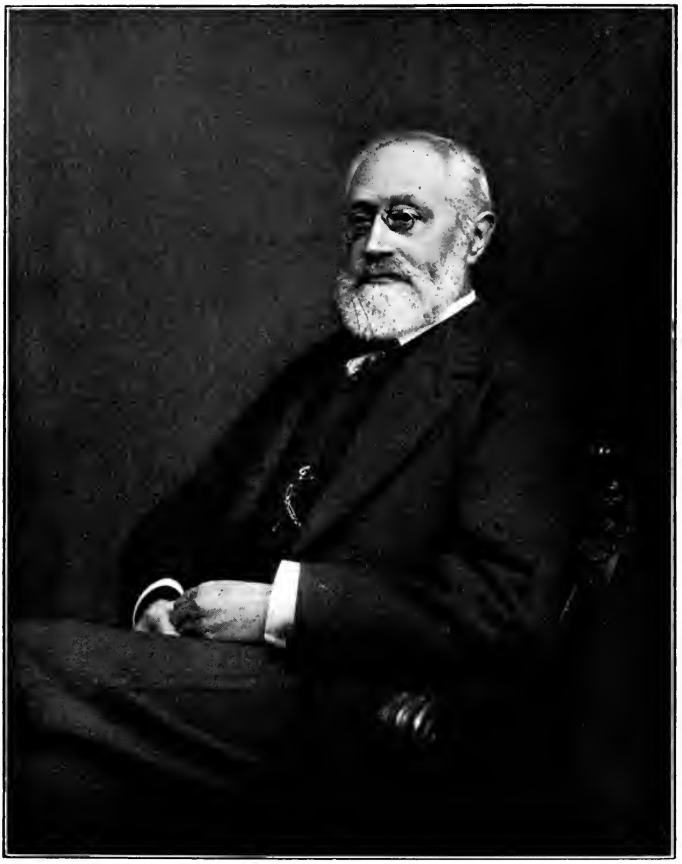
EDUCATIONAL AIMS AND EFFORTS
1880–1910



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EDUCATIONAL AIMS AND EFFORTS

1880—1910

BY

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LONGMANS, GREEN, AND CO.
39 PATERNOSTER ROW, LONDON
NEW YORK, BOMBAY, AND CALCUTTA
1910

TO

MY WIFE

TO WHOSE IDEALS I AM INDEBTED
FOR ALL MY BETTER AIMS
AND TO WHOSE ENCOURAGEMENT
I OWE
MY MOST FRUITFUL EFFORTS

THIS BOOK
IS DEDICATED

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EDUCATIONAL AIMS AND EFFORTS: 1880-1910

PART I.—INTRODUCTORY

I

PROGRESS IN ELEMENTARY EDUCATION

AMONG the changes which, during the past thirty years, have influenced the character of the British people, none have been so potent as those connected with our system of education. Between the years 1880 and 1910 the political aspirations, the social aims, and the commercial activities of the nation have been profoundly modified, and this alteration, the full effect of which we are only beginning to realize, is more or less connected with the new ideas and habits which a wider and more generous system of education has introduced into their lives. In this development, with which nothing in our past history can compare, I have been permitted to take some part. The particular work in which I have been engaged has afforded me the opportunity of becoming intimately acquainted with the eductional needs of different classes of our industrial population, and has enabled me to offer and to consider suggestions for the improvement of our educational system. During this period I have been compelled by the nature of my duties very carefully to watch State legislation and the effect of Governmental action on the educational efforts of local authorities and of other bodies. The articles and addresses which are included in this volume form stepping-stones, so to speak, across the somewhat wide stream of events which separates the educational conditions that prevailed in 1880 from those of

to-day, and it has seemed well to me, by way of introduction and with a view to filling up the gaps, to indicate, very briefly, but with some attempt at historical continuity, the progress that has been made during this eventful period in different branches of education.

In the year 1880 School Boards had been in operation for scarcely ten years—too short a time for their work to have produced any marked effect on the lives and habits of the people. The men and women, none of whom, at that time, could have been much more than twenty-one years of age, who had received their training in the Board Schools, had barely realized their further educational needs. The great results of the legislation of 1870 had only begun to be felt. A new generation of working men and women had not yet arisen, adequately equipped with the skill and knowledge to enable them to exercise any appreciable influence on the activities and aspirations of the nation.

The period which I am considering is remarkable for the extent of the constructive work which was effected in nearly every branch of public education. A Board, presided over by a Cabinet Minister, responsible for elementary, secondary, and technological education, has been established on the ruins of the old Departments at Whitehall and South Kensington. The aims and methods of the teaching in our primary schools have been modified and widened. The foundations of a system of technical education have been securely laid, and the superstructure is approaching completion. A beginning has been made in the organization of secondary education, for which Matthew Arnold, with a keen sense of our greatest national need, so long and forcibly pleaded. New universities have been created and endowed, and new facilities have been added to the older seats of learning. Those who have lived through these years, and have watched with interest, and sometimes with anxiety, these new developments, may possibly feel that they are but the forerunners of further changes still required to perfect our system, though none can fail to be deeply impressed with the extent of the progress effected during a period which covers, after all, no more than the life of a single generation.

The statistics for the year 1879–1880 show that 3,895,824 children in England and Wales were receiving instruction in Public Elementary Schools. Of these, 2,809,944 attended Voluntary, and 1,085,880 Board Schools.[1] Education, although obligatory, was not then free. Fees were exacted from the parents, varying in amount from 1*d.* to 9*d.* a week. The curriculum was almost entirely literary. It suffered by inheriting the traditions of the education provided in our old Grammar Schools. Organized with a view to providing children with the elements of primary instruction, with a knowledge of the three "R's"—Reading, Writing, and Reckoning—and intended at first to offer little more, the curriculum was gradually expanded till it included subjects of little or no use to the children in after-life, and taught by methods which failed to produce aptitudes of any permanent value to them. At that time, besides the obligatory subjects of instruction, there were optional, or class subjects, and special subjects, among which were included agriculture, mechanics, animal physiology, Latin, and French. Moreover, the whole character of the teaching was vitiated by the conditions under which State grants were apportioned. Nothing, probably, has tended more to retard the progress of education in this country than the system of "payment by results," which was only gradually abolished. The system was unknown in any foreign country, and its injurious effects were fully realized long before it was discontinued. It fostered and encouraged the very methods of instruction which every sane educationist would have tried to avoid. It was founded on a distrust of the very persons in whose desire conscientiously to discharge their duties it was above all things essential that the public should have full confidence. To the commercial spirit, which was thought to be a distinctive characteristic of the English people, may have been due the fact, that this system lingered so long as an essential condition of State aid to elementary, and, in some departments, to secondary education. It is difficult now to realize the kind of work which H.M. Inspectors of Schools were for many years called upon to

[1] The most nearly corresponding figures for the year 1908–09 are 6,025,163 children receiving instruction, 2,586,114 in Voluntary and 3,439,049 in Council Schools.

discharge. Their duties involved the examination of every individual child, and the marking of the degree of excellence in the *vivâ voce* and the written tests to which they were subjected; and it was on the results of these tests that the larger part of the Government grant to each school was apportioned. In the Code for 1880 it is distinctly pointed out, that "the results of the examination of each scholar will be communicated to the managers." The process was undoubtedly a simple and an easy means of ascertaining the amount of subvention to be apportioned by the State; but it took little note of the methods and general character of the teaching, of the discipline and equipment, or of the tone and spirit of the school. Gradually, other considerations were taken into account; but the system survived so long that it grew into the life of the school, vitiating the aims of the teacher, and it came to be regarded as the absolutely essential and only condition by which the State was secured in obtaining full value for its money. Nothing has more effectively raised barriers between elementary and secondary education, and between the status of the teachers in the two classes of schools, than this dependence of elementary instruction for financial aid upon the grant-earning power of the pupils. Matthew Arnold, who, as Inspector of Schools, was compelled to work under this system, in an interesting Report on German schools, says, "Again and again I find written in my notes, *The children human.* They had been brought under teaching of quality to touch and interest them, and were being formed by it." How was it possible that little children could be touched or interested in teaching that aimed at enabling each of them to pass an examination, on the results of which the school budget partly depended? Such a system could not have existed unless it had been consonant with the spirit of the times, and there can be no doubt that it reflected some of the traditional and economic principles which had been inherited from a former generation, and which have survived even to the present day.

Adam Smith, in his article in *The Wealth of Nations*, dealing with "The Expense of the Institutions for the Education of Youth," insists very strongly on the relation which should subsist between the teacher's remuneration and the results

which he achieves. Whilst pointing out that "the common people cannot in any civilized society be so well instructed as people of some rank and fortune, the most essential parts of education—to read, to write, and to count, can, and should be, imparted to them." And he goes on to say that the public can facilitate this acquaintance by establishing in every parish or district a little school, "the master being partly, but not wholly, paid by the public; because, if he was wholly or even principally paid by it, he would soon learn to neglect his business." It seems strange, in view of the changes that have since occurred, to read that "those parts of education for the teaching of which there are no public institutions are generally the best taught," and that "in modern times the diligence of modern teachers is more or less corrupted by the circumstances which render them more or less independent of their success and reputation in their particular professions. Their salaries, too, put the private teacher who would pretend to come into competition with them, in the same state with a merchant who attempts to trade without a bounty in competition with those who trade with a considerable one." Adam Smith's views were logically in accord with the principles of that political economy which regarded society as a mass of units, mechanically moved under the influence of irresistible and measurable forces, but which neglected altogether the feelings and motives that determine the actions of human beings. In his application of the mercantile spirit to the teacher's profession he was quite consistent, but his conclusion that, as there are no public institutions for the education of women, "there is accordingly nothing useless, absurd, or fantastical in the common course of their education," suggests somewhat conflicting ideas, when we compare girls' education less than a century ago, as described by Herbert Spencer, with what it was in 1880, and with the present trend of public opinion as to what it should be.

I have quoted these extracts from Adam Smith's classical work, because the views he there expresses were more widely prevalent in the latter half of the last century than may be generally supposed. It was in 1884, at the first International Conference on Education, held in London, that the late Mr. Mundella, than whom no one who has since presided at

Whitehall has proved a more enthusiastic advocate of popular education—pointed out in a speech to the members of the Conference the inherent difficulties, if not the impossibility, of abolishing "payment on results." The proposal to do so would, he said, "effect an entire revolution in the system of education"—a revolution the consequences of which he was incapable of foreseeing. "Parliament," he said, "would not be found to vote three, four, or five millions a year without having some test, and if they simply left it to the Inspector's report to say whether the work was fairly done, and whether the school was good, bad, or indifferent, they would have the worst Code that could possibly be devised by man, because the school might find itself deprived at a stroke of its grants, and the teacher of his reputation, and there would be no means, except the judgment of the Inspector, of testing the condition of the school."

The system of "payment by results" was not confined to our elementary schools. In the evening classes in science and art, which were at that time widely distributed throughout the country, the same system obtained, and for many years the teachers' remuneration depended entirely on the grants they "earned." This led very frequently to the farming out of classes to an organizing teacher, who employed a number of assistants, and pocketed the result-fees of their instruction. The teachers in charge of some of these classes knew little more than the pupils who attended their lessons. In an article dealing with this subject in the *Manchester Guardian* of February 27, 1883, the writer says, "The recent educational speeches of Professor Huxley and of Mr. Philip Magnus should awaken more than passing interest, each having a special knowledge of an important phase of the subject"; and, after referring to the speeches, he goes on to say, "There is good reason to believe that much of the science teaching of the country is of a very poor type indeed; and the need of a more highly trained and better-remunerated body of science teachers is making itself strongly felt. Any one who, at the class examinations, obtains a second class in the advanced stage is thereby qualified for the important position of teacher. When appointed, the teacher's payment is generally speculative, depending upon a number of contingencies, and the average payment of teachers last year was only £24 13*s.* 11*d.* . . .

What seems now to be required is that a higher qualification should be demanded; that the teacher should give more time to the preparation and illustration of his lessons; that he should depend no longer entirely upon the so-called 'results.'" This system, involving an undoubted waste of public money, by means of which a scanty knowledge of elementary scientific facts was scattered broadcast throughout the country, continued for many years under the direction of the State. In some cases students were actually bribed to attend the classes and to present themselves for examinations, with a view to swelling the amount of Government grant, and, in the selection of subjects to be taught, less regard was shown to the requirements and occupations of the students, than to the ease and rapidity of imparting to them such a knowledge of the subject, as would enable them to pass the examinations. Indeed, cases have been instanced of young men and women, living and working in large manufacturing towns and cities, and knowing nothing of country life, being taught agriculture, the cost of the teaching being defrayed by the State. These abuses were only gradually abolished. The system extended to what are called "organized Science Schools,"—that is, schools of a higher elementary type, supported almost entirely by special grants, to which further reference will be made later on. But bad as the system was in the case of adults, who to a certain extent were free agents, and might refuse to attend classes on subjects which seemed to have no bearing upon their work, it was still more harmful in the case of children, who at the most impressionable age, were, in many cases, subjected to over-pressure, in the endeavour to learn subjects of doubtful value by methods which were in no sense educative.

In a paper published in May, 1890, in a magazine called *Subjects of the Day*, edited by Mr. James Samuelson, brother of the late Sir Bernhard Samuelson, I stated, "The three planks that constitute the platform of the new education departure are: (1) Abolition of payment on results; (2) practical teaching; (3) free schools"; and at that time no one of these reforms had been introduced into our system of public elementary education. During my brief membership of the London School Board (1890–92) a beginning was made, by means of experiments,

in supplementing headwork by handwork in our elementary schools, a more rational system of grants was substituted for the method of "payment by results," and school fees were practically abolished. It was the difficulty of retaining the voluntary schools system without payment by results and without school fees that so long stood in the way of these very necessary reforms. But I foresaw then, as I stated at the time, that the difficulty might be overcome by the improvement of the inspectorate. "If grants on results were abolished, schools would be maintained, as they are now, from two or three sources, according as school fees are retained or abandoned. The sources of income would be—local aid, whether in the form of rates or subscriptions, supplemented or not by school fees; and Government grants. What is wanted, is that the Government grant should be a fixed sum per unit of average attendances, and that the payment of that sum should be independent of results. To secure, and to afford the necessary assurance of, efficiency, changes would have to be made in our system of inspection. In addition to H.M.'s Inspectors, who would visit each school, as now, and report to the Education Department, district inspectors should be appointed by the School Board or other local authority. It would be the duty of the district inspectors to visit the schools under their charge more frequently than they are visited by the Government Inspector, to report to the authority appointing them, and to assist the managers and teachers in giving effect to the recommendations and suggestions of H.M.'s Inspectors. The withdrawal of the Government grant, which would lead to the closing of the school, would be the ultimate penalty of inefficiency."

The above extract from my article on elementary education, published twenty years ago, gives a fairly accurate forecast of what has since happened. The system of inspection has been much improved, and voluntary as well as provided schools can be efficiently maintained by the intelligent efforts of the teachers, without recourse to the crude commercial system of payment on results.

The abolition of fees in elementary schools was a measure of social reform which, in very early days, I strongly advocated.

My experience of foreign school systems had shown me that it had greatly helped in promoting regularity of attendance, and there was no doubt that the exaction of fees in our own schools threw upon the teachers, who were responsible for the collection of the children's pence, an intolerable burden, which interfered with their correct relation to their pupils. Moreover, I could not escape from the conclusion that free instruction was a necessary corollary of compulsory education. If parents were compelled to send their children to school, it seemed unreasonable to enforce payment.

In a letter to *The Times* (November 20, 1885), I referred to my having recently returned from "a few days' tour in France, where I had the opportunity of inquiring into the results of the working of the Elementary Education Act of 1881." That Act provided for compulsory education and gratuitous instruction in the primary schools. These results, from the point of view of attendance, appeared to me so satisfactory that I urged the abolition of fees in our own schools. Toward the close of my letter, I said, "There are many other reasons which might be, and have been, urged in favour of free education in elementary schools, which induce me to hope that the question will be considered by both parties in the State as an open one, to be treated on its own merits. I also trust that the so-called religious difficulty may be met by continuing the wise policy that has saved us from the troubles that have befallen other countries, viz. that of placing voluntary schools on the same footing as Board schools with respect to State support. If the equivalent of school fees is provided from the Consolidated Fund, and not out of local rates, no very great burden will be imposed upon the tax-payer."

Early in the following year, on the invitation of the Teachers' Guild, a Conference was held in the rooms of the Society of Arts, to discuss the question of free education. Canon Percival (now Bishop of Hereford) occupied the chair, and among those who took part in the discussion were Mr. Diggle (then chairman of the School Board), the Rev. Brooke Lambert, the Rev. Canon Daniel, and Mr. Oscar Browning. The meeting was attended by a large number of teachers and educationists, well known at the time for their keen interest in the subject. In

opening the discussion, I endeavoured to combat the main argument adopted by the opponents of free education,—that it would lead to the suppression of voluntary schools, the retention of which, as part of our national system, I have always strenuously supported. I stated that the children in these schools "had increased by 685,813 between 1873 and 1883, notwithstanding the competition of Board schools," and I pointed out, what was then and is now equally true, that the religious feeling of the country was strongly in favour of the maintenance of denominational schools, and that parents generally believed in the necessity of some definite religious training for their children." [1]

Mr. Diggle, in his reply, disagreed with many of my arguments and disputed most of my facts. In the course of his remarks, he said that the abolition of school fees meant the increase, in a few years, of the School Board rate from ninepence, at which it then stood, to two shillings—an amount to which, a quarter of a century later, it has not nearly reached, although it now includes provision for secondary schools, for the training of teachers, and for technical and higher education. Objections were also raised that the abolition of fees would injuriously affect our secondary schools, the better organization of which was then regarded as a primary necessity.

It was not, however, till the year 1891 that the London School Board was enabled, by means of an additional Parliamentary grant, to provide free education; and fees continued to be charged in some of our voluntary schools till a comparatively recent date. The abolition of fees was undoubtedly an important step forward in social reform, and had the effect of popularizing education. Looking back at the improvements that have since been rendered possible, by throwing the entire burden of the expense of secular instruction upon the rates and taxes, one cannot but regard any proposal for the re-imposition of school fees in place of local rates, such as that contained in the Bill which passed its second reading in the House of Commons in 1908, as a retrograde step, and it was evident that the clause in that Bill, enabling voluntary schools to "contract out" of the general scheme of public education by receiving

[1] *The Standard*, February 11, 1886.

State aid, free from local assistance and control, would not be acceptable to religious bodies. There can be little doubt that the inclusion of the principle of "contracting out" in the Bill introduced towards the close of that session, destroyed the prospect of a compromise between the Church party and the Nonconformists, which the Archbishop of Canterbury and Mr. Runciman genuinely desired to effect. A compromise on other lines, by which voluntary schools may remain within the national system, may still be looked for.

The abolition of school fees was regarded as a step in the direction of socialistic reform, and in this connection it is interesting to note the remarkable change, during the last few decades, in the public estimate of the extent to which the Government should interfere in the social life of the people. In the early part of the last century the whole set of opinion in England was towards lessening in all directions State control, and diminishing, as much as possible, the sphere of Government interference with the freedom of the citizen. The late Mr. Lecky, commenting in one of his addresses on the change that has since taken place in the popular estimate of Government functions, said, "I should not be dealing sincerely with you if I did not express my own opinion that this tendency carries with it dangers even more serious than those of the opposite exaggeration of a past century—dangerous to character by accustoming men to the constant interference of authority, and abridging in innumerable ways the freedom of action and choice." Recent legislation has abundantly justified the fears which Mr. Lecky so forcibly expressed.

Besides the abolition of fees and of payments on results, there were two further reforms, which I eagerly supported in the hope of making our school system more nearly comparable, as regards efficiency, with that of other countries. These were the introduction of manual work into the curriculum, and the establishment of continuation day schools of a modern type adapted to the requirements of boys, who, on leaving the elementary schools, would be drafted into engineering shops, or engaged in some branch of productive or commercial industry.

Even as late as 1890, when I was co-opted a member of the London School Board, no one of these objects had been

attained. Each of these changes and additions required increased State aid, and could not be introduced by School Boards without the sanction, if not the direct action, of Parliament. By help of grants from the Science and Art Department, which was then a separate and a somewhat independent branch of the Education Office, schools were established in many of our more important centres of industry, in which chemistry and mechanics and certain other branches of physical science were taught, and the excess of earnings on the grants obtained from the teaching of these subjects helped to pay some of the incidental expenses of the schools. At that time, however, there were very few, if any, properly organized continuation schools for either boys or girls. In London, and in other parts of the country, there were a certain number of schools working under the Endowed Schools Act, and in accordance with schemes prepared by the Charity Commissioners; but in nearly all these schools the teaching was antiquated, and provided a very poor preparation for the new means of livelihood which the application of science to industry had opened up. The School Board for London, fully conscious of the need that existed for higher elementary or secondary schools of a modern type, went so far as to use the rates for the provision of more advanced instruction than that given in the ordinary elementary schools; but this practice was stopped in 1901 by the decision of the Law Courts on an action initiated by the Government Auditor. For many years the need of some higher grade of education of a practical character, adapted to the requirements of the more promising pupils in the ordinary schools, was generally felt; but there was a dearth of scholarships to defray the cost of instruction, and a dearth of schools providing the kind of teaching that was needed. It was difficult to see how this need could be supplied. There were no funds available. In London, the City Companies did what they could to meet the want; but opinion had not, yet, so far crystallized as to enable public bodies to settle the particular type of curriculum which was best adapted to the requirements of children who had received their early training in the Voluntary and Board schools. During this period of uncertainty as to what was really

required, I delivered many addresses, in which I endeavoured to make known the want and the best means of supplying it. The substance of an address on this subject, delivered in 1883 before the Society of Arts, has been published in my book on *Industrial Education*. The efforts which at this time were being made by some of the City Guilds to lay the foundations, on a scientific basis, of a national system of technical education, brought into prominence the urgent necessity of establishing schools of this particular type. It was felt that, in the absence of such schools, the provision of facilities for the higher technical instruction was premature. In a somewhat lengthy communication to *The Times* (October 8, 1884), I pointed out that "the few scholarships at the disposal of the School Board had been mostly employed in sending boys to secondary schools, in which the instruction was based on classical studies, and where it was only to be expected that they would acquire a distaste for, instead of an appreciation of, manual work; and that, if the country was to derive the fullest benefit from the money then expended on public education, it was essential that the qualified children of the higher standards should be drafted into schools duly provided with laboratories, and with the necessary apparatus for practical science teaching, as well as with rooms for instruction in drawing, and with properly equipped workshops." Some few years elapsed, however, before the means were provided, and before the machinery was obtained for the establishment and maintenance of such schools. Even now the number of such schools is wholly inadequate. Parents would be keener to let their children remain longer at school if satisfied that the instruction would be helpful to them in obtaining employment, and that, on leaving school, avenues would be open to them, other than the "blind alleys," where alone, too often, work can be found. A beginning has been made in the establishment of trade schools, somewhat of the type of the French *Écoles d'apprentis*, but these are not yet sufficiently well organized to provide the relief that is now more than ever urgently needed.

