



Mathematics, statistics and teaching in
establishments who train Army Officials in the
period 1837-1926: a characterization

Filipe Papança

EasyChair preprints are intended for rapid
dissemination of research results and are
integrated with the rest of EasyChair.

January 15, 2020



*Mathematics, statistics and teaching in establishments who train
Army Officials in the period 1837-1926: a characterization*

Filipe Papança¹

This article is based on the findings of the doctoral thesis Mathematics, Statistics and teaching in the training establishments of the Portuguese Army Officers in the period 1837-1926: a characterization defended at the University of Evora on June 7, 2010 and published in book by EdiumEditores². The launch of the work took place on May 29 at the University of Beira Interior - Covilhã in the first Ibero-American Congress of History of Mathematics Education. Due to the inherent limitations related to the print edition Annexes not included in this edition. The publisher promised to put them on your site.

1

Doctorate in Education, Master of Statistics and Information Management, Bachelor in Applied Mathematics, Professor at the Military Academy - Portugal - filipe.papanca @ gmail.com

2 Anyone interested can order via the website or through <http://www.wook.pt/> site publishing house

ABSTRACT

Mathematics, statistics and teaching in establishments who train Army Officials in the period 1837-1926: a characterization

The purpose of this work is to study the evolution of teaching in Portuguese Academies who form Army Officials in the period (1837-1926) especially in mathematics and statistics.

In particularly this work tries to answer to following questions:

a) How can we characterize, in terms of content, the military teaching in the areas of Mathematics and Statistics available in Army Officials courses? What criteria are utilised in selection of this knowledge? How can we characterize the context of military teaching particularly in terms of mathematics and statistics of Army Officials training and in other courses ministered in these institutions?

b) What is the place of representations of mathematics and statistics in solemn moments?

c) What is the role of statistics in the daily life of these institutions?

This dissertation makes one characterization based in document sources (found in the school's library) of the army officer's teaching quotidian in this time, particularly the school sections, regulations, statistics, teachers, ceremonials, study tours and teachers books. Extended lists of the curricular organization, documents and manuals made by teachers of the school were produced.

In the period studied the curricular organization tries to adapt to the demands of new technologies. They try to give a practice and laboratorial teaching. In the solemn moments mathematics had several functions. Statistics had an important role by organizing factor.

Key Words: Mathematics, Statistics, Military Teaching, School of the Army, War School, Military School, Military Academy;

1. The three phases of the establishment

The period of constitutional monarchy coincides with the time of the *Military School* (1837-1911) who had the charge of not only training of army officers but also civil and mining engineers. As for the evolution of the establishment that will be striking out three phases of evolution: the first stage victory and consolidation of liberalism (1834-1851), taking as its starting point the consolidation of the liberal regime with the peace of Evoramonte (1834) is founded Army school in 1837. We are witnessing the consolidation of the institution despite the constant changes of location to settle at Quinta da Bemposta in 1851, where part of it still is. The second phase (1851-1910) begins with the outbreak of regeneration and progress made during the second half of the century XIX and early XX century, the institution becomes the true school of the country needed for its development. Much of the progress and prosperity experienced during this period begins in this school, once trained technicians who needed the emerging industry, civil engineers for public works, engineers to oversee construction of the mines and ports. Also in the literary field a myriad of writers and historians became this institution. She helped to train military engineers, professionals who gave their contribution to the enrichment of the most varied fields of society and as was already experienced and specialized in a particular branch of knowledge that some of them returned to this school to teach. The third phase, coinciding with the First Republic (1911-1926), begins with The *School of War* (1911-1919) who sought to continue the work initiated however, improving education, modernizing laboratories and offices, publishing regulations, extending its sphere of action into new areas of knowledge, sociology for example, modernizing the curriculum, concerned with the beauty and artistry as exemplified by the beautiful panels of Jorge Colaco. In this new phase the courses are to be exclusively military that is not unconnected with the fact that the creation of the *Technical Superior Institute* is, however, open to civil (students free) as a means of spreading the military culture. Political instability, incidents and events of the First Republic with its focus on

other bodies such as the Army sergeants and contractors, the creation of other educational institutions motivating for example the loss of training of civil engineers and mine, the aftermath of the First World War and the consequences of this conflict in the curriculum, were factors in a very difficult task. During this period the Chapel and the tower which was later installed the observatory were delivered to the school. However there is the First World War, a conflict which Portugal participated actively. Responding to this call, the special (1916-1919), mode of curriculum tailored to the needs of the war, the solution was found that the institution to address this situation. The school tried to fit the teaching to the war effort, revealing an educational effort and a remarkable ability to organize, but degraded the teaching with administrative passages, led to the breakdown of military discipline, frustrated the achievement of many to cause a jam careers that indirectly contributed to worsen the deficit of public accounts. After the war, the *Military School* (1919) sought to restore some lost credibility by continuing to upgrade facilities and improve the regulations, to extend its scope into new areas such as colonial issues, Economics and Accounting , looking again, gradually increasing the level of demand in both input frequency, the level of knowledge and in the military level. It also seeks to restore the authority and discipline. The requirement of proof of admission, first imposed at the Military Academy in 1925, was an important milestone in returning their accuracy, credibility in allowing admission at the same time, opening up a wider range of candidates, simplifying the process, promoting freedom of choice, since it no longer is subject to the frequency of disciplines in certain institutions, placing the emphasis in the field of knowledge required. Depending on the courses, specific tests were required of Mathematics, Physics, Chemistry, Design, and Process Accounting and Bookkeeping General Analysis that focused on content previously established. The proposed content for the courses of Military Engineering and Artillery Walk to do with today's material taught in the first year of higher education in Mathematics disciplines. In addition, to register the promotion of sports through the evidence of physical fitness, with the imposition of minimum to be achieved, knowledge of language, beyond the homeland History and Geography of Portugal and the Iberian Peninsula, materials that made up the core curriculum. In recent years the study period, one begins to notice a certain lack of contact with the enjoyment of beauty, finding himself in his analysis of the documents you start making more gray, paradoxically at a time when the emphasis is on creativity and entrepreneurship. After all the mathematics part of the art of war, both in terms of

