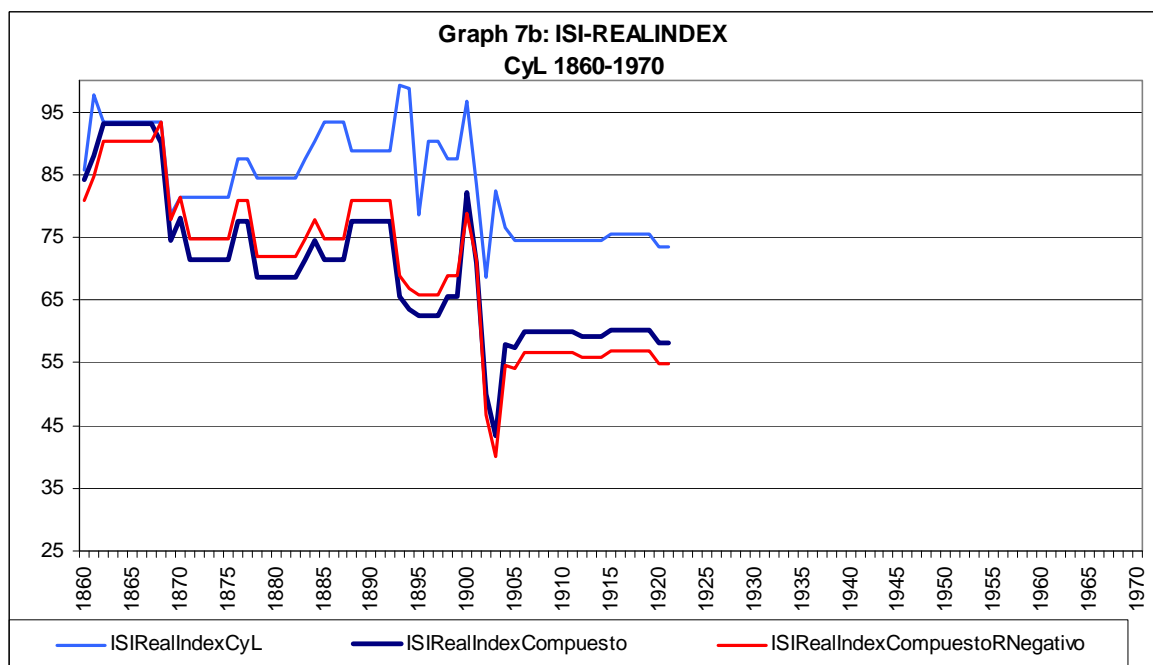
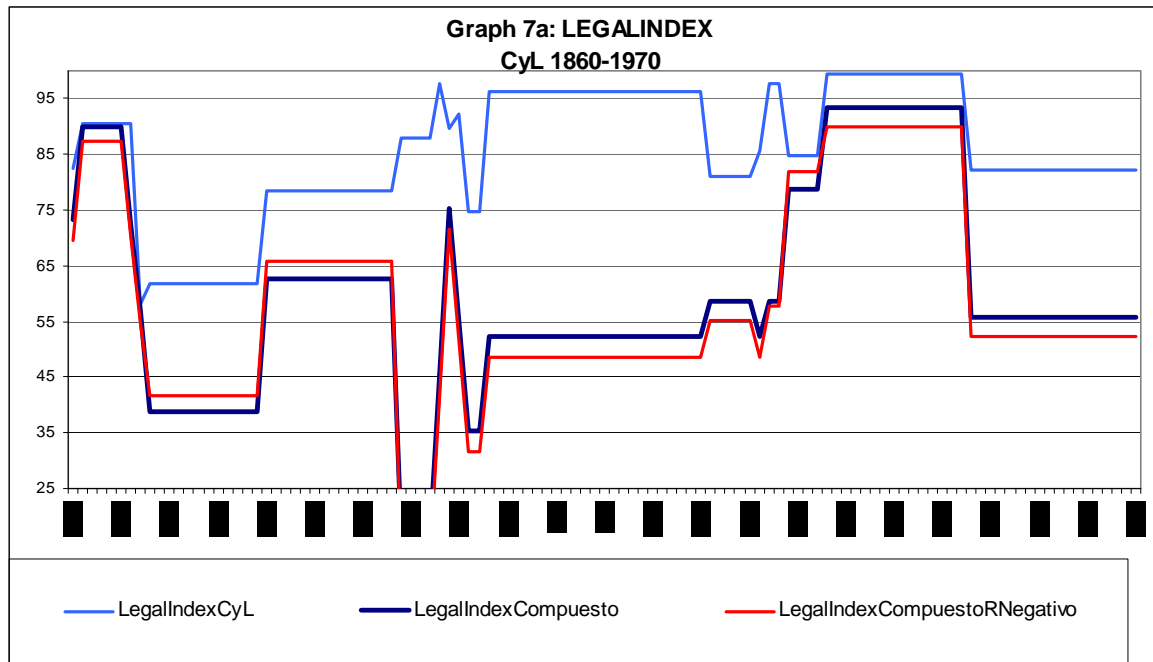
Source: Organisation of the education system in Finland 2009/2010, Chapters 4.9 and 4.10

