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## Escuela Nautica de Manila: Scientific Education in the Spanish Philippines

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# Philippine Studies: Historical and Ethnographic Viewpoints

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Philip Vergel Ay-ad and Filomeno V. Aguilar Jr.

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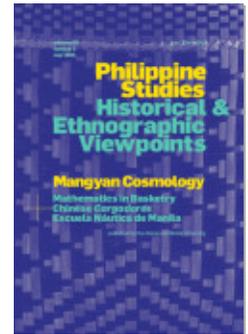
## Escuela Náutica de Manila: Scientific Education in the Spanish Philippines

Philip Vergel Ay-ad, Filomeno V. Aguilar Jr.

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AND FILOMENO V. AGUILAR JR.

# Escuela Náutica de Manila Scientific Education in the Spanish Philippines

Science education in the nineteenth-century Philippines has been portrayed as highly deficient, yet pockets of respectable scientific education existed. The Escuela Náutica de Manila, which opened in 1820, offered such an education. This article narrates its establishment and discusses its changing curricular offerings in relation to empire-wide initiatives and constraints internal to the Philippines. Its quality of scientific education can be glimpsed from reports related to three episodes: the earthquake in 1863; the planned closure of the school in the late 1880s; and the advent of American colonial rule in the early 1900s. This school survives as the Philippine Merchant Marine Academy.

**KEYWORDS: PILOTAGE • NAUTICAL EDUCATION • SEAFARING • COLONIAL SCIENCE, SPANISH COLONIALISM**

The famous chapter titled “The Physics Class” in Rizal’s *El filibusterismo*, provides an unflattering portrait of science education in the Spanish Philippines, serving as “a trenchant critique of the colonial and ‘monastic’ education in the Philippines as much as it is a virtuoso performance of humorous erudition,” as Ramon Guillermo (2011, 472) puts it. This stultifying university education could be seen in the triumph of sophism over science, emblemized by “the mysterious laboratory” where closed cabinets held “enigmatic apparatuses” that students were not permitted to see, much less touch (Rizal 1996, 99). Nevertheless, in this well-known chapter Rizal (ibid.) offered a caveat against any absolute generalization, saying that at “the Ateneo of the Jesuits . . . the science is practically taught in the laboratory itself.” Rizal’s hint compels us to examine preuniversity or secondary education, such as at the Ateneo Municipal, where things were different from what he depicted in his novel, and at other secondary schools, especially those outside the Catholic Church’s ambit.

By not probing science education, most studies of education in the Spanish Philippines have reinforced inadvertently the dominant impression conveyed by “The Physics Class.” However, by focusing on secondary-level vocational education, Frederick Fox (1976) has provided a valuable corrective. Aside from the Colegio de Tiplas (Choir School) founded in 1742, there were fourteen mostly publicly funded skills-oriented educational institutions established in the course of the nineteenth century, four of them devoted to agriculture and another four to arts and trades (*artes y oficios*) (ibid., 265). In most of these schools, science courses, along with mathematics, were included in the curriculum. At the top of this list and the very first to be established—in 1820—was the nautical school, which was known by various names but mostly as the Escuela Náutica de Manila.<sup>1</sup>

Fox (ibid., 286) emphasized that in the late nineteenth century “the vast majority of new workers throughout the world continued to receive their training on-the-job in the traditional apprenticeship mode” and that “[o]nly the great industrial nations were beginning to make truly broad use of formal preservice job preparation.” Viewed from this perspective, the vocational schools set up in the Spanish Philippines can be seen “to have been genuinely substantial” (ibid., 287). In this light, the vocational schools of the nineteenth century deserve close analysis, although most of them (except for the *normal* or education schools) have been bypassed in Philippine historiography.

In fact, nautical education in the Spanish Philippines has been mentioned in a number of studies, but it has not been examined in depth. Encarnacion Alzona (1932, 43–44) produced the earliest study on the history of Philippine education; she offered a brief reference to the Escuela Náutica de Manila’s institutional history, saying that it was established so that the merchant marine could employ natives instead of resorting to foreign pilots. Evergisto Bazaco’s (1953b, 14) study of the different branches of the Escuela Normal as well as the development of secondary education mentioned the nautical school’s opening in 1820, but his study of vocational education ignored it completely (Bazaco 1953c). José Arcilla (1983, 61, 64) alluded to a nautical school that the Manila board of trade funded, along with the Escuela Pía, forerunner of the Ateneo Municipal. Only the journalist Leoncio Gonzáles Liquete’s (1930a, b) account, which appeared in two parts in the *Philippine Magazine*, gave due significance to the Escuela Náutica de Manila in the training of seafarers from the perspective of local Spanish maritime reform; but scholars have overlooked the work of Gonzáles because it lacked proper documentation.<sup>2</sup> As a field of applied science, nautical education has also escaped notice in Warwick Anderson’s (2007) survey of the history of science in the Philippines from the Spanish period until the 1970s—although the Escuela Náutica did figure in a couple of general surveys that appeared in the 1930s, one on scientific and technical organizations in the Philippines by Leoncio Lopez (1935) and another on science in the Philippines in the pre-American era by Eulogio B. Rodriguez (1935). Economic histories, such as those written by O. D. Corpuz (1997) and Benito Legarda Jr. (1999), fail to mention nautical education. Similarly, John H. Parry’s (1990) *The Spanish Seaborne Empire* did not mention the development of nautical schools as part of the Bourbon reforms.

The pervasive occlusion of the Escuela Náutica de Manila in Philippine historiography may be related to the relatively low prestige of seafaring compared with other occupations. But even within maritime history the specialized field of seafarers’ education is generally neglected (Kennerley 2002, 3). Nevertheless, the pervasive disregard of nautical education in Philippine historiography is paradoxical given that the Philippines is the biggest source of ratings among the world’s seafarers and, after China, the next biggest source of maritime officers in the world at present (International Chamber of Shipping 2020). As the first scientific and educational institution that the Spaniards launched in the nineteenth-century Philippines, the

Escuela Náutica de Manila has withstood the test of time. Two centuries after the school's founding in 1820 and having undergone several dramatic changes, including periods of closure, the elevation of nautical education to the tertiary level, and the steepening educational requirements of the global maritime industry, the Escuela Náutica survives today as the state-run Philippine Merchant Marine Academy based in San Narciso, Zambales.

To redress the marginalization of nautical education in Philippine historiography and for us to understand the quality of scientific education that it offered, this article examines selected aspects of the history of the Escuela Náutica de Manila. We begin by revisiting the impetus for the establishment of this nautical school, followed by a discussion of its changing curriculum, its faculty, the admission of native students, and its tie-up with the Escuela de Comercio for foreign language instruction. Moreover, the quality of scientific education provided by the Escuela Náutica can be glimpsed from reports that were produced in the wake of three key moments: the earthquake in 1863; the planned closure of the school in the late 1880s; and the advent of American colonial rule in the early 1900s. The article ends with an epilogue that provides a capsule history of the nautical school in the twentieth century.

