

# HIGH SCHOOL CURRICULA AND HUMAN CAPITAL IN NINETEENTH AND TWENTIETH CENTURIES SPAIN\*

*El currículo de la educación secundaria y el capital humano en la España de los siglos XIX y XX*

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**Summary.** During the nineteenth and early twentieth centuries, most European countries adopted a modern education system. Making comparisons across countries and throughout the centuries is difficult, however, as the number of years of schooling required to graduate and the curricula changed quite frequently. This paper defines a new unit of measure to evaluate curricular changes across time and place: hours per week by discipline needed to complete a secondary school degree. Using data from two different sources, we have estimated two different Indexes in Spain which are then applied to enrolment rates. 1) A Legal High School based upon the curricular contents required to graduate and obtain the Bachiller degree according to Spanish educational laws; and 2) a Real or San Isidro Index, using annual calendar data from that Institute in Madrid to capture the actual implementation of those bills. Both refer to a previously defined Finnish 2010 Standard built on one of the best-known protocols. We assume that the closer they were to the Finnish Standard, the better the Spanish school curricula were. Both indexes have been used to estimate a quality-adjusted and long-term consistent measure –a constant as against a current value– of the number of high school students from which measures of the stock of human capital, such as average years of schooling, are usually estimated. The new series are an improvement upon previously available indicators of

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human capital stock in the long-term and might prove useful for future studies regarding its impact upon the modernization of the country.

**Keywords:** *Human capital indicators; Educational policies; High-school curriculum; Enrolment rates; Spain.*

**Resumen.** *Durante el siglo XIX y principios del XX, la mayoría de los países europeos adoptaron un sistema educativo moderno. Sin embargo, es difícil hacer comparaciones entre países y a lo largo de los siglos, ya que el número de años de escolaridad necesarios para graduarse y los planes de estudio cambiaban con bastante frecuencia. En este trabajo se define una nueva unidad de medida para evaluar los cambios curriculares a lo largo del tiempo y el lugar: las horas semanales por disciplina necesarias para completar un título de secundaria. Utilizando datos de dos fuentes diferentes, hemos estimado dos índices en España que luego se aplican a las tasas de matrícula. 1) Un Bachillerato Legal basado en los contenidos curriculares exigidos para graduarse y obtener el título de Bachiller de acuerdo con las leyes educativas españolas; y 2) un Índice Real o San Isidro, utilizando datos del calendario anual de dicho Instituto en Madrid para recoger la ejecución real de dichas leyes. Ambos se refieren a un estándar finlandés de 2010 previamente definido y basado en uno de los protocolos más conocidos. Suponemos que cuanto más se acercaban al estándar finlandés, mejores eran los currículos escolares españoles. Ambos índices se han utilizado para estimar una medida ajustada por calidad y consistente a largo plazo –una constante frente a un valor corriente– del número de estudiantes de secundaria a partir de la cual se suelen estimar medidas del stock de capital humano, como el promedio de años de escolaridad. Las nuevas series son una mejora de los indicadores disponibles anteriormente sobre dicho stock a largo plazo y podrían resultar útiles para futuros estudios sobre su impacto en la modernización del país.*

**Palabras clave.** *Indicadores de capital humano; Políticas educativas; Currículo de la educación secundaria; Tasas de matriculación; España.*

## INTRODUCTION

Institutions, “the humanly devised constraints that structure political, economic and social interaction”, are considered one of the keys to understand economic development.<sup>1</sup> For some authors, institutions

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<sup>1</sup> Douglass C. North, “Institutions”, *Journal of Economic Perspectives* 5 (1) (1991): 97.

explain “the origins of prosperity and poverty”,<sup>2</sup> while for others whether institutions cause growth or, rather, whether growth and human capital accumulation lead to better institutions is still a moot question.<sup>3</sup> One of the many problems regarding the role of institutions is to understand how they take shape and, even more importantly, how flexible and adjustable to a changing environment they are.<sup>4</sup> Institutions can be “organic”, those that “arise endogenously out of the repeated exchange of agents”, or “designed” and as such “the result of coordinated actions of many individuals or government”. Public institutions are usually designed on purpose and “can rely upon the power of the state to enforce its laws”. Yet, they risk been “subverted by their own public agents” who may have their own interest to advance. Furthermore, “[l]egal institutions are typically very persistent, [...and] self-enforcing, if they reflect the socio-economic power distribution in a society and help to preserve it”.<sup>5</sup>

During the nineteenth century, in many western countries the school became the main institution responsible for human capital accumulation, as it gradually replaced the family, the Church and even the workplace.<sup>6</sup> The birth and development of the modern educational system followed basically two different paths. The first one arose from the bottom up by the direct intervention of individuals and society at large in Anglo-Saxon countries, mostly the USA.<sup>7</sup> The second one was led by the

<sup>2</sup> Daron Acemoglu and Simon Johnson, “Unbundling Institutions”, *Journal of Political Economy* 113 (5) (2005); Daron Acemoglu and James A. Robinson, *Why Nations Fail: The Origins of Power, Prosperity and Poverty* (New York: Crown, 2012).

<sup>3</sup> E. L. Glaeser *et al.* “Do Institutions Cause Growth?” *Journal of Economic Growth* 9 (2004).

<sup>4</sup> Joel Mokyr, *The Enlightened Economy* (Yale University Press, 2007), Avner Greif, “Historical and Comparative Institutional Analysis”, *The American Economic Review* 88 (2) (1998).

<sup>5</sup> T. H. L. Beck, “Legal Institutions and Economic Development”, *CentER Discussion Paper* 2010-94 (2010): 9-12.

<sup>6</sup> Clara E. Núñez, “Literacy, Schooling and Economic Modernization: A Historian Approach”, *Paedagogica Historica, International Journal of the History of Education* 39 (5) (2003).

<sup>7</sup> Claudia Goldin, “America’s Graduation from High School: The Evolution and Spread of Secondary Schooling in the Twentieth Century”, *The Journal of Economic History*, 58 (2) (1998) and “The Human-Capital Century and American Leadership: Virtues of the Past”, *Journal of Economic History*, 61 (2) (2001). Claudia Goldin and L.F. Katz, “Technology, skill, and the wage structure: insights from the past”, *The American Economic Review* 86 (2) (1996); “Human Capital and Social Capital: The Rise of Secondary Schooling in America, 1910 to 1940”, *Journal of Interdisciplinary History* 29 (1999), “The Legacy of U.S. Educational Leadership: Notes on Distribution and Economic Growth in the 20th Century”, *AEA Papers and Proceedings* 91 (2001), and “The ‘Virtues’ of the Past: Education in the First Hundred Years of the New Republic”, *NBER Working Paper no. 9958* (2003).

state, which took over existing prior institutions, and used its power to re-arrange and reinforce them. This model prevailed in Continental Europe and its areas of influence.<sup>8</sup> Educated nations were supposed to have higher civic standards and to breed better and more responsible citizens who laid the foundation for better institutions, among them the schools.<sup>9</sup> Poorly educated nations, on the other hand, had to rely on the learned elite for the design and implementation of those growth-promoting institutions.<sup>10</sup> Yet, the interests of the elites might not have coincided with those of the nation at large and thus they might have failed to provide for good, sound educational institutions. Since private returns to education are usually higher than social returns,<sup>11</sup> educational policies are especially sensitive to conflicts of interest between those who design them –the political elites– and those who are supposed to benefit from them. Yet, we lack long-term historical studies about how efficient and well suited to improve the stock of human capital was the school institutional setting.

Most studies suggest that the quality of the school system might be important in the process of human capital accumulation. Literacy rates, school enrollment rates or even years of schooling are commonly used estimators of the stock of human capital available at any given time and, as such, they have been used to explain the impact of education upon economic growth.<sup>12</sup> The results, however, are far from conclusive. Some historians in the 1980's and 1990s, as some economists later, concluded that there is no clear relationship between human capital and development.<sup>13</sup>

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<sup>8</sup> Fritz K. Ringer, *Education and Society in Modern Europe* (Bloomington: Indiana University Press, 1979). Jerald Hage and Maurice Garnier, "El estado fuerte, la coordinación de la educación y el crecimiento económico en Francia y Alemania" in *La maldición divina: ignorancia y atraso económico en perspectiva histórica*, coord. Clara E. Núñez and Gabriel Tortella (Madrid: Alianza, 1993).

<sup>9</sup> Daron Acemoglu, Simon Johnson, James Robinson and Pierre Yared, "From Education to Democracy?" *American Economic Review Proceedings* 95 (2005).

<sup>10</sup> Alexander Gerschenkron, *Continuity in History and Other Essays* (Harvard University Press, 1968), described the role of the state in establishing growth-promoting institutions in late-comer countries. The school could be considered one of them.

<sup>11</sup> George Psacharopoulos and Harry A. Patrinos, "Returns to investment in education: a further update", *Education Economics* 12 (2) (2004).

<sup>12</sup> Robert J. Barro y Jong Wha Lee, "A new data set of educational attainment in the world, 1950–2010", *Journal of Development Economics* 104 (2013). Kenneth L. Sokoloff and Stanley L. Engerman, "Institutions, Factor Endowments and Paths of Development in the New World", *Journal of Economic Perspectives* 14 (3) (2000).

<sup>13</sup> Núñez, "Literacy".

Considering this conclusion counterintuitive, though, other scholars thought that the inconclusiveness was due to poor data and decided to improve the existing estimates. The prevailing view today is that earlier estimates of human capital may have been faulty and inadequate to capture human capital accurately. Improving these estimates can lead to a significant increase in the measured effects of human capital upon economic growth, by as much as 25 per cent.<sup>14</sup> Recent studies using skills and knowledge attainment rather than school enrollment data have confirmed that the quality of schools enhances their effectiveness.<sup>15</sup> Thus, one year of schooling may provide different levels of literacy depending on the quality of the school. Just having access to schools, the simple fact of being enrolled, is not enough to guarantee that children will get an adequate level of education, for instance, a satisfactory literacy level. Furthermore, new research on the factors that determine student success suggests that inputs such as expenditure per student, teacher salaries, or class size, those indicators traditionally used to estimate the quality of schooling, are mostly irrelevant. The institutional school setting, including “teacher quality and institutional structures that determine incentives”, “accountability measures like external exit exams, school autonomy in process and personal decisions (if combined with accountability), private-school competition, and public financing”, seem to be more relevant issues.<sup>16</sup> We might conclude, therefore, that the human capital accruing to the population depends not only upon the quantity but also upon the quality of the education available. Therefore, estimates of the human capital stock need to consider the quality of the school system. So far, the best attempt to measure school results that we have are PISA international test submitted to 15 year olds that measures their “ability to use their reading, mathematics and science knowledge

<sup>14</sup> Angel de la Fuente and Rafael Doménech, “Human Capital in Growth Regressions: How Much Difference Does Data Quality Make?” *Journal of the European Economic Association* 4 (1) (2006); Angel de la Fuente and A. Ciccone, “Human capital in a global and knowledge-based economy”, *Final report. European Commission*, 2002; D. Cohen y M. Soto, “Growth and human capital: good data, good results”, *Journal of Economic Growth* 12 (2007); OECD *Education at a Glance: OECD Indicators*. Organisation for Economic Co-operation and Development, Paris (several years).

<sup>15</sup> E.A. Hanushek and L. Woessmann, “The economics of international differences in educational achievement”, in *Handbook of the Economics of Education*, eds. E.A. Hanushek, S. Machin and L. Woessmann (Amsterdam: North Holland, 2011) Vol. 3.