The great reform, which at that time appeared to me essential to the provision of practical instruction in our

elementary schools, was an extension of the aim and scope of the scheme of elementary education, so as to include not only the training of the intellect and the will, but also of the hand and eye, as the most important organs through which impressions were produced. The instruction given in our schools during the early days of School Board education included, so far as it went, a certain amount of intellectual and even of moral training, but left outside its objects the training of the sense-faculties. From observations I had made in foreign countries, and from experiments which had been tried at home, I had come to the conclusion that the scope and character of our elementary teaching were deficient, that it was founded on too narrow a basis, and moreover that it had grown up, and was being developed, without sufficient reference to the scientific principles that should govern and determine any carefully considered system of primary instruction. Even as early as 1865, when a student at the University of Berlin, I had been deeply impressed with the influence of Froebel, as exemplified in the kindergarten schools, many of which were then in operation in different parts of Prussia, and I was also struck by the scientific spirit which inspired the whole system of German education. In such intervals as I could spare from my university studies I visited several schools, and was present at some of the lessons, and early in 1866 I wrote a paper on the results of my observations, which was read in my absence at the Literary and Philosophical Society of University College.[1]

[1] Of this Society the late Professor W. Stanley Jevons was the first President. In a footnote to his *Letters and Journals*, edited by Mrs. Jevons (Macmillan, 1886), it is stated, "The formation of a Literary and Philosophical Society amongst the students was suggested to Mr. Jevons by his friend and fellow-student, Mr. Philip Magnus." When formed, I asked Mr. Jevons to act as President, and with his well-known modesty he only reluctantly consented. I was elected Vice-President. Jevons contributed a paper during the first session on the "Value of Gold," which was printed in a volume of the Transactions of the Society prior to the publication of his fuller paper on "A Serious Fall in the Value of Gold." Before leaving for Berlin, I read two papers on "J. S. Mill's Theory of Causation," criticizing it very freely. These papers I had been asked to include in the first volume of the Transactions of the Society; but the reputation of Mill then stood so high, and his works were so generally regarded by students as infallible text-books, that I was too diffident and distrustful of my own conclusions to assent. Later on, in 1877, when Jevons was criticizing Mill in the pages of the *Contemporary*

It was not, however, till the year 1880—when I was appointed Organizing Director and Secretary of the City and Guilds of London Institute, and when, as part of my duties, I had to consider very carefully the kind of education most suitable, as a preparatory training, for our artisan population—that I fully realized how defective was the education given at that time in our elementary schools, both in those under the direction of the School Board and of voluntary associations. Nothing approaching to hand and eye training was then admitted into the ordinary curriculum of our schools, and I should have found it very difficult, if not impossible, to persuade the English public that instruction in the use of tools might be made part of a liberal education. In many schools the rudiments of science were taught frequently by itinerant teachers, who brought with them a case of apparatus, as a conjurer might do, and, after showing his experiments, took it away with him. Disconnected object-lessons served to arouse some little interest in scientific facts; but very little was attempted in the way of making science lessons the means of giving instruction in scientific method. Drawing was taught in a very small proportion of our schools, and then not to all children. Year by year the late Dr. Gladstone presented a report to the Chemical Section of the British Association, showing the number of children who obtained grants on specific science subjects, which were regarded as *extras*, and no part of the ordinary school curriculum.

Before the year 1900 no great change was made in the system of examining children in specific branches of science, such as mechanics; sound, light, and heat; and chemistry. In his report to the British Association in that year, Dr. Gladstone

Review, I sent him my papers to read, and I was gratified to learn from him that my criticism was sound. Jevons, in a letter to a friend in 1874, wrote, "Whatever I have said or shall say of Mr. Mill, is due to a very long consideration of his works, and to a growing conviction that, however valuable they are in exciting thought and leading to the study of social subjects, they must not be imposed upon us as a new creed." During the last thirty years the authority of Mill as a philosophic writer and economist has certainly declined. My paper on "Education in Germany," written at the time, although I did not know it, when Matthew Arnold was engaged in inspecting German schools, was read in my absence by a fellow-student, Mr. (now Sir) Robert Hunter.

referred to the fact that "the abolition of individual examination in the specific subjects has been received with favour by school managers and teachers, with the result that much more attention is devoted to this branch of instruction, and it is hoped with much less cramming." And he further stated, "The Code which has been introduced this year will further carry out this principle by substituting one block grant for all the elementary class and specific subjects, so as to avoid the temptation to study what would bring in most grant rather than what is most adapted to the circumstances of the individual school."

In the summer of the year 1880, I was present at a meeting of an Education Conference held at Brussels. My main object in attending was to inform myself as to what was then known of the organization and work of technical schools in Europe. It was an International Conference, and I knew I should have the opportunity of conferring with many distinguished educationists on some of the questions which were then beginning to engage public attention in this country. I was not disappointed.

I ascertained what at that time had been already accomplished by the French and German Governments in providing practical studies in elementary schools. The École Modèle at Brussels, a sort of experimental school, which was excellently well equipped, particularly attracted my attention, and formed the subject of a paper which I read before the Education Society of London—a Society of which the late Professor Alexander Bain was then President, consisting of persons interested in the endeavour to give to education a scientific basis. Within a few days of my return from Brussels I went to Paris, to ascertain for myself the educational effect of the handicraft instruction which was being provided in some of the French schools. Numerous experiments were being tried, and the movement in favour of introducing handicraft teaching into schools was making rapid progress. In July, 1881, a Royal Commission was appointed to inquire into the opportunities for technical instruction provided in this country and abroad, and it was as a member of the Commission that I again visited Paris in the autumn of that

year. The commissioners began their inquiry by investigating the conditions of primary education in France, and so deeply impressed were they with the possibilities that might result from the introduction of workshops into schools, that they issued in February, 1882, a preliminary report, dealing with the new laws regulating public instruction in that country. After inspecting schools, not only in France and Belgium, but also in Italy and Holland, where handicraft teaching was provided, I was convinced that the introduction of manual training into our scheme of elementary education would help to give a more practical bias to the instruction; and, during the next few years, I was actively occupied in a propaganda for making workshop teaching an essential part of general education. Whilst both in France and Belgium and in the United States workshop instruction had many powerful advocates, and the school curriculum was being modified to make room for it, progress in England was not very rapid. The proverbial conservatism of the people in educational matters stood in its way, and for many years there seemed little hope of inducing the authorities at Whitehall to recognize handicraft instruction in the school code. From the outset, those who urged this new departure had to explain that the instruction to be given in school workshops was intended to be very different in character and purpose from the teaching of carpentry as a trade subject. There was some opposition on the part of trade unions, but this difficulty was gradually overcome, and the advantage of familiarizing children at an early age with the use of tools was slowly recognized.

Later on, when the number of teachers of the subject had increased, and when they began to be interested in the work in which they were engaged, they formed themselves into an Association, and in 1894 I was asked to be their first President. That office I held for ten years, and in my annual addresses to the Association the opportunity presented itself of referring to the continued progress of the movement and to the revolution it was gradually effecting in the objects and methods of instruction in our elementary schools.

In 1901 an educational section was added to the other sections of the British Association for the Advancement of

Science, with the result, that many of our distinguished professors of science were induced to take a wider and deeper interest in educational problems than they had previously shown. At the annual meetings of the Association, attention was directed to reforms of method and curriculum, which were urgently needed in our system of elementary education. In the year 1903, a Committee, of which I was chairman, was appointed to report on the studies most suitable for elementary schools, and the reports of that Committee and of its sub-committees have helped to draw public attention to the many advantages of making practical studies the basis of our elementary school teaching.

The work of the Committee bore fruit. The dominant note of the Committee's first report was sounded in the following sentence: "The Committee is satisfied that the intellectual and moral training, and indeed to some extent the physical training also, of boys and girls between the ages of seven and fourteen would be greatly improved if active and constructive work on the part of the children were largely substituted for ordinary class teaching, and if much of the present instruction were made to arise incidentally out of, and to be centred around, such work." The Committee suggested many useful changes, which were subsequently embodied in the regulations governing primary instruction, issued by the Board of Education. In the prefatory Memorandum to the Code of Regulations for 1908 a great advance was shown in the recognition afforded to the educational value of handicraft teaching. After giving sound reasons for such recognition, it was stated: "Handicraft ought, therefore, wherever it is practicable, to be included in the ordinary curriculum of the school for older boys, and instruction in it should keep step and be closely correlated with the other instruction and be continuous throughout the whole year. The Board have under consideration the question of developing all forms of manual instruction in the lower classes of Public Elementary Schools, and, in particular, of filling up the gap between the Infant School, in which manual instruction is an essential part of the curriculum, and the upper classes, to which the teaching of handicraft is at present confined."

This declaration of policy on the part of the Board went a

long way towards realizing the hopes of the pioneers in this important movement, and, when we consider the advance that has been made since the year 1880 in the substitution of practical studies for class teaching in our elementary schools, we shall realize our indebtedness to those educational reformers who first helped to make manual instruction an essential part of elementary education.

From the several addresses which I have delivered on this subject, I have selected for inclusion in this volume my first Presidential address to the Association of Manual Training Teachers, in which reference is made to the origin of the movement, and my farewell address to that body in 1904, in which, under the title of "A Forecast," I ventured to indicate some of the further changes in elementary teaching which would follow from bringing handicraft instruction into the school curriculum. I have also added a short paper, dealing more particularly with some of the hygienic aspects of manual training, which was delivered at the International Health Congress, held in London in 1892, and an address to the Parents' National Educational Union with reference to handicraft for girls.

The introduction of manual training into our schools marks the greatest improvement in our elementary education since 1870. In my several addresses to the teachers, I endeavoured, as best I could, to make them realize the position which handwork was certain to occupy in the education of the future, and the responsibility that would rest on them to bring it into close connection with the teaching of drawing and physics, and to extend its methods to the teaching of other subjects. For many years I have regarded manual training as the basis of the new education, the essential principle that would modernize our methods of instruction, and such, I believe, it will be found to be. Some of the changes in our methods of instruction, to which I have referred in my "Forecast," are likely to be attained more quickly than I had reason to expect, if full effect is given to the intention of the Board of Education, as stated in their Report for the year 1908. In the address I gave in 1907, as President of the Education section of the British Association, I referred to some of the causes which have retarded the progress

of our elementary education, and have prevented it from proving, as had been expected, the sure means of training skilful, intelligent, and capable citizens, and I pointed to the direction in which we might hope to look for improvement. This address, with some few omissions, I have also here reprinted. Still more recently, in an address given at the Seventieth Annual Conference of the Union of Lancashire and Cheshire Institutes, I again referred to the same subject, and quoted passages from the Report of the Commissioners on the Poor Laws in support of my contention. The commissioners, in their majority Report, were emphatic in recommending very drastic changes in the aims and objects of elementary education and in the curriculum of studies. To the absence of adequate training in practical pursuits, they partly ascribed the want of initiative and resourcefulness in our working population, and they state that "there is a very strong feeling that the education of our children in the elementary schools is not of the kind which is helpful to them in after-life." This is a severe indictment, which they repeat more than once, and they conclude by recommending a thorough re-consideration of the curriculum, as well as of the aims and ideals of elementary education.

After forty years' experience, we can arrive at no other conclusion than that our system of elementary education must be modified. To the altered conditions that have rendered necessary this change, reference is made later on. But there can no longer be any doubt that elementary instruction must be based on practical work, and must have an experimental rather than a literary bias. Education, to be effective, must have regard also to the *milieu* in which the child lives, and one of its objects should be to utilize the influences of surroundings where they are helpful, and to correct them where they seem likely to prove harmful to the healthy growth of character.

II

SOME PROBLEMS IN SECONDARY EDUCATION

In the Report of the Board of Education, published in December, 1906, it was stated: "While the development of Secondary Education is the most important question of the present day, and is the pivot of the education as it affects the efficiency, intelligence, and well-being of the nation, yet its present position may be described as chaos." As may be anticipated, some progress has been made since that Report was published. The chaos, of which Matthew Arnold so unceasingly complained, still exists. He was familiar with the methodical and well-organized system of Prussian education, and, compared with it, the condition of our own secondary education could not claim to be regarded as a system. Thirty years ago, neither the State nor local authorities exercised any control over secondary schools, nor were School Boards empowered to provide, or assist in maintaining, such schools out of the rates. Apart from the great Public Schools, the only other secondary schools then existing were those in part supported by ancient endowments, or by the Livery Companies of London, or by corporate bodies, and the schools which were known as "private adventure" schools. In many of the private schools the education was of a high order, and the boarding and day schools, in which boys were prepared for the great Public Schools, were generally well managed and under the direction of competent teachers. In accordance with the terms of their schemes, many of the endowed schools were periodically inspected by persons appointed by one or other of the Universities. Between the years 1875 and 1885, I personally inspected, on behalf of the University of London, a large number of schools of very different types, and it was to the experience

so acquired, that I was indebted for such knowledge as I possessed of the general character, condition, and organization of secondary education in this country. The want was felt at that time of a more modern type of education than that provided in the majority of our schools, and the difficulty of satisfying it was largely due to the inherent conservatism of schoolmasters, who taught what, and how, they had themselves been taught, and to the action of the Universities, whose entrance scholarship examinations practically governed the curriculum, not only of the Public, but also of Intermediate secondary schools.

In the year 1878 I was called upon to make suggestions for the organization of the science teaching in the Modern School of Bedford, one of the schools deriving its endowment from the Harpur Trust, which had been newly constituted under a scheme of the Charity Commissioners. My connection with that school lasted some years. I inspected it three or four times, and was afterwards elected by the masters as their representative on the Governing Body of the Trust. Twice I distributed the prizes on Speech Day, and on the second occasion I opened the new laboratories, which were completed in the year 1895. The school corresponded very nearly to the best type of secondary school, a type of school distinctly above the higher grade science school, and more nearly on a level with the *Oberrealschule* of Germany. It was a school with its Latin and literary side well developed, in which adequate provision was made for practical science teaching and for instruction in modern languages. At the time of which I am speaking, the course of study in nearly every endowed school consisted of Latin for all boys, a smattering of Greek for some, Euclid as far as the first four books, elementary algebra and arithmetic, the outlines of the history of England, and the elements of science, taught by means of lectures and table experiments, in which the boys took no part. Some few schools were equipped with chemical laboratories, but the practical teaching consisted generally of the preparation of the commoner gases and the analysis of simple salts. The instruction did little more than convey information, and information of a kind that was soon forgotten.

Nevertheless, this unmethodical teaching of some of the facts of science was not without beneficial effects. It opened the pupil's mind to a world of natural objects with which he would have been otherwise wholly unfamiliar, and gave him in some cases a taste for inquiring into the causes of simple phenomena. In Eton, Harrow, and Rugby, and indeed in many of the other large Public Schools, where the boys remained till the age of eighteen or nineteen, the classical instruction was undoubtedly of the highest educational value, and, in such schools, other influences were at work, which helped to create serviceable aptitudes and habits; but in the ordinary Grammar Schools, where the boys remained only till fifteen or sixteen years of age, the lessons in Latin failed to give them any real mastery of the language or love of its literature, and, with the gradual intrusion of other subjects, the curriculum became too crowded for any single subject to be so taught as to afford the intellectual discipline which the study of Latin, seriously pursued, provides. In the majority of schools the mathematical instruction was equally deficient in developing constructive ability, and, in the teaching of other subjects, there was the same absence of character-building qualities. It was generally supposed that our secondary education failed through want of organization,—that nothing more was needed than further provision, and the systematic grading of schools, and the multiplication of scholarships. But more than this was needed. Ideals had to be created, and methods had to be changed. Moreover, in order to effect any permanent improvement, it was essential that a different class of teachers, more expressly trained for their special work, should be attracted to the profession.

For this reason, I was an early advocate of some scheme for the registration of teachers. The movement dates back at least forty years. In 1869 a Bill was introduced into Parliament by Mr. W. E. Forster and Mr. Bryce to amend the laws relating to Endowed Schools and for other purposes. The Bill contained clauses relating to the examination and registration of qualified teachers in secondary schools. It provided for the establishment of an Educational Council, to consist of two persons to be elected by each of the Universities

of Oxford, Cambridge, and London, and of six persons to be nominated by the Crown. The functions of the Council included the examination of scholars, the granting of certificates to qualified teachers, the registration of efficient schools, both provided and endowed, as well as of persons to whom were granted certificates of fitness for teaching. Various provisions were inserted in the Bill as to the conditions of the registration of private schools. More than twenty years ago I was one of a deputation to Sir William Hart Dyke, then Vice-President of the Council, in support of a scheme for the registration of teachers. The deputation was introduced by Sir Lyon (Lord) Playfair. The Vice-President, after listening to the speeches, gave the usual official and non-committal reply; but there was no doubt that the objects and aims of the deputation had his entire sympathy. Indeed, he expressed very strongly the opinion that the registration of teachers would improve the standard of teaching in a large number of our secondary schools. Between the years 1869 and 1889 numerous Bills, having for their object the registration of teachers, were introduced into Parliament. It was not, however, till after the Secondary Schools Commission of 1894 had reported in favour of registration, that provision was made in the Board of Education Act of 1899 for the framing of regulations by the Consultative Committee, constituted under that Act, for a register of teachers to be "formed and kept in a manner to be provided by Order in Council." Accordingly, for some few years, a register was kept, in compliance with the Act. But in 1906 the Board inserted in the Education Bill a provision to repeal that section of the Act of 1899 which required them to keep a register. The Bill was not passed, but the keeping of the register was discontinued in 1908, notwithstanding the protests of a very large number of representative educational bodies. The reason alleged by the Board of Education was that the words of the enabling Act, subsequently passed, required that the Registration Council should be representative of the teaching profession generally, and the difficulty of so constituting the Council that it should include teachers, not only of elementary and secondary schools, but also of special subjects taught in such schools

was the pretext for delaying the formation of any Registration Council.

Personally, I advocated the registration of teachers because I was opposed to the "free trade" in teaching, which enabled any one to become a schoolmaster quite apart from the special qualifications which he might possess, and I felt that the public needed some hall-mark by which to distinguish competent from incompetent teachers. Moreover, I was convinced that the professional status of teachers in secondary schools, many of whom were, and still are, so badly paid as to render the profession unattractive to qualified men, would be raised by the keeping of a register, which would include the names of those only who, by a university degree or other qualification, showed that they possessed an adequate knowledge of their subjects, and had acquired by training or experience a capacity for teaching.

At a meeting of the Convocation of the University of London, held on May 10, 1881, I seconded a resolution "that it is desirable that there should be an Act providing for the registration of teachers." This resolution was submitted to Convocation on the recommendation of a sub-committee, which had very exhaustively considered the details of a Bill for the Registration of Teachers, to be introduced into Parliament that session by Sir John Lubbock, now Lord Avebury. The sub-committee in their report referred to the creation of an Educational Council, with large powers, as likely to lead to the subjection of all secondary schools to the inspection and control of one central authority,—a result, they feared, that might unduly restrict variety of method, and seriously affect the activity of schools. They pointed out, however, that the advantage to the body of teachers of being placed in a recognized position as one of the learned professions; the encouragement to teachers to become properly qualified for their work; and the prospect offered of a gradual weeding out of the incompetent and ill-educated, would outweigh any disadvantages which might follow from central control. In the Report of the committee reference was made to the question of including "teachers of special subjects" in the register, and it was finally decided, that having regard to the difficulty of defining the meaning of a "teacher in a school,"

the names of all teachers should be arranged alphabetically, and that their qualifications should be given in a separate column. The Report of the sub-committee is interesting, as showing that no advance has been made in the consideration of this subject during a period of nearly thirty years.

The question of the organization of secondary education had been for some time what is called a "burning question." It was much talked about, but was not very clearly understood. Under the auspices of the Teachers' Guild, a body which has rendered eminent service to the cause of educational reform, a Conference was held on December 6, 1888, in the rooms of the Society of Arts, to discuss this question. As chairman of the Conference, I was expected to indicate what was really needed, in order that our secondary education might be co-ordinated with elementary education, and with university and higher technical teaching. So far, it stood alone, as it were, with no direct relation to what was above or below it. At that time there was general agreement as to the formation of an Educational Council directly responsible for the supervision of secondary schools, and, as indicating what was then in the minds of many of those who had interested themselves in this particular question, I stated that it would be the duty of such a Council to prepare schemes (1) for providing in different parts of the country an adequate number of schools of different types; (2) for the adaptation of the instruction to local needs and requirements; (3) for the registration of qualified teachers; (4) for the utilization of available funds for the provision of scholarships; (5) for the regular inspection of all schools in receipt of aid from endowments or public funds; (6) for the recognition of private schools fulfilling certain necessary conditions; (7) for the publication of an Annual Report, giving statistics of secondary education and full particulars of schools recognized as efficient.[1] On the motion of the late Professor Gladstone, the meeting finally adopted a resolution in favour of "an Educational Council, in whose hands the organization, oversight, and direction of the secondary education of the country should be placed."

[1] *The Times*, December 29, 1888.

These suggestions, which may now appear somewhat crude, were intended to pave the way towards a complete scheme of education under State supervision. Twenty years ago, the establishment of a Board of Education, controlling primary, secondary and technical education, with power to aid schools by State grants, and the formation of Local Authorities, providing assistance out of the rates, seemed a remote possibility, and those who saw clearly the urgent importance of some scheme of organization adopted the suggestion of an Education Council, without clearly defining the exact relation in which that Council should stand to the State, and without even desiring that its interference with existing schools should result in any uniformity of type of school or of methods of instruction. Indeed, considerable doubts were entertained as to the advantages of State inspection. The method of inspection of elementary schools was very imperfect, and it was generally felt that any similar control over the work of secondary schools would be resented by the best teachers, and would tend to hinder rather than to advance educational progress.

Looking back upon the results of the legislation which placed secondary education directly under the control of the State, it is open to question whether the proposals of the earlier Bills to establish a Council, consisting of persons who were members of the universities and conversant with educational requirements, might not have helped to ease the pressure of Government interference, and have solved, in a manner satisfactory to the great bulk of the teaching profession, the question of registration. Under date of November 4, 1877, Mr. W. E. Forster, with whom I was then in communication on the subject, wrote me a letter, in which he said: "I am much obliged to you for your note, and glad to find that my suggestion last Wednesday meets with your approval. I wish I could tell how much support a Bill for an Education Council would receive." What that suggestion was I cannot now say; but I see from the copy of my letter to Mr. Forster of November 7, 1877, that I referred to some of the questions which have since occupied a large share of public attention. I wrote: "I am very strongly of opinion that schools should be tested more by inspection than by examination, and that

the testing of results is of far less value than the testing of methods. Better work would be obtained from schools if they were not perpetually preparing their best boys for external examinations. This view is, I think, likely to be gradually held." I further said: "I see a proposition has been before the School Board in favour of State aid for secondary education. This proposal is severely criticized in the *Educational Times*, and it would seem to be unwise to entrust the London School Board with larger powers than it now exercises." The decision of the Law Courts twenty-three years later prevented the Board from continuing to exercise such larger powers.

