This article was downloaded by: [134.117.10.200]

On: 28 December 2014, At: 06:04

Publisher: Routledge

Informa Ltd Registered in England and Wales Registered Number: 1072954

Registered office: Mortimer House, 37-41 Mortimer Street, London W1T 3JH, UK

Royal United Services Institution. Journal

Publication details, including instructions for authors and subscription information:

<http://www.tandfonline.com/loi/rusi19>

On the Several European Systems of Naval Education

J. K. Laughton M.A., R.N.

Published online: 11 Sep 2009.

To cite this article: J. K. Laughton M.A., R.N. (1881) On the Several European Systems of Naval Education, Royal United Services Institution. Journal, 24:108, 849-869, DOI: [10.1080/03071848109418530](https://doi.org/10.1080/03071848109418530)

To link to this article: <http://dx.doi.org/10.1080/03071848109418530>

PLEASE SCROLL DOWN FOR ARTICLE

Taylor & Francis makes every effort to ensure the accuracy of all the information (the "Content") contained in the publications on our platform. However, Taylor & Francis, our agents, and our licensors make no representations or warranties whatsoever as to the accuracy, completeness, or suitability for any purpose of the Content. Any opinions and views expressed in this publication are the opinions and views of the authors, and are not the views of or endorsed by Taylor & Francis. The accuracy of the Content should not be relied upon and should be independently verified with primary sources of information. Taylor and Francis shall not be liable for any losses, actions, claims, proceedings, demands, costs, expenses, damages, and other liabilities whatsoever or howsoever caused arising directly or indirectly in connection with, in relation to or arising out of the use of the Content.

This article may be used for research, teaching, and private study purposes. Any substantial or systematic reproduction, redistribution, reselling, loan,

sub-licensing, systematic supply, or distribution in any form to anyone is expressly forbidden. Terms & Conditions of access and use can be found at <http://www.tandfonline.com/page/terms-and-conditions>

OCCASIONAL PAPERS

This portion of the Number is reserved for Articles, either Original or Compiled, on Professional Subjects connected with Foreign Naval and Military matters; also for Notices of Professional Books, either Foreign or English.

It is requested that communications or books for review may be addressed to Lieut.-Colonel Lonsdale Hale, at the Royal United Service Institution, Whitehall Yard, London, S.W.

ON THE SEVERAL EUROPEAN SYSTEMS OF NAVAL EDUCATION.¹

By J. K. LAUGHTON, M.A., R.N., Mathematical and Naval Instructor at the Royal Naval College.

IN the spring of 1878, whilst Professor Soley, of the United States Naval Academy at Annapolis, was in Paris, on duty at the Exposition Universelle, he received an order to examine into and report on the systems of naval education in force in the several countries of Europe. In giving effect to this order he used not only the material offered by the Exposition, but also the numerous official papers more directly obtained, and made a personal inspection of the naval schools and colleges of England and France, and of the German practice ship for cadets. His investigations appear to have been thorough and searching, and the report which he rendered to the Secretary of the Navy—now published by order of the Senate of the United States—embodies more accurate and detailed information, as well as more intelligent criticism on the various systems of naval education, than has hitherto been rendered in any way available.

Not unnaturally, the report begins with Great Britain; and following carefully the several statements made as to matters of fact, we are struck with the remarkable accuracy of the whole: the very few errors that we have noticed are of the most trifling nature, entirely void of significance: and if we may take this first part as a gauge of the merit of the other three, the work stands almost alone, as an absolutely correct historical record. It is as such a gauge that we have used it. We do not propose to repeat here the minute details which Professor Soley has given of the English system of entry, of service, and of promotion; of education on board the "Britannia," in sea-going ships, and at the College at Greenwich. These cannot but be pretty well known to all readers of the Journal who are interested in the subject. But whilst thus omitting the facts, we think that the opinions which Mr. Soley has been led to form on the several points connected with our system are well worth reproducing, if only as the opinions of a singularly capable and well-informed foreigner free from the trammels of old custom and of national prejudice.

¹ "Report on Foreign Systems of Naval Education," by Professor James Russell Soley, U.S.N. 8vo. Washington, 1880. Size 9 $\frac{1}{4}$ " x 6" Weight under 24 oz. Pp. 336. Price 7s. 6d.

It is thus, then, that he concludes a careful summary of the history of education in the English Navy, from the establishment of the Naval Academy at Portsmouth in 1729, to the opening of the College at Greenwich on the 1st February, 1873 :—

“It will thus be seen that while there has been undoubted progress, it has been after a long series of changes, experiments, renewed experiments, and expedients of all kinds, from which even now it cannot be said that a harmonious or satisfactory system has been evolved. In fact, it is rather a combination of makeshifts, resulting from a series of tentative and spasmodic efforts in almost every form which naval education is capable of taking. The Naval Administration never seems to have looked at the subject as a whole, from the beginning, in the entering examination of cadets, to the final stage at the promotion to Sub-Lieutenants, and to have worked out a systematic plan which should have both consistency and coherence. It appears rather to have adopted from time to time such partial views as were presented to it by advocates of a particular theory, by Officers who leaned one way or another, a process which has sometimes resulted in its going back upon its own tracks, and making experiments which had been already proved failures. This is partly due to the want of attention hitherto given to the subject, a want which is now in a fair way to be met. Every year more is to be heard in the way of discussion of naval education, and every year more comprehensive and reasonable views seem to gain ground. That the Government is likely to stop at its present stage in reforming the education of Officers is very improbable; and as the Naval College at Greenwich is now firmly established, it will hardly be many years before further and perhaps more radical changes take place in the English system.”

After which, he passes on to a detailed account of the course of study, examinations, and mode of life on board the “*Britannia*,” and concludes :—

“In considering the good and bad points of the ‘*Britannia*’ system, the principal defect is to be found in the course of instruction. It cannot be denied that the course, as indicated by the examination papers, is far in advance of the mental powers of average boys of the age prescribed for cadets. The reason that more do not fail to complete the course is to be found in the low standard of passing,¹ and in the system of cramming, carried out by clever tutors, who are masters in the art of coaching pupils for examinations. In seamanship alone the passing mark is relatively high, but the course of book and model work is one that presents no difficulties and exacts little concentration. For the other studies, no one among the persons acquainted with the system in England seems to pretend that the students come anywhere near the ostensible standard, or carry away anything like real knowledge of the subjects embraced in the programme. This is the ‘*Britannia*’s’ defect. But in respect to training other than mental, in all especially that goes to make character, it would be hard to find a better system, or one more judiciously or carefully applied. It is doubtless in view of this that the ‘*Britannia*’ has been selected for the training of the two Princes, one of whom will eventually be the heir to the throne. The regulations for the government of the school and the daily life of the pupils strike a well-adjusted balance between oversight and independence, restraint and freedom; and the Officers upon whom devolves the task of carrying out the discipline, from the Captain to the Lieutenants, are men qualified to continue to the young cadets the highest influences of the best ordered homes, and to engraft upon them, by their example and companionship, the practice of a manly self-reliance and a manly self-restraint.”

The service at sea, as midshipmen, is next described, and the system of

¹ Practically, this low standard of passing permits the course to be modified in favour of the weaker boys.

instruction afloat commented on. Mr. Soley's opinion is that, so far as the mathematical instruction is concerned, it could hardly be better arranged, without sacrificing something more important—the whole groundwork of professional training,—which, after all, is the *sine quâ non* of a naval Officer's education.

