

The Portuguese Polytechnicians of the “long nineteenth century:” technical expertise, military aspirations, and political disenchantment. A preliminary study

*Luís Miguel Carolino**, *Teresa Salomé Mota*** and *Dulce Figueiredo****

Abstract

This article focuses on the career paths of students who completed the preparatory course addressed to future military officers and engineers offered by the Lisbon Polytechnic School. We show that, after completing their studies, the Lisbon polytechnicians held positions in the public service and carried out the policies of State modernization launched by the Liberals in the period known as the Regeneration (*Regeneração*: 1851 *coup-d'état* to 1868). The graduates became in this way part of the Portuguese “technoscientific aristocracy.” Yet, despite its key role in preparing this technoscientific bureaucracy, the Lisbon Polytechnic School did not turn into the *alma mater* of the Portuguese political elite, which continued to be the University of Coimbra. In effect, an overall study of the career paths of former students of the Lisbon Polytechnic points to a relatively low level of political formal engagement.

Keywords: Lisbon Polytechnic School, science teaching, engineers, nineteenth century, Portugal.

* Interuniversity Centre for the History of Science and Technology (CIUHCT – Centro Interuniversitário de História das Ciências e Tecnologia); ISCTE – Lisbon University Institute (ISCTE – Instituto Universitário de Lisboa).

** Interuniversity Centre for the History of Science and Technology (CIUHCT – Centro Interuniversitário de História das Ciências e Tecnologia).

*** Interuniversity Centre for the History of Science and Technology (CIUHCT – Centro Interuniversitário de História das Ciências e Tecnologia).

Introduction

In a classical masterpiece of Brazilian historical scholarship, José Murilo de Carvalho, while examining the role played by political elites in the making of the Imperial regime in the nineteenth-century Brazil, characterizes the members of the State Council (Conselho de Estado), the political *crème de la crème* of the Imperial order, as a cluster of people with a closely knitted relationship with the centre of political decisions but largely disconnected from the mass of the population. Using a cosmic metaphor, he mentions that counsellors were like large planets moving in a heliocentric system around the Sun, the State political centre—that is to say the Emperor—and against a myriad of far-off stars, the common people.¹ Strange as it may seem to present-day pluralist representative democracies, the nineteenth-century political elite played a crucial role in making Brazil the country we know today. As Murilo de Carvalho has argued, it provided the social, political and ideological grounds for the maintenance of Brazil as a single country, therefore avoiding the political dispersion that characterized the emergence of independent nations in Spanish America.

Portugal and Brazil were, of course, very different countries in the first decades of the nineteenth century. Nevertheless, the two Portuguese-speaking countries shared much more than the same language and a common historical past; to a large extent they faced identical problems and challenges and partook of similar political and institutional traditions (one of them being the State Council, a singular institution in the European context).² Portugal came out from a long civil war, which devastated the country between 1828 and 1834, as a poor country deprived of its major colony (Brazil). Like nineteenth-century Brazil, it had to modernize its State apparatus and to reappraise its economic structure in a period that has been characterized as a gap between two imperial eras (“*inter-ciclo dos impérios*”).³ Both countries had a strong centralized political tradition, administrative and economic policies being largely dependent on the political centre. In

¹ José Murilo de Carvalho, *A Construção da Ordem: a Elite Política Imperial. Teatro de Sombras: a Política Imperial*, 6th edition (Rio de Janeiro: Civilização Brasileira, 2011), pp. 375-76.

² Cfr. Pedro Tavares de Almeida, *A Construção do Estado Liberal. Elite Política e Burocracia na “Regeneração” (1851-1890)*, PhD thesis (Lisbon, New University of Lisbon, 1995), p. 36.

³ David Justino, *A Formação do Espaço Económico Nacional. Portugal, 1810-1910*, 2 vols., (Lisbon: Vega, 1988).

this context, bureaucratic corps played a key role in the creation of new political and social orders on both sides of the Atlantic.⁴

In this article, we aim to scrutinize the career path of part of the Portuguese bureaucratic corps. In particular, we do this by focusing on the technical personnel who had studied at the Lisbon Polytechnic School (LPS), entered into public service and carried out the policy of State modernization launched after the 1851 *coup-d'état*, the Regeneration (*Regeneração*). There is some evidence that an important part of the technical elite that implemented the Regeneration political programme studied at LPS. For example, the majority of the engineers who, under the direction of Filipe Folque (1800–1874), carried out the topographic and geodetic surveys of the country in the second half of the nineteenth century had been trained at LPS.⁵ If this was the case, the LPS appears to have played a similar role to the French *École Polytechnique*. As Bruno Belhoste has shown, the *École Polytechnique* was crucial in training the French *technocratie* during the nineteenth century.⁶ Did the LPS play a similar role? Was LPS the pivotal training centre for the Portuguese technical *intelligentsia*?