tactics, strategy, and fortification, as is well highlighted in the solemn opening speeches, there is also a certain artistic flair. The instability created during the First Republic and the forced secularization of education carried out in this period, the aftermath of World War I, an overemphasis on economic and financial issues, an exaggerated concern with the regulations, may be some possible causes for this situation. Contact with various forms of artistic expression is something remarkable to go through the chapel, the sacristy, the entrance of the palace decorated with beautiful panels Jorge Colaco, pictures from the boardroom, the magnificent library with bookcases and beautiful panels of tile. At the end of the period analyzed, the creation of new specialized military colleges as the *Military Aviation School*, forerunner of the Air Force Academy and the embryo of a new branch of the Armed Forces, the *School of Military Health Service* and the restructuring of the *Central School of Sergeants* opened new horizons for the training of army officers, a diversified and motivating the change in the framework of this work.

2 The teaching in the educational army context

Throughout the study period, was made a survey of teachers responsible for disciplines (Annex 3). In terms of curriculum sought to adapt the courses to meet new demands, in terms of technology modernizing the terminology, and application teaching. It also instituted the trips and study visits. It created new courses such as Mining Engineering with First Republic that are being taught in other institutions, the Military Administration and other divided as Artillery in Field Artillery and Foot Artillery. To underline the enormous change that has occurred since the time of the *Royal Academy of Fortification, Artillery and Design* in order to provide a school of practical education, including the acquisition of material (despite constant financial constraints) for the different sections, offices, laboratories, museums and chronographs station. The facilities were to be appropriate in order to meet these needs, the ring being the first infrastructure to be built, followed by the offices of the disciplines, laboratories and

museums under constant revision, the library, the boarding , the gym, the training ground, astronomical observatory, the station chronographic and firing range. There was a concern, often adapting pre-existing structures in the former Royal Palace on new functions, as well as acquiring neighboring buildings thus offsetting the loss of land driven by the design of new streets and construction of the Hospital D. Estefania. These sections have received donations from individuals, businesses, state agencies, also benefiting from acquisitions, however, made. Certain occasions, such as the formal opening, have been exploited to enhance this aspect of education as well as to call the attention of those responsible in order to obtain more and better ways. With the same objective were prepared reports to the Board of Education. In addition to the existing mathematics books in the Library and adjacent museum, the institution is in possession of a considerable amount of small arms and machine guns patents into a museum and a valuable collection of vestments exposed in the small museum adjacent to the sacristy. For the analysis of documentation, we can see the variety of material in these sections, described in detail in Chapter 5. The practical teaching, aiming the application of material taught in theory, at least one fact from the location of the Palace of Bemposta School in 1851, became a reality through the implementation of projects especially in the study room and supported by several offices, museums and laboratories, complemented by study visits and military exercises. In the level of engineering the *Ecole Nationale des Ponts et Chaussées*, founded in 1747, served as inspiration to your teaching through the use and construction of models and maquettes, as shown by the Solemn Opening Speeches. The level of teaching, in addition to lecturing in terms of curriculum was a reserved space for the exposure of the subjects taught and practical realization by students, project work, according to a schedule established at the beginning of the year and this, as well as your weight in the evaluation, published in the yearbook. Upon his completion and evaluation the best works were displayed in the rooms to serve as inspiration and motivation to the following courses. The prizes for the best ranked students, delivered at the Opening Ceremony of the Academic Year as well as trips abroad, worked as incentives. Beyond the practical application, is needed to stimulate the spirit of initiative, aimed at finding innovative solutions to known problems or new applications of existing solutions. The trips contributed to a better understanding of military reality in other countries, particularly in ways that would later be implemented in Portugal, contributing to a

gradual awareness of the spirit of a class that has already taken shape international as evidenced by the *Notes on some establishments and fortifications in France, Belgium and Germany* by Fernando Pimentel. Physical activity, in terms of military training, also plays a major role, covering a wide range of sports including gymnastics beyond itself, athletics, cycling, called a velocipede in that time, fencing, horse riding among others. The programs started as lists of contents, following the disciplines, then going to be more detailed, introducing sections but still follow the curriculum. Later come to be both independent publication, such as yearbook, empowering themselves in the face of curriculum (fully raised in Annex 2). With the suspension of publication of yearbooks (1912) have been reduced to be published independently. The programs of the *Special Regime* (1916), for his effort to synthesize and adapt teaching seek to respond to the challenge, in a short time, training officers, to ensure the missions related to the presence of Portugal in the *First World War*. By analyzing its content, there is the lack of a unified education within the Statistics and Probability and Statistics, and its spread by teaching various subjects (see Annex 2 for example, excerpts of programs connected to the *Special Regime* in Statistics area). This appears related to Military History and Geography, the ballistics and later also with the Military Administration, Bookkeeping, Accounting and Economics. Is attributed more importance to these last two areas, conditioned on their own admission. In this time for the course for the Military Administration was required proof of an admission of Accounting and Bookkeeping. Manuals (his systematic list consists Annex 6) cover the most diverse materials that comprise the program (or part thereof) of the disciplines that make up the curriculum taught. The publications analyzed, developed by teachers of the School or the disciplines of the School include content from various areas of mathematics (analytic geometry, astronomy, probability, and Models of Topography, Ballistics) and, above all, the result of efforts made in preparing lessons together with the school experience, experience in teaching, experience in contact with the subjects taught, research, experimentation, experience and in the case of José Gonçalves Nunes from a mission abroad. The effort to update and an increasing demand for better match of teaching to the reality of hosts, especially at the technological industry, also weighed in its preparation.