<sup>16</sup> E.A. Hanushek and L. Woessmann, “Do better schools lead to more growth? Cognitive skills, economic outcomes and causation”, *Journal of Economic Growth* 17 (2012). These results also consider the high contribution of family background to student attainment.

and skills to meet real-life challenges”.<sup>17</sup> It is a measure of functional literacy, “the capacity of a person to engage in all those activities in which literacy is required for effective function of his or her group and community and also for enabling him or her to continue to use reading, writing and calculation for his or her own and the community’s development”, as defined by UNESCO.<sup>18</sup> Surprisingly, this definition is not so different from the one included in the Plan Pidal of 1845: “that which is especially typical of the middle classes, whether they intend only to acquire the elements of knowledge indispensable in society to every educated person, or they try to pave the way for further studies that are more difficult to acquire”.

So far, however, given the difficulty of measuring the quality of the school system, our measures of the stock of human capital in nineteenth- and twentieth century-Spain rely exclusively on quantitative indicators.<sup>19</sup> This is so despite the fact that we know that schools, especially at the secondary level, are difficult to compare over long periods of time and across countries since they do not mean the same in terms of years of study, age of the students, or even content or purpose of the schooling. In fact, they might be very different institutions.<sup>20</sup> By combining the recent skills and knowledge attainment approach with the institutional approach to school performance, this paper examines the curricular plans of Spanish high schools in a first attempt to identify some potential quality indicators that would allow us to standardize the usual quantitative estimates so as to make them comparable across time and countries.

We propose to use the distribution of skill-imparting versus knowledge-oriented course work as the unifying thread to understand the long-term process of configuration of the Spanish high school system. The first section identifies the main characteristics as well as some of the major changes of the high school curriculum approved by the Spanish governments between 1824 and 1953. To keep track of and better understand the frequent reorganization of curricula that took place over such

<sup>17</sup> PISA is the OECD’s *Programme for International Student Assessment*. <https://www.oecd.org/pisa/>

<sup>18</sup> <https://uis.unesco.org/en/glossary-term/functional-literacy>.

<sup>19</sup> Clara E. Núñez “Educación”, in *Estadísticas históricas de España: siglos XIX y XX*, eds. A. Carreras and X. Tafunell (Bilbao: BBVA, 2005).

<sup>20</sup> Goldin, “The Human-Capital Century”.

a long period, the second section presents an index –the *Spanish High School Index*– which I have defined in reference to a theoretical optimum, the *Standard 2010 Finnish High School Index*. Using an early 21th century benchmark, built on the best-known present-day protocol as a reference according to PISA results, allows us to bring a long-term and comparative perspective to the study of the design of Spanish high school curricula and facilitates the identification of theoretically good and bad practices. In the third section, we build a new Index –the *San Isidro HSI*– which shows how these legal changes in the curricula were implemented at one of the main historical public institutes in the country, a proxy for all high-schools. The comparison of both the *Spanish* and the *San Isidro Indexes* permits us to differentiate between the changes intended by the Spanish legislator and those implemented by the Madrid high-school *Catedráticos* –the high school teachers. Finally, in the fourth section, both these *Indexes* are applied to our series of high school students to estimate a consistent long-term series measuring the *constant* as against the *current* value of one year of schooling. This constant long-term series of the number of high-school enrolled students could later be used to estimate a *quality-adjusted* and *long-term consistent* measure of the contribution of the high school to the stock of human capital in Spain.<sup>21</sup>

### THE SPANISH SECONDARY SCHOOL SYSTEM: CURRICULAR DEFINITION AND CHANGES

Having lost the mainland American colonies in the 1820s, Spain struggled to become a modern nation throughout the nineteenth century. New institutions were established, and fresh regulations were issued regarding trade and commerce, banking and money, property rights and labor relationships, taxation, and public expenditures, as well as education. Bills and decrees were issued by the Spanish Congress, the *Cortes*, regulating public instruction while increasingly larger sums of financial resources were appropriated by the state to finance a three-stage educational system: the universities (beginning in the 1830s), the high schools

<sup>21</sup> Number of enrolled students is the flow variable used to estimate measures of the stock of human capital, such as Average Years of Schooling or People with a given educational level. See Núñez “Educación”.

(since 1886), and, lastly, the primary schools (from 1901 on). For a country with very high illiteracy rates until the middle of the twentieth century, this timing reveals the educational priorities of the governing elites, largely made up of landowners.<sup>22</sup> They probably mistrusted the effects of universal primary education and did not expect to benefit directly from a population of literate farm-hands; on the contrary, they probably feared the better educated workers would emigrate in search of better paid jobs or demand improvements in their working conditions at home, either way increasing agricultural labour costs.

Despite widespread illiteracy, secondary education became a priority for the governing elites. They considered it as intended for the children of the middle and upper classes. As such, it dominated the Spanish educational debate during most of the nineteenth and early twentieth centuries. Secondary education in Spain had a double, sometimes conflicting, nature. As heir to the Old Regime's *Minor Faculties* (Colleges), high schools prepared students for entry into the University. Later, the so-called *General Studies* became a degree, the *Bachiller* (*Baccalauréat* in France, *Abitur* in Germany). But the high school initially also included what came to be known as *Applied Studies*, which later became independent studies in new institutions, such as the *Escuelas de Comercio* (Commerce Schools) and the *Escuelas de Artes y Oficios* (Arts and Crafts Schools). In the struggle between two conflicting ideas about the role of the high school, "at the same time a complement to primary instruction and preparatory for higher education",<sup>23</sup> it seems as though the second idea finally prevailed: the *Bachillerato* became the entry door to the university and attracted the largest number of students, while the professional studies were set aside in a separate sphere and became less popular among students. 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.<sup>24</sup>

<sup>22</sup> See the educational level of Spanish cohorts born between 1832 and 1984, Núñez "Educación".

<sup>23</sup> *Real decreto citando las asignaturas que comprenderán los estudios generales de la segunda enseñanza* (1895).

<sup>24</sup> Núñez, "Educación", Figure 3.1.



Enrollment rates measure the flux of students from which a future stock of human capital can be estimated. They do not consider the efficiency of the school system in producing results: turning illiterates into literate people or preparing high school students for the professions or entry into the university, among others. Yet, there is compelling evidence suggesting that a year of schooling does not necessarily produce similar results upon all enrolled students. Both students and school traits can modify expected results. Innate talent, personal commitment and family background have a known impact upon student achievement. Although the evidence is not conclusive, most research on the role of the school has focused on the effect of three main factors: expenditures (both per student and teachers' salaries), teacher background (ability, education, and experience) and class size. Notably less attention has been paid to assessing the effects of curricular changes upon student performance. Yet recent studies measure student achievement by their command of certain skills, such as Mathematics and Languages, and student knowledge in some specific subjects, such as Science. They have shown that achievement is a significantly better indicator of human capital accumulation than years of schooling and has greater power in explaining economic growth.<sup>25</sup> This recent and fruitful approach is difficult to follow during earlier periods, especially the early years of the definition of the educational system, for lack of data on actual attainment based upon exam results. Even if we are unable to establish *what students learnt in the school* in, say 1870 i.e., we might gain some insight by looking at *what they were supposed to learn*, that is at curricular contents. This approach would be especially useful if student choice of subjects were highly restricted, as was the case in Spain.<sup>26</sup>

<sup>25</sup> R. Greenwald, L.V. Hedges and R.D. Laine, "The Effect of School Resources on Student Achievement", *Review of Educational Research* 66 (3) (1996) and Hanushek and Woessmann "Do better schools lead".

<sup>26</sup> As in the rest of Continental Europe, in Spain curricula were established by the central state for both *General* and *Applied Studies* (Ringer, *Education and Society*; Hage and Garnier "El estado fuerte"; Antonio Viñao Frago, *Política y educación en los orígenes de la España contemporánea. Examen especial de sus relaciones en la enseñanza secundaria* (Madrid: Siglo XXI, 1982); Federico Sanz Díaz *La segunda enseñanza oficial en el siglo XIX (1834-1874)* (Madrid: Ministerio de Educación y Ciencia, 1985). See also Aaron Benavot "Curricular Content, Educational Expansion and Economic Growth", *Comparative Education Review* 36 (2) (1992); David H. Kamens, John W. Meyer and Aaron Benavot, "Worldwide Patterns in Academic Secondary Education Curricula", *Comparative Education Review* 40 (2) (1996) on high-schools curricular development in Europe. In the USA, however, the high school had a very open curriculum. Goldin, "The Human-Capital Century", considers the "lack of

The single most important Education Bill of the nineteenth and early twentieth centuries was the Moyano Law (1857), which organized the myriad of rules that had been previously adopted, beginning with the Quintana *Dictamen* of 1813, and later the Plans by the Duke of Rivas (1836) and Someruelos (1838), and especially the reforms by Pidal (1845-1853). Soon after the approval of the Moyano Law, however, new, and sometimes contradictory laws and decrees were regularly issued. Some of them were implemented, if only for short periods of time after which they were replaced by new ones; others were never applied.

As a result of all these legislative twists and turns, the legal setting of Spanish secondary education was highly unstable. Between 1824 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 approved in the Cortes. Those plans that were approved had a life span of 4.75 years on average between 1824 y 1938. Had all of them 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 used 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).<sup>27</sup> Three Plans were in vigor for just about five years: Bustos (1861), Callejo (1926), and Villalobos (1934); and two others, for four years, Moyano (1857) and Groizard (1894). The 1953 Plan inaugurated a new period of long-term stability in curricular contents, which lasted until 1970. That year a new Education Law completely transformed the system.

The Spanish high school system that haltingly took shape during the nineteenth century was highly centralized, clearly structured in different courses, with well-defined access and selection processes, both for teachers and students, as well as strictly defined graduation requirements. Curricula were also defined, with contents, calendars, hours of study, even exams, minutely regulated by law. From this information –the

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national education standards” and, in general, “few state standards”, one of “virtues” of the American high school system.

<sup>27</sup> The duration attributed to these plans refers to major changes in curricula. We are disregarding minor and partial changes, especially those relative to the Plan Calomarde and Plan Pidal.

number and names of the *asignaturas*, the main subjects of study, on the one hand, and the amount of school-time assigned to each of them during the five to seven years it took to complete a degree of *Bachiller*— we can infer the different, sometimes even conflicting, type of high school that the legislators had in mind.<sup>28</sup> Furthermore, since changes were so frequent, we can also get a glimpse of the possible costs that curricular instability might have imposed upon the school system.

In this paper, curriculum refers to *the courses offered by a school*, that is to say, the “school’s academic requirements for graduation, such as the courses students have to take and pass”.<sup>29</sup> We are focusing “on *what students are to learn*, [...] the content of the intended curriculum”, and *not on how that content is to be taught*, what often is referred to as “pedagogy and curriculum”.<sup>30</sup> We are, thus, using a more restricted definition than the one followed by experts on curriculum studies who consider that “curriculum is a written instructional blueprint and set of material for guiding students’ acquisition of certain culturally valued concepts, procedures, intellectual dispositions and ways of reasoning”.<sup>31</sup>

Changes in the denomination of the *asignaturas* were so frequent as to make it almost impossible to follow them. Most of these, however, were mere nominal changes and did not imply any significant renewal of the actual contents taught in class.<sup>32</sup> We find 51 different names for

<sup>28</sup> We are working with a total of 25 Plans of which we have detailed information about *asignaturas*, 871 in all, and only 20 Plans 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 degrees, *Bachiller* in Sciences and *Bachiller* in Humanities (Plans of 1845, 1894, 1926 y 1953). All figures take into consideration this distinction.