While studying the political elite of the Regeneration, Pedro Tavares de Almeida identified among its members personnel with a technical and scientific background. Like the Brazilian elites, their Portuguese homologues were highly educated, despite the high rates of illiteracy in the country.⁷ Within the elite, people with an education in science and in technoscientific disciplines represented an important cluster. In specific governmental areas, namely in the ministries of War, Admiralty and Public Works, technoscientific personnel with a military background formed a hegemonic body.⁸ According to Tavares de Almeida's estimation, in the second half of the nineteenth century, the rates of people with scientific background within the Portuguese political elite presented the following figures: 47.5% of State counsellors; approximately 50% of ministers; 48.1% Parliamentary High Chamber (Pares do Reino); 40.8%

⁴ See Carvalho, *A Construção da Ordem...* and Almeida, *A Construção do Estado Liberal...*

⁵ Luís Miguel Carolino, “Measuring the heavens to rule the territory: Filipe Folque, the teaching of astronomy at the Lisbon Polytechnic School and the modernization of the State apparatus in nineteenth century Portugal,” *Science & Education*, 21 (2012), 109-133.

⁶ Bruno Belhoste, *La Formation d'une Technocratie. L'École Polytechnique et ses Élèves de la Révolution au Second Empire* (Paris : Belin, 2003).

⁷ Almeida estimates that 4/5 of the political elite during the Regeneration had a superior education, Almeida, *A Construção do Estado Liberal...*, p. 51. For the case of the Brazilian elites, see Carvalho, *A Construção da Ordem...*, pp. 63-92.

⁸ Almeida, *A Construção do Estado Liberal...*, p. 52.

elected members of Parliament; and 32.6% civil governors.⁹ How many among them studied at LPS? Did the majority of Portuguese political actors come from the lecture rooms of the LPS? A positive answer to these questions would suggest that the LPS, just as the *École Polytechnique* described by Terry Shinn, among others, was a training centre for the political and social elite.¹⁰ By studying there, one came to a position of yearning for a higher status in the monarchy's political elite. Was the LPS's *cursus* a means to attain political distinction? If this was the case, the policy based on the development of infrastructures, which characterized the Regeneration's governments, could in some way have originated from the LPS. Was the LPS a material piece of the Regeneration's ideological apparatus?

In this paper, we aim at answering these questions by focusing on the career path of students that completed the first course offered at the LPS, a preparatory course addressing future military officers and engineers.¹¹ As Steven Shapin, Arnold Thackray and Lewis Pyenson, among others, have suggested, studies based upon prosographical and quantitative technics have proved particularly worthwhile in order to go beyond both the traditional history-of-science narrative focused on individuals (today no longer considered as "a singular genius") and the disembodied narrative on the history of educational institutions.¹² This methodological approach is pivotal in this paper.¹³ We believe, as Aubin and Bigg argued while analyzing the role played by Lockyer and Janssen in the emergence of astrophysics as a distinct field,¹⁴ that comparing the trajectories of the students of the LPS reveals much about the general and specifics of this institution and its part in the making of Portuguese Liberal technoscientific elite.

⁹ Almeida, *A Construção do Estado Liberal...*, pp. 54, 89, 124, 153 and 182.

¹⁰ Terry Shinn, *L'École Polytechnique, 1794-1914* (Paris : Presses de la Fondation Nationale des Sciences Politiques, 1980).

¹¹ Four courses addressed respectively to military officers and to military and civil engineers (1st course), to artillery officers (2nd course), to navy officers (3rd course) and to navy engineers (4th course) were created at LPS. A fifth and general course including the whole disciplines taught at LPS was also planned. Apart from these courses, students of medicine and pharmacy also made their scientific preliminary studies at the LPS. *Collecção de Leis e Outros Documentos Officiaes Publicados no 1º semestre de 1837* (Lisbon: Imprensa Nacional, 1837), pp. 53-4.

¹² Steven Shapin and Arnold Thackray, "Prosopography as a research tool in history of science: the British scientific community, 1700-1900," *History of Science*, 12 (1974), 1-28; Lewis Pyenson, "Who the Guys Were: Prosopography in the History of Science," *History of Science*, 15 (1977), 155-188.