The officer training establishments of other countries have influenced the training of officers and engineers in Portugal, namely the French model by *Ecole Polytechnique* in

Paris, founded in 1794. To register the literature written by influential mathematicians who taught in this institution. The earliest translations back to Portuguese date of the second decade of the nineteenth century. At the school level in general, also in military school is seen as a means of consolidating the colonization and spread a form of civilization, which is not without influence in military affairs means of teaching. The very concept of military family is also of the transnational aspects. There is a concern with history, noting the first notebooks in the form of reports to the Board of Education, all events worth noting. The contribution to international exhibitions and events such as the *Pedagogical Congress Portuguese Hispano-American* and 1892 *International Exhibition* in Rio de Janeiro, 1922, through the elaboration of monographs that relate the history of schools in charge of officer training, are a priority in these establishments.

3. The operation

The Statistics accompanied the formation of army officers, from the establishments that preceded the *Military School* to the present, revealing an essential element of military education, helping to characterize the school environment and contributing to a better planning of the operation of institution. As an example of this situation, show the statistics that report the number of students finishing the first year with indication that the weapon was designed, the number of students enrolled in each of the weapons, the source of students for district and county, in each weapons, the number of students who completed their studies, the general movement of students, the number of students who were admitted to the ward, and many other aspects. Regarding the library, refer to the statistics of the number of books entered in this, each year. To register the number of publications relating to military statistics highlighting the national level, for example crime statistics and disciplinary and international level for example those relating to the supply of weapons and ground troops, the population of state and military affairs and financial the various countries of Europe. Also in other aspects of human activity, especially in economic and social development, covering issues such as migration, navigation, commerce, industry, banking, economic surveillance, the water consumption. Military culture is also of the transnational aspects,

seeking to define a universal standard. This pattern is reinforced, for example, preparing international military tables including quantitative and qualitative information about certain items, participation in international conflicts such as World War missions in Africa and Southeast Asia, State Major travels, attending courses abroad by army officers and engineers, international exhibitions, conferences and conventions, standards, classifications, international research projects, international agreements and treaties.

At the beginning of the study period, the operating rules (regulations) accompanying the curriculum, particularly in the sections of support as the library and laboratories, in addition to clarifying the norms, duties and tasks relating to students. Later come to be included in the yearbook and for the Republic (after 1912) are published separately. Useful teaching tools in army context, both in the organizational and disciplinary and educational, it should have some would care for them, as a warning Rodrigo de Sousa Coutinho, because there is always the danger of installing a certain regimental mentality. A military school is not like a simple military base even more if the school want to be an academy. It is appropriate to soften some of these standards in order to promote a true academic spirit.

4. Mathematics and Statistics in the army educational context

The school year was marked by the formal opening ceremonies as they were trying to make a point of the situation, gather the whole community, to foster links with other educational and research institutions, as well as in relation to political power in trying to seduce you toward the achievement of better tools and delivering the prizes to the students included, constituting a potential motivating factor. The Solemn Opening speeches sought to motivate the discussion, covering topics of interest to the army middle and the community at large, most related to the subjects taught by the speakers. Them were also discussed issues related to mathematics, with his teaching, for the training of military personnel and engineers, or its role as the face of science or other sciences that would normally against the subjects taught as astronomy, Tactics, Strategy, Ballistic fortification, among other statistics (According to Annex 1).

Sometimes it was also used as a metaphor as a way to exaltation of national feeling. Although the subjects covered are the same as teaching, they now appear in a solemn and mystified, to extolling the figures, figures related to mathematics, whose appearance in daily school life does not come so often. In the presence of such illustrious guests, including the King or the Head of State, hoping to get help, it was natural to highlight its merits in the first case in the area of Oceanography and in the second case of International Relations. Also teaching and school in general were worthy of attention, reflecting on the place of school, the space reserved for the polytechnics, the pedagogical nature of military service, the curriculum, conferences and international meetings stressed also the role played by former students in the military campaigns, especially in Africa. These speeches are published in the yearbook (in the period 1895-1912), independent magazine or publication. Other ceremonies marking the school year, as the blessing of the banner that included an open air mass and the chaplain's speech, oath of the flag, and the relevant ceremony include sporting events and even the funeral events. The latter helps us to understand the efforts made by teachers in order to meet museum collections, writing articles and preparation of monographs, preparation of notes and other activities developed by them, in addition to teaching at the Military School.

5. Future Developments

Although this study made some suggestions of practices that could be related to teaching mathematics, they were outside its scope and may be the basis for future studies. This refers in particular to the use of mathematics, not only during lessons but also during conventional military exercises.

On the other hand, the study of teaching materials related to mathematics focused on a selected set of brochures, it is important to extend its scope to all on file.

Another proposal concerns the lifting of the consequences of changes in the training of army officers (in terms of admission to courses, curriculum, programs, and methods) at civilian schools.