"Whether midshipmen get an adequate professional training under the English system is a question about which it is difficult to get the data necessary for a satisfactory answer. Much can undoubtedly be done for them if the Captain is so disposed; but unless there is some prescribed system for him to follow, he is not likely to give them the attention they need. The Captains of those great ships have had far too serious work on hand for the past few years, to sacrifice anything even to the professional training of junior Officers. What duties, for example, are given to the sixteen or twenty midshipmen on board the 'Alexandra,' the 'Minotaur,' the 'Achilles,' or the 'Iron Duke,' which train them in practical seamanship? Of practical navigation, as far as it consists in taking sights and laying out courses, they undoubtedly get much; but how are they to acquire the needful skill in the management of a ship under sail or steam, the practised eye for wind and weather, the ready resource, the rapid and unerring judgment, that distinguished the old seamen, and that are almost as necessary for the seamen of to-day? These things, which alone can make a man an efficient watch-Officer, are at present only to be learned by the unsatisfactory process of 'picking up;' and it is a question whether more would not be learned in a year's practice cruise in a real training-ship than in five years of midshipman's duty on board an ordinary man-of-war. Certainly, if the first of these five years were so occupied, the midshipman would arrive at his seamanship examination better prepared in the fourth and most essential subject—the 'practice of manœuvring ships under all circumstances of wind and weather;' and his promotion would find him better qualified for performing the duties of Officer of the deck."

From this consideration of the life afloat, Mr. Soley passes on, in natural sequence, to that at Greenwich. "From the list of subjects and text-books," he says, "it might be inferred that the course and examination (of Sub-Lieutenants) were too severe to be completed in six months. Indeed, no one familiar with education would undertake to get a class through these thirteen subjects for the first time in six months, however well prepared they might be. But, as a matter of fact, the acting Sub-Lieutenants do not go through these subjects at Greenwich for the first time; they have been through nearly all of them before in the 'Britannia.' The real fact is that in the 'Britannia' the students have been crammed up to an extremely high and full course (for boys of their age), and that from that time to the final examination at Greenwich, they are trying to digest what they have studied and to convert it into real knowledge. The second course hardly aims at more than an intelligent review of the studies—as far as there have been any studies—of the last seven years. As Sir Cooper Key said plainly in his testimony: 'It must be remembered that all we (at Greenwich) teach, or nearly all we teach them, they ought to have known before they left the "Britannia." The utmost we go up to when they pass as Sub-Lieutenants afterwards is very little beyond what they are supposed to know when they leave the "Britannia";' and he adds: 'The advantage of our system is that we take care that they know it.' Certainly the end proposed—as the Committee's report says—is a modest one. It is merely to go over, at the age of twenty, studies that were completed up to that point five years before. The clearest proof of the practical identity of the two courses is to be found in the examination papers at the close of each. . . . The similarity was not accidental, because both were made out by the Naval Instructor who acts as special examiner at the College."

This, we may remark, has since been modified, and both examinations are now, in great part, conducted by examiners unconnected with the Service—a change, the advantage of which seems, as yet, doubtful.

“The failures that resulted in rejection during the first four years after the foundation of the College reached the rather high figure of thirty; high, that is, for Officers who have already been seven years in the Service. They were generally due, according to Admiral Fanshawe, to the candidate’s knowing nothing to begin with, and taking things very easily in the first three months. Curiously enough, nearly every one of those rejected had passed his time at sea with a Naval Instructor. . . . Notwithstanding the low standard of the examination for Acting Sub-Lieutenants, notwithstanding the previous study on precisely the same ground, and the almost individual instruction the pupils get, yet the practice of taking a private tutor during the whole six months prevails very extensively. About half the candidates are supposed to make use of such assistance, although the College instructors dislike and discourage it. Nor is it confined to the lower men; there are cases of Officers who get a first-class who have been coached for three hours a day during the whole six months. The private tutors, of whom there are several at Greenwich in constant employment, study closely the papers given each month, and cram their pupils accordingly. The examiner, on the other hand, labours to vary his questions in such a way as to defeat the object of the tutor, and to probe the knowledge of the student, so that a constant struggle is kept up between crammer and examiner. It is only in the required course of Sub-Lieutenants that the practice of private tuition prevails.”

Mr. Soley might perhaps have put forward, more prominently than he has done, the reason of this exceptional recourse to private tutors. The examination is compulsory; the penalty of not passing is dismissal from the Service—a very serious matter to a young man of twenty or twenty-one, who has served an apprenticeship of six or seven or eight years; on the other hand, the reward of a first-class is accelerated promotion, the mere money value of which may often be counted as nearly 500*l.*, independent of the value, beyond all money, from a purely Service point of view. It is, then, scarcely to be wondered at that young Officers who feel shaky as to their passing, or their first-class, will try irregular means to ensure success, and one lucky forecast may give a “crammer” a repute which is lucrative even if undeserved.

Of the more advanced courses for the senior Officers Professor Soley says:—“Mathematics forms the backbone of all. In fact, there have been general complaints that the College learned too much in this direction, without affording sufficient scope in others. This objection only refers, however, to the courses for Half-pay Officers, as the special students who are to make naval architects, designing engineers, and gunnery Officers can hardly have too much mathematics. . . . Mathematics, in one shape or another, constitutes about three-fourths of the marks at the final examination of gunnery Lieutenants; hence their attention is chiefly given to these branches. Besides the required studies, they may, if they like, take other courses that are given at the College, but their time is so occupied that, low as the passing standard is, they have enough to do without any extras. Moreover, the examination mark carries with it such direct and important consequences as to pay, &c., that all their efforts are concentrated on taking a first-class certificate. Their course is very thorough, if lacking in breadth, and, in general, they form a body of earnest students.”

Professor Soley has formed a strongly favourable opinion on the system of such special courses leading up to special duties. He says:—“The question of encouraging specialities in naval education and administration is one which has been much discussed, and about which opinions differ, but the full trial which the system has received in England, and its marked success,

"make it worthy of the most careful consideration. In a profession as varied and as many-sided as that of a naval Officer, there is room for the indulgence of every taste, and use for every form of talent. Of course the first object is to produce Officers who can manage ships and fight ships. Seaman-ship, navigation, gunnery, and steam engineering, in their broadest sense, form, if not the foundation, at least the essential superstructure of naval education. Every Officer must receive a certain training in these branches to fit him for his ordinary duties and enable him to meet extraordinary emergencies. But there are other duties incident to the naval profession, and useful alike in peace and in war, which call for a high order of special talent and a high degree of special acquisition. For some one or other of these duties or branches all Officers have sufficient time, while tastes and aptitudes vary; and it is to employ this spare time, and to utilize these particular aptitudes, that an opportunity is given in the English Service to cultivate specialities. It has not been found that this system injures the general efficiency of individuals who take advantage of it, while it adds incalculably to the strength and usefulness of the Service as a whole. It gives the Admiralty men of high scientific training for every kind of work which needs such training, while the presence in the Service of Officers so trained tends to leaven the whole body and to raise the standard of professional knowledge."

It is from this point of view that Mr. Soley does not, on the whole, disapprove of the more discursive studies permitted to the voluntary students.¹ "A Half-pay Officer," he says, "may neglect mathematics to a certain extent and make his numbers in other subjects;" and scrutinizing the marks obtained, at one of the final examinations, by the first of this class, he notices that this Officer "made 51 per cent. of the maximum in mathematics and 61 per cent. in his electives, his percentage on all that he studied being 56." "The Officer in question," he goes on, "might doubtless have done much better had he confined himself to a smaller range of subjects," but the general object of the half-pay (voluntary) student is not so much to reach perfection in any one branch of knowledge, as to obtain such a familiarity with several branches as may be acquired in nine months. Viewed in this light, and in respect to the general improvement of the Service, the 56 per cent. of the year's instruction obtained by this Officer is a positive gain, though not, perhaps, as great a gain as might be expected, to himself and the Navy at large."

This is, however, very like damning with faint praise: and indeed the only part of the English system which Professor Soley unreservedly commends is the collateral course of study pursued by naval engineers and architects. This he considers to offer unequalled advantages: he describes it as of a very high character—"a fact which is made possible by the previous training that all the Admiralty students have received in the dockyard schools." But of English naval education, properly so-called,—the education of executive Officers,—his estimate is very far from flattering: and the conclusion of his report on Great Britain may serve as that *Deus ex machina* whom Burns invoked to assist us in the task of self-introspection.

