

Review

Margaret E. Schotte:

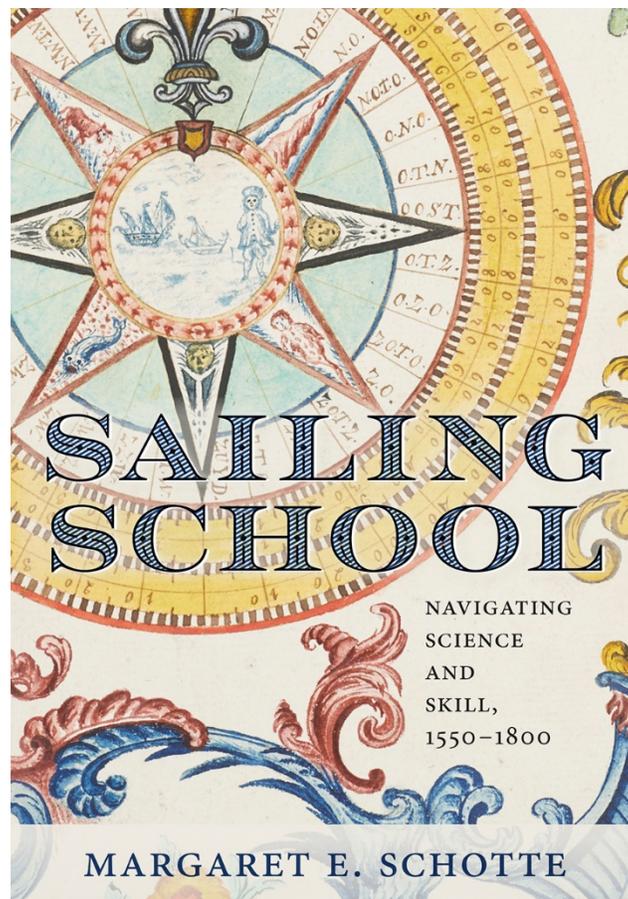
Sailing school:

Navigating science and skill, 1550-1800

Baltimore: Johns Hopkins University Press, 2019. 320 p.

ISBN 9781421429540

Reviewed by Timothy S. Wolters



For some six decades English-language scholars interested in the practice of early modern navigation have used David W. Waters's *The art of navigation in Elizabethan and early Stuart times* and the applicable chapters of Eva G. R. Taylor's *The haven-finding art* as standard reference works on the subject (Waters 1958; Taylor 1957, 151-263). And while both of these books have withstood the test of time reasonably well, there has long been a need to re-examine the history of marine navigation in the early modern era through newer historical methodologies and more recent historiographical perspectives. *Sailing school*, a superb monograph by Margaret E. Schotte, accomplishes just that, significantly enriching historians' understanding of the art and science of early modern navigation.

Revised and expanded from the author's doctoral dissertation, *Sailing school* is a transnational exploration of the ways in which early modern sailors acquired navigational expertise. Schotte organizes her book chronologically and incorporates an introduction, a prologue, five main chapters, and an epilogue. The prologue and main chapters examine the evolving training regimens and navigational practices of key maritime communities in Western Europe from the middle of the 16th until the end of the 18th century, while the epilogue considers the changes that occurred and the continuities that endured throughout a quarter-millennium of European exploration. Schotte begins her story on the Iberian Peninsula in the mid-16th century, a place and time that witnessed publication of two seminal navigational texts (Pedro de Medina's *Arte de navegar* and Martín Cortés's *Breve compendio de la sphaera y de la arte de navegar*) and the creation of the first formal school for navigators at the *Casa de la Contratación* in Seville. She then shifts her focus to Amsterdam in the 1580s, 1590s, and early 1600s, where Dutch teachers, authors, and publishers integrated the book into navigational education. The emerging importance of the printed word was paralleled by the growing mathematization of navigational practice, which in the 17th century involved the incorporation of trigonometry. Here the central figure was Guillaume Denys (1624-1689), an ordained priest who French naval minister Jean-Baptiste Colbert placed in charge of Dieppe's *École Royale d'hydrographie* in 1665. Schotte deftly brings this important yet little known figure to life. Denys taught many hundreds of students during his career, and his navigational texts "revolutionized the French maritime world" by revealing to Colbert and others "the benefits of mathematical rules" in the practice of marine navigation (74, 89).