Bibliography

- Almeida, A. (1877). *Noções sobre tática*. Lisboa: Escola do Exército.
- Almeida, A. (1905). *Noções de Astronomia*. Lisboa: Escola do Exército.
- Amaral, F. (1922). *A mentira da Flandres e ... o Medo*. Lisboa: J. Rodrigues & C.^a.
- Antunes, J. R. (1886). *Apontamentos para a historia da Escola do Exército*. Lisboa: Imprensa Nacional.
- Arbogast, L. F.(1800). *Du calcul des dérivations*. Strasbourg: Imprimerie de Levrault.
- Aubert, J. (1919). *La probabilité dans les tirs de guerre*. Paris: Gauthier Villars.
- Barata, M. T. e Teixeira, N. S. (Eds.). (2004). *Nova história militar de Portugal*. Lisboa: Círculo de Leitores.
- Barreiros, J. (1845). *Instrução theorico-pratica sobre artilharia*. Lisboa: Escola do Exército.
- Bloch, M. (1998). *História e historiadores*. Lisboa: Teorema.
- Boyer, C. (1999). *História da Matemática (2ª Edição)*. São Paulo: Blucher.
- Burilano, S. (1911). *Probabilité du Tir*. Paris: Octave Doin et Fils, Éditeurs.
- Campos, M. (1920). *Portugal na Quadrela Flamenga*. Lisboa: Imprensa Nacional.
- Capello, H e Ivens R. (1886) *De Angola à Contra-costa – Descrição de uma viagem através do continente africano*, 2 vols. Lisboa: Europa-América.
- Carnot, L. N. M. (1801). *De la corrélation des figures de géométrie*. Paris: Imprimerie de Crapelet .
- Carvalho, R. (2001). *História do ensino em Portugal (3ª Edição)*. Lisboa: Fundação Calouste Gulbenkian.
- Castro, J. (1897). *18ª cadeira. Estudo, construcção, reparação e conservação das estradas ordinárias* Lisboa: Escola do Exercito.
- Castro, J. (1898). *18ª cadeira. Tunneis*. Lisboa: Escola do Exército.
- Certeau, M. (1975). *L'écriture de l'histoire*. Paris: Gallimard.
- Chartier, R. (2002). *A História cultural entre práticas e representações (2ª Edição)*. Viseu: Difel.
- Chartier, R. (2007). *La historia o la lectura del tiempo (1ª Edición)*. Barcelona: Editorial Gedisa.

- Constante, G. (1959). Esboço histórico do ensino superior em Portugal. Em Academia Militar (Eds), *Anuário da Academia Militar* (pp .47-71). Lisboa: Academia Militar.
- Correia dos Santos, (1915). *Preparação de Portugal para a Guerra Europeia*; Lisboa: Tip. da Cooperativa Militar.
- Costa, E. (1861) *3ª Cadeira. Artilharia*. Lisboa: Escola do Exército.
- Costa, F. R. S. (1995). *Esboço histórico do Palácio da Bemposta*. Lisboa: Academia Militar.
- Costa, J. R. (1886). *Apontamentos para a História da Escola do Exército*. Lisboa: Imprensa Nacional.
- Costigan, A. W. (1989). *Cartas sobre a Sociedade e os Costumes de Portugal 1778-1779*. Lisboa: Lisóptima Edições.
- Cunha, E. (1940). O Professor José Nunes Gonçalves e a sua Obra (Resumo). Em *Discursos e Comunicações apresentadas ao Congresso da História da Actividade Científica Portuguesa* (VIII Congresso), 12º Vol., Tomo 1º, 1ª secção. Lisboa: Congresso do Mundo Português Publicações.
- Cunha, J. A. (1790). *Principios Mathematicos para instrucção dos alumnos do Collegio de S. Lucas da Real Casa Pia do Castello de S. Jorge*. Lisboa: Officina de Antonio Rodrigues Galhardo.
- Cunha, J. A. (1987). *Princípios Matemáticos para Instrução dos Alunos do Collegio de S.Lucas da Real Casa Pia do Castelo de S. Jorge*. Coimbra: Departamento de Matemática da Universidade. Reprodução fac-simile da edição publicada em Bordéus em 1811.
- D'Alembert, M (1770). *Traité de L'équilibre et du mouvement des fluides*. Paris: Briasson.
- Domingos, J. (1886). *Formulas balísticas*. Lisboa: Escola do Exército.
- Escola de Guerra (1913). *Programas dos trabalhos nas salas de estudo pelos alunos dos vários cursos no ano lectivo 1913-1914*. Lisboa: Escola de Guerra.
- Escola de Guerra (1915). *6ª Cadeira. Apontamentos de Fortificação passageira*. Lisboa: Escola de Guerra.
- Escola de Guerra (1915). *Fortificação passageira*. Lisboa: Escola de Guerra.
- Escola de Guerra (1915). *Noções de Material de Guerra*. Lisboa: Escola de Guerra.
- Escola de Guerra (1915). *Programas dos trabalhos nas salas de estudo pelos alunos dos vários cursos no ano lectivo de 1913-1914*. Lisboa: Escola de Guerra.
- Escola de Guerra (1916). *Balística Externa*. Lisboa: Escola de Guerra.