<sup>29</sup> <http://edglossary.org/curriculum>.

<sup>30</sup> A. Porter, J. McMaken, J. Hwang and R. Yang, “Common Core Standards: The New U.S. Intended Curriculum”, *Educational Researcher* 40 (3) (2011): 103.

<sup>31</sup> Douglas H. Clements, “Curriculum Research: Toward a Framework for Research-based Curricula”, 38 (1) (2007): 36. Aaron Benavot *et al.* “Knowledge for the Masses: World Models and National Curricula, 1920-1986”, *American Sociological Review* 56 (1) (1991), stress that primary school curricula are very similar across different national educational systems.

<sup>32</sup> Julio Ruiz Berrio “Las reformas históricas de la enseñanza secundaria en España”, *Encounters on Education* 7 (2006), insists in the shallowness of the curricular changes. C.E. Núñez and B. Moreno “Historia de un desencuentro: legislación y praxis en el Instituto San Isidro de Madrid (1860-1920)”, in *Aulas con memoria. Ciencia, educación y patrimonio en los institutos históricos madrileños (1837-1936)*, eds. Leoncio López-Ocón, Santiago Aragón and Mario Pedrazuela (Madrid: Comunidad de

*Geography and History*, 21 for *Religion*, 47 for *Spanish* and 34 for *Mathematics* throughout the period.<sup>33</sup> To better understand curricular changes, I have replaced these original, and at times peculiar, names with their equivalent standard ones: *Geography*, *History*, and so on. The resulting reduced set of *asignaturas* has been further organized into two large overlapping blocks of *knowledges* –Sciences and Humanities– and two blocks of *skills* –Mathematics and Languages. According to recent definitions of functional literacy these skills are needed to access knowledge. Thus, *Physics*, *Chemistry* or *Natural Sciences* belong to the Science/Knowledge category, while *Mathematics* would be in the Science/Skill group; *Philosophy*, *Geography* and *History*, are considered part of the Humanities/Knowledge category, and *Spanish* or *Modern Languages* part of the Humanities/Skill group. And so on. This categorization will allow us to measure the relative weight assigned to each set of categories in the different curricula issued by lawmakers and in those implemented at the two main high schools in the country.

Let us summarize first some of the main traits of the Spanish high school curricula between 1824 and 1953. By discipline, the *Sciences* seem to have been underrepresented relative to the *Humanities*, with 38 against 62 percent of the total number of *asignaturas*.<sup>34</sup> By content, there was apparently more equilibrium in *Knowledge* versus *Skills-providing* topics, with 52 and 48 percent assigned to each group. Within each discipline there were significant differences, though. Thus, *Mathematics* (*Arithmetic*, *Algebra* and *Geometry*), a purely skill-providing subject of study, represented 34 percent of the scientific disciplines, as against 66 for the knowledge-oriented ones –mostly *Natural Sciences*, *Physics* and *Chemistry*. The Humanities group, on the contrary, favoured skills acquisition and the study of Languages amounted to 56 percent of all

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Madrid, 2012), have shown how *catedráticos* and school text-books remained active for decades, as many as three decades, at the same high school as one legal plan was replaced by a new one.

<sup>33</sup> 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's name is preceded by vaguely defining qualifications, as "Nociones de..." or "Elementos de...", even the sequence in which it must be taught, as in French (1.º), Gimnastics (2) and Physiology and Hygiene (3).

<sup>34</sup> Excluding Religion and Gymnastics (more on this later) there were 739 *asignaturas* in the period under study.

*asignaturas* –26 Spanish, 16 Modern, and 14 percent Classical Languages.<sup>35</sup> We might conclude that there was a bias against the Sciences, especially those skill-providing such as *Mathematics*, in the nineteenth and early twentieth century Plans of the Spanish *Bachillerato*. This tension between the Humanities and the Sciences, and between skill- and knowledge-providing *asignaturas*, could have originated in the fact that high schools derived from the Old Latin Schools or Minor Colleges that prepared students for access to the University.<sup>36</sup> The bias against Science skill-providing subjects, if large enough, could have determined the students' future choice of discipline at the University level. Engineering and the Sciences might have been underrepresented relative to disciplines not requiring a sound mathematical foundation at an early age. Furthermore, the choice of discipline might have had effects upon the future stock of human capital and, perhaps, even upon the country's future economic growth.<sup>37</sup>

Not all legal curricular Plans share these general traits, however. Most high school Plans organized the *Bachillerato* into two cycles totaling 6 years –7 according to the 1934 Plan and only 5 in a few others. The number of *asignaturas* tended to increase as the different plans unfolded. On average, each Plan had 30 *asignaturas*, though there were significant differences: there were only 6 *asignaturas* prior to 1844 and 20 between 1845 and 1867. In 1868 their number jumped to 30, until they were again reduced to an average of 14 from 1880 to 1893. During the following year, 1894, a substantial new increase was approved that pushed the total number of *asignaturas* to an average of 37 until 1903, when a new plan was approved reducing the total number, again. The average number of total *asignaturas* remained at 30 during the following 23 years, one of longest periods without new curricular plans. In the late

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<sup>35</sup> Languages included Spanish, Modern –French, German and English– and Classics –with Latin, Greek and sporadically Hebrew. Modern Languages are skill subjects since they give access to knowledge produced in other countries. Considering Classical Languages as skill-providing subjects is more debatable, though.

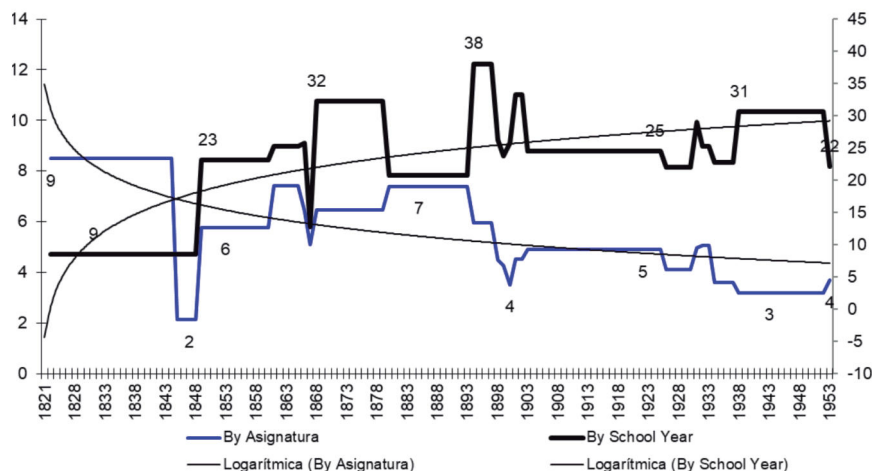
<sup>36</sup> Begoña Moreno and Clara E. Núñez “Los planes de estudio en la aparición y consolidación de la enseñanza secundaria: el Instituto Cardenal Cisneros de Madrid 1885-1938”. *Arbor* 749 (2011).

<sup>37</sup> Clara E. Núñez “Strong state and weak universities: the long-term roots of the Spanish university system problems”, *CIAN-Revista de Historia de las Universidades*, 18 (1) (2015). See Joseph Altonji “Effects of personal and school characteristics on estimates of the return to education”, *Economic Perspectives, Federal Reserve Bank of Chicago* 22 (1998).

1920s, a new period of change and expansion started, the total reaching 67 *asignaturas* in the 1938 Plan. Obviously, the shorter curricula were found in the earliest years, and the longest ones in the final period, beginning with the 1934 Plan (44 *asignaturas*) and reaching a peak with the 1938 Plan (67).<sup>38</sup>

Except for the earliest years, before the 1850s, the larger the number of *asignaturas* the greater the number of years required to complete the degree. This noticeable increase in the number of *asignaturas*, though, is primarily attributable to the splitting of large and comprehensive subjects into smaller and more defined topics. A common subject, such as *History and Geography* (one *asignatura*), in time became *Historia de España* and *Historia Universal*, on the one hand, and *Geografía de España* and *Geografía Universal* on the other, a total of four *asignaturas*. Something similar happened with other subjects.<sup>39</sup> This explains why it is important to also consider the amount of time devoted to each of them in the Plans if we want to know the real weight each subject had been assigned.

**Figure 1. Weekly teaching hours by school year (right scale) and by asignatura (left scale) according to the extant Legal Plan (1824-1953)**



Source: La Gaceta de Madrid, legislation on high school curricula.

<sup>38</sup> The educational bills we are going to study mainly concern the *Bachillerato*, although some of them also dealt with *Applied Studies*.

<sup>39</sup> *Physics and Chemistry* became two independent topics, while *Natural Sciences* became Natural History, Geology, Botany, Biology, Zoology, Astronomy or even Mineralogy or Cosmology, depending upon the Plan.

As with the number of *asignaturas*, the time required for the completion of the *Bachillerato* was also increasing (Figure 1, right scale). From an average of 9 hours per week each year until 1848, the school calendar jumped to 21 between 1845 and 1867, expanded further to 32 during the revolutionary years from 1867 to 1879, and was reduced back to 21 between 1880 and 1893. After 1894, the weekly assignment reached its highest point, with an average of 33 hours until 1902. From then on, despite frequent changes in the name and number of *asignaturas* according to each new Plan, the school calendar remained stable with an average of around 25 hours per week until the 1938 Plan, which increased the hours to a new high of 31. Apparently, a maximum of around 5 hours daily during 6 days per week had been agreed upon by regulators quite early –around the middle of the nineteenth century– in the drawing up of the high school curricula and remained a standard from which the deviations that took place during brief and intense periods of political dissension and change were never too large. In a standard plan, lasting 5-years, this would make for a total of 150 *hours per week to complete the degree* and to obtain the *Bachillerato*. In a 6-years-long Plan that would amount to 25 hours per week during those 6 years; in a degree lasting 5-years, it would reach 30 hours per week. Thus, *hours per week to complete the degree* is a measure we have devised that contemplates the possibility of each Plan having a different annual number of hours and requiring a different number of years to complete a degree. *Hours per week to complete the degree* incorporates both these possible sources of differences into a standard unit of analysis, the one we are going to use in this paper to measure changes in the weight assigned to different areas of study.

There was a limit, though, to the increase in the overall class-time students could follow each year, which resulted in less hours being assigned to each *asignatura* as the number of *asignaturas* increased: from a maximum of 9 hours per week each year until 1844, to a minimum of 3 in the 1930s, with an average of 6-7 hours in the second half of the nineteenth century and 5 to 3 in the twentieth. It would be wrong to conclude, therefore, that the increase in the number of *asignaturas* implied an increase in curricular content. The original subject matters, organized around large knowledge and skill areas, hardly changed in absolute terms; any long-term gains, as it took place in the Sciences, implied

a parallel long-term loss in the Humanities. Apparently, both areas lived in an unstable equilibrium of around a 40/60 percent of the total teaching load respectively which we shall see in more detail later. These changes, both in the number of *asignaturas* and in the school-calendar, reveal an increase in the regulation of the *Bachillerato* during the second half of the nineteenth century and the first half of the twentieth. Greater regulation meant a more detailed curriculum, with a larger number of *asignaturas* and less time assigned to each of them. Consequently, it also implied that the *Catedráticos* had less discretion to organize the learning process. 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.