¹³ Information on the professional and/or academic qualifications of student's parents is absent from the LPS's primary sources held at the Arquivo Histórico do Museu Nacional de História Natural e da Ciência. Because of that, we are not able to provide details on the students' socio-economical background.

¹⁴ David Aubin and Charlotte Bigg, "Norman Lockyer, Jules Janssen and the Astrophysical Self" in Thomas Söderqvist, *The History and Poetics of Scientific Biography* (Aldershot: Ashgate, 2007), pp. 51-70.

Portuguese polytechnicians: between a military and a technical career

The Lisbon Polytechnic School (LPS) was established at the beginning of 1837 as part of the reform of the educational system carried out by the Liberal regime.¹⁵ When the Liberal Revolution succeeded in 1820, the liberals soon assumed that the educational agenda was the key to building up a society based on the values of freedom, secularity and citizenship.¹⁶ Scientific and technical education naturally played a central role in such a political programme. Yet, years of political instability, which devastated economic and social structures and culminated in the civil war of 1828–34, postponed the educational enterprise. In 1836, a plan of educational reforms was devised under the direction of the Ministry of the Kingdom Passos Manuel (Manuel da Silva Passos, 1801–1862), but the LPS was established under the tutelage of the Ministry of War (Ministério da Guerra), and replaced the institutions for technical education in the *ancien régime*, such as the Navy Royal Academy (Academia Real da Marinha).

The LPS was an institution characteristic of the Liberal regime in Portugal, as it was planned to provide the technical and military elite with a scientific training for the nineteenth century. It was created by the Liberal constitutional monarchy and closed down when the “long nineteenth century”—to use a concept coined by Eric Hobsbawm—ended in 1910, with the Republican Revolution. By then, the LPS was converted by the republicans into the Faculty of Sciences of the University of Lisbon, in 1911.

¹⁵ On the history of the LPS, see particularly Pedro José da Cunha, *A Escola Politécnica de Lisboa. Breve Notícia Histórica* (Lisbon: Faculdade de Ciências, 1937). See also Fernando Bragança Gil and Maria da Graça Salvado Canelhas, “Ensino e cultura no Monte Olivete até à Faculdade de Ciências” in Fernando Bragança Gil and Maria da Graça Salvado Canelhas (eds.), *Faculdade de Ciências da Universidade de Lisboa: Passado/Presente, Perspectivas Futuras. 150º Aniversário da Escola Politécnica/75º Aniversário da Faculdade de Ciências* (Lisbon: Museu de Ciência da Universidade de Lisboa, 1987), pp. 17-26; Vanda Leitão, *A Química Inorgânica e Analítica na Escola Politécnica de Lisboa e Academia Politécnica do Porto (1837-1890)*, MA dissertation, (Lisbon, New University of Lisbon, 1998); Fernando Bragança Gil, “O Liberalismo e a institucionalização do ensino superior científico em Lisboa” in *Actas do 1º Congresso Luso-Brasileiro de História da Ciência e da Técnica* (Évora: Universidade de Évora e Universidade de Aveiro, 2001), pp. 346-58; Luís Miguel Carolino, “The making of an academic tradition: the foundation of the Lisbon Polytechnic School and the development of higher technical education in Portugal (1779-1837),” *Paedagogica Historica: International Journal of the History of Education*, 48 3 (2012) 391-410; Carolino, “Measuring the heavens to rule the territory...,” 109-133.

¹⁶ See Luís Reis Torgal, “A instrução pública” in José Mattoso (ed.), *História de Portugal*, Vol. 5: O Liberalismo (1807-1890), ed. L.R. Torgal and J.L. Roque (Lisbon: Círculo de Leitores, 1993), pp. 609-51. On the Portuguese educational system of the nineteenth century, see Luís de Albuquerque, *Estudos de História*. Vol 6: Notas para a História do Ensino em Portugal (Coimbra: Ordem da Universidade, 1978); Rómulo de Carvalho, *História do Ensino em Portugal desde a Fundação da Nacionalidade até ao Fim do Regime de Salazar-Caetano* (Lisbon: Fundação Calouste Gulbenkian, 1986); Maria Cândida Proença (ed.), *O Sistema de Ensino em Portugal, Séculos XIX-XX* (Lisbon: Edições Colibri, 1998); Rogério Fernandes, *O Pensamento Pedagógico em Portugal* (Lisbon: Instituto de Cultura e Língua Portuguesa, 1992).