- Escola de Guerra (1917). *Curso de Estado-maior Estudo Comparativo dos regulamentos*. Lisboa: Escola de Guerra.
- Escola de Guerra (1917). *Instruções para o serviço das secretarias*. Lisboa: Tip. da Escola de Guerra.
- Escola de Guerra (1917). *Topografia 2ª parte: levantamentos expeditos – execução de cartas*. Lisboa: Escola de Guerra.
- Escola de Guerra (1919). *Instruções de cavalaria. Apontamentos sobre arreios e equipamentos para as tropas de cavalaria*. Lisboa: Escola de Guerra.
- Escola de Guerra (1919). *Instruções de cavalaria. Apontamentos sobre formações e serviço de bivaque e marchas pela linha-férrea*. Lisboa: Escola de Guerra.
- Escola do Exército (1858). *Arquitectura: Apontamentos*. Lisboa: Escola do Exército.
- Escola do Exército (1861). *Apontamentos de Caminhos-de-ferro*. Lisboa: Escola do Exército.
- Escola do Exército (1862). *Apontamentos sobre pequena guerra*. Lisboa: Escola do Exército.
- Escola do Exército (1880). *Noções de Geometria Analytica – Princípios de mechanica*. Lisboa: Escola do Exército.
- Escola do Exército (1892). *Administração militar portuguesa: apontamentos*. Lisboa: Escola do Exército.
- Escola do Exército (1892). *Apontamentos de Legislação militar portuguesa*. Lisboa: Escola do Exército.
- Escola Militar (1922). *26ª Cadeira. Máquinas Térmicas*. Lisboa: Escola Militar.
- Escola Militar (1922). *2ª Cadeira. Sociologia*. Lisboa: Escola Militar.
- Escola Militar (1922). *8ª Cadeira. Material de Guerra*. Lisboa: Escola Militar.
- Escola Militar (1922). *Alterações à Lei Orgânica de 23/6/1922*. Lisboa: Tip. da Escola de Guerra.
- Escola Militar (1922). *Balistica (1ª parte). Noções Fundamentais sobre a Teoria dos Explosivos*. Lisboa: Escola Militar.
- Escola Militar (1922). *Comunicações militares*. Lisboa: Escola Militar.
- Escola Militar (1923). *4ª Cadeira. Princípios de Direito Publico (2ª parte)*. Lisboa: Escola Militar.
- Escola Militar (1923). *6ª Cadeira. Efeitos dos projecteis*. Lisboa: Escola Militar.
- Escola Militar (1924). *A educação cívico-militar dos alunos*. Lisboa: Tipografia da Escola Militar.

- Escola Militar (1925). *4ª Cadeira. Princípios de Direito Publico (2ª parte)*. Lisboa: Escola Militar.
- Escola Militar (1926). *37ª Cadeira. Higiene*. Lisboa: Escola Militar.
- Euclides (1792). *Elementos*. Coimbra: Imprensa da Universidade.
- Euler, L. (1770). *Traité de l'équilibre et du mouvement des fluides*. Paris: Briasson.
- Euler, L. (1795). *Eléments de Algèbre*. Lyon: Bruyset.
- Euler, L.(1796). *Introduction a l'analyse infinitésimal*. Paris: Barrois.
- Fazenda, M. N. (1906). *Emigração Portuguesa - ano de 1903*. Lisboa: A Editora.
- Feferman, S.(1998). *In the light of logic*. Oxford: Oxford University Press.
- Ferreira, L. (1895). *Discurso proferido na sessão solemne de abertura*. Lisboa: Imprensa Nacional.
- Fiosconi, César e Guserio, Jordan (1718). *Espingarda perfeyta e regras para a sua operaçam*. Lisboa Occidental: Officina de Antonio Pedrozo Galran.
- Fortes, M. A. (1728). *O engenheiro Português: Tomo primeiro*. Lisboa Occidental: Officina de Manuel Fernandes da Costa.
- Fortes, M. A. (1729). *O engenheiro Português: Tomo segundo*. Lisboa Occidental: Officina de Manuel Fernandes da Costa.
- Garnier, P. (2004). *Teorias da história (5ª edição)*. Lisboa: Fundação Calouste Gulbenkian.
- Gaspar, V. (1917). *Curso do Estado-maior. Serviços*. Lisboa: Escola de Guerra.
- Geraldo, J. C. (2006). *José Hermano Batista, Um herói da Grande Guerra 1917-1919*. Lisboa: Prefácio.
- Ginzburg, C. (1999). *Mitos, emblemas, sinais, morfologia e história (3ª edição)*. São Paulo: Companhia das Letras.
- Gonçalves, N. (1894). *Theoria do movimento de rotação dos projecteis oblongos*. Lisboa: Escola do Exército.
- Gonçalves, N. (1895). *6ª cadeira-Introdução ao estudo dos projecteis-Probabilidades do Tiro*. Lisboa: Escola do Exército.
- Gonçalves, N. (1895). *6ª cadeira-Introdução ao estudo dos projecteis-Probabilidades do Tiro*. Lisboa: Typ. da Academia Real das Sciencias de Lisboa.
- Gonçalves, N. (1900). *Provas mecânicas dos aços para canhões*. Lisboa: Typ. La Bécarre de Francisco J. Carneiro.