### **The Protracted Opening of Manila's Nautical School**

With the rise of transoceanic navigation in the sixteenth century, knowledge of nautical science became indispensable for navigators. It became necessary "to train master mariners in the new 'mathematics' of navigation and nautical astronomy" (Kennerley and Seymour 2000, 152). In the open sea, a ship's position "had to be calculated using arithmetic and trigonometry," especially when astronomical observations could not be made owing to cloud cover or poor visibility (*ibid.*, 154–55). In the revival of Spanish nautical science in the eighteenth century, one of the premier nautical schools was the Real Colegio Seminario de San Telmo de Sevilla, where the curriculum encompassed "arithmetic, algebra, geometry, applications of trigonometry in astronomical operations, cosmography, conic sections, series, differential calculus and integral calculus," along with "drawing classes" (García 2007, 2:43, 69).

Nautical education became a part of the Bourbon reforms. A royal decree issued on 8 July 1787 mandated that all of Spain's coastal merchant guilds in all of the "open" ports should set up nautical schools (Anduaga

2008, 373; Ibáñez and Llombart 2000, 747). In this global policy, all of the Spanish empire's nautical schools were to fall under the jurisdiction of the Real Armada (García 2007, 1:269), a development that, according to Marta García (2009, 190), "came to be known as the 'militarization of science.'" As a result, nautical schools were opened in many of the Spanish colonies.

In the meantime, José Basco y Vargas, a naval officer who served as governor general of the Philippines from 1778 to 1787, sought to promote the territory's agriculture and commerce. In 1783, antedating the empire-wide policy, Basco (1783, 79B) had desired to open a nautical school in Manila, which would be modeled after his alma mater, the Guardias Marinas de Cádiz, that would teach nautical science as well as military fortification and naval construction (Lomas et al. 2005, 464). However, Manila's *consulado* or merchant guild—which had been created in 1769 to allocate to shippers the cargo space on the galleons (Legarda 1999, 39)<sup>3</sup>—refused to cooperate (Basco 1783, 79–80B).

The idea of setting up a nautical school in Manila was propelled by Francisco Muñoz y San Clemente, a graduate of the Colegio Militar de Segovia who started his career in 1760 as a sublieutenant in the Real Cuerpo de Artillería, subsequently serving in the Real Armada (King 1999, 55). On 12 October 1788, he was assigned to the post of "Teniente del Rey and deputy governor of the Philippines" and at the same time promoted to *capitán de navío* (navy captain) (*ibid.*, 56, 65).<sup>4</sup> In August 1790 he was also appointed commandant of the arsenal in Cavite (*ibid.*, 65).

A keen observer of world events, Muñoz was aware of the ongoing reorientation of Philippine maritime trade, which was dependent on shipping. He recognized the attendant need for skilled pilots for both transoceanic and domestic shipping. Thus, in 1793, he advanced a proposal to establish a school of pilotage (Muñoz 1793b, 3r). The improved navigation the maritime school would usher in, Muñoz (*ibid.*) contended, would stimulate the growth of agriculture, which in turn would help support the school financially.

Muñoz's (1793a, 2r) proposal received royal approval on 23 October 1792, which stated that, with the advent of free trade in Manila in 1790, the establishment of the nautical school would be advantageous as its absence had compelled the colony to rely on foreign pilots. However, by the time Muñoz left the Philippines in 1803 the nautical school had not yet opened. The *consulado* did not abide by the royal order, ostensibly because its

huge infrastructure investment in cleaning the sand bar of the Pasig River in 1793 had drained its funds (Muñoz 1793b, 3r–3v). On 16 September 1799, a decree was issued instructing the consulado to proceed with the school's establishment (Rivera 1799, S467). However, a royal order issued on 2 November 1804 prevented the consulado, without permission from the crown, from dipping into the funds of the Caja de Avería, a tax fund to cover galleon damages, which hitherto the consulado could tap to support its civic projects (Fuentes et al. 1816, S475). The 1804 royal order discouraged the consulado from setting up the nautical school.

In 1816 serious consultations resumed. The end of the Galleon Trade in 1815 (which never had the benefit of sourcing crew from a navigation school in Manila<sup>5</sup>) and the incipient growth of export trade in Philippine primary commodities—particularly sugar and abaca, but also, later in the nineteenth century, tobacco and coffee<sup>6</sup>—unleashed a huge demand for pilots, resulting in the employment of foreigners (*ibid.*, S475B). Under these circumstances, on 18 November 1819 the king allowed the consulado to draw funds from the Caja de Avería in order to establish the nautical school (Fernández 1819, S503B). After another round of lengthy negotiations on a school site, initially focusing on the compound of the Escuela Pía (with which, it was thought, the nautical school could be merged), Manila's nautical school finally opened on 5 April 1820 within the consulado's premises on Calle Cabildo in Intramuros, an arrangement the consulado found financially convenient (Fernández 1822, S61). The protracted search for a school site could be seen in the fact that the regulation for the school had been completed on 16 March 1820, more than a fortnight before the school opened (Fernández et al. 1820). Referred to as the Academia de Pilotaje until 1860, but also concomitantly called Escuela Náutica, the school stayed on its original site until the 1863 earthquake, after which it moved to rented premises also within Intramuros.

Since the nautical school's inauguration, the consulado had assumed the financial responsibility for the institution (Fernández 1822, S63), but it also received assistance from the colonial government, enabling it to offer free education. In 1837 the school's budget for "other expenses" was formally included in the colonial state's books. The Escuela Náutica's approved regulation of 1839 set the school's budget at ₱200, subject to the approval of the General Intendancy (Dirección General de Estudios 1839, arts. 33, 35). A royal order issued on 21 October 1858 doubled the annual budget to ₱400 (Ripoll and

Rocha 1878, 1879). Apparently two-thirds of this amount was paid for by state funds, while one-third was settled by local funds. A royal order in 1867 reversed this arrangement, with two-thirds of the expenses paid for from local funds and the remaining one-third shouldered by the colonial state (San Pedro 1865–1868, 9:108), an arrangement that lasted until the end of Spanish colonial rule.

### **The Escuela Náutica's Initial Curriculum and Faculty**

Following the inclusion of nautical schools in the Bourbon reforms in 1787, an empire-wide policy subjected all such schools to a common standard set in 1790 by the commander-in-chief of the *Cuerpo de Pilotos*, Francisco Javier Winthuysen: all navigation schools had to adhere to a two-year program, a plan that was enforced until 1850 (García 2007, 2:17; García 2009, 194, 209; Ibáñez and Llombart 2000, 749). The subjects for the first year were Mathematics and Drawing; in the second year the subjects were Cosmography, Navigation, Maneuver, and Drawing (Ibáñez and Llombart 2000, 749).

The 1793 proposal of Muñoz adhered to the imperial policy of a two-year program of study. However, the two curricular plans overlapped only in terms of two subjects: Cosmography and Navigation (table 1). In 1799 Muñoz added another subject, Geography and Astronomy. The number of subjects to be studied in a two-year duration totaled eight (table 1). Knowledge of celestial bodies and geography was considered essential for a successful application of nautical astronomy.<sup>7</sup> With the addition of subjects such as Plane and Spherical Trigonometry, the curriculum of Manila's nautical school apparently conformed to Muñoz's preferences, including the dropping of the applied subject of Maneuver.