Many influences were at work in the closing decades of the last century, tending to improve secondary education and to widen its area. The agitation in favour of technical instruction during that period was a potent factor in directing public attention to our shortcomings. In the Report of the Royal Commission on Technical Instruction, published in 1884, to which fuller reference will be made later on, it was expressly stated that "the best preparation for technical study is a good modern secondary school," and the commissioners also pointed out that "our middle classes are at a great disadvantage compared with those of the Continent for want of a sufficient number of such schools." They went further, and pronounced what was then regarded as the very radical opinion, that "it would be desirable in some of these schools, especially in large towns (where classical schools are not wanting), in order to provide for the fuller teaching of other subjects, more particularly of mathematics, that the classical languages should be altogether excluded from the schemes of instruction." It will be seen that this expression of opinion was very carefully guarded. The idea of excluding Latin from any type of secondary school seemed at that time so essentially revolutionary, that the recommendation referred to in the Report was only intended to apply to those schools, in which the great majority of the pupils were expected to be occupied in technical pursuits; and it was in respect of such pupils only, that the Commissioners ventured to suggest, that the time spent at school in the study of Latin grammar might be more usefully employed. One other

quotation from the same paragraph of the Report may be here given, as indicating the direction of later legislation: "It is to be desired that, in the proposed reorganization of local government, power should be given to important local bodies, like the proposed Council Boards and the Municipal Corporations, to originate and support Secondary and Technical Schools, in conformity with the public opinion for the time being of their constituents." This recommendation implied a certain confidence in the wisdom and public spirit of local authorities, which, in the majority of cases, subsequent events have fully justified. In February of the year 1886, in the evidence I gave before the Royal Commission on Elementary Education, over which Viscount Cross presided, I had the opportunity of explaining the proposals I had previously made as to the establishment of continuation schools. What I felt then, and have since emphasized, was that the vast and increasing expenditure on elementary education was being largely wasted, owing to the fact that the facilities provided for enabling children to continue their education on strictly practical lines were insufficient. Subsequent events have fully justified what I then feared, and the problem of unemployment, which is not yet solved, is partly due to the lack of skilled labour, and to the rush of children, with very little practical training, into occupations which are, and must remain, poorly paid, and lead to no permanent means of gaining a livelihood.

In the same year, a Select Committee of the House of Commons, under the chairmanship of Sir Lyon (Lord) Playfair, was appointed to consider the Endowed Schools Act of 1869. Very important evidence was given before that Commission as to the control exercised by the Charity Commissioners over schools, which were partly supported by endowments held under trust. In a great number of cases, the conditions under which these schools were administered were revised by schemes prepared by the Charity Commissioners. Soon after the appointment of the Select Committee, I urged in the evidence I gave, the importance of creating a certain number of schools with a practical curriculum, in which selected children from the elementary schools might be enabled, by means of scholarships, to pursue their studies. I described in some detail

the character of the instruction provided in the *Écoles Primaires Supérieures*, then recently established in France, in all of which manual training was an essential part of the curriculum. With reference to this evidence, the following statement occurs in the report of the Committee, published in 1887: "It has been pointed out to your Committee with great force that, in thus training the hand and eye along with the intellectual faculties, the true remedy is found against the excessive growth of the class which comes under the wide definition of 'clerks.'" To some extent, the general question of the organization of secondary schools was considered by the Committee, and I had the opportunity, therefore, of bringing under their notice the essential differences between the various types of schools which are found in Germany, and of showing in how far our own schools failed to meet the demand for a varied curriculum. In the absence, at that time, of any local authorities, capable of dealing with education generally, and of applying locally raised funds to the provision of the additional schools, which were then urgently needed, the Committee did not recommend any amendment of the Endowed Schools Acts. They recognized that such changes as were required could only be satisfactorily made as part of a comprehensive scheme of local government, and they stated with a clear insight into our then existing needs, "When provincial authorities, such as County Government Boards, are established, they will at once, and without special legislation, acquire an important influence over the work done under the Endowed Schools Acts."

The mutual dependence of technical on secondary education was demonstrated by the help which local authorities were able to afford to secondary schools out of the funds placed at the disposal of their Technical Instruction Committees. The Local Government Act of 1888 enacted that "a Council should be established in every administrative County," and in the following year an Act was passed, conferring upon these Councils, now known as local authorities, power of levying a rate not exceeding one penny in the pound for the purpose of promoting technical and manual instruction in the district. By giving a very wide definition to technical instruction, the local authorities were enabled to make grants to secondary

schools for the encouragement of such specific teaching as came within that definition. Many County Councils availed themselves of the means thus provided for promoting scientific teaching, but the sum of money realized by the rate left a very small balance applicable to secondary, as distinguished from technical instruction, properly so called. In August of the following year, 1890, local authorities came into possession of a windfall under the Local Taxation, Custom, and Excise Act, amounting to about £750,000 per annum, and the allocation of this fund to the purposes of technical education was left to the discretion of the local authorities among which it was distributed. This increase of income strengthened the position of the Technical Instruction Committees throughout the country, which, by means of the funds thus placed at their disposal, were enabled, in many places, to render valuable help to secondary schools. The County Council of London was behind most other Councils in taking advantage, for the purposes of education, of these newly acquired funds. The members proceeded with considerable caution; they appointed a committee, under the chairmanship of Sir John Lubbock, to consider the educational requirements of London. Together with Mr. (now Sir) Henry Cunnynghame and others, I gave evidence before that committee, and indicated the purposes to which these funds might be devoted. At first, a sum of £20,000 annually was allocated to education, and the remaining £143,000 of the County Council's share was used in mitigation of the rates; but, after much deliberation, the Technical Instruction Board of the London County Council was established. The first meeting of the newly organized Authority was held on April 28, 1893, and the Board was dissolved in 1903, on the passing of the London Education Bill. I was a member of the Board during the entire period of its existence, and can testify to the excellent work that it accomplished, not only in the region of technical instruction proper, to which further reference will be subsequently made, but in helping secondary schools to supplement their linguistic and mathematical teaching by practical instruction in science and art, in providing the equipment and apparatus that was needed, and also by encouraging the teaching of modern languages and commercial subjects. It

was during the life of these local technical instruction committees that the Government in March, 1894, appointed a Royal Commission to consider "the best methods of establishing a well-organized system of Secondary Education in England, taking into account existing deficiencies, and having regard to such local sources of revenue, from endowment or otherwise as are available, or may be available, for this purpose, and to make recommendations accordingly."

The Commission was presided over by Mr. Bryce, and their Report was published in August, 1895. The main recommendations of the Commission were embodied in a Bill which was introduced into Parliament in 1896, and was withdrawn soon after, owing mainly to the difficulty of satisfying the aspirations of the smaller Boroughs to be constituted as independent local authorities In 1898 the Government introduced a new Bill, which, with some amendments, was passed in 1899, and came into operation in April, 1900. By this Act, Education was, for the first time, unified and placed under the direction of a Board presided over by a responsible Minister of the Crown. The chief administrative officer was the Permanent Secretary, controlling the three distinct branches of Elementary, Secondary, and subsequently of Technical Instruction, each under a separate Principal Assistant Secretary. The Board of Education, thus constituted, took over the educational functions of the Charity Commissioners, both with respect to the making of new schemes and the right of inspecting schools under schemes already in existence. The Bryce Commission, in accordance with Bills previously introduced into Parliament, recommended the creation of an Advisory Education Council. The recommendation, however, was not adopted, but instead thereof, provision was made in the Act for the establishment of a Consultative Committee, with more restricted powers. The Act further enabled local authorities to raise a rate not exceeding twopence in the pound for the purposes of higher education.

This Act, following on previous legislation, led the way to the unification of the local administration of all branches of education. The bringing together under the direction of a Board, presided over by a Cabinet Minister, of elementary, secondary and technical education, involved, as a logical consequence, the

similar association under local committees of the educational functions, which, during the previous decade, had been exercised by two separate popularly elected bodies—the School Board and the County Councils. The way was thus paved for the legislation of 1902 and 1903, which was carried through by the Conservative Government after the general election of 1900.

The important feature, historically considered, of the Act of 1902 is the abolition of School Boards. These Boards were concerned with elementary instruction only, and the local authorities which took their place were invested with wider powers, enabling them to deal with education in all its branches, and to assist schools of every grade and type, from the Kindergarten to the University and the Higher Technical Institution. The Act further enabled them to use local rates for the provision of scholarships and exhibitions, by means of which children might mount from the lowest to the highest rungs of the educational ladder. The passing of this Act fulfilled the aspirations of the best friends of education, and when some means shall have been found for adjusting certain religious difficulties and removing the grievances of which Nonconformists not unjustly complain, the Act of 1902, thus amended, will be regarded as a landmark in the history of education in this country, only equalled in importance and in far-reaching consequences by the Act of 1870.

The foregoing outline sketch, for it is nothing more, of the Legislative enactments by which the machinery of secondary education has been altered and improved during the past thirty years requires to be supplemented by a brief reference to some of the more striking internal changes, which have taken place in the conduct of our schools, and in the subjects and methods of instruction. Following on the demand for technical teaching, the cry was raised for special commercial training in our secondary schools. Underlying the art of distribution, we were told, were principles and methods, for proficiency in which specialized instruction was urgently needed. Our Consuls abroad, in their reports, told wondrous tales of the wisdom of the German commercial traveller and agent; how he discovered the wants of purchasers in different countries, how

he bargained in the language of his customers and arranged for the packing of goods in the most attractive form, and for the pricing of them in the currency and measures understood by the native buyers. Some useful suggestions were evolved from these comparisons of German methods with our alleged deficiencies, but, after carefully sifting them, the sane educationist came to the conclusion that the complaints were somewhat exaggerated, and that under any circumstances our secondary schools ought not to be converted into commercial offices. *Waarenkunde* and book-keeping, and the writing of invoices in French and German, and information as to commercial routes, could not be regarded as forming a suitable or adequate course of instruction even for those young people whose days might have to be passed on an office stool, or in the buying and selling of natural products and manufactured goods. Many public conferences were held on commercial education, at which various schemes were discussed. Examinations were started in commercial subjects, and, at one time, there was some apprehension that the course of healthy instruction in our secondary schools was in danger of being seriously disturbed by the desire of parents that their boys should gain certificates testifying to their knowledge of commerce. The agitation in favour of adapting the school curriculum to mercantile requirements was strenuously advocated by the London Chamber of Commerce. Its Education Committee, of which I was a member, arranged new curricula for secondary schools, organized lectures and held examinations in special commercial subjects. In directing the attention of adults engaged in Banking and mercantile houses to matters of commercial interest, the London Chamber did useful work. Even as regards secondary education, the agitation was not without some good results. It stimulated teachers to overhaul their methods and subjects of instruction, and to consider whether the curriculum could with advantage be so modified or specialized as better to equip their pupils for the subsequent work in which they might be engaged. The most efficient teaching tends to fall into grooves, and very often requires pressure from without to shunt it on to new lines. One important change that followed from these efforts was the

better and more practical teaching of modern languages, but educationists were agreed that specialization in our ordinary schools should be discouraged, and that a sound general education on practical lines was, on the whole, the best preparation for commercial work.

The intrusion of science into the curriculum was the lever that effected many alterations in our school system. Time had to be found for the efficient teaching of some one branch of physical science. This necessity led at first to a congestion of studies, but gradually new ways were opened, and it was seen that the organization of secondary education could only be effected by the differentiation and classification of schools. The difficulties were increased by the recognition of the fact that science could not be properly taught by book and blackboard. It demanded much more. It wanted time and money, time for experimental work as an instrument in the formation of serviceable habits of thought, and money for the construction and equipment of new workrooms. A few of our University professors set themselves the task of discovering the best means of making science a real disciplinary study. The same problem had been attacked with respect to Latin and Greek by every great writer on educational subjects since Comenius, and during the last few years had frequently engaged the attention of head masters at their several Conferences; but the science professors took a wider outlook, and their efforts resulted in many and diverse reforms. They helped to give a new direction to teaching generally. The practical and constructive methods essential to science were found applicable to other subjects. The teaching of chemistry, physics, mathematics, and biology has been revolutionized very largely by the efforts of some of our University professors. The faulty methods of chemical instruction as an educational discipline became apparent when it was seen how easily young people were drilled into the practice of the qualitative analysis of simple salts.

I remember some five-and-twenty years ago suspicion being thrown by the Science and Art Department on the head master of a well-known school, whose boys uniformly obtained correct results at the practical chemical examinations of the

Department in the analysis of simple salts. I was asked by the governors of the school to arbitrate between the Department and the head master. I accordingly submitted the whole class to a similar practical test. The solutions were prepared under my direction, and given to the boys under conditions which prevented the possibility of any person connected with the school having knowledge of the nature of the salts. I was present during the examination, and the results were equally correct. Acid and base was observed by nearly every boy, and the steps of the analysis were correctly stated. There was no doubt that the method of teaching had degenerated into a "mechanical drill." Professor Armstrong's criticism and practical suggestions gave the quietus to mere "test-tubing," and he succeeded in substituting for it the working out of chemical problems and the introduction of simple methods of research into elementary science lessons.

Changes in the same direction were effected by Professor Perry in the teaching of mathematics and mechanics, and his address to the Education Section of the British Association in 1902 at Belfast helped permanently to displace Euclid from the position which, although frequently assailed, it had held till very recent times in all our schools. The attack on Euclid dates back some years. Professor Sylvester, in his address to the Mathematical Section of the British Association in 1869, gave what seemed unanswerable objections to the use of the *Elements* as a school book; and, in a lecture on the same subject, published in 1880,[1] in which I compared the teaching of Euclid with the freer teaching of geometry, I quoted from his address the following words: "I should rejoice to see Euclid honourably shelved or buried 'deeper than did ever plummet sound' out of the schoolboys' reach"—a wish, I am sure, that was sympathetically echoed at the time by many schoolboys and their teachers; and Sylvester, who was essentially a geometrician, painfully added, "the early study of Euclid made me a hater of geometry."

In the teaching of physics and biology, the experimental or "heuristic" method, as it came to be called, was gradually

[1] *Euclid and the Teaching of Geometry* (Kegan, Paul & Co.), 1880.

and partially introduced into our schools. The all-important feature of this change was that the pupil was trained in experimental methods, and was himself engaged in operations similar to those by which new facts and new principles are discovered. He worked under the instruction or guidance of his teacher, but throughout his lesson he was actively occupied in *doing*, instead of being passively employed in listening. There can be no doubt that such teaching, altogether apart from its primary object, is valuable in its influence on character. The independent working-out of scientific problems trains the student in initiative and in resourcefulness, and the stress laid on quantitative experiments tends to create accuracy of thought and habitual carefulness. As in so many other reforms, there was nothing new in the idea; but there was much that was fresh in its practical application, and the problem which those professors to whom I have referred had to solve was that of bringing within the ordinary conditions of class teaching this particular method of instruction. One might quote passages from the writings of many of the older educational reformers, showing how well they realized the intellectual gain of substituting practical and independent work for book learning. In forcibly contrasting the educational value of what we learn by ourselves with what we learn from others, Rousseau may always be quoted with advantage. He tells us, "Sans contredit on prend des notions bien plus claires et bien plus sûres des choses qu'on apprend ainsi de soi-meme que de celles qu'on tient des enseignements d'autrui."

It was Huxley who, many years ago, saw clearly enough the defects of the science teaching then in vogue, but, apart from the impulse given to his students by his own example, he did little in the way of indicating how any branch of physics might be scientifically taught to school-children. His text-books are full of interest, and, in the hands of an enthusiastic teacher, must have helped to instil the love and spirit of investigation in any intelligent pupil. But it was left to his disciples and to the pupils of men like the late Lord Kelvin to formulate in detail the methods which helped to revolutionize the faulty system of instruction, of which Huxley himself frequently complained. In his several suggestive discourses on education,

Huxley again and again insists on "the elements of chemistry, the elements of botany, and the elements of physics being taught in our ordinary and common schools"; but how they were to be taught, he failed to tell us, and the system of State examinations and payment on results, with which he was officially connected, stood in the way of any effective reform. Huxley had no misgivings as to the fact that, in his days, notwithstanding the efforts of the Science and Art Department to spread scientific knowledge, scientific education was "inchoate and tentative," and, as he stated, "would remain so until years of patient study have organized scientific teaching as well as, or, I hope, better than, classical teaching has been organized hitherto." Writing in 1882, he tells us: "Work done in a laboratory involves a good deal of expenditure of time without always an obvious result. . . . On this ground there must be ample time given to science teaching. What that amount of time should be is a point which I need not discuss now; in fact, it is a point which cannot be settled until one has made up one's mind about various other questions."[1] It is quite certain that, convinced as Huxley was that science must be regarded as an essential part of the secondary school curriculum, he clearly saw the difficulties of teaching it efficiently, without being able to make any constructive suggestions for removing them. If one compares the numerous text-books on science which are now published, with those in use less than thirty years ago, we shall realize the change that has been brought about in science teaching since Huxley's educational missionary work was first begun. The change, however, was not confined to science subjects. It affected the teaching of languages, of literature, history, and geography. The principle underlying it was that the teacher's function was to guide rather than to instruct—to put his pupils in the way of learning by themselves and of acquiring knowledge in school much in the same way as they would in after-life. It made book-learning and lectures subservient to investigation and inquiry. It subordinated examination to teaching, and demanded that the pupil should have time and opportunity for private reading and independent thinking.

[1] *Science and Education* (Macmillan & Co.), 1893.

In connection with the varied efforts that were being made at this time to organize and to improve secondary education, mention may be made of the establishment of the Joint Scholarships Board early in 1895. The Board consisted of representatives of some of the principal Education Committees of County and Borough Councils, and the object of the Board was to frame conditions of examination for the scholarships enabling children to pass from the elementary through secondary schools to the Universities. It was at first desirable that some approach to uniformity of standard should be preserved in the award of these scholarships, and the conditions of examination afforded an opportunity of indicating the kind of knowledge which applicants might be expected to possess and the sort of training which they should have received. I was chairman of the Board from the date of its formation till 1906, when my parliamentary duties obliged me to resign. On June 3, 1895, I addressed a letter to *The Times* under the heading of "A New Educational Departure," in which I explained the *raison d'être* of the new Board. In that letter I pointed out that our object was "to formulate a scheme of examination which should aim not only nor primarily at testing acquired knowledge, but at securing sound instruction by strictly scientific methods." I further said: "Many years' experience of school teaching in this country and abroad had forced upon some of us the conclusion that the modern sides of our Public Schools had not proved educationally as successful as it was hoped they would have been; and it was evident that this partial failure was due rather to the absence of scientific methods of instruction than to any inherent defect in science or in modern languages as instruments of education. It was felt, therefore, that any scheme of examination which should influence teaching must be something more than a dry syllabus of subjects like the contents of a text-book on which questions might be asked; it should set forth in some detail the best methods of instruction by which the pupil should be trained to independent inquiry and research. . . . It is difficult, in a few words, to indicate the aim of the Committee in the framing of each syllabus. But it may be said that their main object has been to make the young learner helpful to himself, to train him in

habits of accuracy and truth, to teach him the use of the simplest instruments of discovery, to enable him to weigh evidence in arriving at conclusions, and to acquire by such means knowledge that may be serviceable to him in life."

This scheme may have seemed somewhat ambitious; but, as a fact, very great care was shown in the preparation of each syllabus of instruction, on which examinations were to be based; and I have no doubt that the efforts of the members of the Board, assisted, as they were, by some of our most distinguished professors, succeeded in improving the methods of teaching in many of our schools, and of shunting the instruction on to new lines. But at best examinations can only exercise an indirect influence on teaching. It is to the teachers themselves and to the training which they have received that we must look for permanent improvement in method. The Committee, however, undoubtedly exercised, at a critical time, a beneficial influence on our secondary education—an influence which has been continued through one of their prominent members, receiving, later on, a high appointment as School Inspector under the Board of Education.

It is possibly owing to the freedom I enjoyed as a boy from the fetters of external examinations that I have always urged the importance of widening the scope of school examinations, so as to prevent any undue interference with the intellectual bias of the scholar and with the liberty of the teacher. During the entire period of my attendance at University College School, where the education then provided was of a distinctly high standard and well adapted to modern requirements, the only examinations held were those conducted by the masters themselves. Later on, owing no doubt to the pressure of parents, preparation for the Matriculation of the University of London influenced to some extent the courses of study, and a larger number of boys were entered for, and succeeded in passing, various examinations. In the summer of 1875, I accepted the invitation of the Council of University College to preside at the distribution of prizes to the pupils of the school where I had been a pupil. In the course of my address, I referred to the growing competition among schools for prizes and high places in the examination pass-lists, as

tending "to produce uniformity of teaching and to suppress individuality both in masters and in boys," and I drew attention to the desirability of associating as closely as possible external examinations with school-work; and one of my first endeavours, as member of the reconstituted Senate of the University of London, was to assist in opening up fresh avenues to the University by liberalizing the Matriculation Examination, and by offering a very wide choice of subjects to candidates.

During the period I am considering, the subject of girls' education largely engaged public attention. It was a period of action and reaction, of decided progress in one direction, marked later on by a reversal of opinion and a change in the direction of current thought. The establishment of High Schools for Girls, the admission of women to University degrees, afforded opportunities to girls to secure an education similar in all respects to that open to boys, and to submit themselves to the same examinations. If at any time doubts existed as to the capacity of girls to win prizes and distinctions in competition with the other sex, the last three decades have completely shown how easily they hold their own in the struggle, and that, in so far as intellectual ability can be tested by examination, they are able to succeed even where their brothers fail. Whether the mental strain is in any way harmful, whether an education similar to that of boys is beneficial to themselves or serviceable, in the general interests of society, are questions which only recently have come to the front, and are now awaiting an answer. Many years ago, I had doubts as to the value of much of the teaching given in our girls' schools, and, as indicating the views I then held, I quote the following extract from my address at the College of Preceptors (February, 1888), on the occasion of the distribution of prizes:

"I must not forget that the majority of the prizes and certificates I am to give away to-day have been won by girls. We men are too apt to think that the only education worth considering is our own. We talk and write so much about it, that women may be pardoned if they have come to think that the system of education which is best for men is best for women also. It is only on this supposition that I can explain

the facts, that those who have been desirous of promoting the higher education of girls have so strongly advocated the admission of women to the same examinations for degrees as those taken by men, and that the High Schools for girls have been organized on the principle of Grammar Schools for boys. I do not wish it to be thought that I am opposed to the higher education of girls. I am in favour of it. I voted for the admission of women to London degrees. I did so, not because I thought the curriculum of study best suited to their wants, but in order that an interesting experiment might be tried, and because I did not hold it right to interfere with the liberty of action to which women, as much as men, are entitled.

"But surely, if the great principle of education, which we are now beginning to apply to the education of men, is applicable to that of women—viz. that education should not be aimless, but should have some definite relation to the life interests and occupations of the individual—the training of girls ought to be on very different lines from that of boys.

"The problem of girls' education does not appear to have been thought out from this standpoint. Instead of considering what is the best possible kind of education to give to girls, in order that they may most efficiently discharge the duties which nature and society have cast upon them, people have been anxious to show that women are intellectually capable of passing the same examinations as men, as if it thereby followed that the preparation for such examinations is the best possible training for them. And now, when we are beginning to see that the mediæval training, which for so many years has held its own in our boys' schools, is ill adapted to the practical pursuits of men's lives, women, without apparently any regard to its adaptability to the occupations of their own lives, have shown themselves desirous of adopting it. But, surely, we do not wish to see our girls clad in the misfitting garments which their brothers are discarding. No, the whole question of girls' education demands a full and careful consideration, from the point of view of suitableness to woman's wants, woman's occupations, and woman's mission in life."

It is not surprising that women of culture and organizing ability, like the late Miss Buss, who may be called the mother

of Girls' High School education, and the late Miss Beale, who more fully developed her ideas, should have realized that a great change was needed in the training of girls, which, excellent as it was in certain respects, had not kept pace with the improvements in education generally. They felt that, physically and intellectually, girls were stunted, and were held in undue subjection by the kind of instruction which was regarded as alone fitting for them. That girls were capable of better things there can be no doubt; and if these early pioneers, in their eagerness to show that there was nothing in the nature of woman to prevent her following the same course of study as was prescribed for men, overlooked certain differences of character in the two sexes and certain differences that should be considered in the aim and purpose of their education, we do well to remember what they actually accomplished in the way of reform rather than what they left undone.