- Gonçalves, N. (1903). *Estudo do movimento dos projecteis na alma das boccas de fogo*. Lisboa: Typ. da Academia Real das Sciencias de Lisboa.
- Gonçalves, N. (1909). *6ª cadeira-Introdução ao estudo dos projecteis-Probabilidades do Tiro*. Lisboa: Tip. da Escola do Exército.
- Gonçalves, N. (1929). *Balística Interna*. Lisboa: Imprensa Nacional.
- Gonçalves, N. (1932). *Balística Externa*. Lisboa: Imprensa Nacional.
- Gonçalves, N. (1938). *Balística Aplicada: lições professadas na 6ª cadeira da extinta Escola do Exército, no ano lectivo de 1901-1902*. Lisboa: Imprensa Nacional.
- Gonçalves, V. (1940): Análise do Livro VIII dos Princípios Matemáticos de José Anastácio da Cunha. Em *Discursos e Comunicações apresentadas ao Congresso da História da Actividade Científica Portuguesa* (VIII Congresso), 12º Vol., Tomo 1º, 1ª secção. Lisboa: Congresso do Mundo Português Publicações.
- Guerra, S. E. N. G. (1907). *Estatística criminal e disciplinar do Exercito- anno de 1905*. Lisboa: Imprensa Nacional.
- Guerre, M. (1850). *Programmes pour l'admission et pour l'enseignement a L'École Polytechnique*. Paris: Imprimerie Nationale.
- Guerreiro, G. (1917). *Curso de Estado-maior. Crítica de operações*. Lisboa: Escola de Guerra.
- Guimarães, V. (1926). *Lição inaugural do ano lectivo 1924-1925*. Lisboa: Tipografia do Diário de Notícias.
- Haag, J. (1926). *Applications au Tir*. Em Émilie Borel (Ed.), *Traité du Calcul des Probabilites* (Tomo IV). Paris: Gauthier Villars.
- Julia, D. (2001). A cultura escolar como objecto histórico. *Revista Brasileira de História de Educação*, 1, 9-43.
- L'Hospital, M. (1781). *Analyse des infiniment petits, pour l'intelligence des lignes courbes*. Paris: Jombert.
- Lacroix, S. F. (1800). *Traité élémentaire de trigonométrie rectiligne et sphérique et d'application de l'algèbre a la géométrie* (seconde édition). Paris : Imprimerie de Crapelet.
- Lacroix, S. F. (1802). *Complément des Éléments de Géométrie- Essais de Géométrie sur les plans et les surfaces courbes* (seconde édition). Paris: Imprimerie de Crapelet.
- Lacroix, S. F. (1802). *Traité élémentaire de calcul différentiel et de calcul intégral* (seconde édition). Paris: Imprimerie de Crapelet.

- Lacroix, S. F. (1810). *Tratado Elementar D' Arithmética*. Trad. Francisco Cordeiro da Silva Torres. Rio de Janeiro: Impressão Regia.
- Lacroix, S. F. (1811). *Elementos de Algebra*. Trad. Francisco Cordeiro da Silva Torres. Rio de Janeiro: Impressão Regia.
- Lacroix, S. F. (1812). *Tratado elementar da applicação da algebra à geometria*. Trad. José Vitorino dos Santos e Sousa. Rio de Janeiro: Impressão Regia.
- Lacroix, S. F. (1812). *Tratado elementar de calculo differencial e de calculo integral*. Trad. Silva Torres. Rio de Janeiro: Impressão Regia.
- Lacroix, S. F. (1822). *Traité élémentaire du calcul des probabilités* (deuxième édition). Paris: Bachelier.
- Lacroix, S. F. (1801). *Complement des Elements d' Algèbre a l'usage de l'École Centrale des Quatre-Nations* (deuxième édition). Paris: Imprimerie de Crapelet.
- Lacroix, S. F. (1802). *Éléments de Géométrie a l'usage de l'École Centrale des Quatre Nations* (deuxième édition). Paris: Imprimerie de Crapelet.
- Lacroix, S. F. (1803). *Éléments d' Algèbre a l'usage de l'École Centrale des Quatre-Nations* (troisième édition). Paris: Imprimerie de Crapelet.
- Lagrange, J. L. (1806). *Leçons sur Calcul des Functions*. Paris: Coucier.
- Lagrange, J. L. (1821). *Théorie des Functions Analytiques*. Paris: Imprimerie de la République.
- Laplace, M. (1825). *Essai Philosophique sur les Probabilités* (Cinquième Edition) Paris: Bachelier.
- Legendre, A-M. (1794). *Éléments de Géométrie, avec des notes*. Paris: Firmin Didot.
- Legendre, A-M. (1809). *Elementos de Geometria*. Trad. Manuel Ferreira de Araújo Guimarães. Rio de Janeiro: Impressão Regia.
- Legendre, A-M. (1812). *Elementos de Geometria*. Trad. Manuel Ferreira de Araújo Guimarães. Rio de Janeiro: Impressão Regia.
- Legendre, A-M. (1815). *Elementos de Geometria*. Trad. Manuel Ferreira de Araújo Guimarães. Rio de Janeiro: Impressão Regia.
- Magalhães, J. C. G. (1891). *Apontamentos para a Historia da Escola do Exercito coligidos dos documentos officiaes com referencia ao período decorrido desde 1 de Janeiro de 1886 a 31 dezembro de 1890*. Lisboa: Escola do Exercito.
- Marques, A. O. (Eds.). (2004). *Nova história de Portugal* (1ª, 9ª e 10ª Vols.) Lisboa: Presença.
- Martins, F. (1945). *História do Exército Português*. Lisboa: Editorial Inquérito.