"In the English Service there seems to be a theory that a naval Officer is a creature of delicate and sensitive organization, whose regard for his profession and whose zeal for a high standard of professional attainment must

¹ Till lately, these were all appointed to the College on half-pay. Captains and Commanders are so still; but it has been judged advisable that the Lieutenants should be on full-pay, and they are now borne, additional, on the books of the "President."

² He might probably also have done much better, had he not been laid up for the three weeks before the examination with a smart attack of measles.

"be stimulated by surrounding him eternally with all its minor details, to an extent unknown in any other walk in life. To make a sailor, he must begin at twelve or thirteen, even though he does not go to sea for two years, to accustom him early to his duties. During these two years, he must live on board a ship, and be able to climb the rigging, to familiarize himself with details; though the ship lies at anchor in a river, a few yards from the shore, and carries no spars but her fore-mast and head-booms. He must sleep in a hammock, to inure himself to hardship. In the opinion of the majority of Officers, he must have his College for higher instruction in a naval port, or he will forget his duties: and he must pursue his scientific researches in a dockyard, because he will be surrounded by Officers engaged in the work of the profession, with whom he can discuss articles in the professional magazines.¹

"If the naval profession has become what many enlightened Officers of the present day would have us believe, an occupation involving accurate scientific knowledge, the system of training in England has a tendency to grasp the shadow while losing the substance. The expedients adopted with reference to the higher education of voluntary students, and the admirable courses of instruction for Officers who have taken up one branch of the Service, notably in the 'Excellent' and 'Vernon,' do much to remedy the inherent defects of the system; and the promotion in two grades by selection, excludes the most incompetent Officers from positions of great responsibility. But it seems impossible that the injurious effects of the method of training pursued with young Officers, during the first eight years of their professional life, should not be felt by the vast majority throughout their whole career. The peculiar features of this training have been already pointed out: the discouraging efforts in the 'Britannia' to attain a point hopelessly beyond the young student's reach; the five years of desultory training on board the great cruising ships, passed in a struggle to retain and comprehend a mass of undigested facts and principles, crammed for the immediate purpose of passing an examination; and finally, the review course, where the student first finds himself fairly on his feet, in his relations with his instructors. The fatal defect of the system has been aptly set forth in a remark of one of the Greenwich professors, in his evidence before the Commission, where he says that the standard for Sub-Lieutenants is the same as that for cadets in the 'Britannia,' but the essential difference lies in the fact that at Greenwich the students actually reach the standard, while at Dartmouth they do not. No one who has had much experience in educational methods will deny that such a system must be productive of harmful results when applied vigorously to the training of a body of young men; and one is therefore led to the conclusion that the high scientific and professional attainments of many English naval Officers are not in consequence, but in spite, of their early education."

The second part of this report is devoted to the system pursued in France, and is, we believe, not only more full, but more accurate than anything hitherto accessible to the public. It begins with the very beginning—"The corps of line Officers" is recruited from four different sources: 1. *Aspirants* or naval cadets, graduated from the Naval School at Brest; 2. *Aspirants* chosen from among the graduates of the Polytechnic School at Paris;

¹ The reasons here adduced had undoubtedly weight in the formation of the very general opinion to which Mr. Soley refers: but of equal, or even greater weight, was the doubt (not yet, perhaps, resolved) whether the immediate neighbourhood of London, with its operas, theatres, and a thousand social or festive allurements, might not act injuriously on a college at Greenwich.

² Professor Soley uses the term "line" Officers as the American equivalent of the English "executive."

“3. First masters (*premiers-mâtres*) nominated for the grade of Ensign after undergoing an examination; 4. Auxiliary Ensigns who have received the certificate of sea Captain (*Capitaine au long cours*) in the merchant service, and who are admitted to the titular grade of Ensign.” The different ranks of executive Officers are essentially the same as in the English Service. “If at any time during war the full number of Officers is inadequate to the needs of the Service, the want is supplied by auxiliary Officers chosen among the merchant Captains. These, whose grade in the Navy is that of Ensign, correspond to the English naval reserve. Promotions are made partly by selection and partly by seniority from the lowest grade up to and including that of Commander. Above this point they are wholly by seniority. In every case, however, a certain term of service must be passed in each grade before promotion to the next higher. In the case of midshipmen, Ensigns, and Lieutenants, the minimum period is fixed at two years of sea service, with two additional years of shore duty in the latter grade.”

About four cadets in the year are entered direct from the Polytechnic School; but the greater number, averaging about forty-five, are entered through the “Borda,” an old ship-of-the-line at Brest, which may roughly, and with a great difference, be compared with the “Britannia” at Dartmouth. The course in the “Borda” extends over two years; at the end of which time the youngsters, till then simply “pupils” (*élèves*), become cadets (*aspirants de 2^e classe*), and, together with those who join from the Polytechnic, pass into the sea-going training ship, the “Flore.” On board this the course lasts nearly a year, and consists in the study and practice of the professional branches.

The Polytechnic is in no sense a naval school: it is a preparatory school for all the scientific branches of the public service; it is under the control of the Ministry of War, and its organization is military: but of the number of highly trained youths who pass out each year, twenty-two, at their choice, receive appointments under the Minister of the Navy, of which four are cadetships on board the “Flore;” the others, after special courses, become naval architects, hydrographers, Officers of the commissariat, or of the marine artillery.

“It must be understood that the pupils of the Polytechnic School are carefully selected at the start, and that the examination for admission insures a high standard of preliminary attainment. It is an open competitive examination conducted by boards at various cities designated as centres of examination. The candidates must be between sixteen and twenty years of age. The competition is exceedingly close, the number of candidates being usually about four times as great as the number of appointments. The programme of examination includes arithmetic, geometry, algebra, trigonometry, analytic geometry of two and three dimensions, descriptive geometry, physics, chemistry, French, German, and drawing. Even with this high standard and close competition for admission, it is found that the severity of the course at the school tells hardly upon the weaker men; and it is a matter of observation that some at least of the graduates, on being subsequently admitted to the special schools of application, show signs of mental exhaustion.

“The principal advantages derived by the Navy from the Polytechnic School consist in the high preparatory training given to the Officers of the three corps of constructors, hydrographers, and marine artillery. All of these are closely connected with the Navy proper, the hydrographers being occupied with the coast survey and the preparation of charts; the artillery, with the manufacture of naval ordnance and with sea-coast fortification; and the constructors, with the design and construction of ships and engines. The value of the training for these Officers cannot be over-estimated, especially

“in the case of the constructors, as the graduates that select this corps are usually among the higher men of their class. With regard to the other corps, the line Officers and commissariat, each of which receives a mere fragment of the graduating class, the object of the system is not quite apparent. In the case of the line Officers, it is chiefly to give the Navy a few men peculiarly fitted for certain forms of purely scientific work which arise from time to time in the Service. For this purpose the course is better fitted than that of the Naval School at Brest; though it is doubtful, even with this difference, whether any great advantage is gained, especially in the case of those naval graduates of the Polytechnic who take a low number in their class. Certainly the difference is not so great as to make the lower men of the Polytechnic classes necessarily more available for scientific purposes, during their whole career than the best men from the ‘Borda.’ At the close of the Polytechnic course, the graduates who have selected the Navy as their future career are embarked on board the practice ship ‘Flore,’ to make their first cruise, in company with the graduates of the same year from the ‘Borda.’ Having no professional training whatever, they start at a disadvantage; and they must perform double work to put themselves on a level of professional acquirement with their contemporaries. At the end of their cruise they pass their examination for promotion, and become midshipmen (*aspirants de 1re class*).”

The “Borda” is however distinctively the school through which cadets enter the French Navy, and their admission to this is by competitive examination, the requirements of which are high, extended over a considerable range of subjects, and are based directly on the programme of study in the *lycées*, the principal schools for secondary instruction in France. It is needless to enter into the details of this examination, further than to remark that the candidates must be not less than fourteen, nor more than seventeen years of age; that the average age is about sixteen; and that when Professor Soley speaks of the standard of an examination as high, it is high. An overwhelmingly large proportion of the candidates come from the *lycées* and communal colleges, which may perhaps be best roughly described as the public schools and grammar schools of France. Of these Mr. Soley speaks most highly.