Of the subjects proposed by Muñoz, the consulado felt that Arithmetic was unnecessary because it believed the subject was already studied at home. The consulado also assumed that prospective students learned arithmetic from colonial offices and courts; in case they had not, students could use personal time to learn the subject (Antonio de Escuzeta et al. 1799, S453B–54). In fact, the Winthuysen plan had specified Mathematics rather than Arithmetic as the required subject. However, Muñoz wanted to include arithmetic lessons because he recognized that, owing to the deficient primary education in the colony, there was widespread ignorance in this subject. The Escuela Náutica's first professor and director, José María Tirado, who had

**Table 1. Subjects in nautical education identified in the 1790 Winthuysen Plan and in the 1793 and 1799 proposals of Francisco Muñoz y San Clemente**

YEAR	1790 WINTHUYSEN	1793 MUÑOZ'S PROPOSAL	1799 MUÑOZ'S PROPOSAL
First	Mathematics	Arithmetic	Arithmetic
	Drawing		Drawing
		Geometry	Geometry
		Plane Trigonometry	Plane Trigonometry
Second	Cosmography	Cosmography	Cosmography (includes Nautical Astronomy)
	Navigation	Navigation	Navigation
	Maneuver	Nautical Astronomy	Geography and Astronomy
	Drawing	Spherical Trigonometry	Spherical Trigonometry

Source: Ibáñez and Llombart 2000, 749; Muñoz 1793b, 1799

done private tutoring in Manila prior to the opening of the nautical school, also realized the inadequacy of basic arithmetic education. The consulado could not paper over the problem. Because of the need to introduce more arithmetic lessons, when the Escuela Náutica finally opened in 1820 it had a three-year program of study.

Thus, Arithmetic was taught in the first year; however, Geometry was also taken up in that year. Drawing, which was placed in year one in Muñoz's 1799 proposal, was taken up in later years. In the second and third years, three other subjects were required: Cosmography, Navigation, and Chart Construction (table 2). It was a watered-down version of the 1799 proposal, as the school's initial curriculum excluded Plane Trigonometry, Spherical Trigonometry, and Geometry and Astronomy. This state of affairs reflected the dearth of expertise and resources in the colony at that time. In fact, Tirado became the school's first professor without the benefit of a competitive examination, as Madrid required.

At the end of June 1821, the consulado abandoned its cost-cutting measure and held competitive examinations for the post of the second professor of the nautical school. Juan Justo Reyes and Camilo de la Peña were the only candidates for the position, and Reyes was chosen unanimously after three days of examination (Ortiz et al. 1821). Originally arriving in Manila in

**Table 2. The Escuela Náutica de Manila's curriculum, 1820**

YEAR	1820
First	Arithmetic
	Geometry
Second and Third	Cosmography
	Navigation
	Drawing
	Chart Construction

Source: Fernandez et al. 1820

October 1816 as a tutor, Reyes had become director of the Escuela Pía and had attempted to make it coeducational (Arcilla 1983, 62); in 1821 he also founded the *Ramillete Patriótico Manilense*, a short-lived newspaper with a liberal and antifriar bent. Because of his political views, Reyes was prevented from assuming his post as the nautical school's second professor (Arrinda et al. 1821, S555B–56; Fernández 1821, S553). As a result, Tirado continued to be the only professor in the first three years of the school, especially as no candidate passed a subsequent competitive examination.

In 1825 José Antonio Vico, First Pilot of the Royal Navy, was the sole candidate who took and passed the examinations; he taught first- and second-year subjects. Until the mid-1830s Tirado and Vico were the only teachers at the nautical school, with a third position unable to be filled. In 1837 Tirado retired and Vico became the new director, a position Vico held until his death in 1859. By 1839 the Escuela Náutica had three new teachers: Mariano Cresini, Leandro Gruet, and Antonio Morata y Martínez. Morata, who taught in the school until 1848, turned out to be the last of the pioneer professors who hailed from the Peninsula. Cresini and Gruet, probably Creoles, were still students of the nautical school when they obtained their teaching positions (Vicente 1860, S119), which the colonial government allowed because Vico and Morata could not handle all the classes, given the increase in the number of students by the mid-1830s.

Henceforth, the Escuela Náutica would rely on its Creole graduates who passed the competitive examinations and were deemed competent to teach in the school, a practice that started about two decades after the school opened and continued until the end of the century (Ay-ad 2016, 542–45).

**Table 3. The Escuela Náutica de Manila's curriculum, 1839**

YEAR	1839
First	Arithmetic
Second	Basic Geometry
	Plane Trigonometry
Third	Spherical Trigonometry
	Cosmography
	Navigation
	Drawing
	Practical Geometry

Source: Dirección General de Estudios 1839, 226–32

Although a case of inbreeding, it nonetheless demonstrated the Escuela Náutica's ability to train capable students who developed the competence required to pass on professional knowledge to succeeding cohorts of students.

### **Curricular Improvements, 1839–1895**

In its second decade of operation the Escuela Náutica de Manila acquired greater stability. Its curriculum would be changed roughly every twenty years, which would enhance its scientific and technical offerings. In 1839 it made its first curricular change, which devoted the entire first year of study to Arithmetic, suggestive of the continuing deficiency in the basic education of student entrants to the nautical school. Arithmetic served as a “bridging course” that would be maintained for most of the remainder of the century, making the Escuela Náutica's program always a year longer than whatever curriculum Madrid designed or mandated. Yet 1839 also saw other branches of mathematics, specifically Plane and Spherical Trigonometry, finding their place in the curriculum (table 3), subjects integral to the vision of Muñoz. Unlike the initial curriculum that paired Geometry with Arithmetic in the first year, the 1839 reform deepened the subject of Geometry, which it divided into Basic and Practical.

In 1850 Madrid issued a royal order that divided the education of pilots for the merchant marine into the theoretical and the practical (Ibáñez and Llobart 2000, 754). The Ministerio de Instrucción supervised the former, while the Real Armada retained control of the latter together with the licensing

**Table 4. The Escuela Náutica de Manila's curriculum, 1860, 1880s, and 1895**

YEAR	1860	1880S	1895
First	Arithmetic	Arithmetic	Arithmetic
			Algebra
			Physical and Political Geography
Second	Algebra	Algebra	
	Elementary Geometry	Plane Geometry	Geometry
	Topography	Plane Trigonometry	Plane Trigonometry
		Planimetry and Stereometry	Meteorology
			Mechanics
Third	Spherical Trigonometry	Spherical Trigonometry	Spherical Trigonometry
	Elements of Geodesy	Topography	Topography
	Surveying		
	Geographic and Hydrographic Drawing		
	Cosmography and Nautical Astronomy	Nautical Astronomy	Cosmography
Fourth	Navigation	Navigation	Navigation
	Meteorology	Meteorology	Maneuvers
	Physical and Political Geography	Physics	
		Topography	Topography
		Hydrography	
		Topographic Drawing	Topographic Drawing
		Hydrographic Drawing	Hydrographic Drawing
		Surveying	

Source: García 1860, 94–95; Gamero 1895

exams. The program of study would take three years, with the basics taught in the first two years and the navigation subjects taken up in the third year.

