

THE FUTURE OF EDUCATION.

SIR NAPIER SHAW has done good service to the cause of education by the timely publication of his trenchant "Open Letter" and other essays,¹ and although the brochure is a small one, its intrinsic value is not to be measured by the exiguity of its pages. The author writes with first-hand knowledge, gained partly in earlier years at Cambridge, and partly in the course of his experience as head of the Meteorological Office. In the latter capacity he is naturally brought into contact not only with newly finished products of the university mill who are seeking employment, but with men of affairs to whom the science of common life ought to be as generally familiar as, actually, it is not.

Thoughtful persons who happen to be conversant with the anomalies and anachronisms so obvious in the educational systems of this country will find themselves, although not perhaps in complete agreement, at any rate in sympathy with much that is so admirably set forth in this little volume. Of course, some effective shots are fired at the universities in which compulsory classics are still so strongly entrenched. The defenders of a position rapidly becoming hopeless might perhaps have been expected long ago to have recognised the common sense of the shrewd old poet who laughed at their prototypes in his own days:—

. . . nisi quæ terris semota suisque
Temporibus defuncta videt, fastidit et odit.

Perhaps in their hearts they may have done so, but custom and vested interests have always proved serious obstacles in the way of progress. Things are changing now, but whilst we want to destroy the loaded dice which have enabled the classical side of the great schools unfairly to win a wholly undue proportion of the ablest boys, we do not desire to see the aggrandisement of the modern side effected by the establishment of countervailing malpractices of a similar kind.

As soon, however, as we attempt to arrive at any conclusion as to what part science is to play in the education of the future, we encounter a distracting diversity of opinion. The war has brought many things home to us, and few things more forcibly than a recognition of the immense importance of science to the national safety. But on what lines are we going to move in the future? Sir Napier has pungent things to say about much of the stuff that passes for science in too many of our schools and colleges. He makes a strong appeal, based on utilitarian as well as on educational grounds, for the more adequate recognition of the "observational sciences." Those who have had to do with ordinary boys and girls are likely to agree with him in the main, and, as a matter of fact, beginnings have been already made in more than one of our great schools. The results have shown how well suited for young people a properly devised course of education on these lines can be made.

¹ "The Lack of Science in Modern Education, with Some Hints of What Might Be." By Sir Napier Shaw. Pp. 42. (London: Lamley and Co., 1916.) Price 1s. net.

A deplorable ignorance of the common, though fundamental, facts of Nature is by no means so rare as it ought to be amongst those who have acquired their knowledge of science in the laboratory. Perhaps this need not excite surprise, for even in high quarters we find curricula in science recommended which, although admirably adapted to enable a boy to win a scholarship under the existing defective methods of selection, are assuredly not calculated to stimulate his interest in the big experimental laboratory of Nature.

A distinguished professor has urged, in a recently published book, that the ideal school curriculum in science should begin with mathematics, to be followed by physics, chemistry, and mechanics, "and that wholly subordinate importance should be attached to the biological sciences, because [*sic*] the elementary stages of these latter subjects, necessarily largely descriptive, are insusceptible to broad treatment as illustrative of scientific reasoning and method." Perhaps it would not be easy to find a more complete lack of appreciation of the psychology of the ordinary boy and girl, or a more profound misapprehension of the relative values of the various branches of natural knowledge in earlier school education compressed into fewer words. A moderate amount of the physical sciences (particularly such parts as do not demand a broad treatment illustrative of scientific reasoning and method) is certainly desirable. What is, however, most needed for the average boy or girl is a training in accurate observation and elementary analysis of natural phenomena, not the formal science of the laboratory—that should come later—but in the field, on the hillside, in the cloud, and in the river. The good teacher will see to it that scientific reasoning will inevitably develop in the minds of the children. They will, and practice shows they do, become interested in common branches of natural knowledge, the very existence of which escapes so many grown-up people who were not shown how to observe these things when they themselves were young.

There is just as much danger of falling into a groove in the teaching of science as in that of other subjects, and it behoves all who have the interests of higher as well as school education at heart to keep a sharp eye on the specialist fiend. Mathematics is not the only gateway to science, any more than Greek grammar is the only avenue to the best literature. It takes all sorts of people to make a world, and it needs an acquaintance, elementary perhaps, but certainly not superficial, with all sorts of subjects to make an educated man or woman. It is the business of education to stimulate the development of all sides of the healthy mentality of boys and girls (whilst not neglecting their own natural bias) before the imperious needs of specialising in order to equip them for particular paths of life impose limitations on the area covered by instruction. Properly considered, if the foundations have been well and truly laid, and on a broad basis, it would seem that specialised instruction may be justly likened to the rising edifice, and it should form

the natural and proper continuation of earlier work. But for young people, whether they are going to be scholars or scientific investigators, men of affairs or ordinary citizens, what is pre-eminently needed is an education on broad lines, not a sham education, warped by early specialisation, whether in the direction of physical science or in that of the dead languages.