“They—the *lycées* more especially—are admirably organized and carefully inspected; their methods of instruction and programmes of study are based on sound principles, and they produce the best results. Of course it is a great advantage to a professional school to be able to draw its pupils from such a source, and thus to be assured that they have a preliminary training at once broad, thorough, and complete. There is no greater drag to the efficiency of an institution for higher education than the want of good fitting schools—a want such as is felt in the present moment at our [sc. United States] military and naval academies, and nowhere felt more severely. This want in France is supplied to the fullest extent and in the most satisfactory way. The great national schools, including the Polytechnic, Saint Cyr, the normal school and the naval school at Brest, receive the great majority of their pupils from the best schools that exist in the country. They are thus enabled to make the qualifications for admission high, to do away with all those elementary branches of instruction that form no proper part of the work of a professional school, and to concentrate the energies of their pupils upon studies of a high character, connected more or less directly with the profession in view. The high standard of admission and the competitive examinations are not productive of cramming; on the contrary, they are far less so than a lower standard would be, even in a test examination, where the preparation is given in inferior schools, with a month or a fortnight of private tuition just before the examination. At the examination for admission at Annapolis—[we may interpolate, at Greenwich also]—limited as it is in scope and trifling as are the subjects that compose it, a

"large number of the weaker candidates are prepared by this latter process. In France, where the programme of the examination is based directly on that of the schools—in fact, is identical with it in most subjects,—there is no such difficulty. There is no need of private tuition; a candidate who wants to pass the examination cannot do better than attend the regular school course that leads up to it; and even in the case of a pupil who is weak in one of the required branches, the school system is sufficiently flexible to admit a slight modification in his favour."

With youngsters so prepared on entry, the course of instruction stands on a superior footing. It extends over two years. "The academic session begins on the 1st of October, and lasts nearly ten months. The regular programme of studies extends only over the first eight months; June is occupied in studying for the coming examinations and in special exercises. The examinations take up nearly the whole of the tenth month, July. After the close of the annual examinations, the students of the second-class are embarked on board the 'Bougainville,' a small vessel attached to the school. This is a screw steamer, with engines of 120 horse-power, built specially for the school. In this they take a short practice cruise, during which they visit various points on the neighbouring coast of France, including Cherbourg on the one hand and Lorient on the other. Sometimes the cruise extends as far as Ferrol, in Spain. During the cruise, the pupils are stationed with the men, and work the ship, receiving at the same time instruction of a practical character in seamanship, navigation, and steam-engineering, and performing exercises in drawing. For the first few weeks, the first-class also takes part in the cruise, in the same or another vessel; and during this time, the practice-ships manœuvre in and about the roads of Brest; and when the second-class goes to sea, the members of the first-class, which has now been graduated, are sent home for a six weeks' vacation. The 'Bougainville' returns to Brest early in September, and the second-class men have leave for a month. On the 1st of October they return for the second-year course in the 'Borda'; whilst the graduates, now for the first time admitted with a specific rank to the Navy, are embarked on board the 'Flore' for a more extended cruise. They are called *aspirants de deuxième classe*, a term nearly equivalent to cadets, and they are still undergoing instruction, though instruction of a more distinctly practical character."

On board the "Borda" the study is exceedingly severe; so much so that a statement of the number of hours per week, $72\frac{1}{2}$, would seem incredible without the accompanying details. These are:—

"General subjects :	
" Literature, history, and geography	$5\frac{1}{2}$ hours.
" English.....	$5\frac{1}{2}$ "
" Drawing	$3\frac{1}{2}$ "
"Scientific subjects :	
" Analysis and mechanics.....	$6\frac{1}{2}$ "
" Astronomy and navigation	$6\frac{1}{2}$ "
" Physics and chemistry	$3\frac{1}{2}$ "
" Practical navigation	$2\frac{1}{2}$ "
"Professional subjects :	
" Seamanship (theory and practice)	$15\frac{1}{2}$ "
" Steam-engineering (do., do.).....	$4\frac{1}{2}$ "
" Gunnery (do., do.)	$2\frac{1}{2}$ "
" Infantry drill and small arms (do., do.) ...	$4\frac{1}{2}$ "
" Naval architecture.....	$2\frac{1}{2}$ "
" General study.....	10 "
	<hr/>
	$72\frac{1}{2}$ "

"The total amount of work performed under supervision—over ten hours a day (including Sunday)—is reduced slightly by the infrequent privilege of an afternoon on shore; but even with this deduction it would be considered excessive according to American standards, especially in a school where the pupils had only a month or six weeks of vacation in the whole year. The principle of work under supervision is, however, one of the essential features of all French education."

To meet the requirements of this very severe course, the number of teachers is necessarily large. Besides the Captain, who directs the studies as well as takes charge of the discipline, and the Commander, who has charge of the conduct and of the professional instruction of the students, there are, as instructors, eight Lieutenants, twelve Professors, and one principal mechanician—or, as we would say, Chief Engineer. "The Lieutenants have charge of the courses in seamanship, naval architecture, gunnery, and practical navigation, there being two for each branch, one taking the upper and one the lower class." They have also charge of all details pertaining to the daily life and conduct of the pupils; and enforce the discipline of the ship, but they can only inflict reprimands. Cases requiring severer punishment must be referred to the Captain or Commander. The twelve Professors are:—

Professors of Analysis and mechanics	2
„ Astronomy and navigation.....	2
„ Physics and chemistry	1
„ Literature, history, and geography	2
„ English	3
„ Drawing	2

That is to say, the instructing staff numbers 23, for an average number of 90 pupils. This, the long hours, and the high standard of admission make it possible to accomplish a great deal in the time, and to do the work thoroughly. "The studies classed under 'general subjects' embrace a full course of French literature and a continuation and completion of the history course of the *Lycées*. Instruction in the English language includes the technical terms of seamanship, gunnery, and steam-engineering." Of the "scientific subjects," "the course in astronomy and navigation begins with a short review of descriptive geometry and of spherical trigonometry. Astronomy is taught chiefly as subsidiary to navigation, but it receives a pretty full treatment, always from a mathematical point of view. The course in navigation is both theoretical and practical, and includes all that could well be taught in a stationary ship. In analysis and mechanics the course begins with a short review of certain subjects of algebra, next comes a thorough course in analytical geometry, including higher plane curves. This is followed by the differential and integral calculus, including the method of least squares. After this, the class takes up mechanics, going through statics. This completes the course for the first year. The second year begins with the subject of differential equations, after which comes the rest of mechanics, embracing kinematics and dynamics. The second year's work includes an elaborate course in theoretical mechanics and in mechanics applied to machinery." Of the "professional subjects," the course in seamanship, though largely practical, includes "the problems of mathematics and mechanics involved in the subject, such as arise in lifting and getting on board heavy weights, in the action of sails and rudder on the motions of a ship, &c." The course of gunnery would appear to be chiefly theoretical: steam-engineering and naval architecture are treated with great fulness and thoroughness, and the courses in these are most elaborate and skilfully managed.