Just as it did not adhere to the original plan of Winthuysen, Manila's nautical school did not comply fully with the 1850 edict; rather, it revised

the curriculum based on its own context. Of the fourteen subjects found in the 1850 academic reform package issued by Madrid, the 1860 curriculum of Manila's nautical school offered eight subjects that conformed to the plan: Arithmetic, Algebra, Geometry, Geodesy, Spherical Trigonometry, Cosmography, Navigation and Maneuvers, and Hydrographic Drawing (table 4). However, Manila continued to emphasize Arithmetic in the first year, with most of the other subjects taken up in the succeeding three years in a four-year course of study. Moreover, the *Escuela Náutica de Manila* did not offer subjects such as Progressions, Logarithms, and Experimental Physics identified in the 1850 curricular revision from Madrid. Nevertheless, the 1860 curriculum signified a marked improvement over the 1839 curriculum. For the first time, the nautical school included Meteorology in its program of study—anticipating the establishment of the *Observatorio Meteorológico de Manila* five years later.<sup>8</sup>

In the 1880s (no exact date could be determined), another revision in the curriculum was made, which increased the number of subjects in the 1860 curriculum from twelve to sixteen (table 4). More technical subjects were introduced, such as Physics and Planimetry and Stereometry, while subjects already in the curriculum were taught in greater depth and through more than one subject, such as the splitting of Geographic and Hydrographic Drawing into Topographic Drawing and Hydrographic Drawing.

In 1895 the curriculum was reduced to fifteen subjects. Some subjects introduced in the 1880s were removed, particularly Physics and Planimetry and Stereometry. Surveying was also expunged, for reasons we could not explain. Other subjects were moved around in terms of the year these were taken up. However, the addition of two subjects, Algebra and Physical and Political Geography, in the first year was interesting and could be interpreted as a sign of improvement in the basic arithmetic education of entrants to the nautical school. In effect, by the last decade of Spanish rule in the Philippines, the students were deemed as having greater competence in arithmetic than previously such that a school year dedicated exclusively to this subject was no longer deemed necessary.<sup>9</sup>

## **The Tribunal de Comercio**

To meet the challenges of the new economic reality, in 1829 the Spanish government issued the *Código de Comercio* for Spain and its colonies, which stipulated that *Tribunales de Comercio* would supplant the *consulados* or

merchant guilds (Smith 1972, 16; Vas 2005, 83). The crown issued a royal order on 26 July 1832 adopting the commercial code to the Philippines. Consequently, in 1834 Manila's consulado was abolished, and in its place the Real Tribunal de Comercio was established (Díaz 1998, 25). In the following year, a superior decree created the Junta de Comercio, which was responsible for the development of local trade and navigation. The Tribunal de Comercio and the Junta de Comercio were essentially one and the same entity because the members of the former were also associates of the latter. Henceforth, the Tribunal de Comercio would be in charge of the Escuela Náutica de Manila.

The Código de Comercio also required the creation of *auxiliares del comercio* (commercial assistants) such as *corredores de número* (brokers) and *intérpretes de navíos* (ship interpreters) (Casares 1833, S190B; Duazo 1833, S192B–93). These positions required trained and competent individuals, all the more so as the full opening of Manila to world commerce in 1835 and the further expansion of trade heightened the need for competent agents. After some delay, the Junta de Comercio inaugurated the Escuela de Comercio on 15 July 1841 (Oraá 1841) on the same compound as the Escuela Náutica. The school of commerce began to teach the central plank of its curriculum: commercial accounting. However, knowledge of the international languages of commerce was also vital, and in this light the Escuela de Comercio taught French and English.

Beginning in the 1850s students of the Escuela Náutica were encouraged to study languages at the Escuela de Comercio. An informal merger between the two schools developed, especially when in 1851 the Junta de Comercio sought to close the Department of English Language due to low student numbers (Varela and Caviedes 1851). Because he believed nautical students benefited from the department, the general adviser rejected the suggestion, telling the Junta, “if it is not indispensable to you, at least it is very useful to the seafarers” (*si no es indispensable, es al menos muy conveniente a los marinos*) (Rosales 1851, S215B). The Junta de Comercio retained the teaching of English (Muñoz et al. 1852, S222).

### **Ethnicity as an Admission Requirement**

In the Escuela Náutica's initial years it had very low student numbers that did not go beyond twenty in any class. However, during the second decade of its existence first-year enrolment rose to forty-six students in 1833 and fifty-four students in 1835 (Vico 1835, S639). By 1851 the school had sixty-nine students, twenty-nine of them in the first-year Arithmetic class.

At its inception, only children of Spaniards, both Creole and Peninsular, and other Europeans living in the Spanish Philippines could study in the nautical school. The eligibility was extended to Spanish mestizos. No gender was specified, but it was assumed all students would be male. Moreover, the regulation that created the *Escuela Náutica* did not specify any age requirement for admission; but succeeding regulations, starting with those of 1839, required students to be at least 13 years of age—one year older than the age requirement at the *Escuela Náutica de Bilbao* (Ibáñez and Llombart 2000, 750). The age requirement was meant to ensure that prospective students had completed their primary education. Students seeking admission to the nautical school were also expected to be able to read and write in Spanish (although the 1820 regulation did not mention the Spanish language explicitly) and to count. Until 1860 an interview served as the equivalent of an entrance examination.

The ethnic requirement for admission to the *Escuela Náutica* caused quite a stir, given that some educational institutions were already admitting native students. The *Colegio de Niños Huérfanos de San Juan de Letrán* opened its doors to natives as early as 1640, twenty years after it was founded (Manlapaz 1953, 36). The *Universidad de Santo Tomas (UST)* accepted native students, mainly Chinese mestizos, starting in the second half of the eighteenth century (Villaruel 2012, 1:240). A small number of Spanish mestizos also enrolled there (*ibid.*, 1:241–45). However, at the behest of the consulado, ethnicity became a basis for admission at the nautical school—which a newspaper criticized in 1821 (Alzona 1932, 62). The same requirement had been imposed at the *Escuela Pía* when it opened in 1817; it was also applied to the *Escuela de Comercio* when it opened in 1839. However, the ethnic barrier was no longer found in the regulations of the *Academia de Dibujo y Pintura* when it opened in 1849; in the following year, the *Escuela de Comercio* also removed this requirement. For the *Escuela Náutica* it took four decades before the ethnic barrier was lifted.

However, the school could have accepted natives even before the ethnic restriction was removed officially in 1860. One of the very first natives who studied and graduated from the *Escuela Náutica* was Pascual Ledesma y Villasis. Because he graduated in 1863, he was likely to have entered the nautical school in 1859. Ledesma turned out to be a notable alumnus.