There is no doubt that the writings of the younger Mill, which largely dominated philosophic thought about that time, influenced the views of educated women, but still more potent, probably, was the unveiled contempt which Herbert Spencer, in his widely read work on *Education*, threw upon the underlying principle of girls' education as he understood it. "If you ask," he said, "why Italian and German are learned, you will find that, under all the sham reasons given, the real reason is that a knowledge of those tongues is thought ladylike. It is not that the books written in them may be utilized, but that Italian and German songs may be sung, and that the extent of attainment may bring widespread admiration. . . . Dancing, deportment, the piano, singing, drawing, what a large space do these occupy!" Whilst penning this scathing criticism Herbert Spencer was scarcely conscious of all that was implied in his own dictum, "Men dress their children's minds as they do their bodies, in the prevailing fashion," or he might have been startled at the new fashion of women's education, which his own words helped to hasten.

Personally, I have often wondered that, till very recently, women have shown so little concern for the construction of a scheme of education suitable for girls. It has always seemed to me that such a scheme should contain certain features

distinctive of the sex. Women are too apt to assume that they are inferior to men, and in order to combat their own assumption, they have demanded the same education, and have sought to discharge in life identical duties. The true theory of women's education must be founded on the belief that each sex is both inferior and superior to the other, but in different respects. We cannot add anything to what has been so well said: "Woman is not undeveloped man, but diverse." There is already a healthy reaction from Herbert Spencer's views, not only as regards the training suitable to women, but in many other directions. Nothing could be more pregnant of meaning than his definition of the purpose of education, "to prepare us for complete living," incidentally stated in the first chapter of his book, although the last written, and women are now beginning to see how much is needed, that is more essential, than a knowledge of the classical languages and mathematics to prepare them for self-development and complete living. Of late years there has been a decided movement in favour of including the domestic arts among the subjects of instruction in girls' schools of every grade. Reference has been made in the preceding pages to the efforts of local authorities to provide domestic teaching in our elementary schools, but it is now generally recognized that in secondary schools also the curriculum should be to some extent differentiated according to the sex of the pupils. The management of a home, including the discharge of household duties and the rearing of children, are no longer regarded as matters to be learned by intuition, or unworthy of the care and thought of an intelligent woman. It has been shown that these duties demand special knowledge and experience, and that the elements of science and of certain other subjects can be most advantageously studied in their immediate application to the special work with which nearly all women at some time or other must necessarily be occupied. To this aspect of women's education I referred in an address, included in this volume, which was delivered in 1904 at the request of the Parents' National Education Union.

Professor Smithells of Leeds and Mr. Hellyer of Dublin have explained in detail, in several lectures and reports, how the elements of different branches of science may be usefully

taught and practically illustrated in connection with the study of the domestic arts, and it is gratifying to find that the head mistresses of some of our best girls' schools are now fully alive to the importance of providing instruction in these subjects, and are rendering very valuable help in making it real and efficient. The Board of Education, in their regulations for Secondary Schools, issued in 1908, required that "provision should be made in the case of girls for instruction of a practical character in the elements of housewifery," but they did not appear to have fully realized the close connection that should exist between such instruction and the teaching given in the school laboratories. The recognition of the fact that the curriculum of girls' schools should differ in some respects from that of boys' schools is a healthy reaction from the views that prevailed less than half a century ago among those who were foremost in the movement for reforming girls' education. It is the outcome of two ideas that have gained strength during the period under consideration. The one is that manual work should form part of every child's training, the work to be educative and formative of serviceable habits, and the other is that the subjects of instruction must be so selected as to serve as a general preparation for the discharge of the essential duties of life. In considering the most suitable curriculum for secondary schools, due weight must be given to both these principles, the disciplinary and the utilitarian; and it is in the endeavour to combine them that the difficulties of determining the most suitable programme of studies for boys' and girls' schools are brought into prominence. The step forward that has been made in differentiating the two classes of schools should be encouraged, and will probably be followed a decade hence by other steps in the same direction.

At a meeting of the British Association, held at Cambridge in August, 1904, in a discussion on some of the unsolved problems connected with the introduction of handicraft instruction into schools for girls, I stated:

"In the training of girls, much has to be done in this direction. I have nothing to say against co-education up to a certain age. But I am certain that any education which tends to make boys effeminate and girls manly will conduce to the

physical and mental deterioration of the race. Its results will not be seen in a decade, but they will be in a century or less. The process of evolution is a progress in differentiation, and this applies particularly to the sexes. Our education should be the means of developing the highest type of womanhood and the highest type of manhood, and the more widely these types are differentiated, the stronger, the more intellectual, and the more highly organized will be the men and women of the future."

"We have yet to show how the different branches of domestic economy, as it is generally called, may be taught so as to serve as a centre of interest for the acquisition of knowledge of other cognate subjects, and as a rigorous exercise in the practice of scientific method. Progressive schemes of instruction have to be elaborated suitable for different types and grades of girls' schools. But in all such schemes the aim and purpose must be educational and not professional. The method of instruction should be such that the girl may grow in intelligence and resourcefulness; may have her interests enlarged and her general knowledge widened, while at the same time she is acquiring that special skill in the domestic arts which will increase her usefulness in every womanly occupation in which she may be engaged. Underlying the domestic arts are scientific principles, the roots of which stretch out wide and far. The scheme of instruction, therefore, which should vary with the age when the child leaves school, should carefully associate theory with practice, and should show in detail the kind of experiments that the child should perform in order to acquire that amount of accurate scientific knowledge which will be helpful in her work."

The authorities of King's College, now connected with the University of London, have taken a most useful step in arranging courses of instruction for women in domestic subjects of university standard. "Home Science," as they call it, admits of being treated from this higher standpoint, and the recognition of its value in the education of young women should greatly help in popularizing the teaching of the subject in our secondary schools, and in thus effecting a much-needed reform in girls' education. It is essential, however, that not only home science, but also practical household duties, should be efficiently taught.

The regulations for secondary schools, issued by the Board of Education in 1908, first brought home to teachers and school authorities a knowledge of the extent of powers possessed by the Board in determining the conditions affecting the entire scheme of instruction in secondary schools prepared to receive Government aid. Prior to the issue of these regulations, the amount of control which the Board might exercise over the curriculum and organization of such schools was scarcely realized. For many centuries they had been practically free from external influence, and had been allowed to grow up and to develop in accordance with traditional practice, tempered by public opinion. Whilst welcoming the financial help which the State was prepared to offer, there was consequently some hesitation on the part of the managers of many of these schools in accepting aid accompanied by the conditions under which alone it could be granted. Moreover, there was ground for fear that the control which the Board might exercise, through its inspectors, or by rules that might be laid down as to management, would tend seriously to interfere with the independence which the schools had hitherto enjoyed, and to produce a general uniformity in the methods of instruction, destructive of that "freedom, variety, and elasticity," which was supposed to be the characteristic of secondary education in this country. At the same time, it was recognized that the receipt of money grants must be subject to conditions, that the Board must fix some standard of efficiency to justify the expenditure of public funds. It was, however, the special regulations for the admission of a large percentage of children from the elementary to the secondary schools, imposed, without previous consultation with school authorities and without Parliamentary sanction, that roused the attention of governing bodies to the vast powers which the award of grants conferred upon the Board. In these circumstances it was thought desirable that the governing bodies should form an Association to watch over the interests of secondary schools and to make representations to the Board, and, if necessary, in Parliament, in cases where the Board's action might appear unduly arbitrary or educationally unsound. The Secondary Schools Association for England was accordingly established

with this object, and held its first general meeting on February 25, 1908. By its constitution it was free from political bias, and among those who joined the committee were Lord Shuttleworth, Mr. W. R. D. Atkins, Sir William Anson, the late Sir William Bousfield, Mr. S. H. Butcher, Sir William Chance, Mr. Henry Hobhouse, Sir Alfred Lyall, Canon Rawnsley, and Professor M. E. Sadler. As President of the Association, I was called upon, on more than one occasion, to approach the Government on matters affecting the interests of secondary schools. The meetings held by the Association, and the publicity given to its work, have directed attention to the position which the State now occupies in relation to secondary education, and its very existence may prove useful as a check on the exercise by the Board, without due consideration, of the wide powers which the authorities at Whitehall undoubtedly possess.

The action of the State and of local authorities in affording financial aid to municipal and endowed schools cannot fail to have a prejudicial effect upon private schools, in which the fees charged are necessarily higher. This cannot be avoided. At the same time, there should be room in every well-organized national system of education for the private school, and some encouragement might be given by the State to such schools conditional on the education provided being in all respects efficient. Encouragement might be afforded by free inspection and by enabling public exhibitions and scholarships to be tenable at the schools. Moreover, the inspectors might be directed to regard the work of each school strictly on its merits, apart from any general regulations as to the curriculum or the conditions to which the teaching should conform. Indeed, the greatest latitude might be permitted in the choice of subjects and in the methods of instruction. Educational experiments can be more easily made in private schools than in those in which the income largely depends upon Government and local grants. All that the inspectors need ascertain is that the instruction is of such a kind as to stimulate the intelligence, and to exercise a beneficial influence on the character of the pupils. It is because I have always taken some interest in private schools that I accepted, a few years since, the office of

President of the College of Preceptors—an institution which was one of the first to assist in the training of teachers, and which has undoubtedly helped to improve the education provided in a large number of secondary schools. It may be here recorded that the new building in Bloomsbury Square was opened in March, 1887, by King Edward VII., accompanied by Queen Alexandra, then Prince and Princess of Wales—a gracious act, affording proof of the interest which his late Majesty showed in the particular class of schools with which the College of Preceptors is mainly associated.

III

SCHEMES FOR RE-ORGANIZING LONDON UNIVERSITY

My connection with the University of London dates back many years. After spending four sessions at University College School, I entered the College in the autumn of 1858. The College building was much smaller then than now. The two wings stretching east and west had not been erected, and the school premises included the whole of the upper storeys of the southern half. The engineering laboratory, which at first occupied what was the students' union or club room, had not been established. The chemical laboratory was on the medical side of the building, and there was nothing approaching to a well-equipped laboratory for physics. The instruction provided, however, was excellent of its kind, and I retain the most pleasing memories of my student days, extended as they were, over a somewhat long period. The professors, most of whom applied themselves to their arduous duties with singular enthusiasm, were poorly remunerated, and it was not surprising that occasionally some were tempted away by the offer of better posts. Others, however, no less distinguished, remained loyal to the College, and the students of my time fully realized the gratitude they owed them. Of the professors whose lectures I attended, I was most indebted to Augustus De Morgan, David Masson, and John Morris; but it was not due to any fault in the teaching that I did not profit equally by the instruction I received from Henry Malden and Francis Newman.

In those days there was no prescribed course of instruction which students were expected to follow. They could take such lectures as they pleased, and were regarded as students even if they attended only a single course. Although the teaching

consisted mainly of lectures, the professors were ever ready to answer questions, and to assist the students in solving difficulties, and Prof. De Morgan was always in his lecture-room some time before the lecture began for this express purpose. There can be no doubt that the personal influence of some of the teachers was a factor of great educational value to those who were able to give up their entire day to college work. The teaching, however, was not uniformly good, and there were cases then, as indeed there must always be, where the diligent student found that he could spend his time more profitably in the library than in the lecture-room, and some of us, I remember, availed ourselves of the complete freedom we enjoyed to do so.

In 1867, the year after my return from Berlin, I wrote an article for a magazine, edited, I think, by the late Sir John Seeley, who was then Professor of History at the College, in which I gave a short description of the Berlin University, of its aims and methods of instruction, as gathered from my own experience as a student. I contrasted it with my own university, which now, after more than forty years, is still in a period of transition. Educational problems are long in solution before they crystallize into permanent forms, and, as indicating the trend of public opinion, which, many years later, led to a reconstitution of the London University, I quote the following extract from my article of 1867:—

"The University of Berlin differs as to its constitution in very many respects from a university in England. It is neither a collection of separate colleges, as at Oxford or Cambridge, nor an office in which examinations are conducted, as in London, but an institution which resembles, on a larger scale, what University College was intended to have been by its liberal founders. It is well known how the opposition that greeted Lord Brougham's attempt to establish a university in Gower Street on the type of the universities abroad, succeeded in depriving that institution of the title which it had borne for some short time, and in conferring its privileges on a new establishment, chartered and endowed by the Government, and supposed to represent more correctly an Englishman's idea of a university. What that idea may have been it is difficult to

say. It is sufficient for Londoners to know that they have a university, and one which is daily widening the circle of its benefits, but it must be more than doubtful to those who can look back thirty years whether the temporary offices which are now transferred from Burlington House to Savile Row better correspond to the common meaning attached to the word university than the institution in Gower Street might have done, had it been suffered to develop according to the intentions of its projectors. Before long, the University of London will have a building of its own.[1] But even then it must remain an inexplicable anomaly to all foreigners, for it is a university without students, a university without professors—a university, in fact, which is very willing to test your abilities, but does not attempt to fulfil its essential duty—to instruct. Logicians have long ago told us that a general idea can neither be pictured on the senses nor represented by the imagination, and that our knowledge of universals is rather potential than actual, and necessarily insufficient. The University of London may well serve to illustrate the difficulty which logicians have experienced, and the danger of endeavouring to express in bricks and mortar a foggy conception of the brain."

Between 1867, when the above was written, and 1880, the beginning of the period which I am considering, doubts had been freely expressed as to the wisdom of the policy embodied in the Charter of 1858, under which the university examinations were thrown open to all comers, without reference to their having received instruction at any affiliated school or college. Previously, students were required to produce certificates of attendance before being admitted to any examination for a degree. The reasons alleged for this change, which, later on, gave rise to the suggestion that the university was a "mere Examining Board," were the difficulty of discriminating among the many teaching institutions those that were qualified for recognition as affiliated schools; the absence of any means of ascertaining the character of the teaching provided in these schools; and the inability of the Senate to frame satisfactory regulations as to regular attendance. The hardship of refusing

[1] The new building in Burlington Gardens was opened by Queen Victoria in the year 1870, and abandoned early in 1900.

admission to the university to self-taught and privately prepared students was also, no doubt, a determining factor in the decision. In order, however, to secure some approach to continuity of study, and partly as a substitute for certificates of attendance, intermediate examinations, between the matriculation and degree examination, were then, for the first time, instituted.

Prior to the year 1880, the opinion had been gaining strength that the university, which, except as regards the medical faculty, had completely severed any connection which had once existed with its affiliated schools, was failing to discharge the full functions of a university, restricted as they were, to the prescribing of courses of study to be followed uniformly by all candidates for matriculation and degree examinations, and to the award of degrees on the results of such examinations.

At that time the reforming body in the university was Convocation. It was from a committee of that body, known then as the "Annual Committee," consisting of thirty-two graduates, sixteen in Arts and Laws, and an equal number in Medicine and Science, that most of the suggestions for the reform of curricula, and of the conditions of examination, and later on, for the reconstitution of the university, emanated. Between the years 1880 and 1890, there was a large amount of unrest among the teaching bodies of London, and considerable dissatisfaction was expressed as to the relations that existed between the Senate of the University and the college professors. It was agreed that the definite and uniform curricula issued by the Senate interfered with the freedom of the teacher in his instruction; and, as the teaching of the higher branches of science became more specialized, the feeling that the professors were unduly fettered by regulations, in the framing of which they had no part, gradually strengthened. They complained, with some show of reason, that they were outside the administrative work of the university, and that their teaching was largely directed by a body of men who, however eminent, were not practically engaged in what is, after all, the essential work of a university. The Senate consisted, as to the majority of its members, of nominees of the Crown, every fourth vacancy being filled by election from Convocation.

In this way some few teachers found places on the Senate, but no organization existed through which the teachers generally were able to influence, or even to advise, the governing body of the university. As early as 1867, Convocation suggested the formation of Boards of Studies, but the Senate took no action to give effect to the recommendation. Gradually, the feeling of dissatisfaction, to which I have referred, was formulated in the demand for a teaching university, as distinguished from a mere examining board. Further familiarity with German ideals and the belief which, between the years 1885 and 1900, developed with extraordinary rapidity, that German education in all its phases, and particularly in its highest grade, was pre-eminently the best and best worth imitating, excited in the ranks of a large number of London professors a strong feeling of dissatisfaction with the conditions under which they taught, and with their relation to the university with which they were informally connected. It was evident that a crisis had arisen. The conditions of university education in London were unique. They were due partly to the size of London, partly to the original sin of those who dispossessed University College of its university title, and partly to the fact that education of a university type was developed, in response to the demand for it, haphazard, unorganized and without any definite relation to the parent body, which should have controlled and directed it. So it came about that there were a number of institutions, providing higher education, entirely independent of one another, and bound by no other tie to the university than the examination room. Moreover, in London were found opportunities for private study and research which existed to the same extent nowhere else. The British Museum, with its library and collections, the lectures delivered at the meetings of the learned societies and of the Royal Institution had no connection with the university. Then, again, the absence of collegiate life, of facilities for students to reside with one another, differentiated London, as a university seat, from Oxford or Cambridge, and deprived it of that cloistered atmosphere of learning in which students of the older universities received their training.

To these special conditions probably is due the fact that

London had been without a university for so many centuries, and that Sir Thomas Gresham's endowment of seven professorships in the year 1548, as the nucleus of a university for his native city, had failed to secure for the metropolis a centre of culture in any way similar to that which, with varying prosperity, had existed in Paris through many centuries. The same conditions help to explain the fact that the University of London, after having been established, had had, during its comparatively short period of existence, so chequered a career, and that its functions and position had never been definitely settled, so that, even at the present day, it stands, to some extent, apart from the learned life of London.

Five-and-twenty years ago, before the democratic spirit had permeated as completely as now all strata of society, a university education was accessible to very few outside the professional and middle classes, and the position to be filled and the task to be accomplished by a university in and for London were imperfectly understood. Gradually, however, the reaction against the mere knowledge-testing ideal was gathering strength, and the need of a centralizing force was being recognized to create unity of effort, and to focus the varied agencies in London connected with the higher learning. But no definite conception of what the university should be or do had yet emerged from the general expression of dissatisfaction with the existing state of things; and, as so often happens in such cases, the inquiring spirit of reform spent itself in efforts to improve methods of administration, instead of being directed towards the formation of a germ idea, out of which the true conception of a London University might have been evolved. It is always so much easier to propound schemes for the representation on a body of governors of different and sometimes of conflicting interests, than it is to think out and express the fundamental principle that should govern the deliberations of the governors, and to shape their policy to a clearly defined end. Amid the protracted discussions on the question of university reform, it was not easy to discover any well-expressed determining thought; and it is partly owing to the nebulous conception of the real function of a university for London, which must necessarily differ from any

other university that, for the third time, a Royal Commission has been appointed to indicate to those responsible for its work what should be its duties and its constitution.

In the year 1884, at the first International Conference on Education held in England, one of the sections was devoted to university education. Many valuable contributions were made to the consideration of the problem of university reform. Parts of vol. iii. of the *Proceedings* might still be read with advantage by those who continue to take an interest in this question. A perusal of that volume will show, however, that, so far as the organization of the university was concerned, the discussions, instructive as they were, turned mainly upon the means to be adopted to establish closer relations between the teaching and the examining functions of the university. Little or nothing was said as to the co-ordination of the teaching among the separate institutions engaged in the higher education, and the problem of creating in London one or more great centres for the promotion of learning and research was scarcely approached. The conditions under which students might receive their preparatory instruction for degrees were uppermost in the minds of the speakers, but it did not seem to have occurred to them that a university might discharge some of its highest duties without even granting degrees. The discussions, however, helped to prepare the way for the work of the Commissioners and for the Act of Parliament under which the university is at present organized. The late Professor Henry Morley, in an interesting paper, suggested the formation of a "chamber of teachers" to superintend the teaching side of the university—a proposal not very different from that contained in a scheme of Convocation, to which reference will be made later on. He proposed "To leave the whole present work of the Senate of the London University untouched, and to add to the university its missing half. This other half," he said, "must have a machinery of its own that could work either separately or in close union with the present system. This new part of the university should have a central body, a university chamber, which should be strictly representative. Every place of advanced education in or near London in which students after the age of seventeen devote their whole time in successive years

to serious preparation for the work of life, should send, in proportion to its extent, one or more representatives to this chamber." The idea that a governing body composed of representatives of different interests is necessarily the most efficient still unfortunately survives.

Sir George Young, who took an active part in these discussions, and who, later on, strongly advocated the establishment of a separate university in London of the Federal type, to be known as the Albert University, laid great stress on the fact that the teachers in London had no share in the government of the university. "What appears indispensable," he said, "in our present system is, that the teaching bodies, as such, should have no part in the administration of the university which examines. What is recommended is that the same body, one embodying a substantial representation of the teaching profession, should regulate at the same time university teaching and the university examinations which test and govern it. If this system is incompatible with the examination of outsiders, we cannot help that. The examination of outsiders may continue, but it must not be allowed to stop the way." Lord Reay, on the same occasion, emphasized the importance of associating examinations with teaching. "Let your teachers," he said, "form part of the examining bodies." Excellent as were these suggestions, experience has shown that it is not so easy a matter to select teachers who are representative of the teaching profession, and that a governing body consisting of different persons holding different views, each desiring to push forward his own particular interests, is scarcely a tribunal best fitted to act in a judicial capacity, and to promote the common objects which the governing body is expected to advance.

About this time Professor Karl Pearson contributed to the *Academy* a series of instructive letters for giving to London a new teaching university. Of those who took part in this discussion he certainly was one of the few who had a tolerably clear idea of what was needed. He desired that London should have a university of the type of the Scotch and German Universities. This was a definite idea. The German or Scotch University undoubtedly represents the best type of university,

and the provincial colleges, which have recently received university charters, are so constituted. But Professor Karl Pearson failed to show in any of his writings how the university elements, that had grown up in London, might be organically associated so as to form a single teaching institution similar to the University of Birmingham or of Munich. In setting forth the objects which he had in view, Professor Pearson found it a very easy task to criticize from his own standpoint every scheme that had been suggested for unifying the different agencies and institutions in London. Contrasting his own idea of what a university should be with the proposal that was then being made for uniting the teaching institutions in a Federal University, he correctly said, "The sole type of university which appears capable of accomplishing this is a professorial university on the Scotch and German lines, but such a university the Albert Charter wholly fails to create." Indeed, such a university every scheme that had been suggested failed to create, for the simple reason that no single scheme included practical proposals for the amalgamation or co-operation of existing teaching institutions. Writing in 1892, and the conditions have not much altered since, Professor Pearson stated that there did not exist in London a first-class physical laboratory worthy of a modern university, and he added, "so long as there is competition between the colleges, so long as they possess a double staff, competing at every turn with each other for students' fees, this is unlikely to be remedied."

I have quoted these passages from Professor Pearson's writings, because they show that a scheme of co-ordination was then, as it is now, a necessary first step towards reconstitution. It was for this reason that, as regards the engineering faculty, at least, which was one of the newest and therefore most easily dealt with, I had repeatedly urged, both as a member of the Departmental Committee on the Royal College of Science, and, on other occasions, the urgent importance of centralizing the opportunities for advanced instruction and research, if we were to offer to London students facilities in any way comparable with those provided in a large number of German towns.