Of course, it is easy to say these things, but, as Sir Napier Shaw reminds us in an effective piece of criticism, we are up against many difficulties, amongst which there loom largely the systems of examinations and all that these imply. Like Frankenstein's monster, they have developed unexpected powers of strangulation, and, as with some forms of arbitrary legislation, have strengthened the very abuses they were designed to destroy. Are, then, examinations bad in themselves, or are the evil results, of which so much is everywhere heard, incidental rather than essential? Some sort of test of ability and efficiency will always have to be imposed, and it seems to be a fact that those to whom examinations are anathema have hitherto failed to present a workable substitute.

We may admit that many of the evils alleged to flow from the examination system are real, and especially the desiccating influence it has too often exerted on the training of those selected as payable candidates to be forced for competition for scholarships and other still more valuable prizes of life. But the root of the mischief is not altogether simple; it ramifies in more than one direction. In the first place, the system itself naturally tends to become stereotyped. Instead of providing a suitable test of the progress of those who have extended their studies in varied lines, it is apt to unify direction and stifle initiative. It is so much more easy to arrange examinations for one type of curriculum, and that by no means necessarily the best. So examination becomes a department of administration, where hard cases make bad law; and by a natural process of development the examination tends to become, in fact, the "final cause" of education itself—a complete reversal of its true position.

But to attack a thing because abuses have grown up around it is not necessarily sound practice, and it certainly is not good logic. It is true that the attempts hitherto made to check the evil effects of the system have not been very successful. This is due partly to the complex multiplicity of the examinations themselves, partly to a defective conception of the function to be discharged, but partly also to insufficiently recognised defects in the examiners.

The call for a reduction in the number of the various tests for entrance to the universities and for professional courses is urgent. We hope to see some practical scheme put forward by the Committee on Science appointed by the late Government some months ago. The chief desideratum is a sufficiently elastic system which, while not throttling the individuality of the school and the teacher, will ensure that those who pass the test do possess attainments enough to qualify

them to enter on the next stage of their academic or professional career. The growing practice of accepting examinations "in lieu" has already paved the way for the introduction of a more comprehensive scheme in which the principle might be embodied on a large scale.

It is not so easy to find remedies for defects arising from the personality of the examiner, nor is it perhaps likely that all would even admit the existence of these defects, much less the need for remedies. But that we are here face to face with a real difficulty must, in fact, be perfectly well known to all who have had wide experience in these matters. Some of the evils, partly personal, partly dependent on administration, are more glaring than others. For example, in scholarship examinations it often happens that the successful candidate is selected without undergoing any oral test at all. Sometimes this is entirely the fault of those responsible for the general arrangements; sometimes the examiner avoids any real contact with the examinees. While such a practice may be defended in the case of a pass test, it ought never to be allowed when evidence of genuine ability constitutes the principal criterion for deciding between the competitors. A good examiner will easily appraise the value of written work in the course of a conversational oral examination. If he cannot, or if he only succeeds in scaring a candidate, he is not fit to discharge the duties of an examiner, however eminent he may be in other directions. Thus it would appear that it is with the system and with the examiner that the quarrel of the reformer really lies, rather than with examination *per se*. Don Quixote is not the only man who has wasted energy in tilting at windmills owing, let us say, to a lack of sense of proportion and of clear vision.

Amongst the expedients devised for obviating the deficiencies of badly conducted examinations, that of inspection has perhaps turned out to be the best. But the personal qualities and qualifications of the inspectorate are even more important here than they are in the examiner. A bad official can do immense harm, whilst, on the other hand, a capable one is of great value, inasmuch as the inspector exerts so powerful an influence for good or evil on the teaching.

But, whatever their faults, the inspectorate and the examination systems have a great mass of good results to be placed to their credit, and they do tend to weed out at least some types of incompetent teachers. Everyone who has had experience of schools is perfectly well aware of the real reason why the pupils at one centre are almost uniformly bad, while in another they appear to be almost as uniformly good. The difference, clearly, is not inherent in the children. Furthermore, it is quite intelligible, from their own point of view, why more than a thousand private and preparatory schools continue to refuse all inspection: the curious thing is that such unregulated experiments on the minds of children should be tolerated at all by the public of a country which claims to be enlightened. Perhaps it is because

the sheer business aspect of the matter has been hitherto insufficiently apprehended.