For each possible Index we have two different estimates that we call Legal and Real. The first one, the Legal Index, is based upon what the Spanish educational laws stipulated; the second one, the Real Index, uses data from the San Isidro Institute in Madrid and thus covers a shorter time-span. Both *LegalIndexCompuesto* and *LegalIndexCompuestoRNegative* take into account the role played by Religion and Civics, with different weights assigned to them (Graph 7a). As has been pointed out by Spanish historians of education, Graph 1a shows that Religion and Civics were at the very core of the secondary school educational debate throughout the period. Curricular changes point to a heated ideological debate, with pronounced ups and downs driven by different approaches as to the role of Religion in the high school. Obviously the Franco Plans, those of 1938 and 1953, had larger loads of R&C, most of them pure political indoctrination. Similar levels of R&C, though, are to be found in the 1860s, prior to the revolutionary period, and at the beginning of the 20th

century, up until the Second Republic. Throughout the period, R&C was the single most important issue that set Spanish high schools apart from the High School Finnish Standard (HSFS).

Once the R&C debate is isolated, as in the *LegalIndexC&L*, we proceed to compare the HSFS canon with the reality of the Spanish plans, a comparison which should make clear the contribution of the Spanish high school to the stock of human capital. In the 19th century no Plan reached 95 per 100 of the HSFS, while most Plans between 1900 and 1953 did, with the notable exceptions of the Plan Callejo (1926), the 1932 Plan, and, most important for its long period in vigor, the 1953 Plan. The long-lasting 1880 Plan was an improvement upon the Revolutionary years Plans, but it was also a set-back relative to the 1860s plans.

The Graphs reflect the quality of the Plans as compared with the Finnish model. The best possible Plan would be the one where the differences with the Finnish model were zero (i.e., $a = 96$ and $b = 40$ in Formula 3); in this case, the value of the index would be $= 1$. If, on the other hand, there were differences, the value of the index would be < 1 , and lower the greater the differences.



Graph 7b shows how the legal plans were actually implemented at the **Instituto San Isidro**. The trend is broadly similar between the Legal and the ISI-Real indexes, though the differences are meaningful. First, we can distinguish three different periods. Until the late 1860s, the similarities are stronger, with the San Isidro index scoring higher than the legal system. From the early 1870s two periods clearly stand out, the first one lasting until the turn of the 20th century and the second one until 1921, the last year for which we have information on the San Isidro. Obviously, the Plans of the Revolutionary Years were not implemented, something that accounts for the relative stability of both *ISI-RealIndexCompuesto* (with Religion and Civics) at two levels: 75 per cent of the HSFS until 1900 and 55 afterward. Isolating the R&C effect, as does *ISI-RealIndexC&L*, two trends come to light: an upward trend during the 19th century and a stable one in the 20th. Both trends fit perfectly well with those set by the education Plans (Graph 7a), with a slight delay, yet they differ as regards the levels. The San Isidro *ISI-Real Indexes* have higher levels in the 19th century and much lower ones in the 20th. What accounts for these differences? Human capital is the most important input in the educational production function and the *Institutos* were implementing legal changes according to their human resources. Since teaching is an activity intensive in human capital, it would seem logical to expect a strong relationship between the human resources available to the *Instituto*, that is to say, the number of *Catedráticos*, and the implementation of new education Plans. In a previous article we were able to identify the late 1860s and 1890s as periods of personnel change at the *Instituto* as large numbers of *Catedráticos* retired at the same time. Most of them were replaced following the teaching requirements of the new Plans. At the end of the century, though, there were some *Catedráticos* who were never replaced: those initially assigned to *Applied Studies* (not to *Bachillerato*). As mentioned in Section 2, *Applied Studies* was taught at the *Instituto* until 1887, when separate schools for them –such as the *Escuelas de Comercio* (Trade Schools)— were

established, but some of the Applied Studies *Catedráticos* remained at San Isidro and taught the *Bachillerato* curriculum. This happened, especially, in Modern Languages. A large number of them had joined the faculty in the early 1870s and were thus retiring around 1900.