The decree issued on 11 January 1837 establishing the LPS stated that this institution was aimed at “providing students with the necessary knowledge in order to subsequently enrol in different courses of the Army and Navy application schools (*escolas de aplicação do Exército e Marinha*). At the same time, the school offered the means to disseminate general higher education and obtain subsidiary education for other scientific professions”.¹⁷ This foundational decree created not only the LPS, but it further institutionalized the higher technical educational system of the Liberal regime in Portugal. This system included two distinct cycles: a general scientific course, which was thought to provide a broad-based education in exact and natural sciences to those seeking to pursue scientific studies at the “application schools” and other scientific schools, such as the Army School and the Medical and Surgical Schools. The LPS was among the institutions that offered the first cycle of technical studies, the others being the University of Coimbra (U Coimbra), where the mathematical course qualified its students to enrol in the Army School, and to a lesser extent the Polytechnic Academy of Porto.¹⁸

Hence, an important part of the technical and military elite of the Liberal regime is supposed to have received scientific training at the LPS. During its 74 years of existence, it counted over 7400 student registrations.¹⁹ This number, however, includes both occasional registrations as well as those from former students of the U Coimbra who enrolled in the LPS simply in order to secure an equivalent degree prior to admission in the Army School. The figures regarding the students who actually completed one or more courses offered at the LPS was certainly much more limited. Although it is hard to point to an unequivocally precise number, 258 students are estimated to have completed the first course offered at LPS.²⁰

¹⁷ “A School is created with the principal aim of providing students with necessary expertise in order to pursue the different courses delivered at the Army and Navy application schools. This School will offer, at the same time, the means to promote general higher education and will provide the necessary training to other scientific professions. This school will be named Polytechnic School”. *Collecção de Leis...*, p. 52.

¹⁸ For an introduction on engineering education in the eighteenth and nineteenth centuries in Portugal, see particularly Maria Paula Diogo and Ana Cardoso de Matos, “Aprender a ser ingeniero. La enseñanza de la ingeniería en el Portugal de los siglos XVIII y XIX” in António Lafuente, Ana Cardoso de Matos and Tiago Saraiva (eds.), *Maquinismo Ibérico* (Madrid: Ediciones Doce Calles, 2007), pp. 123-45; Maria Paula Diogo, *A Construção de uma Identidade Profissional: a Associação dos Engenheiros Cívicos Portugueses (1869-1937)*, PhD thesis (Lisbon, New University of Lisbon, 1994), pp. 81-111; Marta Macedo, *Projectar e Construir a Nação. Engenheiros, Ciência e Território em Portugal no Século XIX* (Lisboa: ICS, 2012).

¹⁹ Information regarding student registration is preserved in the series of *Livro das Matrículas dos Estudantes* and *Livro das Cartas*, held at Arquivo Histórico do Museu Nacional de História Natural e da Ciência (hereafter AH-MNHNC), former Arquivo Histórico do Museu de Ciência da Universidade de Lisboa.

²⁰ We obtained these figures using two different sources, the LPS matriculation books (*Livro das Matrículas dos Estudantes*) and the graduation books (*Livro das Cartas*). See previous note.

Those students came from all over the country, though a major contingent had its origins in the Lisbon region. Despite the fact that the educational system that was in place in Portugal was not as consistent and organized as the French one, especially in the first half of nineteenth century, the capacity of the LPS to recruit students nationwide was similar to that of the *École Polytechnique*, in Paris.²¹ The majority of students came from the capital region but the entire country was represented among the student populations of the two schools. As far the LPS is concerned, over 40% of its students were born in the Lisbon region (“distrito”) (indeed 105, corresponding to 42%), while significant contingents came from the North (43, corresponding to 17%), Central (31, corresponding 12.5%), and South (31, corresponding 12.5%) regions of the country. Students coming from the islands of the Azores and Madeira or even in more remote regions of the Portuguese empire and in foreign countries, such as Brazil and France, could also be found among the Polytechnic student community (38 students, corresponding to 16%) (see Table 1).

Birthplace	Lisbon district	South	Centre	North	Azores	Madeira	Others*
Number of students	105 (42%)	31 (12.5%)	31 (12.5%)	43 (17%)	13 (5%)	11 (4%)	14 (7%)

Table 1 - Birthplace of students who completed the first course at the Lisbon Polytechnic School. * These include: India (3), Angola (3), Cape Verde islands (1), São Tomé e Príncipe islands (1), Brazil (3), and France (3). The data presented were obtained from a sample of 258 students who completed the 1st course between 1837 and 1911; *Livro das Matrículas dos Estudantes*, AH-MNHNC and *Livro das Cartas*, AH-MNHNC.