"The discipline is severe, even for a ship in commission. The supervision

"is so close and constant that there is very little opportunity of committing grave offences without immediate discovery ; and the list of punishments is calculated to preclude their repetition." The list is as follows :—

1. Reprimand pronounced (1) by a Lieutenant or Professor ; (2) by the second in command.

2. Punishment squad, one hour a-day for three days at most.

3. Coventry (*la police*), not more than ten days.

4. Prison, not more than ten days.

5. Dark cell (*cachot*), not more than five days.

6. Suspension.

7. Expulsion.

These punishments carry with them each a certain number of bad marks : thus No. 1 gives one or two bad marks ; No. 2, two marks and one in addition for each day ; No. 3 gives five marks and one for each day ; and so on. If these bad marks amount to 200 in the term of three months, the delinquent is reported to the Minister of Marine, for dismissal. Under these circumstances, "there is, naturally"—says Mr. Soley—"little difficulty in maintaining discipline on board the 'Borda.'" We may, in fact, easily enough conceive an *élève* of the "Borda" asking, with Mr. Mallock, Is life worth living? "The general impression obtained by an examination of the 'Borda' system is that it is one of extreme severity and repression. Not that the application of the system or the method of administration is harsh. On the contrary, the relations of the governing authorities and the students seem to be of the most amiable and cordial character. A spirit of subordination and a general desire to perform well the allotted tasks and duties is said to pervade the school ; and though the punishments are severe, they are infrequent. The essential features of the system are the close and constant supervision maintained over the pupils, and the prevention of violations of discipline by the imposition of the heaviest penalties. Such offences as hazing,¹ or going ashore without leave are impossible. The constant watch, the isolation of the ship and the absolute authority of the *Préfet Maritime* in and about the port effectually prevent any co-operation of outside persons in an attempt to go ashore without leave. The penalty for disobeying the orders of a sentry is the *cachot*, a penalty which no one who has once undergone it would care to run the risk of repeating. The features of the system that make the discipline so perfect from a military point of view, are those which tell most severely on the students. In considering its effects upon the latter, however, considerable allowance must be made for peculiarities of national character and modes of thought. Certainly the colourless life of the 'Borda,' its close confinement, its constant supervision, and the absence of all that gives charm or variety to existence would be intolerable to an American or English boy of the age of the French *élèves*."

Immediately after the vacation on passing out of the "Borda," the cadets join the "Flore," a screw-steamer of 18 guns and 380 horse-power. "The duration of the cruise is about ten months, from the 1st of October to the latter part of July. It is followed by a week of examination, after which the ship remains at Brest for six weeks, preparing for another cruise. The cruising ground of the 'Flore' is generally among the French West India Islands. The course of instruction includes the theory and practice of

¹ Hazing is thus referred to in the Rules of the United States' Naval Academy :—

"The practice of molesting, annoying, ridiculing, maltreating, or assuming unauthorized authority over the new cadets of the fourth class, known under the term of hazing, running, &c., shall subject the older cadets to prompt dismissal from the Naval Academy, as prescribed by Act of Congress and the order of the Secretary of the Navy."

"steam-engineering, gunnery, seamanship, navigation, hydrography, and landing-drill. The students perform duty in turn as Officers of the deck, under supervision, and work the ship. A thorough practical course is given in steam-engineering. The details of the programme are somewhat varied from year to year, but it always includes the subjects mentioned, and generally some others; among them, naval hygiene, taught by the surgeon, and drawing, by a master specially appointed. Last year, instruction was given in gymnastics by an Ensign. On passing the examination, the graduates of the 'Flore' become *aspirants* of the first-class, or midshipmen, and they are shortly after sent to sea in cruising ships. They remain in this grade two years, making a total of five years from their admission to the Service to their promotion to the grade of Ensign."

Officers of the Constructor's Department pass through a two years' course at Cherbourg, to which they enter from the Polytechnic. "As the profession of naval construction is a favourite branch among the higher graduates of the Polytechnic, the pupils are selected men, and distinguished in a high degree by earnestness, intelligence, and thorough scientific attainments, as far as they have gone. They enter the school of application at the age of twenty or twenty-one; an age which is most favourable for professional study. Besides the incalculable advantage of a sound preliminary training, they begin their professional course with a feeling of elation and encouragement derived from having already successfully tested their powers. Their number—averaging about four in each year, or eight altogether—is large enough to keep up a generous emulation, while at the same time their instructors are able to give the closest attention to the wants of individuals; and hence they get all the benefits, with none of the disadvantages, of private tuition."

"Practical instruction, or rather illustrative instruction, is given during the session, in visits to the arsenal and workshops, and to vessels making short trial trips. The real practice, however, is given during the summer. On the 1st of July, the students are sent either to one of the naval ports or to Indret. Here they are attached to the different branches of work in the Department of Naval Construction, and go through a regular course in the yard or the machine-shop. At Indret their attention is directed exclusively to the fabrication of engines, and all that is accessory to this branch of the profession." "Second-year students return to Cherbourg on the 20th of September, and first-year students on the 10th of October, the intervening twenty days being passed by the latter in vacation. The time from the reopening of the school is passed in preparation for the final examinations, which begin on November 3rd." By this final examination, and marks accumulated through the course, the students are classed in order of seniority; and as vacancies occur are promoted to the grade of Assistant Engineer of the third class: but their duties, as such, are entirely with the Constructor's Department: they do not go to sea, and have nothing in common with Naval Engineers as we understand the term, Engineers in charge of the engines of a ship. These, in the French Service, are not, as a class, Commissioned Officers; and the few that are, are promoted from the great body, who rank as warrant or petty officers. But those who pass through the school at Cherbourg must be compared rather with the select few, engineers or naval architects, who go through the three years' course at Greenwich. The instruction of both is excellent, and leads to satisfactory results.

But the instruction of engineers, though forming a very important branch of naval education, is not the most important; and it is essentially free from the difficulties which beset the education of the executive class. It is in this that there is the most marked difference between the English and French systems; a difference so extreme as to have led to the remark that the English have no system at all, and the French have too much. Professor

Soley accepts the truth of this as far as the English are concerned : as to the French, he says :—"The fault of 'too much system,' if it means anything, means a sacrifice of results to methods, an effort which looks rather to the perfection of the machinery than to the work done by the machine." This is not the case. Though extreme centralization may act injuriously in some minor details, the public-school system is, in most respects, sufficiently elastic ; "and in the French Naval Schools, there is certainly in matters of theoretical and practical instruction, much greater flexibility than is to be found in those of almost any other nation. The system of oral teaching, without the restrictions of a text-book and supplemented by individual explanation and interrogation, cannot be other than an elastic one. With regard to discipline, however, it must be confessed that if French boys are at all like other boys, a great many rules might be relaxed with direct and positive benefit."

Summing up, then, Professor Soley says :—"The broad features of the French system of naval education consist in a unity of purpose underlying the whole plan ; a rational organization, with a distinct perception of the ends in view, and an adaptation of means to reach the ends proposed ; the exaction of a high standard of preparatory training ; and great originality, freedom and thoroughness of instruction. . . . The course of theoretical instruction is the fullest and most advanced *required* course pursued by the cadets of any Navy in the world except that of Germany ; and the practical and professional branches receive an ample share of time and attention, although the course in these subjects is rightly considered as only preparatory to the work of the practice-ship."

"The other corps of the Service are as well taught as the line in the particular duties of their several professions ; for it may be taken as a cardinal maxim of professional education in France that a man cannot be expected to know how to do a thing by a process of inspiration or intuition, or even by 'picking up,' but that he must be *taught* to do it. Hence they have a thorough course of instruction for the men who are to build their ships, to fight their ships, to govern the employment of the motive power of their ships, to conduct the details of internal administration on board their ships. . . . The education given to Officers in general is of a high and extensive character. This supplies the want of special subsequent training to some extent, but not wholly. There is a decided need at present of facilities for higher education in the branches which particular inclinations may lead individual line Officers to take up. It is not unlikely that such a higher college, similar in purpose to the half-pay (voluntary) courses at Greenwich, may in time be established ; though there is by no means the same necessity for it that exists in England."

Passing on to the German system : "The preliminary steps in the career of a line Officer in the German Navy begin with the application of his parent or guardian for an appointment. These applications are made to the Admiralty in August and September of each year ; and must be accompanied by a number of papers, such as certificates of birth, religious creed, confirmation, &c. ; a full narrative of the life of the applicant, written by himself and duly attested, stating the schools he has attended, his course of study, changes of residence, illnesses, German and foreign works read by him, and other minute facts ; school diplomas and the health certificate of a military or naval surgeon. Candidates must be under seventeen years of age at the date of admission. Exception is made, however, in the case of graduates (*abiturienten*) of the Gymnasia, Realschulen of the first class, and similar institutions, who may be admitted up to the completion of their nineteenth year. No minimum age of admission is prescribed, but a limit is practically fixed by the regulation which requires candidates to present a

"certificate from a Gymnasium, of fitness for the upper second class, or to show
 "in the examination their qualification for it. To do this the candidate must
 "have passed through the lower classes of the schools, which he could hardly
 "accomplish before his fourteenth or fifteenth year.