Once its role has been understood, Religion and Civics can be excluded from the index to better understand the peculiarities of the Spanish educational system –both legal and real– in comparison with the Finnish Standard. We have estimated two additional Indexes for both the legal setting and the **San Isidro Instituto**: one for skill-and another for knowledge-providing topics ([4] and [5]).

$$[4a] \text{ IndexSkill-Maths} = (151 - (|a-30|)) / 151$$

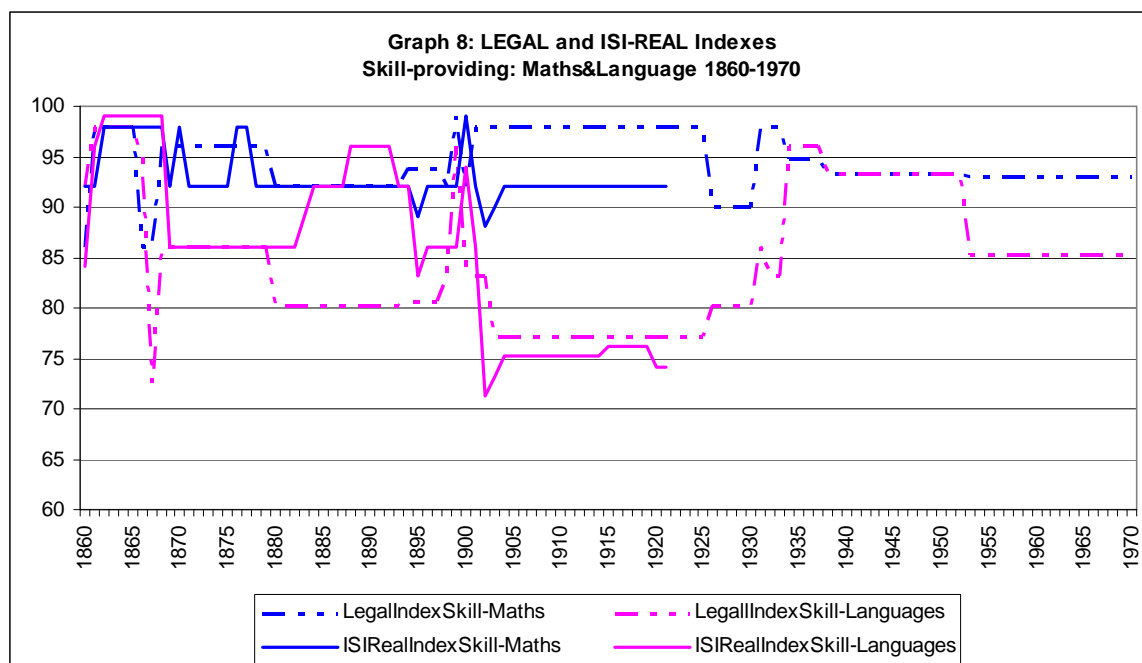
$$[4b] \text{ IndexSkill-Languages} = (151 - (|a-66|)) / 151$$