The state haltingly defined a highly centralized secondary education system with increasingly detailed and regulated curricular contents, at the expense of teachers' and students' freedom to choose what to study and how to do it. Changes in the institutional setting were frequent, usually following periods of political upheaval during which the tensions between conflicting ideas regarding the role of the high school in the educational system became evident. During those periods –particularly the 1840s, 1860s, late 1890s and early 1900s, and the 1930s– almost each party or Minister in charge tried to get a new bill approved, quite often to dismiss the novelties introduced by the preceding one until, finally, one of them became the next *standing Plan* during a few years. As Bustos stated in the introduction to the 1866 Plan, “this mobility of plans and regulations, this frequency with which new paths are undertaken and abandoned, always looking for the most appropriate, Sire, prove that this is a matter of the first order and that it deserves the utmost attention from the Government”.

However, the endless redefinition of the high-school legal setting was also a source of institutional uncertainty and weakness. Even high-ranking educational officials 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, then Minister of Public Instruction, 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, considered that very few people could “distinguish between what was extant and what had been abolished”, 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”. Amós Salvador, Minister in 1911, answered “who knows” when a Deputy asked him which law was in effect. Yet, politicians like themselves were partly responsible for this institutional chaos: there were 190 education ministers between 1833 and the beginning of the 1936 Civil War, an average of 1.8 per year, who stayed in office slightly over 6 months.

### BUILDING A VALUE INDEX FOR THE SPANISH HIGH SCHOOL (1857-1970)

Given the time needed to complete the *Bachillerato* –5 to 7 years– frequent curricular changes might have led to legal ambiguity and institutional instability. They certainly might have had a negative impact upon the high schools’ efficiency, forcing them to a permanent process of re-adjustment to the new ordinances. We do not know, however, whether the new regulations were an improvement upon the existing ones whether *bad* high school practices were being replaced by *good* ones. To identify good against bad curricular practices we are going to estimate a *Standard High School Index*, upon a model built on the best-known protocol today with which to compare and standardize the different Spanish Plans. Good or bad curricular practices thus are only considered so relative to the *2010 Finnish High School Index* we have built as a standard measure in the absence of a solid agreement among historians as to what is a good high school curricula in 19th and 20th century Europe.

This model has been estimated with data obtained from the Finnish Ministry of Education for the 2009-10 school-year –hence the name *Standard 2010* or *Finnish High School Index (FHSI)*. At that date, Finland’s high school system was among the most efficient in the world, especially, but not exclusively, as it refers to mathematical and linguistic skills as measured by PISA results. The *Programme for International Student Assessment (PISA)* measures students’ *broad literacy* in reading, mathematics, and science at age 15. Its main goal is “to represent outcomes of learning rather than outcomes of schooling”, meaning how students benefited from their schooling.<sup>40</sup> At the 2009 PISA test, Finland

<sup>40</sup> Other program, such as TIMMS –*Trends in International Mathematics and Science Study*– and NAEP –the US own *National Assessment of Educational Progress*– devote more attention than PISA

scored second, Korea being first, on the reading and mathematics literacy scale (Tables R1 and M1), and first on the Science literacy scale (Table S1). A few years earlier, the OECD had published a report study of the major traits that characterized the schooling systems of six countries “deemed to be relatively strong in PISA 2000”, Finland being one of them.<sup>41</sup> The stated aim was to “identify which factors appear empirically to be “universal” features supporting *good quality learning* at school [... since], analysis of what has happened in these countries can give some pointers on the *specific kinds of reform strategies that produce successful education systems*”. According to this report, “*central planning and control, particularly over the curriculum [...coupled with] more freedom over optional subjects and [...] greater diversity*” granted to the schools since the 1990s, partly explain Finland’s success story in the 2000s.

**Table 1. Finland’s curriculum for those aged 10-16 in 2010**

Ages	Hours Asignaturas	Total with Religion and Others		Total # Asignaturas excluding Religion and Others			Excluding religion and others			Percentage by Content within each Discipline	Knowledge-providing	Skill-providing	
		Total # Asignaturas	In percentage of Total # Asignaturas	Discipline Sciences and Humanities	Content Knowledge-providing Skill-providing with 2 <sup>o</sup> language		Skill-providing	Discipline Sciences and Humanities	Content Knowledge-providing				Skill-providing
Biology and geography		10	7%										
Physics and chemistry		9	6%										
Health education		3	2%										
Mathematics		30	20%										
<b>Total Science</b>				52	22	30	30	38%	16%	22%		42%	58%
History and civics		10	7%									100%	
Home econoriginally in others		3	2%										
Mother tongue and literature		32	21%				32						
A language 1)		16	11%										
B language 2)		6	4%										
Optional A language		12	8%										
Second Language		34	23%										
Languages		66	44%							49%			
<b>Total Humanities</b>				79	13	66		58%	10%			16%	84%
<b>Religion/Ethics</b>		5	3%									100%	
Physical education		10	7%										
<b>Others</b>		10	7%										
Minimum number of lessons		151	100%	136	40	96	62	100%	29%	71%			
									136				

Source: Organisation of the education system in Finland 2009/2010, Eurydice, European Commission

Using a backward projection of Finland’s curriculum in 2010, we propose to use the Finnish case to test which reform strategies were closer to “produce a successful education system” in nineteenth and early twentieth century Spain. Some of the traits identified in Finland by the OCDE study –a centralized planning of the curriculum, in which the distribution of science and humanities, skill and knowledge subjects plays a pivotal role– were also key traits of the Spanish high school

to specific curricular contents as the determinants of the students’ achievement.

<sup>41</sup> *National system overviews on education systems in Europe and ongoing reforms* (2010), Eurydice, EU.

curricular development since the middle of the 19th century, as we have previously shown. These traits shall be used as a *Standard* unit against which to measure the long-term curricular changes in Spain.<sup>42</sup> Accordingly, the relative role of skill- and knowledge-imparting subjects –grouped by large Science and Humanities subject areas– in the total numbers of *week-hours needed to complete a high-school degree* has been estimated (Table 1). Surprisingly, the total hours of study required in present-day Finland is 151 *hours per week to complete the degree* –see above for a definition of this new unit of measurement–, a figure almost identical to the average for the Spanish high-school legal plans after the 1850s –an average of 25 week-hours each year during a total of 6 years or of 30 week-hours in 5 years–, i.e.<sup>43</sup> Science and Humanities also have a roughly similar presence –40 to 60 percent– in 2010 Finland and in nineteenth and early-twentieth century Spain. The knowledge and skills division of the *Asignaturas* shows, however, different results: while the split run almost 50-50 percent in Spain, it was 30-70 percent in Finland in favour of the skills. So far, this evidence suggests that acquiring a modern high school curriculum might have implied moving from a knowledge-oriented earlier one (heir to the old *Latin Schools* from which the Spanish high schools originated), to the skill-oriented system of today; from a school that taught what was known at the time, to a school that prepares the student to stay up-to-date in a world of constant and accelerated scientific and technical change. Furthermore, society requires that increasingly large numbers of people be prepared to contribute actively to the generation of new scientific and applied knowledge.<sup>44</sup> We'll see whether this requirement was fulfilled by looking at the long-term curricular changes in Spain, while trying to understand how and when these modern traits were acquired, whether by sudden changes or by steady and smooth motion, and instigated by whom, legislators or high-school teachers.

<sup>42</sup> OCDE *What makes school systems perform? Seeing school systems through the prism of PISA* (2004).

<sup>43</sup> 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.

<sup>44</sup> See James E. McClellan III and Harold Dorn, "Science and Technology in World History. 2. Baski." (2006) on the relationship between science and technology in the long run, especially Part IV.

The total of 151 *week-hours needed to complete a degree* in 2010 *Finland*, as well as the distribution of these hours, by discipline and type, has been considered the optimum possible, as in Formula [1]:<sup>45</sup>

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

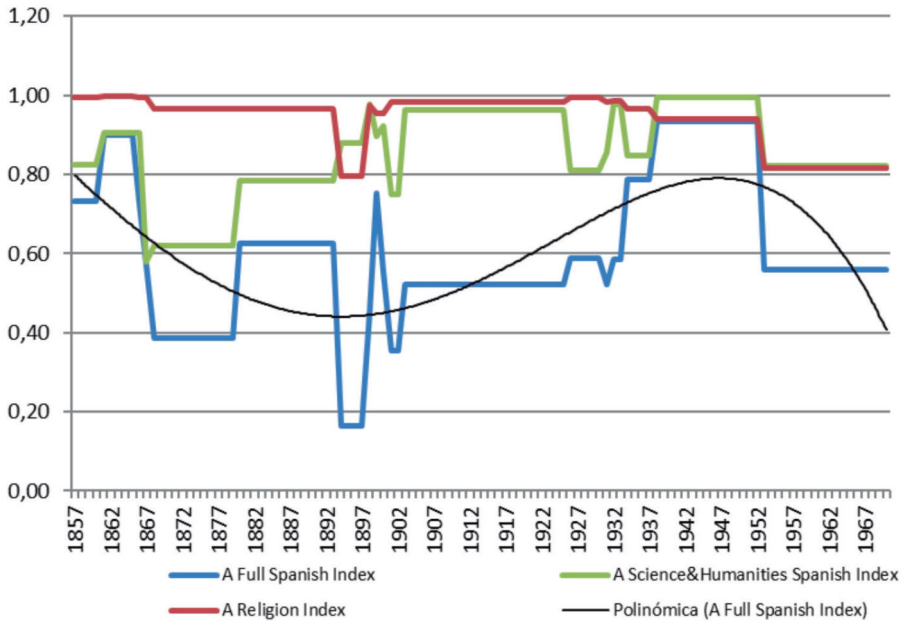
where *a* stands for Skill-providing topics, mostly Maths and Languages, *b* represents Knowledge-imparting subjects, such as Natural Sciences, Chemistry and Physics, or Geography, History and Philosophy, and *c* groups Religion and Civics. Gymnastics has been excluded since it was only formally incorporated to curricula in the twentieth century. The best possible Plan would be the one where the differences, both positive and negative, with the Finnish model were zero (i.e., *a* = 96, *b* = 40 and *c* = 5); in this case, the value of the index would be = 1. If, on the other hand, there were differences –any curricular plan that devoted either more or less time to each optimum *Finnish* study area–, the value of the index would be < 1; and its values would be lower the greater the differences –positive or negative– with the Finish curriculum. Several variations of this *Index* have been estimated to better understand the peculiarities that characterized the birth and definition of the Spanish high-school system. The constant tension between Science and Humanities, Knowledge- and Skill-providing *Asignaturas*, thus, comes to light in these long-term *Legal* and *Real Indexes*.

Our *Full Legal High School Index (HSI)* (Figure 2) suggests that the Spanish high-school curricula diverged from the *Finnish Standard* during the second half of the nineteenth century, converged until the 1930s, and diverged, again, from 1953 on, under the Franco regime. The best plans seem to have been the Bustos Plan (1861: 0.90 relative to the *SF-HSI*) and the Sáinz Rodríguez Plan (1938: 0.93), at the beginning and at the end of the period of analysis. The transition to a modern system does not seem to have followed a straight path from a very distant old-fashioned model to the present modern one, but rather one of periodic advances and setbacks. Our *Full Legal HSI* does not identify the possible reasons for this pattern, however. Historians have long sustained that the educational debate in nineteenth and early twentieth century Spain

<sup>45</sup> Since curricular changes implied changes in the number of *asignaturas*, hours assigned to them and years required to complete the high-school degree, the number of *week-hours needed to complete a degree* that combines all three categories has been adopted as the unit of measure.

turned around the role of the Catholic Church who fought to keep control of the schools. As the state gradually consolidated its grip over the educational system, however, the Church lost ground. The right of the Church to establish private schools was one of the main issues of confrontation all along. The role of Religion in the curriculum, the control the Church exerted and wanted to keep upon several related subjects, might have been another one.