"The examination for admission is held annually at Kiel, in the month of
 "April. It is not competitive, but the standard of admission is high, involving
 "not only the attainments called for by the questions given, but the previous
 "completion of a certain course in the public schools—schools which are
 "unsurpassed by any of their kind in the world." The requirements are
 Latin, German, mathematics (including arithmetic and algebra, elementary
 plane geometry, plane and spherical trigonometry, and the elements of stereo-
 metry); physics, geography, history, French, English, and drawing. In these
 subjects each candidate has to prove his proficiency, either by examination, or
 by recognised certificates from a public school. If successful, he is appointed
 a cadet in the Navy, and forthwith embarked on board the cadet's practice-
 ship, where he stays for six months. This time is fully occupied by training
 in practical duties, no theoretical instruction being given, except such as is
 necessary by way of explanation. "The training-ship makes a cruise during
 "the summer, and returns to port about the end of September. Those cadets
 "who, during the cruise, appear unfit for the naval service, from want of
 "capacity or otherwise, are to be reported as soon as possible to the Admi-
 "ralty by the Commanding Officer, after consultation with the other Officers.
 "On the basis of this report, the Minister finally orders their discharge from
 "the Service. The time passed on board the training-ship, however, does not,
 "in these cases, count as service time towards the performance of obligatory
 "military service required, by the German laws, of all citizens."

"At the end of the practice-cruise, the cadets return to Kiel, and join the
 "cadet's division at the Naval School—a building on shore. Here they have
 "a course of theoretical instruction in professional and scientific subjects."
 The course extends over six months, from October 1 to March 31, and
 embraces navigation, seamanship, gunnery, land tactics, mathematics (thorough
 knowledge of lower mathematics and facility in calculation, leaving out the
 higher equations and series; plane and spherical trigonometry and stereo-
 metry), natural philosophy, official duties, surveying, topographical drawing,
 English and French. At the end of the six months those cadets who are favour-
 ably reported on by the Director of Studies and the Committee of the Instructors,
 are examined in the subjects of their whole course—in the training-ship or
 at the school—and on passing are recommended for promotion to the grade of
 midshipman. "Those who fail may be allowed, upon recommendation of the
 "board, to go over a second time the course for the year, beginning with the
 "cruise in the practice-ship and ending with the course at the school. In
 "order to do this, they must join the class of newly entered cadets, and they
 "lose a year's seniority. In cases of idleness, want of ability, or bad conduct,
 "the board will not recommend the retention of a candidate who fails; and in
 "the absence of such a recommendation, the cadet is invariably discharged.
 "A third trial is never granted by the board, and therefore a second failure
 "causes immediate dismissal.

"After passing the examination, the newly promoted midshipmen are sent
 "for a month to the gunnery ship at Wilhelmshafen. Early in May they are
 "divided among the ships of the ironclad squadron, where they remain on
 "service during the greater part of the summer. In September or October
 "they are ordered back to Kiel and embarked on board the midshipmen's
 "school-ship, of which there are two always in commission, one of them
 "leaving Kiel every year. The cruise lasts two years. The ship goes around
 "the world, but most of the time is generally spent on the coasts of China and
 "Japan." The ships set apart specially for this service are screw steamers of
 modern type, fully rigged, so that they are available for sailing or steaming.

They are supplied with a full battery of breech-loading guns, and with all the appliances and equipments necessary for a training-ship. Among these is a complete library of professional works and works of history, poetry and fiction, in French, German and English.

For duty on board, the midshipmen are permanently divided in four watches under the four division Officers. These watches are rearranged every quarter. When the ship is under steam, the midshipmen do watch duty in the engine-room, where they receive instruction from the machinist in charge. When the ship is under sail they are stationed in turn as the midshipmen of the tops. In port, each acts in turn as signal Officer. They act by turns as gun-captains at great gun exercise, and they are sent in charge of boats. In foreign ports they are organized in parties to visit places of interest; they are encouraged to go to balls and social entertainments, and are given every possible opportunity of conversing in foreign languages. A room is assigned to them on the gun-deck, in which they eat, sleep, and study. The senior in each division performs in turn, for a week at a time, the duties of Officer of the day, as far as the mess and study periods are concerned, and is responsible for quiet and order in the steerage. The mess is managed by a board composed of the cadet's Officer—a Lieutenant appointed by the Captain, the Paymaster, and two midshipmen elected by their companions for a term of three months. The steward is engaged by contract at the beginning of the cruise. Midshipmen are forbidden to contract debts; and if one is negligent and thriftless in pecuniary matters, the Captain, as an extreme measure, may turn over his pay and his private allowance to the Officer of his division, as a trust to be administered according to the Officer's discretion.

The theoretical instruction—about 16 hours in the week—includes navigation, steam-engineering, seamanship and naval tactics, gunnery and torpedoes, official duties and organization, shipbuilding, English and French. Navigation, gunnery, and engineering are taught by the navigating and gunnery Officers and by the Engineer, respectively. Instruction in the direction and care of the ship's stores is given by the Paymaster, and the subjects are assigned to the various Officers of the ship according to their qualifications. In order to give to instructing Officers the needful time to prepare their instructions they may be relieved of the deck, weather permitting, by the Sub-Lieutenant of the watch, from 8 A.M. to 12, and from 12 to 4 P.M. On the return of the practice-ship, the Commanding Officer sends to the Admiralty a full report of the proficiency of the midshipmen, and a provisional rank list. The midshipmen receive certificates of service, drawn up by the Captain with the assistance of the Officers, containing a statement of their character, fitness for the Service and general scientific attainments. The reports and certificates state particularly whether the midshipman is out of debt, and whether he is considered worthy of admission to the Service as an Officer. Those midshipmen who receive favourable certificates are ordered to Kiel to pass the first Officer's examination. This is preliminary to the grade of Sub-Lieutenant, and covers, in general, the ground gone over in the course on board the practice-ship.

“Midshipmen who pass the examination are thereupon subjected to a still further test of a remarkable character, which it is believed is peculiar to the German Service. An election is held at Kiel, to determine the fitness of each midshipman for the grade of Sub-Lieutenant. In this election all the Officers attached to the station have a vote. Upon the request of the Captain of the school-ship, the Commander-in-Chief of the station is required to summon all the Officers on duty, at an appointed time to hold the election. The names of the midshipmen are then submitted, in the order of their seniority, for election to the grade of Sub-Lieutenant without commission (Acting Sub-Lieutenant). In case of a difference of opinion as to the merits of a candidate, the following rules are observed. 1. If the majority of votes is

"against the candidate, his career in the Navy is finished, and the next candidate is proposed without further formalities. 2. If a minority of votes, or only a few individual votes are cast against the candidate, the Officers so voting are required to give the reasons for their opinion in writing; and this vote of the minority, with the indorsements of the Commander-in-Chief of the station and of the Minister of Marine is to be appended to the general report addressed to the Emperor. In this report, all those who have been favourably passed upon in the election are proposed for Acting Sub-Lieutenants; and they become Full Sub-Lieutenants as vacancies occur,"—still, however, without a commission.