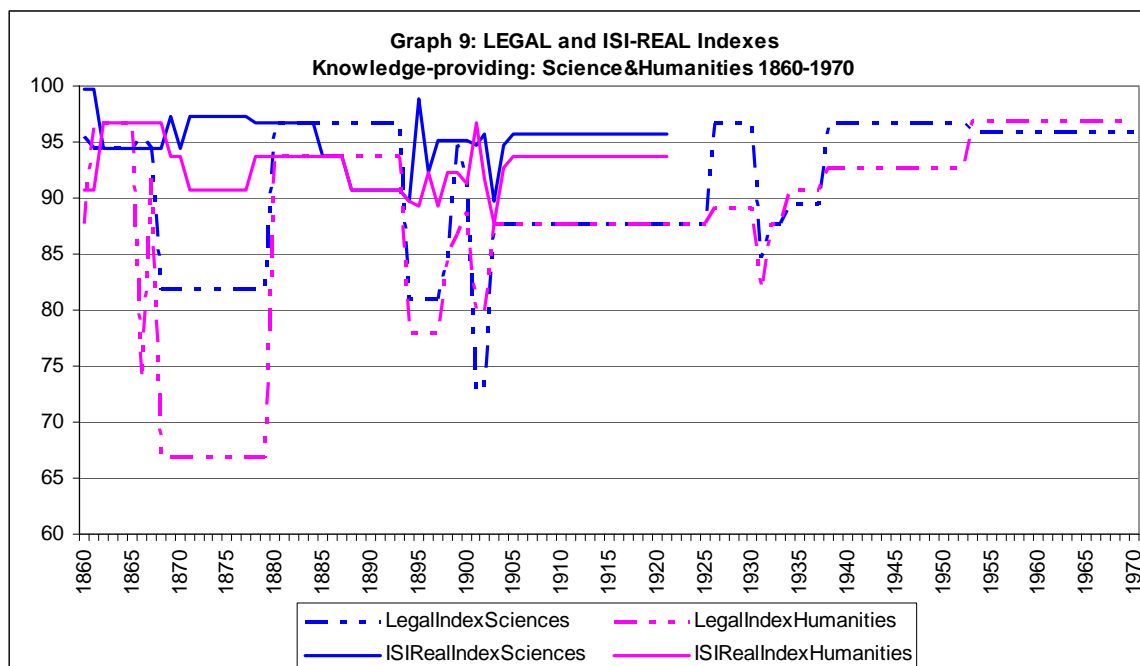
$$[5a] \text{ IndexKnowledge-Sciences} = (151 - (|b-22|)) / 151$$

$$[5a] \text{ IndexKnowledge-Humanities} = (151 - (|b-22|)) / 151$$

Skills are needed to acquire Knowledge. There are two categories of basic skills: mathematics and languages, both the mother tongue and foreign languages. Graph 8 and 9 show the Legal and ISI-Real Index Skills, for both mathematics and language, and the Knowledge Indexes for Sciences and Humanities. With the exception of the Revolutionary Plans of the late 1860s, never applied at the **San Isidro**, the greater differences with respect to the Finnish Standard regard the skills-providing *asignaturas*. The Knowledge Indexes are close and above 90 per 100 of the SFHSIndex most of the time. The ISI-Real-Knowledge-Index shows that, even when the Legal-Knowledge-Index is below 90 per 100, as in the early 20th century, the San Isidro was at higher levels (around 95 percent).

The same can be said of the Skill Index as refers to mathematics: the LegallIndex stays regularly above 90 per cent, with figures for the ISI-Real Index slightly below most of the time and especially so since the turn of the century, probably due to shortages of teachers. The greatest differences so far, excluding the Religious question, affect the teaching of languages, the second great skill-providing subject. If there is a trend at all, it is a decreasing one, with languages being more important in the 1860s and at the turn of the century, and again during the Second Republic and the first Franco's Plan. During most of the time, however, languages represent 80 per cent or less of the SFHSindex. Again, in the 1880s the ISI-Real Index for languages clearly diverges from the LegallIndex, probably due to the presence of a large number of foreign language *Catedráticos* at the San Isidro. Yet, once those teachers initially teaching *Applied Studies* retired, by the end of the 19th century, languages lost ground at the *Instituto* and never recovered their previous levels.





5) CONCLUSIONS

The long-term process of definition of secondary education in Spain led to the establishment of separate independent schools for *Bachillerato*, leading to the University, and work-oriented *Applied Studies*, *Escuelas de Comercio* and other *Escuelas de Artes Aplicadas*. A clear cut between both types of schools did not actually take place until the last decade of the 19th century. The two Madrid public high schools since 1845, **Cardenal Cisneros** and **San Isidro**, were in charge of *Bachillerato* and *Applied Studies* at least until 1887, even though the *Escuelas de Comercio*, i.e., had been established as independent schools much earlier.¹⁸ Furthermore, after that date, which coincided with the year when the State first included the financing of the high schools in the General Budgets, isolated *Asignaturas* from the *Applied Studies* curriculum were still taught at both

¹⁸ On the origins and growth of the *Escuela de Comercio de Madrid* see Fernández Aguayo (1997).