The capacity that LPS had to attract students from all over the country demonstrates that nineteenth-century Portuguese society perceived it to be a national institution, and not merely a local one. The figures regarding students that came from the Northern and Central Portugal are quite revealing. In both regions, there were competing institutions that offered the first cycle of a scientific higher education (namely the Polytechnic Academy of Porto and the U Coimbra); although, almost 30% of the LPS students came from those regions. For a variety of reasons, they preferred to leave their home regions and move to the capital city to attend the LPS.

²¹ We rely on estimation presented by Belhoste, *La Formation d'une Technocratie...*, pp. 340-42.

The large majority of students that completed the above-mentioned first course enrolled in the LPS aged between 16 and 19 years. In fact, 112 students of a total of 187 (60%), whose birth date is possible to identify, were within this age range. An important group of students were a slightly older (52, corresponding to 27.5%) and a small group of 23 students (12.5%) were younger (see Table 2).

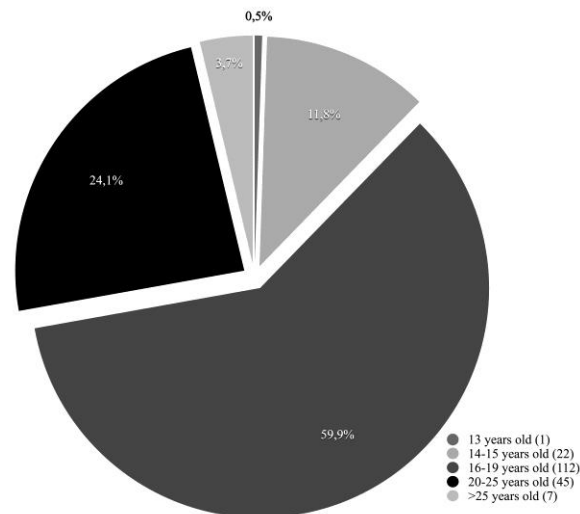


Figure 2 - Graphic showing the age of students who completed the first course at the Lisbon Polytechnic School when enrolling for the first time. The data presented were obtained from a sample of 187 students between 1837 and 1911 and for whom the age upon enrolment in the institution for the first time is known. *Livro das Matrículas dos Estudantes*, AH-MNHNC and *Livro das Cartas*, AH-MNHNC.

Following graduation from the Lisbon LPS, these students completed their education at the Army School, where they were supposed to choose between a degree in military engineering and the General Staff course. Which course did they prefer? Did Polytechnic students opt for a typical career in the Army or for a technical career? An analysis of the polytechnicians' subsequent education demonstrates that the large majority of students that completed the first course of the LPS proceeded to the Army School in order to graduate in (military) engineering. They amounted to 159 individuals, corresponding to 62% of the students who completed the first course of Lisbon Polytechnic and 66% of those ulterior training is unknown. Polytechnic students who followed the General Staff course amounted to 49, corresponding to 19% of the total. Students who wished to pursue studies in Infantry, Artillery or Cavalry at the Army School were not required to take the four-year preparatory course at the LPS (i.e., the first course). A

less demanding and shorter course syllabus was designed for them at LPS. Yet over 30 students who actually completed the first course decided to enrol in the Army School in order pursue training in Infantry, Artillery or Cavalry (see tables 3 and 4).

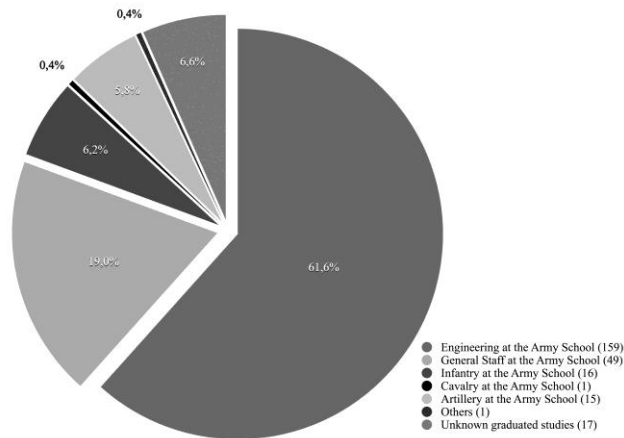


Figure 3 - Graphic showing studies path of Lisbon polytechnicians. The data presented were obtained from a sample of 258 students who completed the 1st course at the Lisbon Polytechnic School between 1837 and 1911. *Livro das Matrículas dos Estudantes*, AH-MNHNC and *Livro das Cartas*, AH-MNHNC.