They then, without waiting for this promotion, return to the Naval School, and go through the Officers' course. This lasts nearly a year, the first half of which is devoted rather to purely scientific study, and the last half to professional branches. The course comprises:—Navigation in all its branches, including "methods of coast surveying; execution of a survey by the use of plane table, and preparation of charts and sketches; knowledge of sailing directions in their dependence upon prevailing winds and currents; acquaintance with the marked features and depths of water of German harbours, with the shoals, lighthouses and beacons of the Baltic, the Sound, the Great Belt, Cattegat and the North Sea, as well as those near the usual routes to the English Channel."—Elements of land tactics—Ship-building and Naval Architecture—Steam-engineering—Fortification; field, permanent and coast—Drawing; "preparation of a sketch of coast-line, a survey, and some line-drawings from subjects in ordnance, ship-building and engineering."—Mathematics; including, roughly speaking, the course of the English Gunnery-Lieutenants—Physics and Chemistry, Physical Geography and Meteorology. Those who pass the examination at the end of the course get commissions as Sub-Lieutenants, their seniority being determined by the report. Afterwards, as vacancies occur, they become Lieutenants: "but in any case, the passing of the examination and a total of five years' sea-service are indispensable qualifications for a commission."

With this, the obligatory course of instruction ends; but there is a voluntary course, for commissioned Officers, which extends over three years, and offers, to those who have the ability and industry to avail themselves of it, the opportunity of pushing their studies to a very advanced standard. But to this, those only are appointed, "who show, by their general character and conduct, by their professional zeal and by their mental attainments, that they will make the most of the privilege to advance the interests of the Service;" and who also are reported as having, in a special examination, "shown sufficient experience, proficiency, talent for observation, sound judgment and practical skill, to appear qualified to receive with advantage a further education." This examination is peculiar; and perhaps, for men of mature years, a better test of ability, as distinguished from mere acquirement, than any other that could be devised. A list of certain subjects—in the departments of military history, seamanship, naval tactics, navigation, gunnery, marine engineering and ship-building—is drawn up by the Admiralty, and published in the November of each year. A candidate for admission to the Academy is required to work up a paper in each of three of these subjects; and to send in these papers by the 1st of June following, with a statement of the works of reference and other means of assistance employed.

To an Officer once admitted, the course of instruction is as follows:—

First Year.

1. Logic, ethics, and the elements of psychology.
2. A short review of elementary mathematics, and the fundamental principles of analytical geometry and higher calculus.
3. Organic and inorganic chemistry.

4. The whole range of pure physics, treated both experimentally and mathematically.
5. Naval organization and naval tactics.
6. Tactics of land forces, with special reference to landing parties.
7. Permanent fortification, especially in coast-defence.
8. Military administrative law and international law (optional).

Second Year.

1. Thorough course in higher mathematics, especially in its application to geometry, mechanics and the calculation of probabilities.
2. History of naval wars.
3. Ordnance and gunnery.
4. Steam-engineering.
5. Naval architecture.
6. Nautical astronomy.
7. Coast survey.
8. Electricity, particularly in its application to torpedoes.
9. Laws of war ; maritime law.
10. Sanitary administration, especially in its relation to the con- } Elective ;
ditions of life on ship board. } but one
11. General survey of the history of civilization. } must be
taken.

Third Year.

1. History of naval wars.
 2. Ordnance and torpedoes.
 3. Steam-engineering.
 4. Naval architecture.
 5. Nautical astronomy, the construction of charts and the principles of geodesy.
 6. Observations and use of all instruments employed in navigation and in geodetic surveys.
 7. Physical geography.
 8. History of civilization.
 9. Construction of harbours.
 10. Natural history of the sea.
 11. Political economy.
- } Elective ; but two of the four must be
taken.

“ Opportunity is also given to the students to extend and perfect their knowledge of foreign languages. Instruction in this branch includes English, French and Danish, and, when practicable, Russian and Spanish. All this is independent of the regular course, but each student is required, during all the years of attendance, to take instruction in at least one foreign language. The regulations governing attendance at lectures and exercises are exceedingly precise and strict, considering the age of the Officer-students. Each has his place in the lecture room, which he must always occupy. The most punctual attendance is required, and no Officer can absent himself from an academic exercise, except in case of illness, leave of absence, or special dispensation. In case of sickness, the fact must be reported without delay. Applications for leave or for other dispensations are made in writing to the director, and are only granted in cases of urgent necessity.” Short examinations are held quarterly, the results of which are sent to the Committee on Studies. After the final examination for the year a merit roll is made out, and a report on the work done. On these depends the return of the students for the next year. At the close of the three years, a diploma or certificate is given by the Committee on Studies to each graduate, the form of which depends on the character of the student's work.

The course here detailed is, beyond question, the highest prescribed for

executive Officers in any Navy in the world. Without seeing the examination papers and a schedule of the marks obtained, it is impossible to say how far the programme is carried out : but from the known thoroughness of German education, generally, we may assume that the nominal standard is fairly attained by a considerable number. That such a standard is at all possible is due, in the first instance, to the high standard of qualification for entry, permitted by the more advanced age of the candidates ; and in the second, to the high standard of the final obligatory examination. That every one of these senior graduates reaches the ideal is not to be supposed ; but making all allowances, the course is transcendently higher than our own, which starts from a much lower level. That the theoretical training of the German naval Officers is excellent, can scarcely be questioned. It has been doubted whether the practical training is equally sound : whether it gives a familiarity with the exigencies of the Service, and develops that readiness of resource which is the everyday need of a seaman. On this point, Mr. Soley does not offer an opinion.

The educational system of the Italian Navy is at present in a transitional stage. The course for cadets has, since the writing of Professor Soley's report, been extended from four to five years ; and it is in contemplation to combine the existing two schools, at Naples and Genoa, into one at Leghorn. It is therefore unnecessary to examine into the course of instruction now prescribed, which appears to be too exclusively theoretical, and to devote a considerable time to subjects very remotely, if at all, connected with the naval profession. And the discipline to which the pupils—lads who enter at the average age of 16—are subjected, is, if possible, more restrictive than even on board the "Borda," and would seem more suitable for young children.—"The scale of punishments, too, ranges from the extreme of pettiness to the extreme of severity ; from deprivation of dessert at dinner to thirty days' solitary confinement on bread and water. In regard to the latter penalty, it is to be presumed that it is rarely inflicted ; but even so, a young man whose offences were such as to warrant this punishment, could hardly be fit to continue at the school, or in the service." The system of the gunnery school, established (by royal decree of April 2, 1873) on board the screw-frigate "Maria Adelaide," at Spezia, is largely founded on that of the "Excellent."

POSTSCRIPT.

With Italy, Professor Soley closes his Report on the Foreign Systems of Naval Education ;¹ but we may here properly supplement it by a brief notice of the American system, deduced from an earlier report by the same writer, from the Official Reports of the Secretary of the U.S. Navy, and from the Registers of the U.S. Naval Academy.² We find then that : "The number of cadet-midshipmen allowed at the Academy is one for every Member and Delegate of the House of Representatives ; one for the District of Columbia ; and ten appointed at large. The nomination of candidates for admission from the District of Columbia and at large is made by the President. The nomination of a candidate from any Congressional district or territory is made, on the recommendation of the Member or Delegate, from actual residents of his district or territory. Each year, as soon after the 5th

¹ Sweden and Norway, Russia, and Austria are entirely omitted.

² "Historical Sketch of the United States' Naval Academy," prepared by direction of the Superintendent for the Department of Education at the International Exhibition, 1876, by Professor James Russell Soley, Sr., Washington, 1876 ; "Reports of the Secretary of the Navy," 1873-79 ; "Annual Register of the United States' Naval Academy, Annapolis, Md.," 1878-79-80.

"of March as possible, Members and Delegates are notified in writing of vacancies that may exist in their districts. If such Members or Delegates neglect to recommend candidates by the 1st of July, the Secretary of the Navy is required by law to fill the vacancies existing in districts actually represented in Congress. They must be filled by appointments from the districts in which the vacancies exist. A sound body and healthy constitution, good mental abilities, a natural aptitude for study and habits of application, persistent effort, an obedient and orderly disposition, and correct moral principles and deportment, are so necessary to success in pursuing the course at the Academy, that persons conscious of any deficiency in these respects are earnestly recommended not to subject themselves or their friends to the mortification and disappointment consequent upon failure, by accepting nominations and attempting to enter a service for which they are not fitted.