Institutos. As a matter of fact, at least at **San Isidro**, these *Asignaturas* only disappeared after the retirement of the *Catedrático* in charge of them, usually by death and in many instances as late as the turn of the 20th century. There were, obviously, some positive externalities in having both types of secondary education at the same *Instituto*: students had a larger choice of subjects to follow, even though not all of them were actually needed to graduate as a *Bachiller*. This seems to have been especially so in the case of Modern Languages, of which French, German and English were offered for most of the period in both *Institutos*, as well as *Shorthand* “the steam of writing” according to a **San Isidro** director.¹⁹

Curricular changes in the Spanish legal educational system and in the Madrid San Isidro *Instituto* provide the base upon which a “High-school value index” has been estimated between 1860 and 1970. Finland’s 2010 high school curriculum has been used as the standard, given the high scores reached by students in that country in PISA and TIMSS tests.

Several indexes have been estimated. The first one, which includes Religion and Civics (R&C), shows that the 19th and 20th century high school debate in Spain was an ideological one, as suggested by historians of education. Explicar Further indexes, excluding R&C, show that the Spanish legal system made a lower contribution to human capital building that the standard Finnish, especially in skill-providing subjects. Language-skills appear as the single largest deficiency in the Spanish system throughout the period.

Legal changes regarding the *Bachillerato* took place around three periods of political change and turmoil: from 1845 to the revolutionary years of the late

¹⁹ In his opinion, “for all people [lawyers, journalists, politicians, businessmen...] offers this wonderful art advantages and benefits [...]. It is thus urgent that the study of this art be compulsory for some Studies, if not for all as it could and should be.” Memoria 1862, p. 19. Five years later, the *Instituto* director admits its importance as an “out-of-program” subject.

1860s and early 1870s; at the 1898 crisis; and, finally, during the 1930s Second Republic and Civil War. They seem to have been excessive and unnecessary, since they were irrelevant and repetitive, on the one hand, and since they did not allow any Plan, whether good or bad, to consolidate. Both Madrid *Institutos* suffered from this legal chaos. Those in charge of implementing the changes, the *Catedráticos* tried to minimize the instability by postponing the introduction of new Plans until the necessary human resources were available. This meant that new *Asignaturas* were introduced only if and when a new *Catedrático* was appointed, and old *Asignaturas* continued to be offered for as long as the *Catedrático* in charge of them remained at the *Instituto*. This policy obviously made sense: human capital is the most important input in the educational production function and the *Institutos* were adapting legal changes to their human resources. Teachers' availability tempered the implementation of legal changes. In the last third of the 19th century this policy limited the negative scope of some of the new legal Plans. In the early 20th century, though, it had the opposite effect, particularly in the case of skill-providing topics, mostly languages. One might conclude that human resources, the policy of recruitment and promotion of teachers, were as important a tool to introduce change in the high school as new legal curricula.

Thus, we can conclude that the organization of secondary education in Spain, as in Continental Europe probably, blended the dictates of legislators with the interests of the *catedráticos* in charge at the public schools.²⁰ There is no indication that it followed social demand for skills and knowledge. The high school was seen almost exclusively as a way of entry to the University. Applied studies, those that could have prepared the human capital demanded by a

²⁰ When they have an opinion on the subject, it is a contradictory one. In 1871 Sandalio de Pereda, then Director of San Isidro, stated that "it is to be hoped that [the Studies of Commerce, then taught at the *Instituto*] be enriched with other useful to agriculture and industry, with a practical and popular approach, for those young people who cannot and should not follow a scientific and academic career." (*Memoria* 1872, p. 7) A year later, he spoke against those same studies been taught at the *Institutos*.

country rapidly undergoing economic modernization, disappeared from the high schools, only some of them to be taught at independent schools –such as the *Escuelas de Comercio*. Any positive externalities that might have risen from their being together –greater options for the students from a larger number of *Asignaturas*, among them Modern Languages, Shorthand, Writing, interrelation between professionally and non-professionally minded students, etc... -- were lost.

Graphs 10 and 11 show high school actual and standardized enrolment rates in Spain, using both the Legal and the ISI-Real indexes, and summarizes the findings so far.