The problem of welding together into a university of the

German or Scottish type the different agencies in London which are concerned with the higher education, if not insoluble, is certainly unsolved, and it was necessary therefore that some new type of university should be created which should offer, as far as possible, to London students some of the advantages of residential university training, and should absorb into itself from existing schools and colleges what was best calculated to promote the real objects of a teaching university. The difficulty was to create the machinery by means of which the University of London might fulfil its local objects, and at the same time discharge its other more extensive imperial duties, which, rightly or wrongly, it had undertaken.

More than twenty-five years ago, when, as we have seen, this question of the re-organization of the university was being freely discussed, there was a concensus of opinion in favour of giving to the acting teachers of the colleges a share in the direction of the studies to be pursued by candidates for degrees, and of associating more closely the teaching and examining parts of the university. At the same time, there was a large body of the graduates in Convocation, including many persons of distinction in different walks of life, who, whilst recognizing the necessity that had arisen for some modification of the constitution of the university, regarded with disfavour any revolutionary change that would hamper the university in carrying on its existing work. They had in mind that, during the past half-century, the university had succeeded in usefully directing, through its examinations, the teaching given in a vast number of schools and colleges in London and in the provinces, and in requiring a high standard of knowledge from its applicants for degrees, and that its work had not been without influence on the older universities. The M.D. degree of London was the most coveted distinction which a medical practitioner could gain: its acquisition added at once to his professional status. The M.A. degree contrasted very favourably, and to the advantage of the holder of it, with the corresponding degree of Oxford or Cambridge, which was, and is, awarded, after a term of years, to any pass-man on payment of a fee, without any further examination test. The preparation for the B.A. pass had helped to give a useful stimulus to the study

of English Literature, and the requirements for the matriculation, which were rigorous and inelastic, involving, at the time when I matriculated, some little knowledge of Greek and Latin, of French or German, of English, mathematics, and science, influenced very widely the course of instruction in our secondary schools, and gave a strong impulse to the teaching of modern subjects. Then, too, the University of London had been the first to grant degrees in science, to give diplomas in the Theory and Practice of Education, and to admit women on equal terms with men to all its examinations. It cannot be a matter of surprise, therefore, that there were men and women too who, in one way or another, having had some share in this progressive educational work, remained attached to their university, and who, forgetful of the torture of the examination room through which they had passed, cherished the traditions that had grown around their *alma mater*. Indeed, both in the Senate and in Convocation, which had uniformly adopted an advanced educational policy, and had urged changes in the constitution of the university, a conservative tendency had been induced, which had the effect of arousing a feeling of opposition to many of the proposals for re-organization which had been suggested from outside. Although I had regarded myself as a radical, or, at least, as a progressive in educational matters, I own that I was moved by a strong, and, as I still think, a sane, desire to protect what was good in our university, and, whilst extending its usefulness in new directions, to interfere as little as possible with the work which it had done and which it seemed to be still capable of doing.

With the agitation in favour of reform, the value of the older work of the university was somewhat unduly depreciated. The reaction against examinations, which was very healthy, went a little too far, and, in the various discussions to which it gave rise, the discipline of working for an examination, and the usefulness, and, indeed, necessity of acquiring knowledge, before aspiring to create it, were certainly underrated. There was too much wide and wild talk of the evils of "cram," and too little weight was attached to the constant efforts of the university, by the addition of practical tests in science, and by the insistence on translation from unseen passages in foreign

languages and by other means, to prevent mere text-book knowledge from deceiving the examiners. A student who conscientiously read by himself for a degree, say in arts or laws, and attended, here and there, as he may have done in London, lectures that he thought would be helpful to him, did not necessarily resort to "cram" in order to obtain his degree. Nor, too, did a student in science, who worked for a few hours in the day or evening, under the direction of competent instruction, in one of the many laboratories found in London, rightly expose himself to the charge of having been "crammed" for his examination. On the other hand, there can be no doubt that the external examinations interfered with the freedom of the university teacher and fettered his instruction. This was so even with the laboratory tests in chemistry and physics. These tests were necessarily limited in their scope, and tended either to restrict the teacher in his own choice of work, or were found to be such as students, occupied in special investigations under his direction, were unable to pass. There was ground for the complaint, therefore, that even the proof of practical knowledge required by the university prevented, in many cases, the student from reaping the full advantage of his teacher's help and guidance.

The example of German Universities was constantly quoted. There, the student obtained his degree largely on the result of researches, which he had made under the direction of his professor; whilst in London, not only in science but in other branches of learning also, the teacher's excursions into new regions of knowledge were limited by the necessity of preparing his students for examination on certain lines, and in certain branches of a subject which, for his own reasons, he had purposely excluded from his course of instruction. These views as to the interference of external examinations with teaching were somewhat new, and the difficulties of reconciling them with the work in which the university had been engaged were not yet fully realized.

There is no doubt that the university ideal was undergoing some change, and many independent forces were at work modifying the aims and methods of university teaching. The demands of science, which, in its practical applications,

had only recently gained admission into academic regions, had to be considered. The aim of the science professor was clear. His duty was not so much to instruct—to open up to his students the storehouses of existing knowledge, as to train them in the methods of acquiring fresh knowledge. To this end, the information conveyed in lectures was of little use, and even the knowledge to be gained from reading was of secondary importance, and helpful only in so far as it served to guide the student along the path that led to the discovery of "onward things." This view of university teaching, that its essential purpose is investigation and research, was being gradually extended to other subjects, and the usefulness and educational value of mere lecture-teaching to students of literature, philosophy, and economics was seriously questioned. This reaction against the conventional professorial practice had the effect, temporarily at least, of discouraging, to some extent, attendance at university lectures on subjects which the student, rightly or wrongly, thought he could equally well study either alone, or under the direction of some well-informed teacher who would direct his reading. Indeed, it is of interest to note how, about this time, the lecture which, for so many decades, had been the chief vehicle of university instruction, was held to be out of date. Darwin, contrasting the value of lectures with that of reading, said, "To my mind there are no advantages and many disadvantages in lectures, compared with reading," and the late Professor Sidgwick wrote, in May, 1890, in a publication called *The New Review*, an article against lecturing, which suggested to me the subject of an address to the students of the Working Men's College, which I have included in this volume.

It will be seen that the difficulty of propounding any satisfactory scheme for remodelling the London University was not entirely due to the conflicting interests of different institutions, but equally to the absence of any clear conception of the true functions of a university, and of any generally accepted conclusion as to the type of university to which London should conform. Those who took an active part in suggesting schemes of reform tried, and tried in vain, to re-arrange the elements which surrounded the old university, so as to form a

new structure, without having previously settled its ground-plan. They were occupied in the hopeless task of forming a living organism without any model to guide them in shaping it, and without the control of any spirit to breathe into it. Hence, all sorts of schemes were suggested and framed and dropped, and committee after committee was engaged in what really seemed a hopeless task. Personally, I took a keen and deep interest in the problem. I was familiar with the German Universities, both by residence as a student and by having visited most of them as a member of a Royal Commission. I had spent several years at University College, and had graduated in arts and science at the university, and I had been an active member of the Standing Committee of Convocation for many years. I was no stranger, therefore, to the elemental conditions of the problem. But, looking back upon the constructive work in which I had taken part, I not only see now that it was faulty, but I also understand the reasons why it could not have been otherwise.

As those who were most interested in the question of university reform began to give more thought to the consideration of the problems it involved, grave doubts were expressed as to the value of a degree conferred on students who could produce no record of systematic instruction at a recognized school of university standard. It was realized that the intellectual value of the Oxford and Cambridge training was indirectly heightened by the comradeship of student-life, and by personal intercourse with the professors, and consequently that attendance even at a day college conferred advantages, which if not equal, were similar in character to those gained by residence at one of the older universities. Much was said about the "academic atmosphere" of a college, as being of lasting benefit to the student, and it was held that any university degree was of little value unless it indicated that the holder had been subjected to some of the influences of collegiate life. The question was raised and fully discussed of distinguishing, in some way, degrees conferred on students who had spent some two or three years at an institution under the guidance of trustworthy professors, and on those who had passed the same examinations, but had received no such training, and the idea began to take

shape of separating those institutions in which examination followed on teaching from the existing university, whose functions were limited to examining. Accordingly, in May, 1884, an association, of which Lord Reay was chairman, was formed for the establishment of a teaching university in and for London, and during the next few years schemes were prepared for an Albert University, for a professorial university, and for combining in London the functions of a teaching and examining university; but no one of these schemes was received with any enthusiasm or general approval by those who were most interested in finding a solution of the difficulty.

The problem was complicated by two considerations: by the fact that both the Senate and Convocation were desirous of extending to the provincial colleges, many of which have since received a separate charter, but which were then loosely connected with the University of London, privileges similar to those offered to the London colleges, and by the strong feeling, then widely held, that the establishment of a second university in London was undesirable in the best interests of education. It was, moreover, realized that, however valuable it might be to students to enjoy the full benefit of regular instruction and of college life before graduating, there were many young men and women, indeed an ever-increasing number, who could not secure such advantages. For these, the opportunity of obtaining a degree without necessarily attending a recognized school was a matter of urgent importance, and the exclusion of such students from the examinations of the university would have been not only eminently unpopular, but also unwise. It was felt that so long as these external students passed the examinations demanded by the authorities of the University of London, and pursued the courses of reading or instruction prescribed by the university, they were entitled to a London degree, even although they may not have resided nor studied within the Metropolitan area. What marked the London degree was not the place in which the student worked, but the subjects he was expected to study, and the character and standard of the examination which he was required to pass. The London degree had undoubtedly a distinctive mark, and was highly valued by those who held it.

In the hope of arriving at some settlement of the various questions that had been raised in connection with the organization and functions of the university, recourse was had to the usual expedient of a Royal Commission, and in May, 1888, a Commission was appointed, consisting of the late Earl of Selborne as chairman, Ex-Lord Chancellor Ball, the Hon. G. C. Brodrick, Sir James Hannan, Sir William Thomson (Lord Kelvin), Professor Stokes, and the Rev. J. E. C. Welldon. It would have been difficult for the Government to have nominated a more competent tribunal. The Commissioners in their Report, published in the following year, stated at the outset that "it was no part of the original conception of the present University of London that it should be a mere examining body, without direct connection with any teaching institution," and in their conclusions they stated that reasonable time should be allowed to the Senate and Convocation to consider whether they would apply for a new charter to extend their functions and duties, to remodel their constitution, to establish boards of studies, and to associate the university with its teaching bodies. If so, they recommended that no new university should be started, and they held that "whatever difficulties there might be in connecting the university and the teaching bodies, this would be more easily overcome if the ground were occupied by one university." It is true that Lord Kelvin, Sir George Stokes, and the Rev. J. E. C. Welldon appended a note to the general recommendations which they signed, to the effect that they saw almost insuperable difficulties in the combination of a teaching university for London and a general examining body for the whole world, and would have preferred the establishment in London of a new and separate university.

In the evidence which, at the request of the Committee of Convocation, I gave before the Commission, I traced the history of the continuous endeavours of Convocation from the year 1875 onwards to bring the university into closer relation with the teaching bodies, to establish boards of studies, and to effect such changes in the constitution and procedure of the university as would have given effect to the main objects of the Association for promoting a teaching university in London, and I stated that, if these proposals of Convocation had been

adopted by the Senate, the necessity for the inquiry in which the Commissioners were engaged might have been avoided.

Early in the year 1884, before his appointment to the Senate, Sir Edward Fry had presided over a Committee of Convocation, which had prepared and submitted to the body of graduates a detailed scheme for giving effect to those objects. The scheme, which embodied many useful and practical suggestions, was not adopted, but was referred back to a committee, consisting of some of the same members, for further consideration. That committee, of which I was appointed chairman, gave close attention to the problem, and presented to Convocation a revised and somewhat simpler plan, which differed from that of the previous committee in its proposal for a general representative Educational Council, somewhat on the lines of the Chamber of Teachers suggested by Professor Henry Morley. The Boards of Studies were to be appointed as standing committees of that council, and the university was to be governed by an executive Senate. The bodies described as "Faculties" mentioned, I think, for the first time in Sir Edward Fry's scheme, were omitted, and in justification of that omission, I stated before the Commission, "that the qualifications for becoming a member of a Faculty were somewhat indefinite," seeing that the Faculties were supposed to include a number of teachers in London institutions providing only evening instruction.

Convocation was not altogether wrong in considering that the Faculties, consisting of bodies so heterogeneously composed, were not the most competent to advise the Senate on educational matters, and they held that if all the teachers of London, occupied in giving instruction to pupils above the secondary school age, were to be organized in Faculties, their functions should be restricted to the election of members of the Senate, and possibly of the Boards of Studies. The scheme of the second committee was finally approved by Convocation at their meeting held on June 29, 1886, as a basis of conference with the Senate, but possibly owing to rumours of the appointment of a Royal Commission to inquire into the whole question of university education in London, no action was taken by the Senate. After the publication in 1889 of the Commissioners'

Report, the Senate applied themselves to the task of preparing a scheme to give effect to the Commissioners' recommendations. Meanwhile, the agitation in favour of reform was developing on two distinct lines. There were those who believed that no other solution of the difficulty was possible than by the establishment of a separate university for London, whilst the Senate and Convocation still adhered to the opinion that the functions and constitution of the university at Burlington House might be so modified as to satisfy the legitimate demands of the professors. Numerous letters appeared in *The Times*, in *Nature*, and in other papers in defence of one or other of these proposals. In 1890 I was elected by Convocation a member of the Senate in the Science Faculty; and in the following year, I read a paper at the London Institution, in which I endeavoured to show that the revised scheme adopted by the Senate, by which the university was to add teaching functions to those which it had previously exercised, would afford a solution of the problem. This revised scheme, however, was strongly opposed by the advocates of the professorial university, some of whom declared it to be "a pitiable failure," and, although by including the provincial colleges within the university, it met some of the objections of Convocation, it was finally rejected by that body.

This action of Convocation prevented the Senate from giving effect to the recommendation of the Commissioners by petitioning the Privy Council for a new charter. Meanwhile, the promotors of the Albert University, which was intended to incorporate in one body University and King's Colleges, the medical schools, and possibly other institutions, had succeeded in obtaining a favourable hearing to their petition for the granting of a new charter; but, as the university thus proposed to be constituted was of the federal type, the scheme was opposed, as failing to give to the professors that direct control, which they deemed essential to the organization of a teaching university. It would seem that the Privy Council, after hearing arguments for and against this proposal, pronounced in favour of a scheme similar to that submitted to them; and later on, the Gresham Trustees expressed their willingness to give some financial assistance to the proposed new university, provided

that it was established in London under the name of the Gresham University.

By the action of Convocation, and owing to the opposition to the proposed Gresham University, London was not much nearer in 1892 to a settlement of the problem than it had been in 1884, and a new Royal Commission was accordingly appointed to consider the proposed draft charter for the Gresham University, the petition from the Royal Colleges of Physicians and Surgeons in favour of a separate medical university with power to grant degrees, and other matters. The new Commission was a large and representative one. It consisted of thirteen members, including representatives of the Universities of Oxford, Cambridge, Glasgow, London, and Victoria, with Earl Cowper as chairman. The preamble to the reference stated that, whereas the former Royal Commission recommended that a reasonable time be allowed for the Senate and Convocation to consider whether they would apply for a new charter "extending the functions and duties of the University of London to teaching and effecting other changes in its constitution, and whereas a long period was allowed and no such application was made; and whereas petitions for a draft charter for the Gresham University were laid upon the tables of each House of Parliament and were opposed," a Royal Commission was appointed "to consider, and if thought fit, amend the proposed charter and to report on a scheme for the establishment under charter of an efficient teaching university for London." The Commissioners, after receiving very varied evidence, published their Report in 1894, and were evidently of opinion that they had settled the question for a generation at least. Their survivors, of whom there are still some among us, must have heard, therefore, with surprise that in 1909, less than ten years after the completion of the statutes consequent upon the Act of Parliament, which was the direct result of their recommendations, a new Royal Commission was appointed to consider for the third time the same question, on which two previous Commissions had expressed their opinion. In the preliminary statement to their Report, the Commissioners of 1892 refer to the "length of time during which this matter has been agitated, and to the necessity of setting it upon

a firm and permanent basis," and that, in order to do so, they felt it their duty "to put a wide construction on the terms of reference." The recently appointed Commission has been placed under no such necessity, seeing that the terms of reference have been made wide enough to enable them to resolve the existing university into its original elements and to substitute therefor one or two universities for London, with such separate functions as they may recommend. This was not the case in 1892. In their Report published in 1894, the Commissioners endorsed the decision of their predecessors of 1888 that there should be only one university in London. "We are of opinion," they said, "that there should be one university and not two, and that the establishment of an efficient teaching university for London will be best effected by the reconstruction of the existing university on such a basis as will enable it, while retaining its existing powers and privileges, to carry out thoroughly and efficiently the work, which may be properly required of a teaching university for London, without interfering with the discharge of those important functions which it has hitherto performed as an examining body for students presenting themselves from all parts of the British empire." Nothing could more clearly or decisively have vindicated the opposition of the Senate and Convocation to the proposal for the establishment of a second university for London than this pronouncement of the Royal Commissioners. Their decision was arrived at after, as they state, most careful consideration of the recommendations of the three members of the previous Commission who did not entirely agree with the majority of their colleagues. They saw very strong objections to what they called "the extreme form of the teachers' view—that is, that candidates should be examined only by those who have individually taught them," and they state that this contention is "inapplicable to the circumstances in London." That the professors should be able to exercise an influence upon the examinations and studies of the university they considered essential, and their scheme of re-constitution was so framed as not only to permit, but to secure the exercise of such influence; but they were emphatic in their assertion of the desirability of combining in one university the existing examining functions

of the old, and the proposed teaching functions of the new university. "We agree, therefore," they state, "in the conclusion of the Commissioners of 1888, that the function of teaching with examining and examining without teaching may be combined in one university without injury to either class, and with benefit to both classes." No expression of opinion could be more decided than this.

There was another proposal under the consideration of the Commission, which has since occupied the serious and careful attention of the Senate of the reconstituted university. The Commissioners were opposed to the policy of absorption into the university of the existing colleges, which were at that time, and have remained until very recently, corporately distinct from the university. The question came under their notice in connection with the proposal for establishing a professorial university. The leading idea underlying that proposal was that all institutions of academic rank in London should be fused and absorbed into the new university, which would then constitute a single teaching institution, giving instruction in such places within the metropolitan area as it might select, and controlled by a governing body consisting of the university professors and of a certain number of Crown nominees. Notwithstanding the weighty evidence given in support of a university to be so constituted, the Commissioners expressed very clearly and distinctly their opposition to the immediate or even ultimate absorption of institutions as the basis of the university, preferring a scheme of co-ordination. "We think," they said, "that the continuance of the individual existence of teaching institutions must be accepted as a necessary datum . . . and that the problem is to co-ordinate the recognized teaching institutions under a central university."

The Commissioners undoubtedly took a correct view of the situation in deciding that the solution of the problem submitted to them for consideration lay in the co-ordination of "recognized teaching institutions under a central university." Whether the Senate of the reconstituted university have acted wisely in adopting, in opposition to this opinion, a policy of incorporation, I am not prepared to say. Events will show. But it is

quite clear that, having adopted and acted upon that policy, it must be continued, and may be found the best means of achieving one of the main objects of university reform—the co-ordination of the teaching in existing institutions. That being so, the Senate have done well in pressing for the incorporation, within the university, of the newly organized Imperial College of Science and Technology, and must pursue the same policy till every institution in London, providing higher education of a university standard, is made part of the university. In no other way can the Senate act with equal consideration and with complete impartiality to all its schools.

My own evidence before the 1892 Commission had no reference to the problem of reconstruction. Indeed, I declined to discuss that question further. It was limited to arguments in support of the addition of an Engineering Faculty to the other Faculties of the university. In urging the importance of this addition, I pointed to the analogy of engineering as a professional subject with medicine and law, and to the fact that the ancient Universities of Paris and Bologna had really grown out of professional schools, and I further explained how, in recent times, the Colleges at Birmingham, Sheffield, and Leeds, which have since received separate Charters of Incorporation, had also been evolved from Schools of Science, established in the first instance with a view to providing instruction in science and technology, more particularly in the application of science to engineering. Seeing that the Engineering Faculty is now one of the most flourishing in the university, and that the newly established College of Science and Technology, which will be largely occupied with the teaching of the different branches of engineering, promises in the near future to develop into an institution of equal magnitude with the university itself, it is difficult to realize that only fifteen years ago, when this evidence was given, any doubt could be felt as to the necessity of including engineering among the subjects of university education. But as late as 1899, when the Statutory Commissioners, appointed under the Act of 1898, were considering the regulations for the government of the reconstituted university, the question of the addition of a Faculty of Engineering was referred to the old Senate for consideration, and, at a

meeting of that body, held on February 22, my proposal that the Commissioners be urged to include engineering among the Faculties of the university was energetically opposed, and was carried only by the casting vote of the then Vice-Chancellor, Sir Henry Roscoe; and the Senate being thus evenly divided, I was asked to prepare and forward to the Statutory Commission, through the Senate, a full statement of the reasons I had given, so that the Commissioners might consider them, together with the arguments on the other side. This was done. The two cases were duly presented, and the Faculty of Engineering was added to the other Faculties of the university.

The bi-lateral constitution of the university, under which an Academic Council and an External Council were appointed to deal with the examinations of the internal and external students respectively, was the result of a compromise arrived at subsequently to the publication of the Commissioners' Report, and was embodied in the Act of 1898 as an instruction to the Statutory Commissioners.

Already in 1899 the scheme of the reconstituted university was accepted, and the removal of its offices to South Kensington was, after much hesitation and negotiation, finally agreed to. At the meeting of the British Association, held in September of that year at Dover, I endeavoured to raise a discussion as to the future of the university, by reading a paper on the subject in the Economic Section. I wanted to show the significance, in the development of the university, of its two new Faculties of economics and engineering, and I was also desirous of directing early attention to the importance of organizing and co-ordinating, under the *ægis* of the university, the facilities for the higher education, which existed in different parts of London. This seemed to me then, as it has appeared since, to be the one great problem which had to be solved, if London was to be endowed with an efficient teaching university. I had no misgivings as to the difficulties that had to be faced. "There can be no doubt," I said, "that the progress of the university itself will be greatly impeded by the several conditions which it must necessarily fulfil, and that what we have to try to do is to form for ourselves some ideal of a university that shall meet the requirements of the

higher learning in the coming century, and then to adapt the conditions as far as possible to that ideal." That ideal we have so far failed to create. During the ten years of our reformed existence much useful work has been accomplished, but it cannot be denied that the university has only drifted along under the influence of opportune circumstances, without the guidance of any carefully thought-out scheme of constructive policy. That the university might not have been able from its very conditions to realize the ideal which some of us had formed as to its future, or to have attained its end, even if its aims had been clearly apprehended, I fully recognized. "Possibly some of us," I pointed out, "may at one time have pictured a University of London consisting of a collection of buildings closely associated as regards position, adequately equipped for the teaching, under competent professors, of every branch of learning, in which no two parts would be duplicated, and from which no part would be wanting—an institution resembling somewhat the University of Strasbourg, but larger and more complete. The realization of such an idea, however, is impossible, having regard to the elements which go to compose the new university, and we must not be surprised if, in the schools associated with it, there shall still be found some overlapping of function, some duplication of effort, as there has been in the past. We may hope that, while there may be branches of the university in different parts of London for what may be regarded as undergraduate instruction, there may be a concentration of teaching force for post-graduate study, even if, having regard to existing circumstances, it may be found necessary to locate the seats of different Faculties in different parts of London." The possible co-ordination of the science teaching of the university seemed to me then, as now, to have justified the removal of the offices of the university to South Kensington, and there is reason to believe that the efforts that have been made to link together the Science Colleges in South Kensington, and to supplement them by new departments for instruction in branches of engineering for which no sufficient provision had previously existed, may be the means of developing and concentrating the more advanced teaching in that Faculty. In concluding my address I made a suggestion which I am

glad to know has not been overlooked. I stated: "If the university is to develop even to some extent on the lines I have indicated, H.M. Commissioners of 1851 should refrain from alienating another inch of their Kensington estate, but should hold the whole of it in trust, so to speak, for London's Teaching University, to be occupied as required by the Senate. A survey of the universities in all parts of the world shows us that it is not by scattering, but rather by the concentration of the highest teaching forces, that a university becomes great and powerful."