- Martins, F. (1965). *Mouzinho* (2ª edição). Lisboa: Edições Excelsior.
- Matos, A. e Portugal, F. (1974). *Paroquia dos Anjos – Lisboa 1758. Memórias Paroquiais de Lisboa*. Lisboa: Câmara Municipal de Lisboa.
- Mattoso, J. (1997). *A escrita da história*. Lisboa: Estampa.
- Militar, A. (2005). *D. Catarina de Bragança e o Paço da Rainha*. Lisboa: Academia Militar.
- Monge, G. (1827). *Géométrie Descriptive* (cinquième édition). Paris: Bachelier.
- Mónica, M. F. (2006). *D. Pedro V*. Lisboa: Círculo de Leitores e Centro de Estudos dos Povos e Culturas de Expressão Portuguesa.
- Morais, C. (1915). *Oração proferida na Sessão solene de abertura da Escola de Guerra no ano lectivo de 1915-1916*. Lisboa: Tipografia Universal.
- Moreira, A. J. M. (1793). *Regras de Desenho para a delineação das plantas, perfis e perspectivas pertencentes à architectura militar e civil com descrição, e pratica dos infrementos de que mais ordinariamente se ferverem os Officiaes Engenheiros affim no bofete como no terreno “para uso” da Real Academia de Fortificação, Artilharia e Desenho*. Lisboa: Typographia de João António da Silva.
- Moreira, J. (1844). *Curso elementar de fortificação para uso dos Officiaes de todas as Armas*. Lisboa: TYP. de L. C. da Cunha.
- Motta, J. (1998). *Formação do Oficial do Exército*. Rio de Janeiro: Biblioteca do Exército Editora.
- Navarro, J.(1993). *Os Comandantes da Escola do Exército, Escola de Guerra, Escola Militar e Academia Militar*. Lisboa: Academia Militar
- Negócios, M., E. *Livro Branco de Portugal no Conflito Europeu - 1ª Parte*. Lisboa: Ministério dos Negócios Estrangeiros.
- Newton, I. (1802). *Aritmética Universal*. Paris: Bernard.
- Paiva, J. (1925). *Electrónica geral e máquinas eléctricas*. Lisboa: Escola Militar.
- Pedrosa, A. (1891). *5ª Cadeira – 2ª parte Photographia*. Lisboa: Escola do Exercito.
- Pimentel, F. (1883). *Apontamentos sobre alguns estabelecimentos e fortificações da França, Belgica e Alemanha – viagem effectuada nos mezes de Junho e Julho de 1880*. Lisboa: Typografia Universal.
- Pimentel, L. S. (1659). *Arquitectura Militar ou Fortificação*. Lisboa: Imprensa Nacional de Lisboa.
- Pimentel, L. S. (1680). *O Methodo Lusitanico de desenhar as fortificaçoens das praças regulares, & irregulares, fortes de campanha e outras obras pertencentes a*

- arquitectura militar*. Lisboa: Impreffaõ de António Craesbeeck de Mello Impreffor de S. Altesa.
- Pinheiro, F. B. (1898). *Curso de fortificação passageira*. Lisboa: Escola do Exército.
- Poincaré, H.(1902). *La Science et l'Hypothèse*. Paris: Ernest Flammarion.
- Poincaré, L. (1909). *La Physique Moderne son évolution*. Paris: Ernest Flammarion.
- Prost, A. (1996). *Douze leçons sur l'histoire*. Paris: Éditions du Seuil.
- Ramos, R. (2001). A segunda fundação. Em J. Mattoso (Eds), *História de Portugal*. Lisboa: Estampa.
- Ramos, R. (2006). *D. Carlos*. Lisboa: Círculo de Leitores e Centro de Estudos dos Povos e Culturas de Expressão Portuguesa.
- Ribeiro, J. S. (1892). *Historia dos estabelecimentos scientificos litterarios e artisticos de Portugal*. Lisboa: Typografia da Academia Real das Sciencias.
- Roberto, J. (2005, Abril-Junho). 1ª Guerra Mundial “O milagre de Tancos”. *Revista de Administração Militar*, 10, ano 3, 3ª Série, 30-40
- Rocha, A. (1872). *5ª Cadeira - 2ª parte. Photographia*. Lisboa: Escola do Exército.
- Rocha, M. (1808). *Memoires d'Astronomie Pratique*. Paris: Coucier.
- Roque, J. e Torgal, L. (1998). *O liberalismo*. Em J. Mattoso (Ed.). *História de Portugal*, Vol 5. Lisboa: Estampa.
- Sampaio, R. A. (1991). *História da Academia Militar*.Lisboa: Academia Militar.
- Selvagem, C. (1931). *Portugal Militar*. Lisboa: Imprensa Nacional de Lisboa.
- Sena, C. & Gonçalves, N. (1923). *Balística Interna*. Lisboa: Litografia da Escola Militar
- Sena, C. (1919). *Estudo sôbre o emprego da pólvora sem fumo no carregamento das bôcas de fogo em serviço que ainda usam póvora negra*. Lisboa: Escola de Guerra.
- Sena, C. (1922). *A Escola Militar de Lisboa: História, Organização, Ensino*. Lisboa: Imprensa Nacional de Lisboa.
- Sena, C. (1925). *Elementos de Balística*. Lisboa: Litografia da Escola Militar
- Serrão, V. (Eds.) (1985). *História de Portugal*. (8º Vol.). Lisboa: Editorial Verbo.
- Serrão, V. (Eds.) (1986). *História de Portugal*. (9º Vol.). Lisboa: Editorial Verbo.
- Silveira, L. N. e Fernandes, P. J. (2006). *D Luís*. Lisboa: Círculo de Leitores.
- Simões, J. M. O. (1892). *A Escola do Exército, Breve Noticia da sua História e da sua Situação Actual*. Lisboa: Imprensa Nacional de Lisboa.