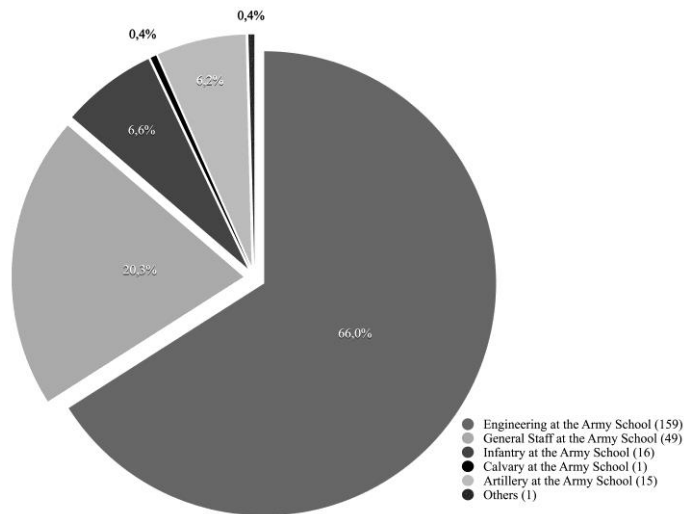


Figure 4 - Studies path of Lisbon polytechnicians excluding those whose subsequent studies are not known. The data presented were obtained from a sample of 128 students who completed the 1st course at the Lisbon Polytechnic School between 1837 and 1911 and for whom there is no information about subsequent studies. *Livro das Matrículas dos Estudantes*, AH-MNHNC and *Livro das Cartas*, AH-MNHNC.

After completing their education, the Lisbon polytechnicians usually entered the public service. An analysis of their career path shows that the vast majority of polytechnicians with a degree in engineering or in General Staff from the Army School joined the Ministry of Public Works (52% of the total number), while an important group pursued a career in the Ministry of War (37%). A smaller group of polytechnicians served in the Ministry for Overseas (Ministério do Ultramar) (which for some time was part of the Navy Ministry) (5.5%). As their career progressed, some polytechnicians move from one ministry to another, but always preserved their status as civil servants.

Not surprisingly, polytechnicians with a degree in engineering served predominantly in the Ministry of Public Works (102, corresponding to 57%), whereas those with a degree in General Staff made their career mainly at the Ministry of War (39, corresponding to 63%). Yet, contingents of engineers working for the Ministry of War (47, corresponding to 26% of the polytechnicians with a degree in engineering) can also be found, as well as the opposite, that is, military personnel with a degree in General Staff serving in the Ministry of Public Works (11, corresponding to 18% of these polytechnicians) (see Table 5).

Engineers		General Staff	
Career	Military rank	Career	Military rank
War – 47 (26%)	General – 27 (29%)	War – 39 (63%)	General – 24 (56%)
Public Works – 102 (57%)	Colonel – 36 (38%)	Public Works – 11 (18%)	Colonel – 10 (23%)
Overseas – 8 (5%)	Lieut-col – 11 (12%)	Overseas – 5 (8%)	Lieut-col – 4 (9%)
Other – 22 (12%)	Other – 20 (21%)	Other – 7 (11%)	Other – 5 (12%)

Table 5 - Career path and top military ranks of Lisbon polytechnicians with a degree in engineering or General Staff in the Army School. The data presented were obtained from a sample of 208 students who completed the 1st course at the Lisbon Polytechnic School between 1837 and 1911 before obtaining a further degree. *Livro das Matrículas dos Estudantes*, AH-MNHNC and *Livro das Cartas*, AH-MNHNC; Lieut-col - Lieutenant-colonel.

Both engineers and personnel of General Staff were military officers. Yet, their aspirations of climbing the military hierarchy differed greatly. Generally speaking, in comparison with engineers, graduates with a General Staff degree succeeded in reaching higher military ranks in a shorter period. With respect to those who completed the first course of the LPS and pursued their training at the Army School, the percentage that reached the rank of General is much higher within the General Staff personnel than that within the group of engineers (56% against 29%). The tendency of General Staff personnel to occupy higher ranks in the military hierarchy is also

evident with respect to other officer positions (see Table 5). This fact clearly shows that they were regarded as having a greater professional prestige within the Army. Nevertheless, the fact that engineers did not seem particularly successful (and presumably engaged) in reaching higher positions in the military hierarchy could also be related to a question of social identity. Maria Paula Diogo has shown that, as the nineteenth century progressed, engineers increasingly claimed the status of civil (as opposed to military) professionals, somehow denying their military identity.²² This is particularly true for the large number of engineers working at Ministry of Public Works. Although the question of professional and social identity of Portuguese engineers goes beyond the scope of this study, an analysis of the military career of students that studied at the LPS and at the Army School certainly corroborates Diogo’s claim.