**Figure 2. Spanish Full, Science & Humanities, and Religion Indexes 1857-1970**



Source: *La Gaceta de Madrid*. Polynomial Fit.

To control for the role of the religious debate, that might obscure other curricular changes important in the definition of a modern high school, we have decomposed the *Full High School Index* into its main elements: *Religion and Civics*, on the one hand, and *Science and Humanities*, on the other, as in:

$$[2] \text{ Religion and Civics HSI} = (151 - (|c-5|))/151$$

$$[3] \text{ Science and Humanities HSI} = (151 - (|a-96|) + (|b-40|))/151$$

Once the religious dispute is isolated, the picture that emerges is a significantly different one. High school curricular changes suggest the existence of a relatively minor ideological controversy driven by different approaches as to the role of Religion and Civics. The average of the *Religion&Civics HSI* is 0.94, with a Standard Deviation of 0.04, as against an average of 0.61 with a much larger SD of 0.20, for the *Full HSI*. The largest departures of the *R&C HSI* from the *Standard Finnish* occurred, however, when Civics, and not just Religion, played a significant role in the curriculum, as happened especially with the 1894 Groizard Plan and, above all, the Franco Plans, especially that of 1953. This means that, the religious content of the Spanish Plans was not very different from the Finnish canon; the differences lay in the Science and Humanities curriculum. This suggests that, even if the Church may have had strong interests in controlling the minds of secondary students, the state had an even stronger interest and vastly more clout in terms of curricular definition. In general terms, thus, it seems fair to conclude that *the high school debate was not really about the role of Religion in the curricula*, even though the public debate, in the media and even in the Cortes, may have misled us to assume that this was the case.<sup>46</sup>

The divergences between the *Spanish* and the *Standard Finnish Index* appear to be due to an academic, and not a religious debate, and they mostly hinged upon (1) the duration of secondary studies in terms of *week-hours needed to complete a degree* and (2) the changing weight assigned to core *Science and Humanities*, or *Skills- and Knowledge-imparting* disciplines (Figure 2). Let us remember, though, that we are assuming that the best practice in terms of future learning outcomes by the high school students would be the one that shared the length as well as the distribution of different areas of study of the *Standard Finnish Index*. Too much time –or too little– devoted to any set of *asignaturas* would distance the *Spanish Index* from the *Standard* one. The excessively encyclopedic nature of Spanish high school curricula, especially noticeable in some Plans, has

<sup>46</sup> Some historians have suggested that the Church control over the curricula was achieved through the teachings of History and Literature. Curiously enough, however, Menéndez Pelayo criticized the Plan Pidal of 1845, which he considered the cornerstone of the following plans, because in his opinion “it secularized teaching, leaving it open to government whims”. Cited in Díaz de la Guardia *Evolución y desarrollo*, 15.

been remarked by some authors, and could have been responsible for this divergence.<sup>47</sup> Encyclopedism would also fit in with the description by historians of education of a traditional secondary school, heir to the Latin Schools of earlier centuries, turning into a modern and scientifically oriented high school.

To better understand the interplay between the length of the curriculum and the *modern* against the *old* traits within it, a further distinction has been made, between *Skill-* or *Knowledge-providing asignaturas* within the *Science-Humanities* divide. We have estimated four additional Indexes ([4a and 4b] and [5a and 5b]).

$$[4a] \textit{ Skill-Maths Index} = (151 - (|a-30|)) / 151$$

$$[4b] \textit{ Skill-Languages Index} = (151 - (|a-66|)) / 151$$

$$[5a] \textit{ Knowledge-Sciences Index} = (151 - (|b-22|)) / 151$$

$$[5b] \textit{ Knowledge-Humanities Index} = (151 - (|b-13|)) / 151$$

As stated before, there are two categories of basic skills: mathematics [3a] and languages [3b] (both the mother tongue and foreign languages). Advances in the codification of mathematics have historically led to significant leaps in technical and scientific knowledge. The introduction of Arabic numerals in Europe by Fibonacci early in the 13th century opened the way to replace the theoretical geometrical approach of the Greeks by a more practical approach based on Arithmetic and Algebra; it also facilitated the accounting practices that facilitated the growth of the Italian banking system. Later, at the end of the 17th century, the development of calculus by Newton and Leibnitz spurred another significant leap forward in technical and scientific endeavours, what we know as the Scientific Revolution to which we are heirs today. Both are examples of two seemingly unimpressive innovations that spurred a revolution in the quest to understand (science) and control (technique) our world.<sup>48</sup> Geometry, Arithmetic and Algebra –the specific language of modern science and technique–, together with the mother tongue and foreign

<sup>47</sup> Ruiz Berrio, “Las reformas históricas”, criticizes most high school curricular plans, beginning with the Plan Rivas of 1838 up to the Sainz Rodríguez 1938 Plan, for their encyclopedic approach. Our Index allows us to identify which Plans suffered more than others from this specific problem.

<sup>48</sup> See McClellan III and Dorn “Science”, 111 and 188.

languages are the core of the *skill-imparting asignaturas* in the high school curricula. Command of both types of skills –mathematics and languages– are needed to access, acquire, and create knowledge. Together with knowledge, skills are required to solve the mainly technical and scientific problems of the modern world, to sustain economic growth and to advance human development. The acquisition of skills, therefore, is a growing concern in modern educational systems, as the *Standard Finnish Index* shows. We would expect, therefore, the greatest divergence in the *Spanish Skills Index*, not in the *Knowledge* one, the further we move back into the mid -nineteenth century. Furthermore, we could also expect the *Science Index* to present larger differences than the *Humanities Index* since the *Spanish high school originated in the old Latin Schools* which put more emphasis on the latter.

Table 2 summarizes some of our main findings. Since quantitative data on high school students is available from the late 1850s only, we are going to concentrate on the 17 high schools Plans that followed the 1857 Moyano Law, dismissing earlier Plans. Once the *Religion&Civics* (Col. 2) debate is excluded, [as in the *Science&Humanities Index* (Col. 3)], only four Plans come close to the *Standard Finnish*: two of the longer lasting, the Plan Bugallal (1903-1926: 0.96) and the Sainz Rodríguez (1938-1953: 0.99), and two of the shortest-lived (Plan Gamazo 1898, and De los Ríos 1932, with 0.98 both), all of them twentieth century Plans. The longest-lived plans of the second half of the nineteenth century, the Ruiz Zorrilla (1868-1880: 0.62) and the Lasala (1880-1894: 0.78), significantly differ from the *Standard Index*. The Lasala Plan was an improvement over the previous Ruiz Zorrilla Plan, by being less encyclopedic in length; most of the change it represented, however, was due to a drastic reduction of the *Skill-oriented* subjects, those most important in a modern secondary school system, and a parallel expansion of *knowledge* subjects. Special attention deserves the earlier Bustos Plan (1861) which was also quite modern –the best fit to the *Standard Finnish*–if not in terms of the length of studies (*S&H Index* 0.90), certainly so in terms of the *Skill-Knowledge* and *Science/Humanities* divide (0.94 to 0.98).



**Table 2. Spanish Legal High School Indexes  
(Standard Finnish = 1)**

PLAN	Year approved	Years extant	Full Index	Religion	Science & Humanities	Skill-Providing	Knowledge-providing	Skill-Maths	Sciences	Skill-Languages	Humanities
Moyano	1857	4	0,73	0,99	0,82	0,78	0,96	0,86	0,95	0,92	0,88
Bustos	1861	5	0,90	1,00	0,90	0,96	0,94	0,98	0,94	0,98	0,97
Orovio	1866	1	0,73	0,99	0,90	0,91	0,82	0,86	0,95	0,95	0,74
Orovio	1867	1	0,57	0,99	0,58	0,59	0,99	0,86	0,94	0,73	0,92
Ruiz Zorrilla	1868	12	0,39	0,97	0,62	0,90	0,52	0,96	0,82	0,86	0,67
Lasala	1880	14	0,63	0,97	0,78	0,72	0,94	0,92	0,97	0,80	0,94
Goizard	1894	4	0,16	0,79	0,88	0,74	0,62	0,94	0,81	0,81	0,78
Gamezo	1898	1	0,45	0,97	0,98	0,75	0,73	0,92	0,85	0,83	0,85
Pidal (Luis)	1899	1	0,75	0,95	0,90	0,95	0,85	0,99	0,95	0,96	0,87
García Alix	1900	1	0,55	0,95	0,92	0,76	0,84	0,92	0,92	0,84	0,89
Romanones	1901	2	0,35	0,98	0,75	0,81	0,56	0,98	0,73	0,83	0,80
Bugallal	1903	23	0,52	0,98	0,96	0,75	0,79	0,98	0,88	0,77	0,88
Callejo	1926	5	0,59	0,99	0,81	0,70	0,89	0,90	0,97	0,80	0,89
Sanjuán	1931	1	0,52	0,98	0,86	0,84	0,70	0,98	0,85	0,86	0,82
De los Ríos	1932	2	0,59	0,99	0,98	0,81	0,79	0,98	0,88	0,83	0,88
Villalobos	1934	5	0,79	0,97	0,85	0,99	0,83	0,95	0,89	0,96	0,91
Sáinz Rodrigu	1938	15	0,93	0,94	0,99	1,00	0,99	0,93	0,97	0,93	0,93
	1953		0,56	0,81	0,82	0,78	0,96	0,93	0,96	0,85	0,97
<b>PROMEDIO</b>			0,60	0,96	0,85	0,82	0,82	0,94	0,90	0,86	0,86
DESVESTANDAR			0,19	0,06	0,11	0,11	0,14	0,04	0,07	0,07	0,08
MÁXIMO			0,93	1,00	0,99	1,00	0,99	0,99	0,97	0,98	0,97
MÍNIMA			0,16	0,79	0,58	0,59	0,52	0,86	0,73	0,73	0,67
MEDIANA			0,58	0,98	0,87	0,80	0,84	0,94	0,93	0,85	0,88
MODA			0,52	0,99	0,90	0,75	0,99	0,98	0,97	0,83	0,88

Source: *La Gaceta de Madrid*.