"Each candidate for appointment as cadet-midshipman must present to the Academic Board satisfactory testimonials of good moral character; and must certify *on honour* to his precise age, which must be over fourteen and less than eighteen years at the time of the examination. No candidate will be examined whose age does not fall within the prescribed limits." "Candidates must be physically sound, well formed, and of robust constitution; they will be required to pass a satisfactory examination before a medical board." "The candidates must pass a satisfactory examination before the Academic Board in reading, writing, spelling, arithmetic, geography, and English grammar. All the examinations except in reading will be written. Candidates who fall below the standard will receive a second and final examination in the subjects in which they fail. Deficiency in any one of the subjects at the second examination will be sufficient to insure rejection. Candidates rejected at such examination shall not have the privilege of another examination for admission to the same class unless recommended by the Board of Examiners."

Professor Soley dwells on the fact that a great number of candidates fall below the standard of this examination which, when compared with the limiting age, can only be called elementary. "It is"—he says—"a matter of remark to the examining board that a considerable majority of the candidates come very poorly fitted for this or any other examination. The subjects required are of an elementary character, the papers set are simple and easy, and the marking is indulgent. The question occurs at once, Why is it that selected boys from all parts of the country, of an average age over sixteen, should be unable to pass a creditable examination in grammar, geography, spelling, and arithmetic? Or, leaving out of consideration the first two branches, as candidates are rarely rejected for a deficiency in geography or grammar alone, why is it that out of 200 boys of sixteen, presented annually for examination, hardly half could be called proficient in arithmetic and spelling?" Amongst other reasons put forward as answers to this question is "a want of time for special preparation;" and that this is accepted as the principal reason is shown by the annually repeated suggestion that the nominations should be made earlier, so as to give time for this "special preparation."

It would seem that a lad of sixteen ought to be able to write and spell decently, without much special preparation. But spelling is somewhat delicate ground; for a recent meeting of English schoolmasters resolved that correct spelling was an obsolete prejudice; and a section of educated men has been found to suggest the modifying our language to suit the needs of the illiterate. Still even the most enthusiastic reformers might draw the line on this side of some of the samples given by Mr. Soley. Deslipine, extradonary, suciside, discention, malisceous, snoar—are a few, which seem to speak of ignorance not only of spelling, but of the sound and the meaning of the words.

Geography fares equally badly. An especially well recommended candidate, who was nearly eighteen years old, who had been for two years and a half teacher in a district school, and had won his nomination in a competitive examination against sixteen others, broke down as grievously in geography as in everything else. One or two specimens of his work will relieve a paper on a very grave subject.

He was asked: "Give the position of the following cities, and tell on or near what water they are situated? 1. Toledo. 2. Carthage. 3. Cracow. 4. Trebizond. 5. Calcutta."

He answered: "Toledo on the western end of Lake Erie Carthage northern part of France England Calcutta southern part of Europe Mediterranean sea."

Another question was: "Make a coasting voyage from Archangel to Calcutta via the Suez Canal. Name all the important bodies of water you pass through, in order."

His answer was: "east on the Bay of Bengal Arabian sea north east on the red sea east on the Mediterranean Mediterranean sea Arabian sea Bay of Bengal red sea."

Professor Soley, as an American, not unnaturally bemoans the possibility of ignorance so extreme under the circumstances; but from the point of view at which we now stand, it is principally interesting, 1stly, as explaining the very large proportion of candidates who are rejected both for admission and afterwards; and, 2ndly, as showing what a very great strain is brought on the resources of the Academy by the low standard of admission.

"Candidates who pass the physical and the mental examination receive appointments as cadet-midshipmen, and become inmates of the Academy. Immediately after admission they are required to sign articles by which they bind themselves to serve in the United States Navy eight years (including the time of probation at the Academy), unless sooner discharged. At the same time they are required to make a deposit with the treasurer, which is credited on his books, to be expended, under the direction of the superintendent, in the purchase of clothing, furniture, text-books, and other authorized articles. The amount required varies somewhat, besides being reduced more or less by the value of clothing brought from home." Exclusive of this reduction, it was fixed for 1879 at 214.74 dollars, equivalent to 45*l.* sterling; and for 1880 at 182.47 dollars, or 38*l.* "The pay of a cadet-midshipman is 500 dollars (104*l.*) a-year, commencing at the date of his admission."

The cadet-midshipmen stay at the Academy for four years, during which the course of study is as follows:—

FIRST YEAR.—Algebra, Geometry: English, History, French, Drawing. *Practical instruction in*—Seamanship, Naval-tactics, Great guns, Infantry-tactics, Field Artillery, Boat-howitzers: Fencing, Dancing, Swimming.

SECOND YEAR.—Trigonometry, Descriptive Geometry, Analytical Geometry: History, Rhetoric, Elementary Physics, Chemistry, French, Drawing (free hand). *Practical instruction*—as before; drop Dancing, Swimming; add Signals, Gymnastics.

THIRD YEAR.—Seamanship, Ship-building, Naval-tactics, Infantry-tactics, Ordnance instructions: Astronomy, Applied Mathematics, Mechanics; Electricity, French, Spanish, English Composition. *Practical instruction*—as before; substitute Boxing for Gymnastics.

FOURTH YEAR.—Seamanship, Naval Architecture, Ordnance and Armour, Navigation and Surveying, Marine Engines, Light, Heat, Spanish, Public law. *Practical instruction*—as before; add Mortar-practice, Marine Engines.

In addition to this, those cadets who display marked ability in Mathematics are permitted to take an advanced course, in the first year, in algebra and the theory of equations; and in the second year, in the elements of

the differential and integral calculus, with applications to trigonometry and geometry of two dimensions. In the third year, whilst the regular course (under the head of Applied Mathematics) comprises the principles of the differential and integral calculus, and their applications to maxima and minima, tracing of curves, areas and volumes, centres of gravity, &c., those cadets who have completed the elective course in Mathematics are permitted to take a more advanced course in integral calculus and analytical mechanics; the text-books for which are "Williamson's Integral Calculus," and "Tait and Steele's Dynamics of a Particle." The text-books for the obligatory course are "Todhunter's Mechanics for Beginners," and "Smith's Hydrostatics": from which it would appear that (in practice, at least) both analytical geometry and the calculus are voluntary subjects. But even so, the bringing a moderate proportion of youths indifferently prepared at entry up to the required standard speaks of a great deal of hard work on the part of both students and instructors; and the number that fail, after every exertion, is not to be wondered at. The proportion that does fail will appear more clearly from the following summary. In the six years terminating 1875:—

The number who graduated (<i>i.e.</i> passed out) was	232
out of number admitted to the Academy	502
and number of candidates for admission.....	848

That is to say, of those admitted to the Academy 46·22 per cent. pass out; and only 27·3 of those nominated. The percentage of those who pass out with their proper class is much smaller; and, as might be expected, a large proportion of those who fail fall out at the end of the first year. At the examination in June 1878, of the first year's class of 111, only 70 were placed; and in June 1879, only 50 out of a class of 73.

At the end of the second, and again at the end of the fourth year, the cadets go for a two months' cruise in a sailing training ship: after this, those of the fourth year are appointed to sea-going ships in commission for a period of two years, during which they are expected to keep up their studies. They are then finally examined for the grade of midshipman, and are eligible for promotion to the rank of Ensign, as vacancies occur.

It will be seen then that the American system is singular in this: that nominations are given largely in excess of the requirements of the Service; and that the nominees are ruthlessly thinned out by a test examination and a course of instruction beyond the capabilities of three-fourths of their number. Such a system must be exceedingly costly and excessively laborious: it must also tend to lower the standard not only of admission but of graduation: and though this latter—owing to the riper age of the cadets and the four years' close study at a college on shore—is somewhat higher than the obligatory course in our own Service, it would seem to compare unfavourably with that of either Germany or France. Whether a competitive examination for entry (as is held for the cadet-engineers), or for passing out, would not be more advantageous is a question which naturally occurs to us, but which probably political motives have led the American Representatives to answer in the negative.