Be that as it may, the decision of embarking on a General Staff course at the Army School was the shortest way to reach a position of military and social prestige, following the completion of the LPS preparatory course, as the following cases show: João Gonçalves Mendonça Júnior (1857–1935), born in Lisbon, and Emídio Lino da Silva Júnior (1860–1936), born in Angra do Heroísmo (Azores), who most likely met each other while studying at LPS in the late 1870s; both Mendonça Júnior and Silva Júnior are virtually unknown in the Portuguese historiography of science and technology. Even so, we believe they constitute typical examples of the Polytechnic students who entered upon a career of public service, being, thus, good representatives of this community. After completing the first course in 1880, Mendonça Júnior graduated in General Staff and embarked upon a career in the Army; he was appointed to various administrative positions. In 1901, he attained his first leading position in the General Staff by being promoted to the rank of Lieutenant-colonel in 1902, Colonel in 1906 and finally General in 1919, when he was already in the Reserve.²³ Emídio Lino da Silva Júnior, in turn, deliberately chose a different career. After completing his studies at the LPS, which he attended on two occasions, 1877–78 and 1882–87, he enrolled in the Army School and completed a degree in engineering, in December 1889. In January 1890, he became a public servant in the Ministry of Public Works. This Azorean engineer was sent to Funchal, in Madeira, where he was appointed interim director to the local office of the Ministry of Public Works. A few years later, in 1895, he

²² Diogo, *A Construção de uma Identidade Profissional...*

²³ AHMNHNC, LME, n.º 11, f. 17, LME, n.º 12, f. 33; AHMNHNC LC, n.º 3, f. 63-3; AHM, DIV/3/7/1736; AHM, DIV/3/7/2779.

returned to his hometown and was entrusted the direction of the Ministry of Public Works office in Angra do Heroísmo. In this same year, he was ranked Captain and asked to choose between the Ministry of War and the Ministry of Public Works, which he did by opting for the latter. His career developed in the Azorean islands and afterwards in Lisbon. In 1897, he was appointed Civil Governor (Governador Civil) of Angra do Heroísmo district, a local prestigious political position. Despite his commitment to engineering, in the military hierarchy he only went as far as the position of Colonel.²⁴

Portuguese polytechnicians in politics

The case of the engineer Emídio Lino da Silva Júnior, who despite being appointed Civil Governor in the Azores never engaged in a political career raises the question whether the LPS was in some way a training centre for the political and social elite of the Portuguese Liberal regime. Needless to say, some important figures of the Portuguese political scene were former students of the LPS. Such was the case of Eduardo Augusto Marques (1867–1944). Born in Mafra, Lisbon region, Marques studied at the LPS between 1884 and 1888, before entering the Army School, where he graduated in General Staff. He then engaged in a military career; a significant part of his career took place in the Far East and in the African colonies of Angola and Mozambique, where, together with military leading posts and diplomatic occasional jobs, he became Colonial governor, namely in Macao, Angola and Mozambique. Following the establishment of the authoritarian regime ruled by Salazar, he was appointed Minister of the Colonies (Ministro das Colónias), in 1930. He was furthermore the Portuguese delegate who, in 1940, signed the *Concordata*, an agreement with the Vatican regarding, among other topics, divorce, and primary education in Africa.²⁵

An overall view of the political posts held by the polytechnicians points to a relatively low level of political formal engagement. In fact, only 1.9 % (corresponding to 5 individuals) of the 258 polytechnicians entered the Parliament High Chamber (Pares do Reino), while a mere 3.9% (10 individuals) were elected MPs and 3.1% (8 individuals) appointed to a Ministry. These

²⁴ AHMNHNC, LME, n.º 11, f. 192, LME, n.º 13, f. 396; AHMNHNC, LC, n.º 3, f. 99v-1; AHM DIV/3/7/2316