Our prediction that the further back into the middle nineteenth century we move the greatest the divergence to be found in the *Spanish Skills HSI* as against the *Knowledge HSI*, does not hold true. Neither does our expectation that the *Science Index* would present larger differences than the *Humanities*. A close look at Columns 6 to 9 in Table 3, suggests that something different was happening. On average, the *Skill-Maths* subjects of all Spanish Plans were the closest to the *Standard Finnish* (0.94; SD 0.03), followed by the *Science HSI* (0.91; SD 0.06). The *Skill-Language*, on the contrary, was the farthest (0.85; SD 0.07), followed by the *Humanities HSI* (0.88; SD 0.09). In 11 out of a total of 16 Plans the *Skill-Math Index* had values equal or above 0.95, while only 4 did in the case of the *Skill-Language*. Thus, it was not the most scientifically oriented areas of the curriculum that differed from the *Standard Finnish* and had to be modernized during the second half of the nineteenth and early twentieth centuries but the most traditional and humanistic. By the middle of the nineteenth century, Spanish legislators had already assigned the appropriate load of the *Science* subjects, especially skill associated topics, to the high school curricula; the debate

continued, though, regarding the role of the *Humanities*, languages being the most discussed-about area. The *Skill-Language HSI* fitted the *Standard Finnish* best in only four Plans, those of 1861, 1866, 1899 and 1934 (values > 0.95). This ongoing debate could certainly have been a remnant from the original Latin Schools. Yet, on average, Classical Languages –mostly Latin, but Greek and even Hebrew in some plans– only represented 21 per cent (SD: 0.17) of the teaching load in the Plans between 1857 and 1953, while Spanish represented 61 per 100 (SD: 0.21) and Modern Languages 28 per cent (SD: 15), close to a significantly high 80 percent together.<sup>49</sup>

To conclude, we might say that *Religion and Civics* can hardly be considered the single most important trait that set Spanish high schools apart from the *Finnish Standard*; the interplay between *Science* and the *Humanities*, and especially that of *Skills* and *Knowledge asignaturas* was far more important. From a theoretical point of view, there was no bias against *Science skill-providing* subjects that could have restrained the students' future choice of discipline at the University level. Engineering and the Sciences, underrepresented relative to other disciplines such as Law and the Humanities, were not negatively affected by lack of a sound mathematical foundation at an early age.<sup>50</sup>

In a long-term relative perspective, the Sáinz Rodríguez 1938 Plan was undeniably the best one, not far from one of the earliest ones, the Plan Bustos of 1861. Yet, they only lasted 15 and 5 years respectively. Other similarly good plans were never implemented, such as the Plan of Luis Pidal (1899), in whose place an inferior plan was introduced –the longest lasting Bugallal Plan (1903: 25 years). Why some good plans were rejected, or bad ones kept in place is far from evident. There was no follow-up rigorous program to check which plans were working and, therefore, reforms were not dictated by actual needs to improve the educational system. They probably followed politicians' whims. We can try to understand however, how these frequent legal changes were implemented by a particular High School, the San Isidro Institute.

<sup>49</sup> Núñez and Moreno, "Historia de un desencuentro".

<sup>50</sup> Núñez, "Strong state and weak".

## HOW WERE CURRICULAR CHANGES IMPLEMENTED IN SPANISH HIGH SCHOOLS? A CASE STUDY OF THE MADRID INSTITUTOS

Discussing the role of institutions determining educational opportunities, Ammermüller concludes that “the effects of schooling institutions depend always on the implementation of policies within individual countries, which can hardly be measured”. Obviously, this applies to what goes on within the class, whether the teacher –or the student– is a good or a bad one, something hard to measure even today and the more so in the distant past. Yet, there is an intermediate point from which we can gain some information: “is school legislation actually implemented, even if only formally?”.<sup>51</sup> And if so, how was it applied and what possible effects might have had its implementation? Detailed information on high school annual distribution of *asignaturas* and registration data of students in the San Isidro Institute of Madrid between 1860 and 1921 allows us to precisely test that: how the new curricular plans approved by the *Cortes* were implemented in each school.

Established in 1845, the Instituto San Isidro and the Instituto Cardenal Cisneros<sup>52</sup> were the only two public High Schools of Madrid until 1918, when the Instituto Escuela was established.<sup>53</sup> Additional public High Schools were established in the 1930s under the Second Republic, some to be closed soon afterwards. Together the official students at Cisneros and San Isidro represented around 5 percent of the total number of official students enrolled in the secondary education in Spain between the 1860s and the 1930s. This figure would rise to 12-15 –almost 20 percent in the 1920s– if all registered students –not only the official ones, but also including the free students, i.e., those who studied at home,

<sup>51</sup> Andreas Ammermueller “Educational Opportunities and the Role of Institutions”, *ZEW - Centre for European Economic Research*, Discussion Paper No. 05-044 (2005), 27.

<sup>52</sup> 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). Both high schools were established anew in 1845, together with 24 others all over the country, Encarnación Martínez Alfaro “El patrimonio de los institutos históricos” in Ruiz Berrio (coord.) *El patrimonio histórico-educativo: su conservación y estudio* (2010) 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* of 1867, p. 10.

<sup>53</sup> 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*. See Encarnación Martínez Alfaro, *Un laboratorio pedagógico de la Junta para Ampliación de Estudios, el Instituto-Escuela sección Retiro de Madrid* (Madrid: Biblioteca Nueva, 2009).

with a tutor, or at a private school—, are taken into consideration.<sup>54</sup> These free students, as they were known, were required to take their final annual exams at the San Isidro or at the Cardenal Cisneros. To pass these exams they had to follow the curricular Plans currently applied by the *Institutos*. What happened at the public schools, therefore, can be taken as a good example of how other high schools in Spain introduced the legal changes approved by the government. In this paper we shall present information gathered at the San Isidro Institute exclusively, since it matches our purposes better than that of the Cardenal Cisneros.<sup>55</sup> The secondary school system, thus, worked as follows: the government established a common core curriculum, the public high school teachers decided how to implement it and, each year, assessed the private schools and even the private tutors whose students had to pass an annual exam to validate their studies.

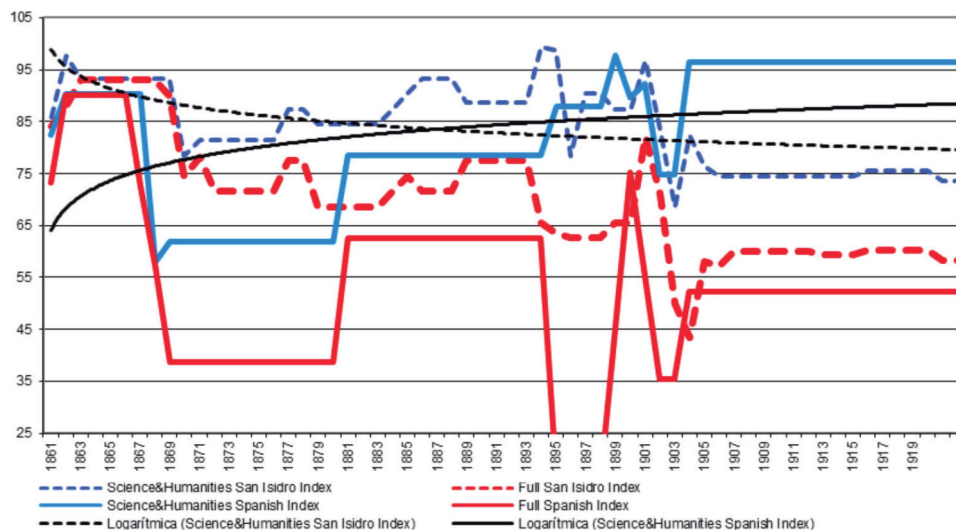
Using annual data on the Institute school calendar, we have estimated a *Real San Isidro Index* to compare to the *Spanish Legal Index* and the *Standard Finnish Index* we discussed in the previous section. This comparison will give us some clues as to how the succeeding legal plans were implemented in Spain (Figure 3). Most curricular changes were applied at the high school level within a year of being approved by the Cortes, though for obvious reasons not all of them were. As expected, the San Isidro *Full Index*, that considers the religious debate, shows a downward trend until the turn of the twentieth century and the beginning of an upward one afterward, while the *Science&Humanities Index*, that eliminates this debate, has an upward trend at least until 1903. Following the approval of the Plan Bugallal that year, however, the San Isidro *S&H Index* shows significantly lower values than the corresponding *Spanish*

<sup>54</sup> Art 1, decree of 26 December 1868, *Memoria* of 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 unofficial students 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 the non-official ones. The exams took place at the end of the schoolyear, usually in June, and quite often required extra teachers to help the *Catedráticos* grade unofficial students.

<sup>55</sup> On the features of the legal curricular setting as they were applied at both the San Isidro and the Cardenal Cisneros Institutes of Madrid, see B. Moreno and C.E. Núñez, “Los planes de estudio”. C.E. Núñez and B. Moreno Castaño “Historia de un desencuentro” and “Did Spanish High Schools Breed Entrepreneurs? The Madrid Institutos of San Isidro and Cardenal Cisneros, 1860-1936”, in Gabriel Tortella and Gloria Quiroga *Entrepreneurship and Growth: An International Historical Perspective* (London: Palgrave-MacMillan, 2013).

*S&H Index* from which it significantly differs until the last year for which we have comparable data, 1921. This difference deserves some attention.

**Figure 3. Spanish and San Isidro High School Indexes, 1860-1920**

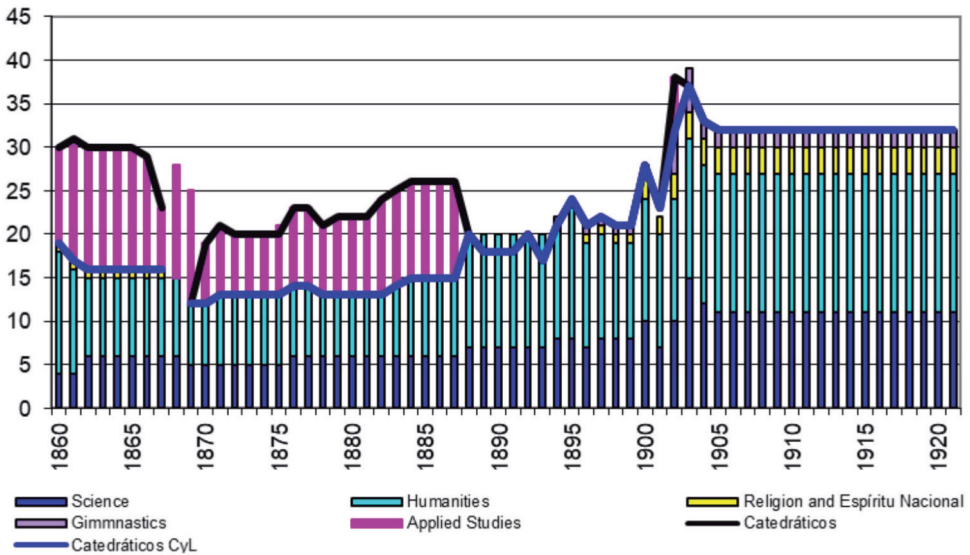


Source: *La Gaceta de Madrid* and *San Isidro Yearbooks*.

Judging by the San Isidro case, high schools enjoyed a large degree of autonomy to implement curricular legal changes. Apparently, they used it to significantly reduce their impact. Sometimes this autonomy acted as a moderate force against *bad* curricular decisions –as in the nineteenth century– while at other times it limited the influence of *good* policies –as in the early twentieth century. As a result, high school students were spared some of the curricular instability they would have had to endure, had all legal changes been implemented. They were also protected against some bad choices as well barred from some good opportunities. It is obvious, though, that the high schools did not have any objective information as to which plan to apply or reject on its own merits. We are only able to distinguish between good or bad practices by reference to the *Standard Finnish Index*. How, then, did the high school decide which curricular changes to introduce and which ones to dismiss? Did the schools consider what was best for the students? Were they a consciously moderating force, with mixed positive and negative effects, applying checks and balances to the whim of lawmakers?