The Times of September 19, 1899, from which the above extracts are taken, reported almost *in extenso* my address, and devoted a leading article to the subject, from which I quote the following: "It is natural that the British Association for the Advancement of Science should feel an interest in the coming reconstitution of the University of London as a teaching body, in which, from the very nature of things, instruction in science and the newer learning generally is likely to find a more congenial home than in the other universities. But it is in what Sir Philip Magnus, in his paper read before the British Association, called the newer Faculty of Science and the newest Faculties of Economics and Engineering that we must probably expect the chief immediate educational development of the re-organized University of London." Even so well advertised, my address failed in its object to stimulate any careful thinking-out of the educational problem which had to be solved, if the machinery for governing the university, created by the Commissioners, was to prove the means of bringing into existence a new university adapted to the varied conditions and requirements of London life. To my mind the fate that has since overtaken the university, of being again thrown into the melting-pot, and of having to wait possibly some years for the legislation which may follow from the findings of the new Royal Commission, is largely due to the failure of the Senate and of those who were mainly responsible for the work of the university to formulate any definite line of policy for its guidance, or any constructive scheme, which would have been understood by the British public and would have appealed to the imagination of the people,—a scheme that might have

enabled them to realize that London possessed a university, the equal, at least, of the universities of other capitals, and capable of repaying many times, by the services it could render to the Empire, any help which it might receive from patriotic citizens.

In the following year, in the hope of stimulating fresh interest in the work of the university, I acceded to a request to write a short paper on "The Imperial Aspect of the University," for an early number of the new *Imperial Review*. The article was published in March, 1901, and, as it deals with some of the questions which are still under consideration, I have reprinted it in this volume.

Since 1900 the university has been working under its new constitution. It took some little time for the Senate, when appointed, to realize the larger duties which had been thrown upon it. Its character was very much changed from the quiet, academic, and united body which had conducted the business of the university for so many years in Burlington Gardens. Some of the old members resigned; others, under the altered conditions, failed to secure re-election. The new Senate was a large and so-called representative body. I have often thought that such bodies are not the best fitted to organize and control a new undertaking. The members so elected are unconsciously too much influenced by the interests they represent, and are consequently incapable of that detachment necessary to realize in all its bearings, apart from individual considerations, the problem to be solved. If unity of purpose is to be attained, the governing body of a number of separate institutions, loosely held together, should consist rather of persons selected for their absolute independence, for their administrative ability, and for their wide knowledge of the character of the work which they have been appointed to direct.

In spite of the somewhat cumbrous constitution of the Senate, the university, during the last decade, has done good work and has developed in various directions. It has encouraged research and advanced teaching in many new departments of learning. It has increased the number of its schools, and has established university professorships in several subjects.

It has appointed, after careful consideration of their qualifications, numerous teachers at its special schools. It has widened its matriculation examination, and has thrown open both sides of the university to a greatly increased number of students. It has taken over and developed the work of the London Society for the Extension of University Teaching, and has given a fresh impulse and useful direction to the spread of that kind of knowledge which so-called extension lectures help to encourage. It has organized a system of inspection of schools, and has given to its school-leaving examination matriculation value. All this work, to which the barest reference only can here be made, it has carried out with great efficiency by help of a grant in money of only £8000 a year from the State. But it has accomplished much more than this. Since 1900 it has taken over, under special Acts of Parliament, the property and functions of University College and of King's College also, as far as secular education is concerned, and has accepted as a gift from the Worshipful Company of Goldsmiths, together with a liberal endowment, an institution at New Cross, still known as the Goldsmiths' College, and now organized as a training-school for teachers. It has, moreover, exercised a very powerful influence on secondary education generally, not only in London, but throughout the United Kingdom.

On June 28, 1903, a letter addressed to Lord Monkswell, then chairman of the London County Council, appeared in *The Times* over the signature of Earl Rosebery, giving the outline of a scheme for the establishment of a great technological school in London, somewhat on the lines of the well-known Technical High School at Charlottenburg, a suburb of Berlin. The letter conditionally promised effective financial aid from private persons, and contained an appeal to the London County Council to make an adequate grant to ensure the success of the undertaking. The proposal met with general approval, but there were some who felt that Lord Rosebery's letter did not take sufficient note of the available facilities in London for higher technical teaching. "It is little short of a scandal," he wrote, "that our own able and ambitious young men, eager to equip themselves with the most perfect technical training, should be compelled to resort to the Universities of

Germany or the United States." This statement seemed to fail in its recognition of the work of existing institutions in this country, although every one agreed that the time had "come for making London—at any rate, so far as advanced scientific technology is concerned—the educational centre of the Empire," and that the "new institution" should be organized as a school of the university, working in close co-operation with the Royal College of Science, the Central Technical College, and with other branches of the university.

This weighty letter was carefully considered by the Technical Instruction Committee of the London County Council, and a scheme was finally prepared by a small sub-committee, of which I was a member, setting forth the advantages of combining existing facilities for higher technical instruction, and of supplementing them by the addition of new departments for instruction in other branches of technology and engineering, for which no adequate provision had been made.

The Council further made a conditional offer to contribute a sum of £20,000 a year towards the main object expressed in Lord Rosebery's letter. It soon became evident, however, that what was needed was, in the first place, a scheme of co-ordination rather than plans of construction, and accordingly, in April, 1904, a Departmental Committee was appointed, under the chairmanship of Sir Francis Mowatt, and afterwards of Mr. Haldane, to inquire into the conditions and further prospects of the Royal College of Science, and of the Royal School of Mines, and of other matters connected therewith. As a member of that committee, I urged the inclusion of the proposed college, when established, among the schools of the university, so that the university might, by its regulations for degrees in science, exercise some directive influence over the curriculum of the students. A small minority of the committee desired that the new institution should be at once incorporated in the university, but the feeling among the majority of the members was very strong that time should be allowed for the institution to develop, and to consolidate its constituent parts, before being brought into that closer connection with the university which was generally recognized as desirable. The committee sat for nearly two years, but even then its

work was incomplete. Our labours were perhaps somewhat hastily terminated by the change of Government in November, 1905, and by the appointment of Mr. Haldane, our chairman, as Secretary for War. Early in our proceedings, the Board of Education conditionally consented to hand over to the new governing body the Royal College of Science and the School of Mines, with their buildings and an endowment equivalent, at least, to the cost of maintaining these institutions. Our Report was published in January, 1906, and recommended the immediate union of the Government Schools with the Central Technical College, and that endeavours might be made to associate with these the engineering work of University and King's Colleges, thus bringing together all these separate schools, in addition to the new departments to be erected on the remaining site at South Kensington. The Commissioners recommended—

"That it be an instruction to the governing body to enter into negotiations with the University of London, with King's College, and pending its actual incorporation, with University College, with regard to the co-ordination of the engineering work of these colleges with that of the new institution; and that if, for the purpose of carrying out such co-ordination, funds are needed, either for transferring the engineering departments of one or both of these colleges to South Kensington, or for carrying on at these colleges work of an advanced type which would otherwise be done at South Kensington, or in aid of any other arrangement for that purpose to which the governing body may agree, the governing body be authorized to incur such reasonable expenditure as may in their opinion be necessary."

Early in 1908, a body of governors was nominated to organize the new institution. A chief officer under the title of Rector was appointed, and plans have been prepared for developing the institution very much on the lines recommended by the departmental committee.

The relations of the new college to the university remain unsettled. By its charter of incorporation, it became a school of the university, and enjoyed the privileges as to graduation conferred upon internal students. But there was ground for fear that, having regard to its endowments and to the

distinguished position of many of the governors, the college might attract to itself the whole of the engineering and applied science work of the university, and ultimately develop into an institution, as distinct from the university, as is the Technical High School at Charlottenburg from the University of Berlin; and in order that the question of amalgamation might be at once considered, the Senate, at their meeting on December 2, 1908, passed the following resolution:—

"That, having regard to the desirability of securing incorporation of the Imperial College of Science and Technology with the University, as recommended by the Departmental Committee and contemplated by the Charter of the Imperial College, the Government be requested to appoint a Royal Commission for the purpose, with a view to the introduction of a Public Bill; and that the Senate re-affirms its willingness to increase its numbers, and will take steps to secure such powers of delegation to its councils and to any committees it may appoint as shall appear expedient."

The Government cannot be said to have lost any time in acceding to the request of the Senate. On March 10, 1909, a notice appeared that His Majesty had appointed a Royal Commission, with Mr. Haldane as chairman, "To inquire into the working of the present organization of the University of London, and into other facilities for advanced education (general, professional, and technical) existing in London for persons of either sex above secondary school age; to consider what provision should exist in the metropolis for university teaching and research; to make recommendations as to the relations which should in consequence subsist between the University of London, its Incorporated Colleges, the Imperial College of Science and Technology, the other schools of the university, and the various public institutions and bodies concerned; and further to recommend as to any changes of constitution and organization which appear desirable. In considering these matters, regard should also be had to the facilities for education and research which the metropolis should afford for specialist and advanced students in connection with the provision existing in other parts of the United Kingdom and of His Majesty's Dominions beyond the Seas."

The reference, it will be seen, was much wider than that asked for or desired by the Senate, and it is anticipated that some years may elapse before legislative effect can be given to the recommendations of the Commission.

Lord Curzon, in his prefatory letter to his well-considered report on *Principles and Methods of University Reform* (Oxford, 1909), saw clearly the danger of the Universities of Oxford and Cambridge being subjected to an inquiry by a Royal Commission, as had been suggested in the House of Lords.

"The reasons against a Commission," he said, "were exceedingly weighty. . . . Of all suggested or feasible reforms, no one can say in advance which will commend themselves to a small body of commissioners, however able or impartial; or, what is still more important, to the Government that may be called upon to act on their report, or to the Parliament that may deal with the Bill of the Government. . . . Meanwhile, for a space, to judge from previous experience, of four or five years, the activities of the University are held in abeyance, there is much distraction and dislocation of every-day work, and internal reforms, which may be both necessary and practicable, are arrested."

These reasons apply equally to the University of London, which has only begun to find itself, and to recognize its newer wants after its re-constitution in 1890. Those wants it has not yet ascertained, and the very fact that very few, if any, of its members are agreed as to the changes they would introduce into the constitution of the Senate, faulty as it undoubtedly is, or into the conditions of graduation, would seem to show that time should have been allowed for the evolution from within of some clear and definite line of future policy.

I cannot but think, therefore, that the Government would have been well advised to have acceded to the request of the Senate, and to have appointed a Commission with the limited reference that had been suggested. It is a serious matter to paralyze the activities of a university during many years, whilst inquiries are being conducted of so general a character as those indicated in the reference to the Commissioners. Moreover, it should be noted that the Senate undertook to take steps to introduce into the constitution of the university such reforms

as experience had shown might be necessary for the more rapid conduct of its work, and to increase its numbers with a view to the more satisfactory representation of the engineering profession. I am very doubtful whether it would not have been better, in the interests of the higher education in London, to have allowed the university to work out its own salvation on the lines indicated in its resolution. It had been brought home to the Senate that its Academic Council and its External Council should have enlarged powers and executive functions, and such an alteration in its constitution might, with little difficulty, have been secured.

The evidence which the new Commission will receive, none of which, at the time of writing, has been published, must be of a conflicting character; and it is to be feared that the recommendations, if and when, embodied in an Act of Parliament, will at best represent a compromise that will not be altogether satisfactory to either side of the university, nor to any one of its incorporated or affiliated schools. Speaking from my own experience of the working of the university and from my knowledge of the wishes of its teachers and graduates, I am convinced, as was pointed out by the two previous Commissions, of the essential desirability, now as before, of having one, and only one, university for London, and of its being made responsible for the organization of the higher education of the metropolis. It is also desirable that the greatest amount of freedom, compatible with the government of the university by the Senate, shall be given to the Academic Council, so that the teaching of the university may develop mainly under the guidance and control of the teachers. It is equally essential that opportunities should continue to be afforded to external students—to students not receiving instruction in any recognized school of the university, to obtain a degree, as now, on the results of examination; and there can be no doubt that the external side of the university will be greatly strengthened, as it has been during the past few years, by remaining in close touch with the Boards of Studies and generally with the teaching staff. On these points I believe there is practically general agreement. As a member of the Committee of the House of Commons to which the Irish University Bill was referred, I

was in favour of the abolition of the Royal University, which granted degrees on the results of examinations only, and I supported the views of the Government that the two universities, proposed to be established, should be essentially teaching universities, giving degrees only to their own students. But I should have found it difficult to have voted as I did, if London had not continued to open its examinations for degrees, on its external side, to all comers, wherever they may have studied. That there should be one university in the Kingdom, offering these facilities, is sufficient; that there should be more than one is clearly unnecessary.

Experience has shown that certain modifications in the constitution of the university are needed. The great development of the Engineering Faculty was not generally foreseen ten years ago; and for the due representation of this Faculty, and for the incorporation within the university of the Imperial College, certain changes in the composition of the Senate and of the Councils and Boards are required. It was in accordance with the Report of the Departmental Committee on the organization of the Imperial College, that the nature of these changes should be referred to a Royal Commission; and if the reference to the Commission had been so limited, I believe, that under the direction of a governing body on which the Imperial College was well represented, other modifications, affecting the relation of the Polytechnic institutions to the university, and the conditions under which evening teaching generally might be recognized, would have been gradually evolved. Any semblance of friction which now exists between the two sides of the university, acting together on the Senate, would have been greatly lessened, and, I might say, entirely removed, by the delegation, under proper conditions, of executive functions to the councils, and by such alterations in the constitution of the Senate as the Commissioners would probably have proposed.

What form our much-investigated university may now assume, I cannot venture to predict; but I believe very strongly in leaving bodies, which are actuated by a desire for change, to work out, as far as possible, their own destinies.

I must now leave this brief record of my association with the work of the university during the last thirty years. It

would not, however, be complete unless I gave expression to the gratification I have felt at the honour which my fellow-graduates conferred upon me by electing me in January, 1906, to represent them in the House of Commons, and by re-electing me four years later by a greatly increased majority. To my work in Parliament, and to the part I have taken in helping forward, to the best of my ability, the several educational measures which seemed to me to make for educational progress, I may find some other opportunity to refer. But I can look back without regret to my long connection with the university, feeling that, although my vision may have been limited, and many of my efforts may have been crude and imperfectly considered, I have endeavoured, by co-operating with others more competent than I am, to make the university the powerful instrument it is for advancing the higher education, and have directed all my efforts, such as they were, to the establishment in London, and for London, of a seat of learning and research worthy of the metropolis of the Empire.

IV

THE TECHNICAL INSTRUCTION MOVEMENT

On Monday, March 22, 1880, in answer to a notice which I first saw in *Nature*, inviting applications for the post of "Organizing Director and Secretary" to the City and Guilds of London Institute, I attended at Mercers' Hall, together with five other men, to undergo the process of being interviewed. The six candidates who presented themselves had been selected from a list of over fifty applicants; but by what tests they were chosen it is particularly difficult to say, when one reads through the names of those who were prepared to undertake this somewhat novel organizing work. Of the six selected for an interview, two have since occupied distinguished positions in the educational world, and the other three, of whom two were well-known Professors of Physics, are no longer with us. Whether, and if so how, the pioneer work of the City and Guilds of London Institute would have been affected, if some other appointment had been made, no retrospective forecast can settle.

The chairman of the selecting committee was the well-known engineer, Mr. (afterwards Sir) Frederick Bramwell, and it was he who questioned me as to my own views of the duties of the post, and how I proposed to discharge them. My answers, I assume, were fairly satisfactory, as, by a method of elimination, I was left the only candidate in the running, and was then formally appointed.

For some little time before my appointment, I had realized that there were great potentialities in the work to be undertaken by the City Guilds. There was at that time probably no country so far behind in the matter of technical education as Great Britain. The very meaning of the term was not understood. Mr. Forster's Education Act had been in operation

ten years, but already doubts were being expressed as to whether the kind of instruction provided by the School Boards, in accordance with the Government Codes was a complete and suitable training for the recruits in our industrial army. The late Professor Huxley had written several letters to *The Times*, calling attention to the serious consequences of neglecting to provide technical instruction for all classes of workers; and during the three years prior to the incorporation of the City and Guilds of London Institute, there was considerable unrest among some of the Livery Companies, who felt very strongly that, having regard to the terms of their charters, it was their duty to apply some part, at least, of their large funds in furtherance of a cause that might prove of the greatest possible benefit to the State, and for which at that time no "Development Fund" was available. It was a voluntary undertaking on the part of the City Guilds, but they were no doubt actuated by the conviction that part of their inherited property was held as a kind of trust to be used for the benefit of the industries of the country. The movement was projected by several public-spirited men, members of the Livery Companies, and among those no longer with us, who helped to direct its course at the outset, may certainly be mentioned the Earl of Selborne, Sir Sydney Waterlow, Sir Frederick Bramwell, Mr. Rokeby Price, Mr. J. Samuel, Mr. William Spottiswoode, Sir William Siemens, Mr. H. C. Saunders, and Mr. W. P. Sawyer.

When I assumed office as Organizing Director and Secretary of the Institute, I found certain branches of work already commenced or in contemplation. I had the advantage, moreover, of considering a volume of essays on our national requirements as regards technical instruction, which had been written at the request of the provisional committee of the Institute by a number of distinguished men who had given some attention to the subject. Among the authors of these essays, excluding those who are still living, were the late Lord Armstrong, Sir John Donnelly, Sir Douglas Galton, and Professor Huxley.

They naturally differed very much in their views, but there was sufficient agreement in opinion among them to enable the committee to include in their provisional programme the building and equipment of a central institution, mainly for the

training of teachers, the creation of one or more subsidiary schools in London, and proposals for assisting in the provision of technical schools in the principal manufacturing centres throughout the country, and for supplementing the Government classes in science and art by evening classes in technology. This was the outline scheme which had been generally approved, the details of which had to be carefully elaborated, both with regard to the educational needs of the country and to the means placed at the disposal of the Institute by the Corporation and the Livery Companies of London. The prevailing opinion at the time was, that technical education mainly concerned artisans, and very few persons then realized the urgent importance of providing a suitable training for the so-called captains of industry, for those who would direct great engineering and manufacturing works, or for those who might assist, by the prosecution of scientific research, in the discovery of new processes and in the application of the more recondite branches of science to industry. This limited view of the scope of technical instruction was one of the difficulties with which, soon after my appointment, I had to contend. Professor Huxley, to whose opinion, rightly, the greatest weight was attached, opened his report on the best means of promoting technical education by saying—

"I suppose that a complete system of technical education will be directed towards the following objects:—

"1. The diffusion, among artisans and others occupied in trades and manufactures, of sound instruction in those kinds of theoretical and practical knowledge which bear upon the different branches of industry, whether manufactures or arts.

"2. Adequate provision for the training and supply of teachers qualified to give such instruction; and for the establishment of schools, or isolated classes, to which the industrial population may have ready access; and, further, for a proper system of examinations whereby the work done in the schools and classes may be tested.

"3. The organization of arrangements for effecting the apprenticeship of scholars of merit, in the branches of industry for which they show aptitude; for enabling such scholars to continue their studies beyond the ordinary school age, by means

of exhibitions; and for opening to the rest of them a career as teachers, or as original workers in applied science."

The first problem I had to face was the organization of the school now known as the Finsbury Technical College. Already, in 1878, at the request of Dr. Wormell, the late head master of the Cowper Street Schools, and a warm advocate of technical instruction, I had undertaken to give, at his schools, a short course of evening lectures on mechanics to a class of artisans. Professor Armstrong and the late Professor Ayrton had previously joined Dr. Wormell in his scheme for giving practical lessons in certain branches of applied science to workmen, and it was with a view to secure better accommodation and more scientific organization for such instruction that proposals were made and plans had been prepared, at the date of my appointment, for the erection of a school in Leonard Street—then known as Tabernacle Row—immediately in the rear of the Cowper Street Schools.

During the years 1880–1882, the evening technical classes, in the Cowper Street Schools, under Professors Armstrong and Ayrton, were continued with increasing success. They were attended by some of the boys who had left the schools, and by a large number of artisans. The plans which had been prepared for the new buildings provided for chemical, physical, and electrical laboratories, but no provision had been made for the teaching of mathematics, mechanics, or drawing. Modifications were accordingly made in the designs, and, later on, when these modifications had been adopted, Professor Perry was appointed to take charge of the instruction in practical mathematics and mechanics. It was also decided to add, as soon as funds should permit, an applied art department, and Mr. Brophy was selected as teacher, arrangements having been made to utilize temporarily certain rooms in the school, for instruction in that subject. No teachers ever applied themselves with more zeal and energy to the somewhat new work that they had undertaken than the three professors and Mr. Brophy. Each realized that he had to elaborate a new scheme of instruction in his own subject, adapted to the requirements of students engaged in different branches of industry. The application of electricity to industrial purposes was in its infancy. Electric lighting had

not yet entered upon the commercial stage; experiments in electric traction had not passed beyond the laboratory. Professor Ayrton prepared plans for special laboratories, in which the students might be initiated in experimental work, and schedules of practical exercises were drawn up for beginners as well as for advanced students. His scheme of instruction was comparatively new, but has since been generally adopted. Professor Armstrong was working out his euristic method of teaching chemistry, and Professor Perry was showing, by means of newly constructed apparatus, how the elements of mathematics and mechanics might be experimentally taught. In the small laboratories of the Finsbury Technical College, the beginnings were laid of that reform in science teaching, which the pioneers of the technical education movement were foremost in promoting.

Towards the end of 1882, I was asked to act temporarily as Principal of the college, to superintend the work, and to give unity to the efforts of the staff. It devolved upon me to outline the general scheme of instruction, and to indicate the place which the college should occupy in the programme of work to be undertaken by the Institute. After much deliberation, it was decided that the class-rooms, laboratories, and workshops of the college should be utilized in the day-time as a day technical school, and in the evening for students who were engaged during the day in engineering, chemical, and other trades.

The scheme for the day school was new and experimental. It was agreed that a definite course of instruction should be mapped out for all students, differing according to the departments in which they severally were entered, but that each student should be required to spend his whole day at the college and to take the full course. Admission to separate lectures or laboratory lessons during the daytime was only exceptionally permitted. Moreover, an entrance examination was made—I think, for the first time—obligatory, and although the age of admission was as low as fourteen, no one was received into the college who did not show, on examination, a competent knowledge of the elements of mathematics. These conditions, rigidly observed, proved successful, and over one

hundred students were admitted on the results of the first examination.