²⁵ AHMNHNC LME, n.º 13, f. 288, LME, n.º 14, f. 277 LC, n.º 4, f. 10-1; AHM DIV/3/7/697; AHM DIV/3/7/2639

figures contrasted with those recorded at the *École Polytechnique*, whose 8.8% of the alumni rose to the higher positions of French politics.²⁶ Undeniably, LPS never reached a position in the Portuguese technical education system comparable to that achieved by the *École Polytechnique* in the French educational framework. Apart from the LPS, preparatory courses addressed to future military officers and engineers were also offered at U Coimbra and Porto Polytechnic Academy. The low political engagement of Portuguese polytechnics is clearer if we take into consideration the U Coimbra former students who enrolled in the LPS to attend an occasional discipline or to obtain the degree equivalence, the low level of formal political engagement of the Lisbon polytechnicians becomes even more evident. Indeed, from the 30 people with a Polytechnic degree who were elected MPs, 20 had studied mainly at the U Coimbra, while 10 had completed the preliminary scientific studies at the LPS. Nevertheless, figures regarding members of the High Chamber and of people holding high positions in the ministries present a more balanced distribution between those who studied in Lisbon and those who, after studying in Coimbra, asked for a degree equivalence in Lisbon (Parliament High Chamber: 5 individuals from the Polytechnic School and 4 from the U Coimbra, with a degree from the Polytechnic; Ministers: 8 individuals from the Polytechnic School and 11 from U Coimbra, with a degree from the Polytechnic, and 1 from another institution). This evidence seems to corroborate the perception of Pedro Tavares de Almeida, who considered the U Coimbra the *alma mater* of the Portuguese political elite during the second half of the nineteenth century.²⁷ Yet, one must keep in mind that the number of undergraduates enrolled at the U Coimbra was much higher comparing to that of LPS. During the nineteenth century, 91,888 students were registered at the U Coimbra²⁸ whereas a bit over 7400 enrolled at the LPS. Thus, the political primacy of the U Coimbra seems to be due, above all, to its particular role in the Portuguese higher education system. In fact, taking into account the disparity of student numbers in these institutions, LPS was undoubtedly not misrepresented in the Portuguese political arena.

The majority of the former students of the first course of the LPS who engaged in a political career studied engineering. This is particularly true for those who were elected MPs. From the 30 MPs who studied at the LPS or at the U Coimbra but asked for Polytechnic degree

²⁶ Shinn, *L'École Polytechnique...*, p. 171.

²⁷ Almeida, *A Construção do Estado Liberal...*, pp. 51 and 88.

²⁸ Carvalho, *História do Ensino em Portugal...*, p. 638.

equivalence, 66.6%, that is, 20 individuals, then enrolled in the Army School to study engineering, while 26.6 % (8) were General Staff graduates (data for 2 are unknown). In the group of ministers with a Polytechnic or University plus Polytechnic background, the majority were trained in engineering (8 against 6 in General Staff and 6 whose complementary training is known). Thus, it is not surprising that engineering graduates were appointed to the Ministry of Public Works while polytechnicians with a General Staff degree were predominately appointed ministers to the Ministry of War. It is also worth mentioning a few polytechnicians or former students of the U Coimbra with a Polytechnic degree held the position of Chancellor of the Exchequer, Secretary of State for Foreign and Commonwealth Affairs, Minister of the Admiralty and Secretary of State for the Home Department.

Despite the fact that the Portuguese political elites were highly educated, or simply had a scientific background, the LPS did not play the leading role in the scientific education of Portuguese ministers, MPs, State counsellors and other political actors during the nineteenth and early twentieth centuries. The key role continued to be played by the only university in the country, U Coimbra, up to 1911.

Conclusion

The Lisbon Polytechnic School (LPS) played a key role in the education of the Portuguese technoscientific elite during the long nineteenth century. A research based upon the professional path of the students who completed the first course shows that the vast majority of the Portuguese polytechnicians held positions in the civil service. Former Polytechnic students became part of the bureaucratic elite that carried out the policy of State modernization launched by the Regeneration during the second half of the nineteenth century by holding higher positions in the military hierarchy and in the Ministry of Public Works. Both during the Monarchy and the Republican regimes (the First Republic and the ensuing *Estado Novo*, Salazar's dictatorship), despite the fact that influent political actors had a Polytechnic background, an overall analysis of this "technoscientific aristocracy" points to a low level of formal political engagement among the students of the LPS. A handful of LPS polytechnicians were elected MPs, a few reached the High Chamber, and a very few were appointed Minister.

By resorting to José Murilo de Carvalho’s astronomical metaphor, one can argue that Portuguese polytechnicians were like planets that gravitated at a great distance around the Sun, the centre of political decision. They depended on the Sun, but were too far to cause an eclipse, temporarily obscure the Sun or interfere in political decisions, or even to transit across the Sun to influence the political scene. At their best, Portuguese polytechnicians were like the superior planets of the Solar System.

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