Upon graduation Ledesma obtained his license, and at 20 years of age he began to practice his profession as captain; he retired from seafaring after

fifteen years (Fox 1976, 268; Gwekoh 1966; Rodriguez 1993, 11; Villarroel et al. 1965, 146). Ledesma subsequently engaged in overtly political activities. He joined the Katipunan in 1896 (Rodriguez 1993, 11; Villarroel et al. 1965, 146); in 1898 he was appointed director of the navy in the short-lived Malolos Republic (Giagonia 1998, 78; Gwekoh 1966; Rodriguez 1993, 11; Villarroel et al. 1965, 146). In 1906 he became a founding member of the Partido Independista Inmediatista (Rodriguez 1993, 11), which merged with the Partido Popular Independista and the Comité de la Unión Nacional to form the Partido Nacionalista (Cullinane 2003, 293). Some consider Ledesma, the former sea captain, as the “real” founder of the Partido Nacionalista.

We have not found data on the number of graduates of the Escuela Náutica de Manila; hence, we do not know the exact number of natives vis-à-vis nonnatives who graduated from the school in the nineteenth century. At best, there are estimates of the number of students the school had, which are discussed in this article.

Nonetheless, apart from Pascual Ledesma, we do know that the most notable graduate of the Escuela Náutica was Juan Luna. Apparently, Juan entered the nautical school in 1869, when he was 12 years old, at the same time as his older brother, Manuel Andrés (Da Silva 1957, 260), who was 13 years old. Juan obtained his license in 1874 ahead of Manuel Andrés, who obtained his license in 1877 only (ibid., 260; Manuel and Manuel 1986a, 265; Manuel and Manuel 1986b, 240–41; Pilar 1980, 37). After five years of theoretical courses and practical sailing to Asian ports such as Hong Kong, Amoy, Singapore, and Batavia, Juan obtained the certificate of *piloto de altos mares tercer clase* (pilot of the high seas third class). While in port during his two-year apprenticeship, he took up landscape painting. Soon after passing the examination for third pilot in 1874, he studied at the Academia de Dibujo y Pintura. In 1877, however, the brothers decided to pursue artistic education in Europe (De la Rosa 1953, 17; Alip 1957, 248; Manuel and Manuel 1986b, 241). Juan distinguished himself by winning a gold medal in the 1884 Exposición Nacional de Bellas Artes de Madrid for his *El Expoliarium* (The Spoliarium).

## **The 1863 Earthquake and Its Aftermath**

During the earthquake (*terremoto*) that struck on 3 June 1863 the building of the Escuela Náutica de Manila was severely damaged; its roof collapsed completely, and its entire façade along Cabildo Street crashed (Camps 1863;

**Table 5. The state of the furniture and equipment of the Escuela Náutica de Manila as a result of the 1863 earthquake**

ITEMS	IN GOOD CONDITION	REPAIRABLE/ SERVICEABLE	BEYOND REPAIR
<b>Furniture</b>			
Narra writing tables			3
Long tables			2
Small narra tables		3	3
Narra shelves with glass doors	1	1	
Narra armchairs	1		3
Narra chairs		4	14
Narra benches		9	6
Long benches without support		3	3
Long narra benches for one individual		8	4
Hat racks		2	1
Large blackboards with frames and narra pedestals		1	3
Blackboards		3	2
Pottery spittoons		1	3
Ink bottles and sandboxes	✓		
A roll with flags of countries/states of the globe			1
A roll with the portrait of School director, Don José Tirado			1
A roll with the portrait of Don José Antonio Vico		1	

González 1863, S759).<sup>10</sup> The Escuela de Comercio was similarly affected, with the Bookkeeping and English Language Departments the only ones spared from destruction (García et al. 1863; Webb 1863). As a result, both schools were closed until new premises could be found, which was not easy as many other edifices had been damaged severely. In November the schools were moved to one of the houses of Fernando Muñoz—a member of the Tribunal de Comercio since 1856 (Anon. 1855, 104)—located at 16 San Juan de Letrán Street in Intramuros (Felipe 1863, S806B; García de Arias 1880b, S171; Muñoz 1881, S815). The house had four rooms where both

ITEMS	IN GOOD CONDITION	REPAIRABLE/ SERVICEABLE	BEYOND REPAIR
<b>Equipment, drawing, and others</b>			
Spheres (celestial, terrestrial, and armillary)			3
Solar system machine		1	
Marine barometer			1
Old sextants		2	
Octant		1	
Astronomical telescope	1		
Nautical compasses		2	
Set of geometrical solids			1
Old chronometers		1	1
Artificial horizon			1
Pocket-size sextant	1		
Surveyor's cross	1		
Seafaring binoculars	1		
Calking iron	1		
Pocket-size pencil case	1		
Astrolabe	1		
Ancient sets of charts of ports and harbors		2	
Card games		1	
Universal spherical chart		1	

Source: García et al. (1863, S719–20B)

vocational schools could fit. The Escuela Náutica, along with the Escuela de Comercio, reopened the following January. Before the earthquake, the nautical school's academic calendar began in June, but with the disaster the start of its academic year was moved to January, a practice that would remain in place until 1874.

Due to the 1863 earthquake, the pieces of furniture of the nautical school were mostly beyond repair. However, its equipment was largely in good condition or at least serviceable, although some could not be salvaged (table 5). The list of equipment in table 5 provides us an idea of the school's

navigation-related instruments, which offered a full range of the requisite tools (cf. Kennerley and Seymour 2000). These instruments, which bear listing down in detail, were conceivably not closed off in an inaccessible cabinet, as in “The Physics Class.”

In 1860 the professor of Topography and Surveying requested several instruments to be bought for his class. Despite the usual bureaucratic delays, perhaps some of the instruments requested (González 1860; Contaduría General de Ejército y Hacienda de Filipinas 1861)—such as compasses, a barometer, a surveyor’s cross, a sextant, and so on—had been acquired as some of those items appeared on the list in table 5. It is noteworthy that the professor requested these instruments to be bought as necessary for the proper teaching and learning of the course, instead of students merely looking at images of these instruments on plates (González 1860, S101B–2B). His request was meant to upgrade scientific education in the nautical school.

Budget-wise, however, the school languished. The school’s budget, which had risen to ₱700 (when exactly the budget was raised could not be pinpointed from the records), was lowered to ₱480 shortly before the 1863 earthquake (Inchausti et al. 1863, S765; Ormaechea 1863, S753). The inopportune timing of the budgetary reduction added to the school’s financial woes.

Moreover, despite the lifting of the ethnic restriction, the Escuela Náutica’s student numbers did not rise higher than the enrolment rates in the 1850s, which ranged from a total of sixty to seventy students. In the wake of the 1863 earthquake, enrolment dipped (table 6). Because of the school’s continuing difficulties with its physical infrastructure and some problems related to its faculty, enrolment remained low until the 1880s. However, it was during this period when the nautical school welcomed the young Juan Luna.