The evening work, although conducted with much more freedom and elasticity, was organized, as far as possible, on the same lines. It was wider in scope than the day work, and included, for a time, certain trade classes, which the college had taken over from the Artisans' Institute, an institution which, by reason of its aims and methods, may certainly be regarded as the pioneer of the London Polytechnics. I have referred to the work of this Institute in the address I gave at Cambridge in 1900, which is included in the volume of lectures, entitled *Education in the Nineteenth Century*, published by the University Press (1901).

For the evening students a scheme of instruction was suggested, adapted to the requirements of those who were already occupied in the practice of different trades. The first complete programme of the college for the session 1883–84 gives particulars of the "Group Courses," which had been arranged for artisans engaged in different branches of industry. A distinguishing feature of the evening classes was that the students were taught and guided in their laboratory work, not by the assistants or demonstrators alone, but by the professors themselves.

The foundation stone of the new building was laid on May 10, 1881, in the presence of a large number of distinguished scientific men and of Ministers of the Crown, by H.R.H. the late Prince Leopold, Duke of Albany. In his short address, after the ceremony of laying the stone was completed, His Royal Highness said, "I have now had the pleasure of laying the foundation stone of the first technical college ever erected in London. The report presented by the Council of the City and Guilds of London Institute for the Advancement of Technical Education will inform those interested in this most important undertaking of the magnitude of the work and the energy and perseverance with which it has hitherto been pursued under somewhat adverse circumstances. The object which the Institute has proposed to itself is a truly national and patriotic one. It has proclaimed its determination to enter into a generous rivalry with other countries in those branches

of trade and commerce in which, one must needs confess that our native industries have of late years not taken the position which we, as Englishmen, would wish them to occupy. The old apprenticeship system, whatever its merits may be, and whatever good work it may have done in the past, is not equal to the exigencies of the present age; and we are beginning to realize that a thorough and liberal system of education must be placed within the reach of the British artisan in order to enable him to hold his own against foreign competition. When this is done, I believe, as I have said on former occasions, that we need not fear any rival in the world."

These words, pronounced over a quarter of a century ago, are, in part, as applicable now as then to our commercial requirements. The new building was completed, and the college was ready for work in the early part of the year 1883, and on February 19 of that year, I delivered the inaugural address, in which I explained in some detail the aims and objects of the college and the system of instruction to be adopted. The address was widely circulated, and afterwards reprinted in my book on *Industrial Education.*[1] The Finsbury College became the model of other institutions in this country and in the colonies. In December, 1884, at the request of the late Lord Shand, I gave the address at the opening of the session at the Watt Institution and School of Arts, Edinburgh, and subsequently I was consulted by the trustees as to the site and plans for the new building, about to be erected, now known as the Heriot Watt College, and as to the scheme of instruction to be pursued. During the next few years, I had the satisfaction of offering suggestions for the establishment of technical schools in different parts of the country, somewhat on the lines of the Finsbury College, but specially adapted to local requirements, and, later on, I took some part in indicating a scheme of instruction for a technical college in Sydney, and, from plans and specifications forwarded to me, I purchased in London a large part of the apparatus with which, in its early days, the college was equipped.

After the general election of 1880, the Rt. Hon. A. J. Mundella, to whose enthusiasm in the cause of education I have

[1] *Industrial Education.* Kegan Paul & Co. 1888.

already referred, became Vice-President of the Council. He had travelled in Germany, and had realized the enormous strides which, since the war of 1870, had been made in the growth of manufacturing industry in all parts of that country. Among his intimate friends was Mr. H. M. Felkin, then resident in Chemnitz, and later well known as the author of more than one interesting work on Herbart's educational theories. Chemnitz was at that time a rival of Nottingham and Leicester in the lace and hosiery trades, and Mr. Felkin had collected a valuable mass of information on the system of education which had given to Chemnitz, a town of about 90,000 inhabitants, the important industrial position which it then occupied. Early in the year 1881, Mr. Mundella showed me Mr. Felkin's manuscript, and, believing that its publication would have the effect of arousing interest in the question of technical education among the manufacturers of the country, he asked me to submit it to the committee of the City Guilds Institute, with a request that they would publish it. The committee readily assented to this request, and I was asked to prepare the manuscript for press, and to write a short preface to it. The little work was published in May, 1881, by Messrs. Kegan Paul & Co., under the title of *Technical Education in a Saxon Town.* In the short preface to the book occurs this passage, "The Council (of the Institute) believe that the full and detailed description of the schools of a single manufacturing town, which is given in this little work, will be in many ways more useful to those who are interested in the development of similar schools in England than a more superficial and less complete account of German education generally; and the more so, since much that the author has written with respect to Chemnitz is known to be true of other towns in Germany. . . . What will strike every one who carefully examines the figures contained in the following pages is the great cost of a well-organized system of technical instruction, adapted to the different kinds of manufactures and to the several grades of workmen. . . . It remains to be seen whether, for the sake of increasing the industrial prosperity of this country, the people of England will be willing to make corresponding sacrifices."

The publication of this little book, showing in detail the

different grades of schools and their adaptation to local manufactures undoubtedly had the effect of bringing home to the somewhat slow-working British mind, that our commercial prosperity was even then seriously threatened by German enterprise, scientifically directed, and that if we were not to be overtaken in the competition for trade, some organized effort was needed to take the place of the happy *laissez faire* methods which were characteristic of our countrymen during the last century.

As Vice-President of the Council, Mr. Mundella used this publication, which was largely circulated, to induce the Government to make certain inquiries into the conditions of education in foreign countries, with special reference to its bearing on industrial pursuits, and, before the close of the session, a Royal Commission was appointed—

"To inquire into the instruction of the industrial classes of certain foreign countries in technical and other subjects, for the purpose of comparison with that of the corresponding classes in this country; and into the influence of such instruction on manufacturing and other industries at home and abroad."

The members of the Royal Commission were: Mr. (afterwards the Rt. Hon. Sir) Bernhard Samuelson, M.P., Dr. (afterwards the Rt. Hon. Sir) Henry Roscoe, Mr. (afterwards Sir) Philip Magnus, Mr. John Slagg, M.P., Mr. (afterwards Sir) Swire Smith, Mr. William Woodall, M.P., with Mr. Gilbert Redgrave, afterwards Assistant Secretary to the Board of Education, as Secretary to the Commission.

The Commission was appointed in July, 1881, and presented their Report in the spring of 1884. During that time separate groups of members of the Commission visited the chief manufacturing towns and commercial cities in Central Europe, and Mr. (now Sir) William Mather visited the United States on their behalf, and made a separate report on education in America. The Report on Agricultural Education was prepared by Mr. H. M. Jenkins, F.G.S., Secretary of the Royal Agricultural Society of England.

In the course of their inquiry the commissioners inspected every grade of school in France, Germany, Austria, Switzerland,

Italy, Holland, and Belgium. They interviewed employers of labour and workmen engaged in all the more important branches of manufacturing and handicraft industry. They inquired into the social condition of the working classes, into the causes of the growth and development of their trades, into the value of the help which they derived from their school training, into the different systems of education and into the influence of university and other grades of education upon the progress of industry and commerce in the several cities which they visited. Their investigations occupied three years, during which time they took evidence in London, Edinburgh, Glasgow, Dublin, Belfast, Manchester, and Birmingham, and visited our universities and some of the chief schools and factories in the United Kingdom. The Report was written in parts by different members of the Commission. Sir Henry Roscoe contributed largely to those parts of it dealing with the research work of the German, Swiss, and other universities and the application of science to industry; Sir Swire Smith dealt mainly with the conditions under which the various branches of manufacture were conducted in different towns, and it was left to me more particularly to describe in detail the curricula and organization of the several schools we visited, and their relation to industrial and trade requirements. The whole of the Report was carefully put together by our secretary, Mr. Redgrave, who supplemented our personal contributions, whilst Sir Bernhard Samuelson, our chairman, undertook the task of editing the entire work, and of bringing into prominence the advantages of our apprenticeship system and workshop training, wherever any of us ascribed, in his opinion, too much influence to technical instruction. A great part of the Report was written during the summer vacation of 1883, when some of us were the guests of Sir Henry and Lady Roscoe at Graythwaite, the house they had that year on Lake Windermere. During our visit, we spent part of the morning in writing up from our notes allotted portions of the Report, which each of us afterwards read to his colleagues. The accompanying illustration, from a photograph taken by the late Lady Roscoe twenty-seven years ago, shows Sir Henry Roscoe seated on the right of the picture, Mr Redgrave on the left, and Sir Swire Smith—all listening to, and no doubt

preparing to criticize, the section which I had that morning drafted. Other parts were written at our offices in London.

The Report was published in 1884, and was widely circulated at home. It was reprinted and still more widely circulated in America, and was for many years the recognized work of reference on all questions connected with technical education. It is difficult to exaggerate the influence which it exercised in promoting administrative changes in all departments of education in this country. Its recommendations gradually introduced a revolution in many of our methods. Its suggestiveness and the moderation of its proposals commended it to the consideration of Government departments, of manufacturers, and of professional and trade societies. A full account of the long-delayed legislation, which followed from its recommendations, is given in my article on "Technical Education" in the latest edition of the *Encyclopædia Britannica*, to which the reader who cares to trace the gradual changes in our system of education, as helped by legislative enactments, is referred for full details.

From 1884 onwards, during many years, the members of the Commission, more especially Sir Henry Roscoe, Sir Swire Smith, the late Mr. Woodall and myself, addressed large meetings in nearly every manufacturing centre throughout the country, describing what we had seen abroad, supplementing the facts in the Blue Book by personal anecdotes, illustrating the determined efforts, particularly of our German and Swiss neighbours, to compensate, by well-considered methods of education, any recognized deficiency of natural resources. At times it may have seemed that our descriptions were overcoloured, but we had to stimulate our countrymen to realize that what we were wont to call our commercial supremacy was being seriously threatened, and that our crying need was a national system of education, adapted to the existing requirements of modern trade and commerce. We did not then foresee that a quarter of a century later our naval supremacy would be likewise threatened by the dogged earnestness and the scientific methods of the same enterprising nation. But, looking back through that vista of time, one cannot fail to recognize that the foundations of German greatness, of her industrial success

and her naval strength, were laid in her well-ordered schools, and that by the financial sacrifices which she made to be in advance of every civilized country in the excellence of her universities, of her technical institutions and secondary schools, she has at length attained to the position to which all her efforts were directed.

I find that during these years, I addressed audiences in Manchester, Liverpool, Birmingham, Hull, Huddersfield, Blackburn, Wolverhampton, Halifax, Burslem, Wellingboro', Salford, Croydon, Preston, Coventry, St. Helens, Exeter, Portsmouth, Crewe, Cardiff, Edinburgh, Dundee, Northampton, Leicester, Nottingham, Nelson, Bedford, Banbury, Bradford, Colchester, Erith, Sheffield, Oxford, Cambridge, Newcastle-on-Tyne, Lincoln, Bristol, West Hartlepool, Darlington, and in several parts of London. Some of these addresses were delivered at prize distributions, others at the opening of schools. Several were printed and circulated, but very few of them possess now any special interest. They have helped, no doubt, to fulfil their purpose. The changes that have been wrought in our system of education, the technical institutions that have been since established in nearly every city and town, the control and co-ordination of our schools by central and local authorities, and the sums now expended out of rates and taxes in salaries and buildings,—all testify to the need there was some twenty-five years ago for an active propaganda, if we were not to be left hopelessly behind other countries in our means of protecting our trade and commerce, indeed, our existence as an Empire.

This missionary and organizing work, added to my official duties, absorbed so much of my thoughts and time, that I was reluctantly compelled to drop all scientific and literary pursuits. At the date of my appointment to the City Guilds Institute, I was acting as joint editor of a series of science class-books, published by Messrs. Longmans, to which I had contributed a volume, and also as editor of a series of books on distinctly educational subjects. I had previously delivered a course of lectures on "Education as a Science" to the students of one of our training colleges, and I had the idea of adding to the existing literature on education some works descriptive of its practice in foreign countries, and of the methods of

teaching the several subjects that enter into the curriculum of secondary schools. It was intended that the series of books under the general title of *The Education Library*, the first volumes of which were published by Messrs. Kegan Paul & Co. in 1881, should supply a want which has since been adequately met by the valuable set of "Special Reports" issued by the Board of Education, many of which were compiled under the direction of Mr. Sadler.

This editorial work, in which I was deeply interested, I soon found I must practically drop. I think I may say with confidence that the books which appeared in each of these two series supplied a distinct need. The works of Professor Mahaffy on *Old Greek Education*, of Mr. Oscar Browning on *Educational Theories*, of the late Professor Laurie on *Comenius*, and of Mr. Joseph Landon on *School Management*, found a ready sale. Provisional arrangements had been made, which I was unable to complete, for the publication of several other works by distinguished teachers, but the only book subsequently added to *The Library* was my own on *Industrial Education*, to which reference has already been made.

My missionary work, which occupied all the time I could spare from my organizing duties, was extra-official and voluntary, but it assisted materially in giving wide publicity to the efforts of the City Guilds to fill up the gap, which existed for so many years in our State-aided organization, caused by the avowed inability of the Government to provide financial assistance to technical and trade schools. There can be no doubt that, to the City Guilds, and to their carefully considered and liberally supported pioneer efforts to establish types of technical schools that might serve as model institutions, the country is deeply indebted. To the initial work of the Clothworkers' Company, reference is made in my Cambridge address on "Industrial Education in the Nineteenth Century," and from the date of the earliest offer of that company to contribute to the establishment of textile schools in Yorkshire,—the first founded in this country,—to that of the comparatively recent offer of the Goldsmiths' Company of fifty thousand pounds to the extension, as part of the Imperial College, of the City Guilds Engineering College, several of the Livery Companies, among which special

mention should be made of the Drapers' Company, have given large sums of money, in addition to their annual contributions to the City and Guilds of London Institute, for special purposes in connection with technical and university education.

In July, 1881, the foundation stone of the City Guilds Technical College at South Kensington was formally laid by King Edward VII., then Prince of Wales, accompanied by H.M. Queen Alexandra, then Princess of Wales, in the presence of the Earl of Selborne, Chairman of the Council of the Institute, Earl Spencer, Mr. Mundella, and others. In his address at the opening of the proceedings, the Earl of Selborne, who was then Lord Chancellor, indicated the main objects and purpose of the Institution.

"This institution," he said, "will not be established as a rival to any other existing seat of learning, least of all to the excellent schools situated in this neighbourhood, which for some years past have been the means of affording to hundreds of young men and women a knowledge of the principles of science and art.

"The aim of this institution will be to supplement the teaching of those schools by giving instruction in the practical application of science and art to the trades and industries of the country, and by cultivating, and endeavouring to stimulate, inventive genius. It is therefore hoped and anticipated that these sister institutions, representing pure and applied science, will work in harmony with each other, forming an alliance, the effect of which will be to raise the intellectual status, and to improve the technical knowledge and practical skill of the working classes of this country, and so to increase its industrial prosperity."

As so frequently happens in this country, the building was planned and the first stone was duly set before the details of instruction had been definitely settled. It was part of my duty, as organizing director, to prepare schemes of instruction for the consideration of the committee. The experience that I had gained by visiting foreign institutions was of great assistance to me in that work. At the time of which I am writing, the idea, somewhat undefined, that was present to the minds of

many members of the Livery Companies, was that the new college, about to be erected, would be largely frequented by artisans, workmen, and foremen, and by those who were training to be teachers of artisans. Indeed, I am inclined to think that the general idea was, that the Central Institution would be similar in many respects to one of our existing London Polytechnic institutions, providing, however, special facilities for the training of persons who would act as teachers in the provincial classes. Only so, can I explain the very strong objection that was taken to the localization of the school at South Kensington—a situation, it is true, as repeatedly pointed out in the press and elsewhere, not readily accessible to workmen. It was necessary, in the first place, to combat this idea. As soon, however, as the correct idea of the object of the Central College had taken shape, the difficulty of the site was overcome, by pointing out that the corresponding institution at Berlin, the erection of which had cost nearly half a million sterling, was to be located in Charlottenburg, a suburb of the city, and further removed from the business quarter than was Exhibition Road from the Bank.

My visits to foreign schools, such as the *École Centrale* of Paris and the technical high schools of Germany and Switzerland, had led me to the conclusion that, except as regards the facilities for chemical training, the instruction which they provided, more particularly in certain branches of engineering, was not sufficiently practical for British needs. At that time there was very little laboratory teaching, as now understood, in any branch of physics, and an engineering laboratory and workshop had only recently been provided at University College, London. These defects I hoped to see corrected in the South Kensington School, and, in the scheme of organization which I submitted for consideration to a committee of experts appointed by the City Guilds Institute, I assumed that the Central College would in course of time develop into an institution in many respects similar to the Imperial College of Science and Technology, as outlined in the report of the Departmental Committee, published in 1906.

As a fact, the scheme adopted by the committee provided

for special courses of instruction in the several departments of engineering, and also for summer courses for teachers of technology, and was framed with a view to embracing, as available funds might increase, other courses applicable to the different branches of manufacturing industry. Two special features of the scheme, adopted by the committee, and since enforced, were the insistence upon an entrance examination at least as difficult as the London Matriculation, although including fewer subjects, and the fixing of a definite curriculum, occupying the entire day, for all students preparing for the college diploma.

The ceremony at the formal opening of the Institution in July, 1884, anticipated somewhat the completion of the equipment of the building, and was so arranged in order to coincide with the inauguration of the first International Educational Congress, held in London. Connected with the Congress was an exhibition of school work, and several of the rooms of the central institution were occupied with exhibits from different European countries. This was the first time that the British public had had the opportunity of seeing the practical work executed in foreign technical schools, and the exhibition served visually to illustrate many parts of the Report of the Commissioners on Technical Instruction, which had been published in the early part of the same year. Although several European countries had sent specimens of their school work, Prussia had declined to be represented, and I was commissioned to visit Berlin and to endeavour to induce the German Government to take part in the exhibition. I found a warm supporter of my efforts in the secretary of the late Empress, but I failed to change the determination of the Government to abstain. At the Paris International Exhibition of 1900, which contained the most complete display of educational work ever brought together, Germany was again unrepresented, and it occurred to me that the Minister of Education may have thought that, whilst other countries had much to learn from the Fatherland, Germany could learn little or nothing from other countries as regards school organization and methods of instruction. This may have been at one time true, but the progress of education, here and elsewhere, shows that it is no longer the case.

The Congress, of which Lord Reay was chairman, was well attended by foreign delegates. As chairman of the technical instruction section, I delivered the opening address on "Unsolved Problems in Technical Education," which, with other addresses and discussions, was published in vol. iv. of the *Transactions.*

These conferences were inaugurated by Belgium, and the first, referring almost exclusively to technical education, met in Brussels in the autumn of 1880. They were held at intervals in different cities of Europe, and served the useful purpose of familiarizing the public with the objects of technical education, and the practical needs of different classes of workers. In 1886 a similar conference was held in Bordeaux, where, in conjunction with the late Sir Bernhard Samuelson, I attended as British delegate. In my address on that occasion, entitled, "Organization des Cours du Soir pour l'Enseignement Technique en Angleterre," subsequently published by the Société Philomathique de Bordeaux, I gave a full description of our evening science and art classes, then held under the direction of the Science and Art Department. Our unique system of "payment on results" aroused much interest. A special article was devoted in the *Temps* of September 24, 1886, to the explanation of this "original" system: "Un système fort original, où se reconnaît l'esprit éminent pratique des Anglais, concilie le besoin d'unifier l'enseignement technique et le désir de laisser chaque école du soir libre de déterminer la nature de ces cours d'après les industries locales. Les subventions ne sont pas données en bloc aux écoles, elles leur sont attribuées suivant la valeur des élèves qu'elles forment. C'est ce qu'on appelle le payement d'après le résultat." The author of the article, after referring to the number of subjects and of schools to which the system applied, proceeded to quote from my address a statement which I had ventured to make as to the results of our art teaching: "Cet enseignement si largement répandu n'a pas tardé à relever le niveau de la production et à émanciper l'industrie anglaise de certaines sujétions à l'étranger qu'elle subissait. 'Je suis bien heureux de pouvoir dire,' s'est écrié fièrement sir Philip Magnus, 'que nous ne dépendons plus aujourd'hui au même

degré qu'autrefois des artistes de Paris pour nos dessins industriels. Aujourd'hui, nous n'employons plus que des dessinateurs presque exclusivement anglais dans nos manufactures de dentelles de tapis, de papiers peints, de rideaux et de meubles.'"

The special correspondent of *The Standard* at Paris, commenting on the Bordeaux Conference, stated in his telegram (September 28, 1886), that my paper "produced no inconsiderable effect. . . . M. Roy, representing the Chamber of Commerce in Paris, said what he could on behalf of the workmen of his own country, but he found it impossible to deny that in England articles of luxury were now being made by native manufacturers, which would have been looked for in vain less than fifteen years ago. All he could say was that the inspiration proceeded from Paris, some of whose best workmen had been tempted to England by high salaries." This was undoubtedly true. Nevertheless, the efforts of the Science and Art Department in encouraging art teaching in evening schools had undoubtedly induced a healthy change in the artistic feeling thrown into the manufacture of the articles to which I had referred. The very able leading article in the same issue of *The Standard* had the effect, which was at that time so much needed, of showing Englishmen that, with renewed educational efforts, they might, not only in design, but also in constructive ability, emancipate themselves from foreign influence, and demonstrate the truth of the principle which constitutes the *raison d'être* of technical education,—that any country, by the diligent application of science and artistic skill to its industrial products, can overcome, to a large extent, its so-called natural deficiencies and extend the variety of its manufactures, so as to supply the home market with the results of native labour, and even to push its goods into other countries.

Since 1886, conferences on the general aspects of technical education have been held in different parts of Europe, and these have been illustrated by exhibits, showing school plans and schemes of organization, specimens of the work of students in technical and trade schools, teaching appliances and apparatus, etc., etc., which have greatly helped to familiarize the

different countries with one another's methods, and to indicate the importance, which every nation now attaches to education, in all schemes for social reform and industrial progress. Of these exhibitions, the most typical and informing was that held in Paris in 1900, and no part of the educational section was more interesting than that furnished by the United States. In the boldness of its experiments, no country has come so much to the front in recent years as America, and the series of pamphlets, prepared by American experts on every grade and aspect of education, gave us so large a measure of information on many new departures, and threw so much fresh light on old problems, that a strong desire was felt to study more closely the American school system,—a desire which was fully gratified by the liberal action of Mr. A. Mosely, C.M.G., in arranging, in 1903, visits of British experts to some of the schools and colleges of the United States.

The British exhibit in 1900 showed the great progress that had been made in this country, since 1880, in providing facilities for practical teaching in all grades of schools. The number of exhibits, which had been prepared in different parts of the United Kingdom, was so large that preliminary exhibitions were held in London, in Edinburgh, and in Cardiff, from which selections were made, to be forwarded to Paris, and, at the request of the Board of Education, I assisted in making these selections, and was thus enabled to note the extent of our progress since 1884, and to compare our advance with that made during the same period in other countries.