In her next chapter, Schotte crosses the channel in order to examine a new model of navigational education adopted by the English in the latter 17th century. Like their contemporaries in other European nations, late Tudor and early Stuart administrators met the navigational needs of England's navy and merchant marine through a combination of traditional, experiential learning and the newer,

classroom-based methods pioneered by innovators like Guillaume Denys. By the 1670s, though, England's "want of able pilots" (100) – to borrow the language of naval administrator Samuel Pepys – led King Charles II to establish a Royal Mathematical School in West Sussex. The purpose of the new school was to provide early-adolescent boys, distinguished by the blue coats they wore, a solid foundation in arithmetic, geometry, and trigonometry, as well as to introduce them to the score of navigational instruments they would use once they left school and embarked on maritime careers. Schotte claims the English model derived, in part, from the country's emphasis on maritime trade, but also notes that "the seemingly inexorable shift toward more mathematics" was tempered by "a simultaneous push to retain manual dexterity" (110). She returns to the continent in *Sailing school's* penultimate chapter, examining Dutch navigational training techniques and methods over the century running from the 1660s to the 1760s. As in England, "hands-on instruction was a key to unlocking the theoretical questions of navigation" in the Netherlands (122), but Dutch textbooks had several unique characteristics and the schools tended to be smaller than the larger state institutions favored by the Spanish, French, and English. Schotte's final chapter takes readers to the southern Indian Ocean, where she recounts the harrowing saga of HMS *Guardian*, a Royal Navy frigate that lost steering after hitting an iceberg on Christmas Eve, 1789. Schotte chronicles how, for nearly two months, *Guardian's* commanding officer, Lieutenant Edward Riou, employed the navigational skills and techniques he had learned in the classroom to navigate his crippled vessel back to shore. She stresses that even in crisis, Riou never "abandoned his theoretical daily tasks" and always made time "to carry out the requisite calculations" relevant to his navigational responsibilities (166).

Sailing school, like most books derived from history doctoral dissertations, draws from a wide array of primary sources, but Schotte's research is particularly impressive. She consulted archival records in six nations on three continents, making heavy use of the collections at the *Bibliothèque nationale* in Paris, the national archives of both the United Kingdom and the Netherlands, and manuscripts housed in some of the world's most prominent maritime museums, including the National Maritime Museum in Greenwich, the *Maritiem Museum Rotterdam*, and *Het Scheepvaartmuseum* in Amsterdam. The book's bibliography lists more than 250 printed navigational treatises from the 16th, 17th, and 18th centuries, and Schotte demonstrates a close familiarity with the relevant secondary literature. The depth of Schotte's research lends itself well to the transnational perspective she adopts, laying bare how different commercial, military, and political interests shaped the training of navigators and the practice of marine navigation in the early modern world.

Readers of this journal will perhaps find *Sailing school's* first and fourth chapters of greatest interest. In the former, Schotte explores navigational training in late 16th and early 17th-century Amsterdam, “an ideal place . . . to trace the broader cultural ramifications of navigational knowledge” (28). She makes this claim because Amsterdam is where the book emerged as a seminal vehicle for the transmission of nautical expertise. The Dutch drew upon elements of the Iberian model, but unlike the professors at the *Casa de la Contratación*, Dutch educators were seldom of high social status. Rather, they were more likely to be entrepreneurs who taught in small, private venues. In the latter 1580s many of them embraced a navigational textbook written by Dutch cartographer Lucas Janszoon Waghenaer, *Spiegel der zeevaerdt*. Waghenaer, a former sailor, believed the best way to learn navigation was under the tutelage of an experienced navigator, but he also thought sailors could benefit from book learning. Others agreed, and there arose in Amsterdam a robust market for maritime texts. This demand spurred a general-interest publisher named Cornelis Claesz (1551-1609) to start specializing in nautical books. He translated and reprinted many foreign titles, bringing little known Spanish- and English-language texts to the Dutch market. Along with the ever-popular *Spiegel der zeevaerdt*, Claesz sold nautical texts in a small retail space located at the mouth of the Amstel river. Schotte does a nice job taking readers into Claesz’s bookshop (48-57), where shoppers might find a Dutch translation of Medina’s *Arte de navegar*, or a text on navigational instruments by Flemish engineer Michiel Coignet (*Nieuwe onderwijsinghe*, 1580 [editio princeps]), or the first formal work to detail how to maintain a nautical logbook (*Tractaet vant zee-bouck-houden*, 1597). For Schotte, Claesz and his brethren were important not just because they sold books to aid sailors, but also because they exposed the Netherlands as a whole “to new mathematical tools and visual modes of abstract thinking” (61).