### **Threatened Closure of the Escuela Náutica**

Since the 1863 earthquake the nautical school had been in dire financial straits because of the additional expenses for the replacement and repair of its furniture and equipment and the rent it had to pay for its premises. The tremor (*temblor*) that occurred on 18 July 1880, although of less intensity than that of the 1863 earthquake, made the situation even more problematic, with classes being held in the homes of the individual professors until repairs

**Table 6. Number of students at the Escuela Náutica de Manila, selected years, 1860 to 1880**

YEAR	ARITHMETIC	ALGEBRA, BASIC GEOMETRY, AND PLANE TRIGONOMETRY	APPLIED GEOMETRY AND HYDROGRAPHIC DRAWING	SPHERICAL TRIGONOMETRY, COSMOGRAPHY, AND NAVIGATION	TOTAL
1861	39	12	10	10	61
1862	39	12	10	10	61
1863	45	13	8	8	66
1878	20	2	4	4	30
1880	20	4	1	1	26

Sources: Fernández (1883, table 25); García (1880a); San Pedro (1865–1868, 4:226); Anon. [1862?], 102–3; Anon. [1863?], 199

to Muñoz's house were completed in August 1881. As a result, the colonial government studied the option of closing down the Escuela Náutica and the Escuela de Comercio.

In 1888 the UST and the Ateneo Municipal de Manila were asked if they could absorb the academic programs of the two vocational schools, which could then be abolished. However, both institutions replied in the negative (Sanz 1888, S531–32B). It served as the opportunity to highlight the unique educational contributions of the two vocational schools.

Miguel Rosés (1888), the principal of the Ateneo Municipal, believed that his institution could teach the mathematical courses of the Escuela Náutica and the business courses of the Escuela de Comercio, but it could not handle the piloting subjects. The rector of UST, Fr. Gregorio Echevarria, vehemently expressed his disapproval of the planned closure of the two secondary schools. Along with Letrán and the Ateneo Municipal, the Escuela Náutica and the Escuela de Comercio offered both the *estudios generales* (which were required to enter the law, medicine, and ecclesiastical faculties) and the *estudios de aplicación* (which were required for vocational careers) (Echevarria 1888, S541B–42). Because the Escuela Náutica and the Escuela de Comercio both offered the *estudios generales*, they provided the type of secondary education that was indispensable for admission to the university. Moreover, even if some subjects were also taught at the university (table 7), the Santo Tomas rector emphasized that the level of teaching was different and therefore the secondary schools served a distinct purpose (ibid., S544–44B).

**Table 7. Subjects taught at the Escuela Náutica de Manila compared with other educational institutions, 1880s and 1895**

	ATENEO MUNICIPAL	ESCUELA NORMAL DE MAESTROS DE INSTRUCCION PRIMARIA	ESCUELA NORMAL SUPERIOR	ESCUELA PRACTICA DE AGRICULTURA	ESCUELA PRACTICA PROFESIONAL DE ARTES Y OFICIOS	UST
Algebra	✓			✓		✓
Arithmetic	✓	✓	✓	✓	✓	✓
Cosmography						
Geometry	✓		✓	✓	✓	✓
Hydrographic Drawing						
Maneuvers						
Mechanics					✓	
Meteorology						
Navigation						
Physical and Political Geography						
Physics	✓				✓	✓
Plane Trigonometry	✓					
Spherical Trigonometry						
Topographic Drawing						✓
Topography				✓	✓	✓

Source: Arcilla (1983, 73; 1984, 381-82); Bazaco (1953a, 13-16; 1953b, 8); Echevarria (1888, S542-42B); Meeny (1982, 495)

In fact, as shown in table 7, the Escuela Náutica was the only educational institution that offered science subjects such as Meteorology and navigation-related courses. It was also the only other entity apart from the Ateneo Municipal that offered courses in Trigonometry, Mechanics, and Topographic Drawing.<sup>11</sup> By 1895 its curriculum was the only one that offered Physical and Political Geography.

Father Echevarria (ibid., S545B–46B) summarized his views on the nautical school as follows:

Si la Escuela Náutica llena o no al presente los fines de su institución no lo dirá este Rectorado; pero si le parece que bien montadas las clases extendiendo las explicaciones de las asignaturas del pilotaje a la navegación en vapor, con escogido personal y buen material de enseñanza . . . y a la juventud abre una puerta [más] por donde pueden servir mejor a los [intereses] del Estado cuales son los de la Navegación de estas Islas a la vez que obtienen una posición decoroso entre sus conciudadanos.

Whether the Escuela Náutica does or does not fulfill the objectives of the institution, the Rectorate cannot say; but it appears to him that the subjects are well conducted, providing the explanations on the subjects of pilotage and navigation of steamships, with choice faculty and good teaching material . . . and the school opens the door wider for the youth to better serve the interests of the State and the state of navigation of these islands, and at the same time get a decent position among their fellow citizens.

Evidently the rector's favorable assessment of the Escuela Náutica (as well as of the Escuela de Comercio) was reassuring to the colonial government, which discarded the plan of closing down these schools (Sanz 1888, S532B–33).

### **Creole Dominance: The Student Body in the 1880s**

The school's director explained that the low enrolment was due to the waning of the allure of the nautical profession, and some students were using the Escuela Náutica simply as a stepping-stone to some other more lucrative career: "the students only study the subjects corresponding to the first two years of school in order to shift to another career that is more lucrative" (los

alumnos sólo estudian las asignaturas correspondientes a los dos primeros años escolares con el fin de obtener con los adquiridos en ellos otra carrera que sea más lucrativa) (Comisión Central de Manila 1887, 95).

Apart from the generally low status of the nautical profession, it would appear that the opportunity structure to access the better-paying posts of maritime officers were skewed against natives; hence, not more of them enrolled at the Escuela Náutica de Manila in order to pursue a career as ship pilots. The countless natives who became seafarers in the course of the nineteenth century were generally ordinary crewmembers or ratings (cf. Aguilar 2012, 370–74; 2014, 30–36), who being unlettered most likely did not possess the credentials of a nautical education.

Because of the colonial state's decision to keep the school, it soldiered on until the end of the century. In later decades students of Spanish descent would represent about half of the student body, which was an inordinate proportion when seen against the small proportion of Spaniards vis-à-vis the total Philippine population. Although natives had been allowed to study in the nautical school officially since 1860, the available data suggest that their numbers did not exceed half of the student body.

The list of student applicants for 1880–1881 offers some interesting details in terms of ethnicity, age, and residence, including Albay, Bulacan, Capiz, and Pampanga (table 8). (Those with no specified ethnicity are assumed to be natives.) Of the twenty-three applicants, ten (43.5 percent or more than two-fifths) were Spanish, mostly Creoles, with a couple identified as Spanish mestizos. One was identified as Peninsular, who was already studying in a nautical school in the Basque region but was intending to transfer to the school in Manila. The number and proportion of applicants of identifiable Spanish descent at the Escuela Náutica contrasted with the applicants to the Bookkeeping class of the Escuela de Comercio for the same year: out of a total of thirty-four applicants, only seven were of Spanish descent (Ay-ad 2016, 553–54), representing 20.6 percent only or roughly one-fifth. The Escuela Náutica was a far more Creole institution than the Escuela de Comercio.