To throw some light upon these issues, we shall now turn to the San Isidro faculty. Human capital is the most important *input* in the educational production function: you need large numbers of teachers –labour– to train, supervise and qualify students. Any legal change in the curriculum might alter the number –and the field of expertise– of the teachers you might need to implement them. You could either hire new teachers, in the fields required by the new plan, or increase the time required from those already available at the Institute; and vice versa, you would have to dismiss unwanted teachers or reduce their teaching responsibilities. Thus, a larger number of compulsory courses in mathematics implied either that more Math teachers joined the school or that a larger teaching-load be assigned to those available. Since teaching is an activity intensive in human capital, it would seem logical to expect the implementation of each new curricular Plan to depend upon the human resources available to the Instituto the number of *Catedráticos*, as high school teachers were known.

**Figure 4. Number of asignaturas offered and of teaching *Catedráticos* (vertical axis) at the Instituto San Isidro 1860-1921 (*Bachillerato* and *Applied Studies*)**



Source: San Isidro Yearbooks.

The need for teachers to implement curricular changes is evident and is shown by the almost exact coincidence of both series –*asignaturas* and

*Catedráticos* (Figure 4). Until the late 1880s, the total number of *Catedráticos* matched the number of *asignaturas* corresponding to both *Bachillerato* and *Applied Studies* at the San Isidro.<sup>56</sup> Afterwards, as *Applied Studies* moved out of the high school, the number of teachers matched exclusively that of *General Studies*.<sup>57</sup>

1887 was a turning point in the organization of Spanish secondary education. That year the *Escuelas de Comercio* became independent from the high schools, and the *Institutos* became preparatory schools for higher education exclusively. Until then, the high school had benefited from a large and quite diverse faculty ready to teach both tracks: *General* and *Applied Studies*. The Instituto could easily apply the 1868 Ruiz Zorrilla Plan since its teaching staff was larger than prescribed by this Plan; as a matter of fact, the large volume of human resources available at the San Isidro moderated the sharp reduction in the number of *week hours needed to complete a degree* according to a strict application of the Ruiz Zorrilla Plan. Courses were offered over and above those required by this legal Plan. Years later, the school still had enough extra-teachers to apply the Lasala Plan for as long as 14 years without apparent stress.

After 1887 things changed, though, as only *Catedráticos* with specific assignments in *General Studies* would be admitted at the San Isidro. Initially the number of *Catedráticos* diminished as some moved out, to the *Escuelas de Comercio*, and others retired. As a result, the teaching load of the remaining *General Studies Catedráticos* increased. In the following years, however, this trend was dramatically reversed: the number of *General Studies Catedráticos* jumped up, as did the number of *asignaturas*, most the result of the splitting of large and general *asignaturas*

<sup>56</sup> 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* of 1872, p. 7). A year later, he spoke against those same studies being taught at the *Institutos*, as it happened shortly afterward.

<sup>57</sup> Before 1868, each degree, *Bachillerato* and *Applied Studies*, represented about 50 percent of the 30 *asignaturas* offered. Between 1870 and 1887, the total number of *asignaturas* declined to less than 25, an average of 15 of them from *Bachillerato* (Figure 4). After 1887 only *Bachillerato* was taught at San Isidro, with an average of 20 *asignaturas*, 32 after 1903. Annual peaks in the number of total *asignaturas* reflected the coexistence of several Plans that year (i.e. 1899 to 1905). Throughout the period the number of *asignaturas* available to students at the *Instituto* increased –from less than 15 to more than 30– as did the number required by law to complete the *Bachillerato* degree.

–like *Geography and History*– into abbreviated more specific ones –*Historia de España, Historia Universal, Geografía de España* and *Geografía Universal*. We should keep in mind that those were years of frequent legal changes regarding secondary education: in the 1890s up to the 1903 Plan, five additional plans had been approved.

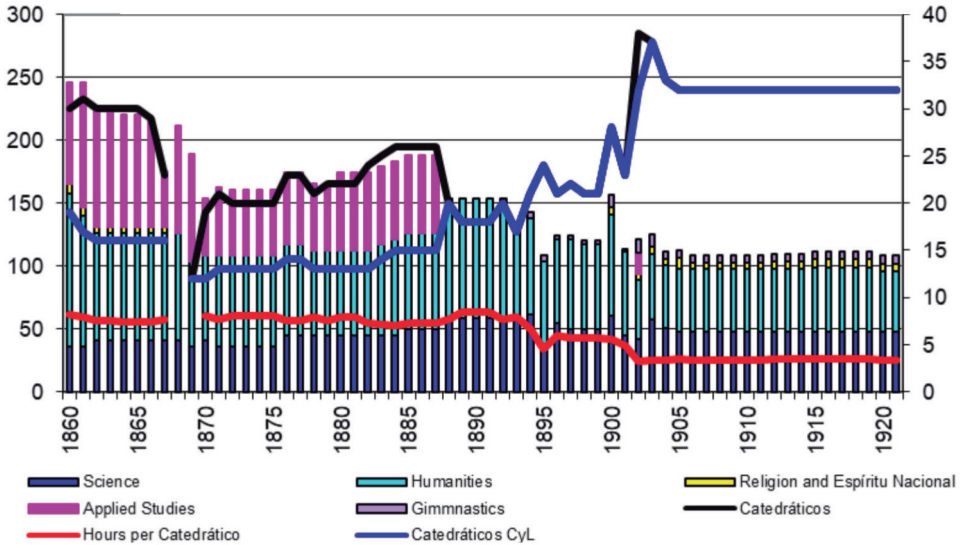
Since an unusually large number of teachers had joined the school in the 1860s, and they were about to retire during the 1880s and 1890s, this end-of-the-century renewal of the San Isidro faculty was of great importance. By 1903, as the Bugallal Plan was about to be launched, the previously diverse teaching faculty, able to attend to the needs of both *General* and *Applied Studies*, had been replaced by an even larger but significantly less diverse faculty. The loss was most pronounced in the Humanities and Languages, especially in Modern Languages, as German, English and Italian disappeared from the school.<sup>58</sup> Furthermore, despite the increase in the total numbers of *catedráticos*, the faculty renovation only partially fitted the increased teaching requirements of the Plan Bugallal –hence the lower levels of the San Isidro Index compared to the *Spanish Legal Index* in Figure 7 after 1903. To cover the needs of the new Plan the Institute could have compensated the lack of some *Catedráticos* by increasing the teaching load of those available. Surprisingly, the San Isidro Institute did just the opposite: it sharply reduced the number of week hours each *Catedrático* had to teach (Figure 5), thus leaving the students with a reduced version of the new curriculum. If anything, we might say that by getting a lower annual teaching load the *Catedráticos* had found an indirect way to get a significant increase in their salaries or, at least an improvement in their working conditions.

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<sup>58</sup> Justo Sales Esteban (1880-1908), a long-standing *catedrático*, took charge of French the only remaining foreign language at San Isidro.



**Figure 5. Number of teaching hours needed to complete a degree (*Bachillerato* and *Applied Studies*) by large knowledge areas at the San Isidro 1860-1921**



Source: San Isidro Yearbooks. Hours: left scale. Number of catedráticos: right scale.

The interests of the *Catedráticos* appear to have been as important a defining force as that of politicians making new rules. As a matter of fact, there was a permanent and significant relationship between these two interest groups. As Table 3 shows, *Catedráticos* from San Isidro were frequently deputies at the *Cortes*, some during several terms. With an average of less than 700 official students per year, the San Isidro had 25 congressmen active at the *Cortes* during 17 different legislative terms prior to 1927. They were especially active in Parliament before the passing of the Lasala Plan in 1880, the Bugallal Plan of 1903 and the Callejo Plan of 1926, three of the longest-lasting plans. Those were years of significant renewal of the San Isidro faculty, as we have seen. Some other teachers held high positions in the *Ministerios* regulating and controlling the educational system. Thus, high school teachers had a voice in the *Cortes* as well as in the government. The information available to us, although scant, suggests that they might have had their personal interests at heart rather than those of the students or even those of society at large in their role as active politicians. They may have been acting as a *lobby*.

**Table 3. San Isidro *Catedráticos* at the *Cortes***

San Isidro teachers	Asignaturas	Year of birth	Year they joined San Isidro	First year as congressman at the Spanish Cortes	Number of terms in office	Last time elected congressman	Number of years in San Isidro when first elected congressman
Carreras y González, Mariano	Economics	1827	1864	1876	1		12
Zabala y Urdániz, Manuel	Geography and History	1852	1882	1898	1		16
Aguayo Millán, Miguel	Mathematics	1878	1905	1927	1		22
Becerro de Bengoa, Ricardo	Natural Sciences	1845	1870	1886	1		16
Requejo y Avedillo, Federico	Natural Sciences, Gymnastic	1855	1883	1886	11	1910	3
Guardiola, Juan Bautista	Geography and History		1863	1854	1	1854	-9
Muñoz Herrera, Mariano	Economics		1870	1871	3	1876	1
Castro y Legua, Vicente	Technical Sciences			1844	1		
Bernabé Pedrazuela, Gregorio	Language	1859	1907	1896	2	1910	-11

Source: San Isidro *Yearbooks*, the *Cortes* webb page, and biographical scketches.

### SOME USES OF THE SPANISH LEGAL AND REAL HIGH SCHOOL INDEX

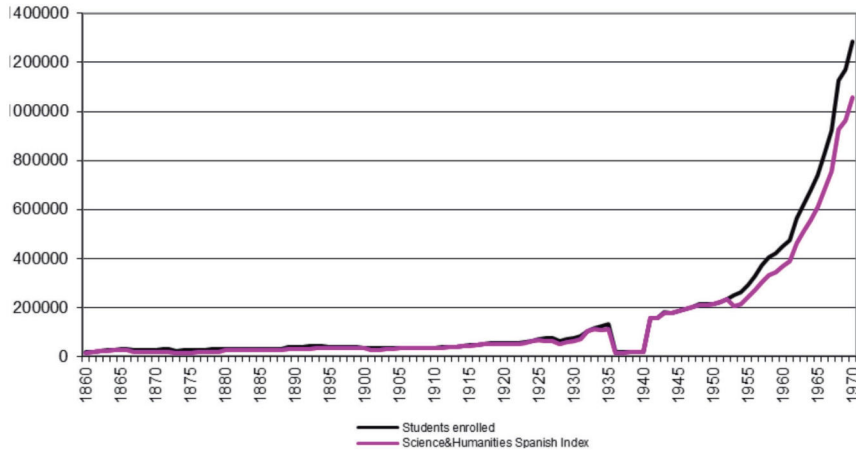
Recent research has shown that traditional measures of school quality regarding resource inputs, such as expenditures, class size or teacher salaries, fail to explain the large differences in attainment levels found between countries in international tests –PISA and TIMMS, i.e. They suggest that “[i]nstead the impact of schools comes through teacher quality and institutional structures that determine incentives”.<sup>59</sup> Identifying those characteristics that make for good schools has therefore become a crucial issue. On the one hand it will allow us to improve our estimates of human capital and, thus, to better understand its relationship to economic and social modernization; on the other, it should inform future more efficient educational policies.

The *Spanish* and the *San Isidro High School Indexes* are a first attempt to measure the quality of the Spanish secondary school system in the long-term, following changes in the curricular contents, *what the students were supposed to learn*. These indexes allow us to identify patterns of good or bad schooling which might have influenced student attainments, the human capital accrued to them. In this section, we shall apply both indexes to long-term series of high school students. Figures 6 and 7 show the actual, absolute number of high school students in Spain –as estimated by Núñez [2005]– as well as the new adjusted number of students that result from

<sup>59</sup> Eric A. Hanushek and Ludger Woessmann, “The Economics of International Differences in Educational Achievement”, in the *Handbook of the Economics of Education*, 3 (2011).