In the latter of the two chapters that focus on Dutch navigation, Schotte explores the contributions of Claas Gietermaker (1621-1667), an individual who served as a nautical examiner for both the Dutch West India Company and the Dutch East India Company in the 1660s. At the beginning of that decade Gietermaker had published *'t Vergulde licht*, a nautical textbook that combined existing print traditions with several novel features, the most enduring of which was the practice exam. The use of exams to certify navigators had originated at the *Casa de la Contratación* and then spread to other areas, including the Netherlands. According to Schotte, Gietermaker’s innovation helped transform nautical pedagogy and codified the format of written navigational exams for more than a century. As part of their studies, students composed hand-written notebooks in which they worked through problems presented in *'t Vergulde licht* and the numerous imitators that followed. In the Netherlands these workbooks

were known as *schatkamers*, and Schotte effectively mines surviving specimens to peer into the world of the aspiring Dutch navigator. She draws attention to the colorful and often fanciful traverse diagrams penned by students, three of which are reproduced in the book's illustrations (plates 5, 6, and 7), and argues that *schatkamers* afforded "the quintessential type of 'pen in hand' learning," a tool that enhanced students' abilities "to visualize concepts – particularly geometric relationships – and memorize formulas" (123). Schotte reports that by the 18th century, mariners from the Netherlands "were better educated and more comfortable with mathematics than their peers elsewhere" (146).

At a broader level, *Sailing school* is rich in empirical detail and offers a welcome addition to the rather limited literature on technical education in the early modern world. Indeed, one of the book's greatest strengths is its engagement with wider issues of interest to historians. To begin, Schotte adds to the growing corpus of historical scholarship that investigates men and women whose socio-economic status was distinct from the masses but removed from the truly elite. Situating her subjects within the broader contexts of both the Enlightenment and the Scientific Revolution, she notes that navigators and those who taught them have long been overdue "for inclusion in the annals of early modern natural philosophy precisely because of their intermediary position between 'high' and 'low' science" (6). Schotte also argues, and convincingly so, that the printed book "had an outsize impact on the practice of navigation in early modern Europe" (177). In this regard her work is groundbreaking, for she is the first author to conduct a critical analysis of the nautical textbooks, school curricula, and student workbooks that shaped, and were shaped by, navigational practice. As Schotte points out, printed works could hold large sets of important navigational information (e.g., ephemerides) that allowed mariners to focus cognitive skills on mathematical calculations rather than on the memorization of geographic and calendrical details. Books also allowed the reproduction of images, most importantly, diagrams and maps. Finally, Schotte takes to task authors who recount stories of technological change but portray culture as static. To be sure, early modern Europe had some shared nautical traditions, but the sailors themselves were hardly timeless. Mariners embraced the printed word as an effective means of transmitting knowledge, both tacit and overt, and her analysis of the materials they read, studied, and assiduously worked through reveals much about emerging modes of human thought.

Other than the list price of \$59.95 (USD), something perhaps unavoidable given budgetary pressures facing university presses in the United States, *Sailing school* invites little criticism. The book is probably too technical for an undergraduate audience, but it would be a welcome addition to the reading lists of graduate courses in either the history of science and technology or in early

modern European history. Schotte, in combination with Johns Hopkins University Press, has produced a beautifully illustrated, perceptively argued, well-written monograph that enhances historical understandings of not just early modern navigation, but also of early modern technical education and the lived experience of the pre-industrial maritime world. *Sailing school* exemplifies the kind of original work that close archival research can yield and will be a definitive work on its subject for years to come.

References

- Taylor, Eva Germaine Rimington. 1957. *The haven-finding art: A history of navigation from Odysseus to Captain Cook*. New York: Abelard-Schuman.
- Waters, David Watkin. 1958. *The art of navigation in Elizabethan and early Stuart times*. New Haven: Yale University Press.

About the reviewer

Timothy S. Wolters earned his Ph.D. in the history of science and technology at the Massachusetts Institute of Technology (Cambridge, Massachusetts, U.S.) and is an associate professor of history at Iowa State University (Ames, Iowa, U.S.) where he teaches courses on military and naval history and the global history of technology. His published articles have appeared in the peer-reviewed journals *Enterprise & Society*, *Journal of Military History*, and *Technology & Culture*, and he is the author of *Information at sea: Shipboard command and control in the U.S. Navy, from Mobile Bay to Okinawa* (Johns Hopkins University Press, 2013). He recently authored an article-length biography of Dutch-American historian and Cold War policy analyst Harvey A. DeWeerd (forthcoming, ca. October 2020, *Journal of Military History*), and is currently working on a book that explores the adoption of navigational technologies in the United States from its founding through the early twentieth century.