Many people will probably hesitate to follow the author in his proposals for an Educational Authority, and especially in the suggestion that it should be a committee formed, not by the Board of Education, but within the Privy Council. It would be interesting to observe the attitude of the Nonconformists if the Archbishops were alone to represent the educational policy for theologians; and, indeed, even in science the President of the Royal Society would probably find it beyond even his powers to represent so vast a series of subjects.

What seems to be really wanted is perhaps not so very remote, after all, from the essential elements of the proposed scheme. The general lines of educational policy will have to be laid down by people who are in contact with both education and affairs, and the means for giving effect to such policy will have to be provided. The carrying out of the policy, when the general plan is settled, will have to be left to the teachers, who ought not to be hampered in working out the details according to individual predilection. No doubt, a considerable overhauling of vested interests will be called for, abuses will have to be checked, and care will have to be taken that a proper balance is preserved between educational efficiency and the tendency towards early and excessive specialisation, whether at the school or at the university.

The danger of undue specialisation is a real one, especially among a people which, like ourselves, prides itself on being practical. It must not be forgotten that it is, and will continue to be, the business of schools, as well as of the universities, to train citizens as well as specialists, and that, while some will become specialists, all ought to be good citizens. Intelligent citizenship implies an intelligent outlook on the conditions that make for, and are involved in, our national and corporate life, and it becomes the more urgent to consider carefully, among the wide range of subjects, what things are, and what things are not, of immediate value in securing the satisfaction of this paramount need. In our great schools it is a matter of common complaint that too much time has been devoted in the past, with astonishingly small apparent result, to a very limited section of the "humanities," too little—sometimes none at all—to the great organised mass of knowledge commonly called science. And yet it is to the advance of science that we owe not only almost all our material progress, but nearly all our modern outlook on life and on the great problems that life holds for each one of us.

J. B. FARMER.

THE WORK OF THE MINISTRY OF MUNITIONS.

LITTLE more than two years ago a small party of men met together at 6 Whitehall Gardens, under the chairmanship of the present Prime Minister, to form a Munitions Department. In the words of Dr. Addison, the present Minister of Munitions, speaking in the House

of Commons on June 28: "There was to be one aim and one aim only—to obtain the goods and make delivery of them to the Army." The story, if it is ever told, of the creation of an organisation which is responsible to-day for the employment of two million persons, and for keeping the products of their exertions up to a level which continually rises, will certainly be astonishing, possibly one of the most wonderful in the history of this country, for the Ministry presents, perhaps, the most remarkable aggregation of men and women of diverse qualifications and attainments that has ever been got together in this country or in the world. Men from every branch of commerce and industry are serving, men of science, lawyers, literary men, travellers, soldiers and sailors, many of them as volunteers. The story, when told, will be one of improvisations connected with many disappointments, manifold and unexpected difficulties, and endless expedients, resulting in the creation of an organisation which, assuming, or having forced upon it, first this function and then that, became at last as prodigious in its proportions as in its output of munitions, and now constitutes an imperishable monument to British genius and resource.

On June 28, however, Dr. Addison reviewed the work of the various departments of the Ministry in plain and moderate language. He dealt with those which are concerned with the production of completed ammunition and the guns which use it, then with those which require the use either of steam or of internal-combustion engines, those which deal with the provision and working up of minerals and metals, certain common services, the trench warfare and other specialised departments, and those of labour and finance. A brief reference will be made to one or two of the most important activities of these departments.

Before the war this country was entirely dependent on Germany for its supplies of potash. This substance is required in both the agricultural and the glass industries. With regard to this Dr. Addison states: "Thanks to the ingenuity of Mr. Kenneth Chance and other gentlemen working with him, a process has been discovered whereby great quantities of potash may be obtained, and the development of the scheme is now in operation with the assistance of the Ministry. We shall be able to provide every ounce of potash that the glass trade requires, as well as very largely to meet the needs of agriculture."

Previous to the outbreak of war the output of steel in this country was about seven million tons per annum, and had remained almost stationary for some years. The output to-day is at the rate of nearly ten million tons, and a scheme is being worked out by which it is hoped to raise the production to twelve million tons by the end of 1918. The production of sulphuric acid has undergone great developments both in private works and in Government factories. A section of the Explosives Supply Department has been set up for the provision of all the artificial manures that are required, and the Ministry contemplates supplying at least a million tons of superphosphate, half a