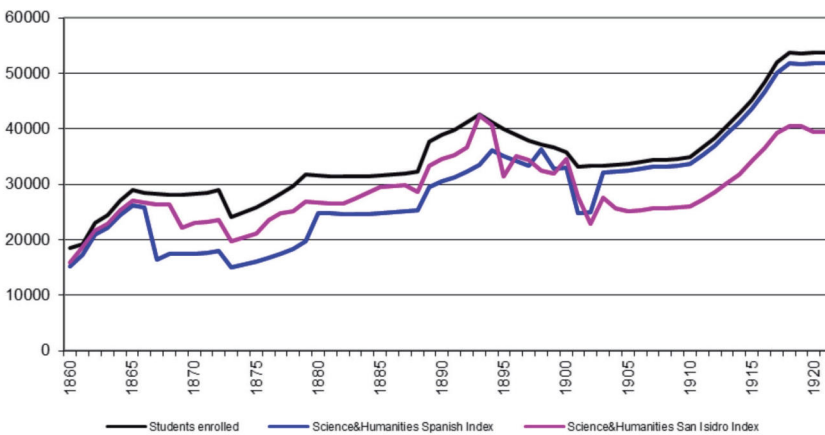
applying to the absolute numbers both the *Legal* and the San Isidro HS *indexes*. The number of students has been adjusted by an indicator of *what they were supposed to have learned at school*, so the adjusted value represents the number of *equivalent students* there would have been in Spain, had all of them followed the same curriculum, the *Standard 2010 Finnish*.

**Figure 6. Adjusted and Unadjusted high school Registered Students in Spain, 1860-1970**



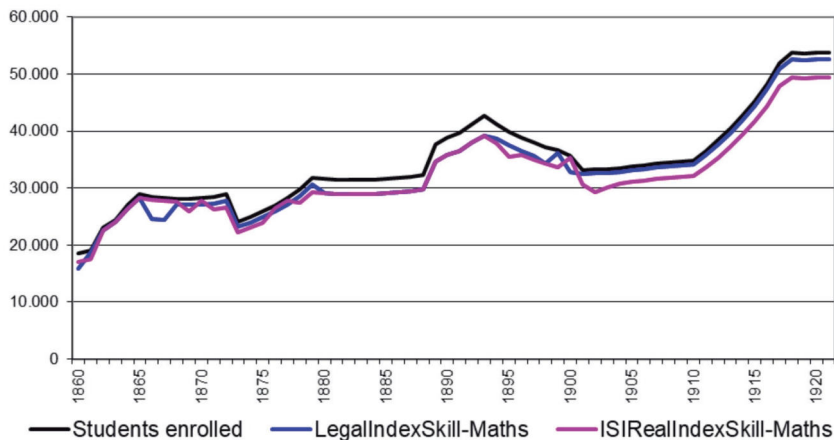
Source: Núñez (2005) and High School Indexes in this article.

**Figure 7. Adjusted and Unadjusted high school Registered Students in Spain, 1860-1922**



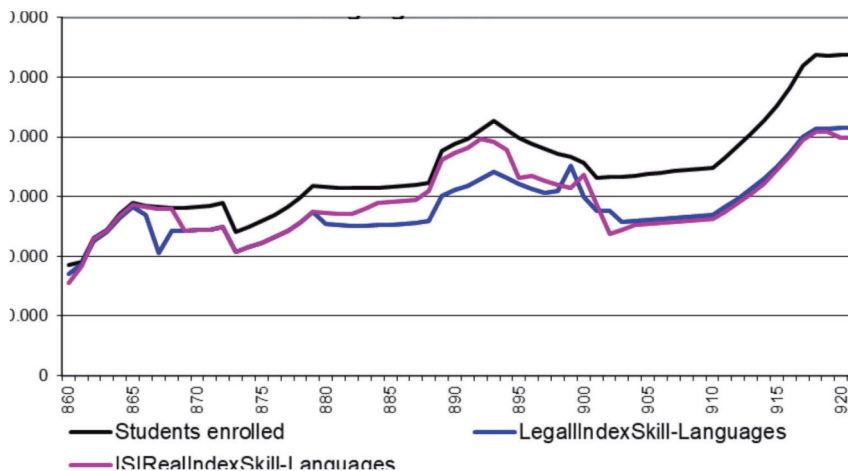
Source: Núñez (2005) and High School Indexes in this article.

**Figure 8. Adjusted and Unadjusted high school Registered Students in Spain, 1860-1922, by MATHEMATICAL SKILLS**



Source: Núñez (2005) and High School Indexes in this article.

**Figure 9. Adjusted and Unadjusted high school Registered Students in Spain, 1860-1922, by LANGUAGE SKILLS**



Source: Núñez (2005) and High School Indexes in this article.

These are our main findings. First, the size of the differences between the real and the adjusted number of students depends upon the curriculum being applied, on the one hand, and the number of students enrolled, on the other. Thus, the largest curriculum deviations from the

*Standard Finnish Index* correspond to the years between the late 1860s and the early 1900s, a period of low enrollment. Their final impact upon our adjusted estimates is large and it decreases in relative terms (42 per 100 in 1867, 38 per cent in 1869 to 1879; or 22 per cent in 1880 to 1892), but it is also quite limited in absolute numbers (from close to 28.000 students to 16.000 adjusted students). The second period of large deviations from the *Standard Finnish Index* corresponds to a period of much higher enrollments, the 1950 to 1970, and thus our *Legal Index* has a greater negative impact upon the absolute figure of adjusted students (261.744 students against 215.183 adjusted students in 1953, and 1.286.335 versus 1.057.514 in 1970), even though it only means an 18 per cent adjustment in relative terms.

Second, as could be expected from our previous analysis, the results differ widely whether we are using the *Legal* or the *San Isidro Index* (Figures 7 to 9). Legal reforms are insufficient to change the system by themselves; they may, or may not, move in the right direction as we have seen, but obviously their success depends on whether they are implemented and how. In the educational system this depends upon the schools themselves, and especially upon the teachers and principals, hence upon the autonomy of the schools. Teachers can significantly reduce the negative effects of bad reforms upon their students (as happened during the second half of the nineteenth century at San Isidro) if they do not fully apply them; and vice versa, far reaching, well-intended reforms will not succeed if enough qualified and motivated teachers are not brought into the schools to put them into practice (as apparently happened after the turn of the twentieth century at San Isidro).

Third, the separation between *General* and *Applied Studies* after 1887 was probably the single most important step in the configuration of the Spanish secondary education system and it brought about a complete reversal in the way the high school implemented new changes in the legal institutional setting. Apparently, this separation lowered the quality of the high schools by reducing their faculty diversity. At the same time, this move clearly benefited the schoolteachers, who got lower teaching loads. This separation had lasting and profound implications upon the implementation of the state core curricular plans. After the separation, the high school became almost exclusively a way of entry to the University and any positive externalities or economies of scale that might have

arisen from the two branches of study being together –greater options for the students from a larger number of *asignaturas*, among them Modern Languages, Shorthand, Writing, a positive interrelation between professionally and non-professionally minded students, etc...– were thus lost.

Fourth, Modern Languages became the key subject that set the Spanish high school curricula apart from the Standard Finnish. Mathematical skills, on the other hand, were very close to the standard throughout the period.

Fifth, even though the debate about *Religion&Civics* was not the key to the secondary school curricular debate, it still might have had a significant impact upon human capital accumulation. The Franco Plan of 1953 introduced the single most significant curricular deviation from the Standard Finnish which could have significantly reduced other potential benefits of increasing enrollment rates.

## CONCLUSIONS

A modern education system came to life during the nineteenth and early twentieth centuries. Most European countries adopted a state-designed system, each with its own peculiarities that changed and evolved frequently. The number of years of schooling required to graduate, the age of the students, even the curricula, differed widely from country to country, and between types of schools within the same country. Thus, despite the similarities, educational levels are difficult to compare across countries and throughout the centuries. And yet, they are commonly used to explain the role of human capital in the process of economic growth. Unaccounted for differences in the school institutional setting might explain the mixed results obtained so far in the economic development literature using human capital estimates derived from enrolment data.

Politicians and educators are now looking at success stories, such as the case of Finland since the 1990s, trying to identify the traits that make for good schooling. Traditional explanations that relied on investment-per-student or class-size have given way to new interpretations in which curricular contents, school governance, and the selection and promotion of teachers appear to have a stronger impact. According to the OCDE, “*central planning and control, particularly over the curriculum* [...coupled with]

more freedom over optional subjects and [...] greater diversity” is one of the keys to successful schools. Recent research on school attainment levels suggests that some curricular plans are better than others since both the skills and the knowledge acquired by the students depend largely upon the curricular setting and its implementation at the school level.

In this paper, we have defined a new unit of measure to evaluate curricular changes across time and place: *hours per week needed to complete a secondary school degree*. This unit combines in one all possible time-variables involved in the schooling process: student age, number of years required, hours of schooling, etc... Using data from two different sources, we have estimated a *Legal High School Index (Legal-HSI)* and a *Real San Isidro High School Index (Real-HSI)*, both referred to a previously defined *Finnish 2010 Standard* built on one of the best-known protocols. We assume that the closer they were to the *Finnish Standard*, the better the Spanish school curricula were. The *Spanish* or *Legal Index* is based upon what the Spanish educational laws and decrees that established the curricular contents required from students to graduate from the high school and obtain the *Bachiller* degree; the *Real* or *San Isidro Index*, uses annual calendar data from that Institute in Madrid to capture what one of the main high schools in the country was doing.

Both indexes have been used to estimate a quality-adjusted and long-term consistent measure –a *constant* as against a *current value*– of the number of high school students from which measures of the stock of human capital, such as average years of schooling, are usually estimated. The new series are an improvement upon previously available indicators of human capital stock in the long-term and might prove useful for future studies regarding its impact upon the modernization of the country.

Understanding how the school system was organized and how it worked help us to obtain better quality-adjusted indicators of human capital, indicators comparable across time and space. We might conclude that the Spanish secondary education during the period studied here suffered from an excess of legislation and political intervention.

Political intervention was not only excessive, but it also lacked vision and direction. Some plans were better than others, but nobody seems to have been able to judge the Plans according to some rational and

empirical standards which could justify the numerous reforms and overhauls which took place.

The yardsticks designed and implemented in this paper enable us to evaluate and discriminate between the different educational plans and show that there was absolutely no relationship between the quality of the Plans and their duration. The knowledge and skill divide that we have considered critical to a modern educational system, had already been attained quite early, but there was one key issue, the teaching of modern languages, in which Spain usually lagged. There is evidence that high school teachers acted as an effective lobby and managed to handle legislation and actual application of the Plans in the schools to shorten their hours of work. The confusing and haphazard education legislation contributed to vest power on the teachers, who had to adapt the plans to the reality of the schools and in so doing were able to further their own interests.

Finally, we might conclude that the separation of professional and academic subjects through the creation of Commerce Schools apart from the high schools was a serious error, in that it narrowed the horizons of students and caused dysfunctionality of faculties in high schools. This appear to have had a larger impact than that attributed to the influence of the Church, which has been blamed for some of the ills of Spanish secondary education. Our yardstick shows that the subject of religion was not all that different from the Finnish index. This suggests that the Church was not able to manipulate legislation as much as has been said. Politicians and parties apparently were less subject to the Church's dictates than to their own political opinions.

### **Note on the author**

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