- Sousa, Paulo (2009). *Ministros do Reino à Administração Interna*. Lisboa: Ministério da Administração Interna.
- Stockler, G. (1819). *Ensaio Histórico sobre a origem e progressos das Mathematicas em Portugal*. Paris: Officina de P. N. Rougeron.
- Tavares, T. S. (1737). *Discursos sobre a disciplina militar e fciencia de hum soldado de infantaria*. Lisboa Occidental: Officina de Joseph António da Silva.
- Valente, W. (1999). *Uma história da Matemática Escolar no Brasil (1730-1930)*. São Paulo: annablume.
- Valente, W. (2005). *História da Educação Matemática – Interrogações Metodológicas*. São Paulo: GHEMAT.
- Vernon, M. G. (1805). *Traité Élémentaire d` Art Militaire et de Fortification a l`usage des élèves de l`école polytechnique et des élèves des écoles militaires*. Paris: Allais.
- Vidal, A. (1863). *Apontamentos de um Curso de Phisica professado na Escola Polytecnycna no anno lectivo 1862-1863*. Lisboa: Escola Politécnica.
- Vidal, A. (1865). *Trigonometria plana*. Lisboa: Escola Politécnica.
- Vidal, A. e Almeida, C. (1881). *Elementos de geometria plana: para uso dos lyceus e escolas municipaes secundarias*. Lisboa: Typ. da Academia Real das Sciencias.

Tabelas

- Etats de l'Europe (1911). *Tableaux Statistiques relatifs à l'organisation militaire, l'armement et l'approvisionnement des troupes, la superficie, la population, les charges militaires et financières des divers Etats de l'Europe, à la date du 15 mai 1911*. Bruxelles: Établissements L WINTRACKEN & C^a.

Anuários e Legislação

- Anuários da Escola do Exército (1895-1911) e da Escola de Guerra (1911-1912).
- Cartas de Lei de 13 de Maio de 1896.
- Cartas de Lei de 13 de Maio de 1896.
- Declaração nº 3; Ordem do Exército nº 3 (1ª Série) de 7 de Março de 1927.
- Decreto do Governo, 12 de Janeiro de 1837, pp. 84-87.
- Decreto de 13 de Agosto de 1790.

Decreto de 2 de Janeiro de 1790, com Estatutos da ARFAD.

Decreto de 20 de Julho de 1701 que cria novas Academias Militares no Alentejo, Beira e Minho.

Decreto de 21 de Abril de 1898.

Decreto de 23 de Agosto de 1894.

Decreto de 23 de Junho de 1922, artigo 2º.

Decreto de 24 de Dezembro de 1732 que cria novas Academias Militares em Elvas e Almeida.

Decreto de 25 de Maio de 1911.

Decreto de 27 de Setembro de 1897.

Decreto de 28 de Outubro de 1891.

Decreto de 30 de Outubro de 1892.

Decreto de 5 de Agosto de 1779.

Decreto nº 10: 088 de 12 de Setembro de 1924.

Decreto nº 15: 395 de 14 de Abril de 1928.

Decreto nº 2: 314 de 4 de Abril de 1916.

Decreto nº 2: 362 de 2 de Maio de 1916.

Decreto nº 2: 469 de 23 de Junho de 1916.

Decreto nº 4:529 de 29 de Junho de 1918.

Decreto nº 5: 787- 4 U de 10 de Maio de 1919.

Decreto nº 7: 530 de 23 de Maio de 1921.

Decreto nº 7: 541 de 23 de Maio de 1921.

Decreto nº 8: 414, de 25 de Setembro de 1922;

Decreto nº 8: 778 de 21 de Abril de 1923.

Decreto nº 9: 523 de 21 de Março de 1924.

Decreto-Lei de 23 de Abril de 1790.

Decreto-Lei de 24 de Dezembro de 1863, reorganiza a Escola do Exército.

Documento de aprovação na “Aula de para Ajudantes de Fortificação” passado em Lisboa a 18 de Fevereiro de 1661.

Lei de 13 de Setembro de 1897.

Ordem do Exército nº 12 de 23 Setembro de 1897; Secretaria d’Estado dos Negócios da Guerra.

Ordem do Exército nº 13 de 30 de Setembro de 1897; Secretaria d’Estado dos Negócios da Guerra.

Ordem do Exército nº 14 de 30 de Novembro de 1925.

Ordem do Exército nº 16 de 31 de Maio de 1919; Secretaria da Guerra.

Ordem do Exército nº 18 de 11 de Outubro de 1913; Secretaria da Guerra.

Ordem do Exército nº 18 de 24 de Agosto de 1911; Secretaria da Guerra.

Ordem do Exército nº 19 de 1 de Setembro de 1894; Secretaria d'Estado dos Negócios da Guerra.

Ordem do Exército nº 24 de 19 de Dezembro de 1884; Secretaria d'Estado dos Negócios da Guerra.

Ordem do Exército nº 29 de 10 de Outubro de 1891; Secretaria d'Estado dos Negócios da Guerra.

Ordem do Exército nº 29 de 30 de Outubro de 1892; Secretaria d'Estado dos Negócios da Guerra.

Ordem do Exército nº 31 de 17 de Outubro de 1891; Secretaria d'Estado dos Negócios da Guerra.

Ordem do Exército nº 35 de 18 de Setembro de 1890; Secretaria d'Estado dos Negócios da Guerra.

Ordem do Exército nº 59 de 3 de Novembro de 1864; Secretaria d'Estado dos Negócios da Guerra.

Portaria nº 4556; Ordem do Exército nº 16 de 29 de Dezembro de 1925