The applicants to the nautical school for 1888–1889 numbered twenty in all, with only a handful coming from outside of what today would be called Metro Manila (table 9).<sup>12</sup> Interestingly, one applicant was a “minor” from the Marianas, while someone from Lemery, Batangas, was 20 years old. Apart from the Spanish mestizo from Agaña, eight Creoles were listed among the applicants. Applicants of identifiable Spanish descent represented

**Table 8. Student applicants at the Escuela Náutica de Manila, 1880–1881**

NAME	ETHNICITY	AGE	RESIDENCE
Arliagabeitia y Aldamir, Robustiano	Peninsular		Spain
Calixto, Edilberto			Tondo
Canals y de la Rosa, José			Binondo
De la Paz, Maximo			Marikina
De Leon, Nazario		Minor	Quiapo
De los Reyes, Teodoro			Quiapo
Del Rosario, Estanislao			Binondo
Dionisio, Eriberto			Lubao, Pampanga
Garchitorena, Cezar de	Creole		Binondo
Gonzalez, Francisco	Creole	15	Binondo
Infante, José	Creole		Binondo
Kerr, Enrique	Creole		
Lim, Leon			
Navas y Vidal, Salvador	Spanish mestizo	14	Capiz
Peña, Cesario	Spanish mestizo		Tondo
Periquet y Adriemden, Gerardo	Creole		
Raymundo, Calixto			Tambobón
Roco, Antonio	Creole	14	Ligao, Albay
Sandico y Cuyugan, Ceferino			Mexico, Pampanga
Santiago, Alejandro			Obando, Bulacan
Santos, Juan		17	Manila
Santos Paraiso del Rosario, José			Binondo
Serrano, Bonifacio	Creole		Pandacan

Source: Ay-ad 2016, 550

45 percent of the total. In contrast, seventy-two applicants wanted to enter the Bookkeeping class at the school of commerce in the same period of 1888–1889 (*ibid.*, 555–56). Of this number, ten were of Spanish descent (six Creoles, three Spanish mestizos, and one Peninsular), or about 14 percent

**Table 9. Student applicants at the Escuela Náutica de Manila, 1888–1889**

NAME	ETHNICITY	AGE	RESIDENCE
Altonága, Ramon de	Creole		Binondo
Arguelles, Cecilio	Creole	15	Quiapo
Auchavala y Ortuiste, Miguel	Creole	16	Quiapo
Baza y Martinez, Juan	Spanish mestizo	Minor	Agaña, Marianas
Cantero y Castañeda, Angel		18	Quiapo
Casas y Noriega, José			Santa Cruz
Concepcion, Luis	Indio	17	Marikina
Dangalan, Cornelio		15	Binondo
De Lara y Agnas, Lupo			Mexico, Pampanga
Delgado y Garcia, Quintin		17	Ermita
Ferrer y Peredo, Ysidro	Creole	18	Manila
Franco, Antonio		16	
Garcia, Tomás		Minor	San Fernando de Dilao
Gonzalez, Francisco	Creole	15	Binondo
Infante, José	Creole		Binondo
Montilla y Ortaliz, Agustin	Creole	18	Sampaloc
Nieto, Enrique	Creole	17	Quiapo
Panganiban, Filomeno		20	Lemery, Batangas
Roxas, Mariano		18	Manila
Sucgang y de la Cruz, Graciano		15	Santa Cruz

Source: Ay-ad 2016, 551

only of all applicants. In both absolute and relative terms, more natives were seeking to study at the Escuela de Comercio than at the Escuela Náutica. By and large, the Escuela Náutica de Manila was a primarily Creole institution, with Creoles constituting the faculty and accounting for a disproportionate share of the student body.

## **Assessments of the Escuela Náutica de Manila: From Spanish to US Rule**

Over the years the nautical school strengthened its curriculum, and it took steps to deepen the teaching of science courses. As we have seen, Father Echevarria, UST rector, was positive enough about the school to object to its closure. His was not the only favorable assessment from within the colonial establishment.

In the mid-1860s, even as the school was still recovering from the devastating 1863 earthquake, one Spanish official declared: “the Nautical Academy of Manila is at a high level of perfection that it can well be among the best schools of its kind” (*la Academia de Náutica de Manila se halla a una altura de perfección cual pueden estar las mejores academias de su clase*) (Govantes 1867, S249B). After conducting an inspection of the nautical school another Spanish official stated, “in it the education that the students receive . . . [is] at a level in which it can be among the best academies of its kind” (*en ella la instrucción que reciben los alumnos . . . a la altura en que pueden hallarse las mejores academias de [esta] clase*) (Vizmanos 1867, S245).

Commendation came not only from Spanish officials, but also from non-Spanish observers who commented on the quality of education offered by the Escuela Náutica, although for any of these assessments, both Spanish and non-Spanish, we cannot be assured of the observers’ impartiality.

In the mid-nineteenth century, Robert MacMicking (1967, 165) praised the nautical school for its academic training: “it is a most useful institution where arithmetic, geometry, and navigation are taught gratuitously at an expense to Government of nearly 2,400 dollars a year.” However, he observed its lack of practical application as gauged from the level of competence of its graduates: “At this place, boys are very well trained up in the scientific and theoretical part of their profession; but unfortunately, for some cause or other, their education afterwards as practical seamen does not keep pace with it.” In addition, MacMicking (*ibid.*) noted that the school’s graduates “generally are much behind our British or American shipmasters in all relating to the sea as can well be conceived, although they are not unfrequently superior to them, and at least are equal, in their theoretical attainments.” MacMicking’s view was influenced by the instruction in the art of navigation in the British tradition being more hands-on than theoretical, and it was learned at a younger age (Schotte 2019, 93–99; Wilson et al. 2015, 27–30).<sup>13</sup> In other words, the Escuela Náutica de Manila was superior to its

British or American counterparts in terms of theoretical knowledge, but not in practical matters. Perhaps, too, the graduates of Manila's nautical school were too self-conscious about their social status that they did not know how to translate their theoretical knowledge into practical skills:

I rather think that the lads educated here are taught too much (if that is possible), and by being so, have their ideas raised above their stations; for many of them are by a great deal, much more like gentlemen than a number of the merchant skippers or mates in our British ships, whose horny fists and tar-stained dress make few pretensions to outward gentility. (MacMicking 1967, 165)

For his part, John Bowring (1963, 118) who in the mid-nineteenth century had a generally negative appraisal of colonial education in the Philippines—"the provisions are little changed from those of the monkish ages"—admitted nonetheless that "[t]here is a nautical school, of which I heard a favourable report" (*ibid.*).

In the early years of American colonial rule assessments of the Escuela Náutica de Manila were also made. Acting Superintendent W. J. Colbert praised the scientific knowledge of the school's students, which he held as the exception to what he considered the intellectual feebleness of Filipinos:

The Filipino is said to be deficient in reasoning power, and this is true to a great extent; yet the results obtained in sciences have been very good. In many instances wonderful progress has been shown. From my knowledge of American institutions of learning I am certain that on the completion of their course in school, 4 of the 6 boys in the highest class could stand in the first third of the entering class in the scientific department of any universities or colleges in the United States. Their work in mathematics is superior to that of any American class I ever saw. (Jernegan 1905, 664)

Moreover, at least one report praised the school's equipment, stating:

The study of mathematics has always been made the strongest feature of the course, and from time to time a considerable sum of money, amounting in all to something over \$10,000, was provided by the

Board of Commerce and expended for equipment by the educational officials of the Spanish Government, some of the apparatus being yet in possession of the school and in use in its work. (Bureau of Education 1904, 7)

## **Conclusion**

Although arriving at an objective evaluation of the Escuela Náutica de Manila may not be possible, we are able to acquire a sense of the unique place it occupied in Spanish colonial education. Over the course of the nineteenth century the school advanced a basic understanding of several fields of scientific knowledge related to navigation, teaching students in a manner very much unlike the physics class portrayed by Rizal.

Initially, the nautical school adapted to its local context by emphasizing Arithmetic, but eventually it felt confident to introduce more scientific subjects as part of its curriculum and to stress mathematics, which became its strength as the early American educationists noted. To British observers in the late nineteenth century the teaching at the nautical school was too theoretical for an area of expertise that was inseparable from its practical application. Nevertheless, the Escuela Náutica de Manila evidently offered a good foundation in the sciences—and later even in a foreign language through its partnership with the Escuela de Comercio—such that students could use the knowledge gained from that school to choose a variety of career options, which included teaching in the school, practicing the seafaring profession, and moving on to other fields.

However, even in the 1850s when it had its highest enrolment, the Escuela Náutica catered only to a small number of students totaling between sixty and seventy per year. By the 1870s and 1880s, it struggled to reach half this number, with relatively few natives seeking admission to a school that was predominantly Creole and not seen as leading to a decent career. Still, for natives who were genuinely interested in a career at sea, Ledesma's example showcased the fact that anyone who wanted to pursue a seafaring career could be served well by the Escuela Náutica de Manila. This pilotage school was a beacon of scientific education in the Spanish Philippines.

## **Epilogue**

Closed during the revolutionary period at the end of the nineteenth century, the nautical school was reopened by American authorities on 15 December

1899 and later given the name Philippine Nautical School; it was closed in 1907 but revived in 1913 (PMMA 2020). The Japanese expanded it “into a bigger establishment that included not only training of nautical officers but also of marine engineers and ordinary seamen” (bid.). However, in the postwar period the school went into decline. To revive the school, in 1963 Republic Act 3680 converted the Philippine Nautical School into the Philippine Merchant Marine Academy (PMMA), at a time when Filipino global migrations were beginning to gain momentum (Aguilar 2014). At present, the academy offers a four-year curriculum leading to the Bachelor of Science degrees in Marine Transportation and in Marine Engineering. Students spend the third year at sea on board a commercial vessel as deck cadets. The school is simultaneously a military academy, and its graduates are commissioned as ensigns (second lieutenants) in the Philippine Navy Reserve. With the termination of US military installations in the Philippines in 1992, Naval Station San Miguel in Zambales was turned over to the Philippine Navy. In 1996 a portion of this naval station was allocated to the PMMA by Proclamation 937, signed by Pres. Fidel V. Ramos on 16 December 1996 (*Official Gazette* 1996). In 1997 the academy was placed under the direct supervision of the Commission on Higher Education. Two hundred years after the Escuela Náutica de Manila was founded, its successor institution is still state-run but has adapted to the demands of the global maritime industry in training aspiring Filipino seafarers for global qualification in nautical science.

## Abbreviations Used

<b>NAP</b>	National Archives of the Philippines
<b>PMMA</b>	Philippine Merchant Marine Academy
<b>SDS</b>	Spanish Documents Section

## Notes

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- 1 Evergisto Bazaco (1953a, 150) and Dalmacio Martin (1980, 26) had claimed that nautical schools were established in Ternate (Cavite) and in Zamboanga. Both authors, unfortunately, did not cite

sources for their claims. In fact, Bazaco (1953a, 150) totally disregarded the nautical school in Manila when he wrote, "Schools for the training of pilots are of old standing in Oriental Spanish colonies, but the most important were those of Zamboanga, Cavite, and Ternate." This clarification rectifies the statement in Aguilar (2012, 373; 2014, 34).

- 2 In 1904 Leoncio Gonzáles Liqueste was managing editor of *La Democracia* and was "a member of the Honorary Commission which was sent to the Exposition at St. Louis, [which] left the Islands on the 23d of April, 1904" (Supreme Court of the Philippines 1906).
- 3 According to Benito Legarda (1999, 39), the *consulado* was "composed of a *prior*, two *consuls*, and four deputies." It replaced a previous body in charge of allocating shipping rights, but problems of fraud and favoritism persisted in the galleon trade.
- 4 Written in September 1788, Muñoz's "Reflexiones sobre los establecimientos Ingleses de la Nueva-Holanda" (Reflections concerning the English establishments in New Holland) was influential in causing Alexandro Malaspina's expedition to the Pacific to include in its itinerary a visit to the new English colony in New South Wales in order to obtain first-hand observations (King 1999).
- 5 In his classic *The Manila Galleon*, William Schurz (1959, 203) explained, "There was generally lacking a personnel trained on the sea... There was no such institution as the *Casa de Contratación* for the training of officers. A scheme to place the sons of the Spanish families in Manila on the galleons in order to secure their practice as cadets that would qualify them to become officers was never realized." The pilot of a galleon "was often a foreign specialist" (Marley 1993, 175).
- 6 For an overview of foreign trade in the nineteenth century, see Legarda 1999, 93–145. For data on the accelerating number of ships entering the Philippines from 1818 to 1897, cf. *ibid.*, 111–13.
- 7 Alston Kennerley (2002, 6) has opined that "approaches to teaching nautical astronomy in the sixteenth century remain valid to day."
- 8 One wonders if the native staff hired by the Manila Observatory, discussed by Kerby Alvarez (2016, 405–7), were graduates of the Escuela Náutica de Manila.
- 9 Regrettably, there is no definite information on how the school administered practical training at sea. The only available information is Juan Luna's account of his seamanship, which entailed thirty months at sea in the final three years of his education (Pilar 1980, 36–37). If his experience was the norm, then the nautical school's practical training would have been shorter than the minimum of three years (thirty-six months) required by English training (Schotte 2019, 175). In the Royal Naval Academy at Portsmouth graduates spent four years at sea before taking the licensure exam (Wilson et al. 2015, 29).
- 10 During the 1863 earthquake the eminent clergyman Fr. Pedro Peláez, who led the campaign for the rights of secular priests, perished, together with other Catholic Church officials, "crushed by the [Manila] cathedral's falling debris as they attended the solemn vespers of the feast of Corpus Christi" (Blanco 2010, 31).
- 11 Although table 7 shows that the Ateneo Municipal also had Trigonometry, it was unclear whether it was Plane or Spherical Trigonometry; Geography was also offered but it was not indicated whether it also included Political Geography.
- 12 Interestingly, the name of the Creole José Infante from Binondo appears in both lists of applicants in 1880–1881 and 1888–1889.

- 13 In the eighteenth century, British "Officer training was immersive, experiential, and practical; it was delivered on an informal, ad hoc basis on board ships in commission. The system stands in stark contrast to the shore-based, theoretical approach adopted by the Danish Navy" (Wilson et al. 2015, 27).

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