I have elsewhere referred to the fact that in 1886 I first brought under the notice of the British Association, which met that year in Birmingham, the need of introducing handicraft instruction into the Government Code. This new departure was in strict accordance with the objects of the City and Guilds of London Institute, and accordingly classes were arranged in the autumn of that year for the instruction of teachers at the Central Institution. These classes, which were subsequently discontinued, led to the formation under the Institute's Department of Technology, of training classes in different parts of the kingdom, and to the organization of an extended scheme for the certification of teachers, which has been adopted not only

in this country, but in Australia, New Zealand, and in the Commonwealth of South Africa. As part of its work, the Institute undertook the organization and direction of classes throughout the kingdom in the application of science and art to different trades and occupations. Reference is made to the growth of this work in my Cambridge address. It proceeded very much on parallel lines with that of the old Science and Art Department, but was definitely restricted to the encouragement of the teaching of technology—a term now very generally understood—which was less familiar twenty years ago. From 1890 onwards, it was to this branch of the Institute's activity that my personal attention was almost exclusively devoted. The organization of the Institute's scheme of technical education was then practically completed. The Finsbury Technical College and the Central Institution had been established under schemes which were found to work satisfactorily and needed only to be developed, but the funds available by the Institute did not so increase as to permit of any considerable extension of its operations in new directions. I was accordingly enabled to restrict my official duties to the development of the trade and technical classes which, under the Technical Instruction Acts and the Customs and Excise Acts, and as a result of the formation of County and Borough Councils, began to assume altogether new proportions.

To the Society of Arts is due the beginning of the movement for the holding of examinations, under the name of Technological Examinations, in the principles of science as applied to industry. The movement for some time made very little progress, owing partly to the fact that the demand for technical instruction had not arisen, and partly that the means were not forthcoming for the payment of teachers. In the year 1879 the City Guilds first offered grants to teachers on results of examinations, and fees to local secretaries who would organize classes, and the result of this offer was an increase in the number of candidates from 202 to 816. In the autumn of 1880 I visited some of the principal classes in the North of England, and interviewed the managers of industrial works, in order to ascertain their ideas as to the kind of instruction

best suited to their employees. The result of my inquiries enabled me to suggest some important changes in the organization of the classes and in the subjects of instruction. The increasing attendance at these technological classes gradually led the way to the establishment of schools in the chief centres of industry. Between 1880 and 1890 the number of students in the classes registered by the City Guilds Institute increased from 2500 to 12,022. On the passing of the Customs and Excise Act, the Institute withdrew the grants which it had previously paid on the results of its examinations, and encouraged, in various other ways, the regular attendance of students at courses of practical instruction in the application of science and drawing to the several trades in which the students were engaged.

An important feature of the Institute's scheme was the requirement that the qualifications of every teacher should be submitted to, and approved by, the Institute as a condition of the registration of any class. The efforts thus made to encourage and improve technological instruction rapidly bore fruit. The withdrawal of grants on results had no appreciable effect on the formation of fresh classes, nor on the attendance of students, and, in the succeeding ten years, between 1890 and 1900, the number of registered classes had increased from 483 to 2182, and the number of students in attendance from 12,022 to 34,189.

It was in the year 1900 that efforts were made to associate more closely the technological teaching under the direction of the City Guilds Institute with that under the Board of Education. Sir William Abney was then principal assistant secretary under the Board, and he was genuinely desirous of effecting a close combination of the work of the two departments. The work of the two bodies overlapped in certain directions. The examinations of the Board in building construction were to a large extent similar to those of the Institute in the several branches of the building trades, and those of the Board in mechanics, steam, and machine drawing covered much the same ground as those of the Institute in mechanical engineering. The main difference consisted in the fact that the Board approached these subjects from the scientific side, and the

Institute from the professional or trade standpoint. The direction given by the Institute was better adapted to the requirements of artisans. The late Duke of Devonshire, who was then President of the Council, fully grasped the difference in the spheres of activity of the two bodies. In opening, in June, 1899, an exhibition of work executed by students of technical schools in connection with the Institute's examinations, the Duke said, "For a period of twenty years this Institute has been working in connection with the Science and Art Department. The division of labour is that the Science and Art Department assists in providing certain branches of scientific and artistic teaching, and the Institute supplements the work of the Department by its practical and technical classes." This very fairly represented the relation of the two bodies, and it was generally recognized that, in the reorganization of the Government's administrative work at Whitehall and South Kensington, that part of it which was directed from South Kensington should be brought into closer relation with the work of the City Guilds. With a view to bringing about this desirable object, it was decided to represent to the Government the great need of closer union and the economy that would be thereby effected. The case of the Institute was presented in a Memorandum of March 6, 1900, from which the following are extracts:—

"Notwithstanding the great importance of instruction in technology in the development of the industrial prosperity of the country, no encouragement by State aid is given by the Education Department to the teaching of technological subjects.

"Technology is distinct from science and art. Even the teaching of science and art for trade purposes is different from the teaching of science and art in general education.

"It is of the utmost importance that the teaching of science and art should form part of general education, and should enter into the curriculum of all primary and secondary schools. Not so technology.

"Forty years ago the Science and Art Department was necessary to give an impulse to the teaching of science and drawing.

"Now, it is recognized that science and art, equally with

literature and language, are essential elements in a liberal education, and no special department for the direction of science teaching is longer needed. The progress of education has rendered such a department unnecessary.

"Technology is the application of different kinds of knowledge to practical occupations, including: (*a*) arts and manufactures, (*b*) agriculture, (*c*) commerce. It is specialized knowledge, and should supplement primary and secondary education without forming part of either.

"For these reasons it is desirable, in the re-organization of the Education Department, that a separate place should be assigned to technology.

"At present, there is much overlapping between some of the subjects included in the Science and Art Directory and those in the Programme of the Institute.

"There is consequently a waste of effort and confusion in the work of teaching and examining."

As a result of these and other representations, a committee was appointed in November of the same year, consisting of Sir William Abney (Chairman), Sir Philip Magnus, Sir Swire Smith, Mr. G. R. Redgrave, the late Sir William Bousfield, Mr. Vibart Dixon, with Mr. A. E. Cooper as Secretary, "to consider the best means of co-ordinating the technological work of the Board of Education with that at present carried on by other educational organizations."

The report of the committee was presented to the President in April, 1901, and certain administrative changes were accordingly adopted by the Board, the object of which was to bring the Technological Department of the Institute into closer relation with the newly constituted Board of Education.

It is probably owing to the fact that the work of the old Education Department and of the Science and Art Department was undergoing reconstruction, and that the newly created Board of Education had not settled down to its enlarged duties, that the more intimate connection of the two bodies, as contemplated by Sir William Abney, was not effected. However, the subsequent withdrawal of the grants on the results of the examinations in the elementary stages of science, and the substitution of the payment of block grants to schools, gave

greater freedom to local authorities in the selection of subjects of instruction adapted to artisans, and enabled the two bodies to work together with less overlapping of effort. About this time, too, successful arrangements were made for co-ordinating the technological work of the Institute with that of the Scotch Education Department, and of the Department for Agriculture and Technical Instruction in Ireland.

It may excite some surprise now to remember that it was mainly owing to the generally adopted principles of Free Trade that the Government so long held aloof from encouraging, by means of grants, the organization of classes in trade subjects. At that time, the philosophy of the old economists, which deprecated State assistance, as discouraging individual initiative, held the ground. The Development Act of 1909 is a measure which would have received little support a generation ago from the Liberal party, whose views on social reform were largely dominated by the political economy of Adam Smith, Cobden, and John Stuart Mill. The construction, by means of Treasury grants, of light railways for the transport of agricultural products would have been regarded as a bonus on the industry of agriculture, and as approximating very closely to an application of the policy of Protection. Indeed, it was mainly owing to the somewhat narrow idea of the functions of the State that the City and Guilds were urged to undertake, for the entire kingdom, a duty which in other countries was discharged by the Minister of Education alone, or in connection with other departments of State.

The tenets of Free Trade were so scrupulously held and practised that the schemes of instruction drafted by the Education Department avoided, as far as possible, all reference to the particular trades which they were undoubtedly intended to assist. The function of the State was restricted to the encouragement of the teaching of pure science, as equally applicable to all industries, and it was left to the Livery Companies of London, by their contributions to the City Guilds Institute, to prepare courses of instruction directly applicable to the different trades in which artisans were engaged. This pedantic refusal on the part of the State to give trade teaching was one of the causes of our belated efforts to organize for this

country a system of technical education; and to this cause is partly due the fact, that the direction of technical instruction remains very largely in the hands of a body receiving no direct help from the State. As the pioneers of a movement which saved this country from some of the disastrous consequences of unfair foreign competition, and, which has had the effect of assisting in the development of our home industries, history will award no small measure of praise to the patriotic efforts of the Corporation and of the ancient Livery Companies of London.

In referring thus briefly to the work of the City and Guilds of London Institute, I have been led to anticipate some incidents in the progress of technical education in which I was permitted to take part.

It was in 1884 that I gave the inaugural address, on the occasion of the opening, by Sir Frederick Bramwell, of the newly erected technical school at Sheffield in connection with the Institution then known as the Firth College. The school and college have now developed into the University of Sheffield, and I recall with some satisfaction the fact, that the City Guilds Institute in 1883, very soon after its foundation, made a grant of £300 a year for five years, to promote in that city an engineering school. In my inaugural address at the opening of the school, I endeavoured to show that the education of the engineer and of the technical student must rest on a broad basis. "It must be technical," I said, "in the wider, and not in the narrower sense of that much misunderstood word. It must embrace not only the technology of the student's particular trade, not only the rational explanation of the processes which he will see carried on in the factory or works, but also in the first place the principles of physical science, however remotely soever they may seem to be connected with his special industry. His education must be built up on a broad basis, for it was impossible to foresee what branch of physical science may in its application help to improve the process of manufacture. In every operation the phenomena of different branches of science are interblended; and the miner, the engineer, the potter, and the weaver claim and obtain assistance from every department of scientific inquiry, and

unexpectedly discover that now one branch of science and now another helps in simplifying and perfecting the processes and in cheapening the products of manufacture."

Even at that time, twenty-six years ago, it had become necessary to show that technical education, to be of real service to the student, must be a liberal education; and, in order to illustrate this proposition, I gave instances that had come under my own observation in the works of Messrs. Holden at Croix, at the potteries of Vierzon, near Limoges, and at the works of the Société Cockerell at Serain, near Liège, of recent applications of chemical, electrical, and optical principles to the processes of manufacture.

Where technical and university education join hands is in the research laboratory; and for this reason, if for no other, the separation of the technical high school from the university, as found in Germany, is now generally condemned. The discipline of research is equally necessary to the student of applied and of pure science, and it is impossible to say how the practical application of science to productive industry may help in the discovery of new truths, or to what extent investigations, apparently of the most abstract character, may prove of service to the manufacturer and engineer. The results of scientific investigations have proved, during the last thirty years, of such inestimable service to industry, that the importance of research in university education is no longer questioned. It has been shown to have an educational value to the worker, quite apart from its value in other respects, but the application of its method to lower grades of instruction is not yet as generally practised as it certainly will be in the near future.

In January, 1889, I gave the inaugural address on the occasion of the opening, by Sir James Kitson, now Lord Airedale, of the new wing of the Leeds School of Science and Technology. An hour or so prior to the opening ceremony, Sir James Kitson took me over his iron and steel works. We were watching that impressive sight of a bar of red hot steel being drawn through the rollers, when Sir James called his foreman and said, "Do you think these men would do their work better if they had learnt a little science?" "No," said the foreman, "in my opinion they would do it a great deal

worse," a reply that was not very encouraging to the efforts which I was about to make to induce artisans to realize the advantage of attending courses of instruction in technology. There did exist a feeling at that time, that however serviceable technical instruction might be to the managers and masters, it was of very little use to the workmen engaged in great industrial operations. These were spoken of as "hands." This contention I had frequently to combat. It is a fact that there is no class of workmen to whom distinctly technical teaching is less immediately useful than to those engaged in industries involving the application of chemical science. This is essentially the case in alkali and colour works; but in all chemical manufactures it is the foremen and managers, and those who carry out investigations in the laboratories attached to the works, who most need technical instruction, and for these the highest scientific training, extending over some years, is indispensable.

The year 1889 was memorable, as it saw the passing of the first Technical Instruction Act for England and Wales—the result of an all-night sitting of the House of Commons, and I see that, in October of the same year, in concluding an address delivered at the prize distribution in Leicester, I ventured to state that "years hence we should look back upon the legislation of 1889 as having given to the progress of technical education that encouragement and momentum which was afforded to elementary education by Mr. Forster's celebrated Act of 1870." The Act of 1889 was not popular, at the time, among a certain class of persons, who were desirous of seeing all grades of education placed under the direction of School Boards or other bodies popularly elected for the express purposes of education. This view was held by a large section of the Liberal party. But, looking back at the progress that has been made during the last twenty years, there can be no doubt that, if these views had prevailed, the subsequent unification of education under the direction of local authorities would have been retarded for another generation.

It is fitting here to say a word as to the National Association for the Promotion of Technical Education, to

which fuller reference is given in my article in the *Encyclopædia Britannica*. The Association was founded in 1886, mainly on the initiative of Sir Henry Roscoe, for promoting legislation in favour of technical education, and for supplying information on the subject to local authorities. The late Duke of Devonshire was its President during its entire life, and its success was largely due to his efforts and to the deep interest which he showed in its work. Sir Henry Roscoe and Mr. A. H. D. Acland were its honorary secretaries, and the latter continued to act in that capacity till 1892, when he was appointed Vice-President of the Council. The services which, in that position, he rendered to the cause of education are well known. The Association enjoyed for some years, too, the great advantage of the wide knowledge and organizing ability, which have since been fully recognized by the Board of Trade, of Mr. (now Sir) Llewellyn Smith, as acting secretary. Together with some dozen other persons interested in education, I joined the executive committee of the Association when it first started, and remained a member of it till its work was completed, and it ceased to exist in 1906.

The Association, like other bodies, worked through its executive committee, and its most useful and successful effort was the publication, at first monthly, and later on quarterly, of a *Record*, the volumes of which furnish a very complete history of the development of technical and secondary education during a period of twenty years. At its annual meetings the late Duke of Devonshire nearly always presided, and his speeches on those, and indeed on all, occasions, showed how carefully he had mastered the full details of his subject. Very frequently addresses were given by the members of the Association in some of the provincial centres, with a view to bringing home to manufacturers and also to trade unions, which, at that time, were by no means active supporters of technical education, its necessity and advantages.

In November, 1888, I read a paper on the subject at Exeter, the object of which was to show, in answer to an article in the August number of the *Nineteenth Century*, by the late Lord Armstrong, entitled, "The Cry for Useless Knowledge," that technical education of a proper kind was serviceable,

not only to the masters of industry and employers of labour, but also to artisans as helping to stem the immigration into this country of foreign workmen and the importation of goods manufactured abroad, which might equally well be made at home. Whether improved technical instruction alone would suffice to enable us to scale the walls of foreign tariffs, and so to compete with foreign countries in their own markets, was a question which I was not then called upon to consider; but there can be no doubt, that the improved instruction of our artisans was, and is, an indispensable condition of our being able to maintain our position in competition with foreign manufacturers in our own and in neutral markets.

But the movement in favour of technical instruction for the wage-earning classes did more than this. It helped, in a measure, to remove some of the causes that made for unemployment. Recent inquiries have shown that, although unemployment is a social disease that cannot be wholly cured, a disease that must recur from time to time, owing to the very conditions of industrial operations, it is less marked and less frequent among skilled than among unskilled workers. One main object of technical instruction is to convert the latter into the former class, and to that extent it is still a forceful social instrument. Labour exchanges and bureaus of information, if properly organized, are of undoubted value, but it is the skilled workmen for whom, in times of commercial depression, there is the greater demand. In every civilized country, there must be a standing surplus of labour to be called upon as required, and it is this constant surplus which suffers so acutely when industry is comparatively stagnant. In these circumstances, men of resourcefulness, who direct their energies into new channels, and can readily turn their hands from one kind of work to another, most easily find employment, and it is to careful technical training that we must look to create that capacity for initiative in our wage-earning classes. Even so, during periods of depression, there must remain a residue of men who may be unable to find work, and these must rely for a time on the results of their own thrift, or, in urgent cases, must be helped by other means.

In March, 1889, I accompanied Mr. A. H. D. Acland,

to Cardiff, where a meeting, which we each addressed, was held, under the auspices of the Association, for the furtherance of technical education in that city. The late Lord Aberdare presided, and speeches were delivered in the theatre of University College, which now forms part of the University of Wales. My inspection of the college, for which a new building has recently been erected, showed me how greatly it was in need of funds, and I was subsequently enabled to bring some of its more urgent requirements under the notice of the Drapers' Company of London, who very generously came to its [illegible] with an annual contribution towards the provision of machinery and apparatus and the maintenance of the proposed engineering department. Since then, University College, Cardiff, has been very largely indebted to the wise liberality of the Drapers' Company.

I visited Cardiff again in 1900, and still more recently, in 1907, I spent some days in that city, inspecting schools and collecting material for a full and detailed report, which the local authority had asked me to prepare, on the position of its schools and the organization of its elementary, technical, and higher education.

As I have elsewhere pointed out, the Polytechnic Institutions of London, which form a special feature in its educational system, were first established by an Act of Parliament, introduced by Mr. Bryce, and by means of funds allocated to the purpose, arising out of the City Parochial Charities, and largely supplemented by grants from the City Companies and by private individuals. These institutions were placed, in the first instance, under the general control of a central governing body, on which I served as representative of the London University. The funds at the disposal of this body were insufficient to permit of any considerable extension of the work of the institutions, and it was mainly due to the intelligent direction of the Technical Instruction Board of the London County Council, and to the able assistance which that body received from its secretary and chief inspector, that the Polytechnics of London occupy their present position. In an article contributed to *Good Words*, in September, 1889, I described their origin and purpose. I saw with much hopefulness

the facilities for social union and recreation which these institutions were intended to supply, as affording some relief to the dulness of the somewhat routine existence of a large number of young men and women among the wage-earning classes. In 1889 the only two institutions in working order were the Regent Street Institute, which was the first to appropriate the name of Polytechnic, and the People's Palace, founded and mainly supported by the Drapers' Company. On its social side, the Polytechnic was "essentially a corporation of working men and women, bound together by the sympathy of kindred occupations, and bent on mutual improvement by means of all such agencies, other than religious, as are calculated to promote their intellectual, physical, moral, and material well-being." The following extract from my article in *Good Words*, written more than twenty years ago, indicate some of the results which were expected to follow from the foundation of these institutions:—

"As regards technical education, the new London Polytechnic may be classed as a trade school. Its purpose is the instruction of artisans and clerks in the principles, and to some extent also in the practice, of their bread-winning pursuits. In every continental city there are evening technical and commercial classes, with kindred objects; but no exactly similar institution is found in any foreign country. This is not to be regretted, as it is far better that England should work out its own scheme of technical education, with due regard to its own special requirements, than slavishly imitate what has been done abroad. . . . In order that these institutions, when established, may realize the expectations of their founders, it is necessary that they should be well administered. It is not only money that is wanted, but thought and experience in direction. The scheme of organization, whilst defining the general objects of the institution, should be sufficiently elastic to enable each separate Polytechnic to develop according to local requirements. It must not be supposed that the duty of the promoters will cease with the provision of the funds. A technical institute, to be successful, must be constantly advancing, constantly adding to and modifying its curriculum, to adapt it to the changing needs of trade and commerce. The new Polytechnic

must continue in close relationship with the industrial and commercial life of the people. There must be no fossilized system of instruction. The "new education" may become as pedantic as the old, unless it be constantly and carefully adapted to changing needs. The necessity of thus adapting the instruction to varying wants throws a grave responsibility upon those who are to direct these institutions. The tendency of teachers to work in the same groove has to be corrected; the influence of examinations to stereotype instruction has to be avoided; and every effort should be made to keep the educational work of the institute in close touch with the newest applications of science to the processes of trade."

Some of these institutions have since become, as regards certain departments of their work, closely associated with the University of London. So far, that connection has not interfered with the main purpose for which they were originally established, viz. the instruction of the wage-earning classes in the principles of the trades in which they are severally engaged, but the future development of these institutions needs to be carefully watched, lest the distinctly industrial ideal of their founders should be even partially lost sight of in the desire to train students for university examinations and professional careers. Opportunities, however, for qualified students to pursue courses of higher instruction in some of these institutions may be usefully provided in accordance with their schemes.

In December, 1888, the first meeting was held, at Liverpool, of the National Association for the Advancement of Art and its Application to Industry. It was intended that the Association should meet annually in the principal manufacturing towns in the kingdom, in rotation, "to discuss problems of a practical nature connected with the welfare of the arts, fine and applied." The main purpose of the Association was to help in the promotion of art in its application to industry, by developing public taste and improving artistically the work of our artisans and our manufacturing products. The object was essentially practical. The first meeting was well attended. Sir Frederick Leighton was President, and delivered one of

his usual inspiring addresses, full of suggestive thoughts, and of real interest to all students of art, pure or applied. Many passages might be quoted from his address, equally applicable to the needs of to-day as to those of the time when it was written. Doubts were expressed, in more than one quarter, whether such an Association, formed very much on the lines of the Association for the Advancement of Science, would prove equally successful. It was recognized that art is not progressive, as science is. Year by year, new facts, the result of patient research in isolated branches of science, are added to our store of knowledge. Can the same be said with equal truth of art? Is there in this respect any clear analogy between art and science? If we compare what we have learnt of the condition of art in Egypt, Crete, and Athens with what we know and do to-day, we should answer in the negative. It was to be expected, therefore, that there should be a latent feeling of doubt in the minds of many who took part in the Congress, as to whether lectures or addresses, even by the most distinguished artists, could help in creating artistic feeling, or in endowing industrial designers with an appreciative sense of beauty. Sir Frederick Leighton, in his address, gave the best possible reply to his imaginary critics; but it was nevertheless, to some extent, an *apologia*. "I do not believe," he said, "in the efficacy of words, either directly to remedy the state of things I have been deploring, or to create a love of art and a delicate sensitiveness to its charms in those to whom the responsive chords have been refused. . . . But it has nevertheless seemed to me, as it has seemed to the framers of this Association, that words, if they be judicious and sincere, may rally and strengthen and prompt to action instincts and impulses which only await a signal to assert themselves—instincts, sometimes perhaps, not fully conscious of themselves—and that a favouring temperature may be thus created within which, by the operation of natural laws, in due time, but by no stroke of the hand, a new and better order may arise."

This encouraging sentiment is applicable to many human activities. But of art, in this country, since this was written, it may certainly be said that "a new and better order"

has arisen. The improvement is due to many concurrent causes, to some of which the President referred, and may have been accelerated by the suggestive addresses of members of the Conference. But the Association did not survive its second annual meeting in Edinburgh. Art is not at home in the wordy atmosphere of Congresses. Its failure was not due to any lack of valuable communications. Among the contributors of papers were Sir L. Alma Tadema, Sir W. B. Richmond, John Brett, E. Onslow Ford, Alfred Gilbert, G. Aitchison, H. H. Statham, Lewis F. Day, Walter Crane, William Morris, W. M. Conway, Sir Lionel East, P. J. Cobden Sanderson. It was not, therefore, from any want of effort on the part of its founders that the life of the Association was so brief; it was due to the conditions that were present to the minds of many who took part in the proceedings. In two directions art may be promoted by discussions and the interchange of views of those, who, amid widely different surroundings, are striving after similar ideals. Methods of instruction may be improved, and the means of reproducing and indefinitely multiplying artistic effects may be illustrated and explained. There is no necessary limit to the improvement that may be introduced in class-teaching and in the equipment of schools; and, in the consideration of such matters, discussion is valuable. Equally so, in comparing notes as to the aid that science may lend to art in providing fresh means of producing artistic effects. The discoveries of chemists and physicists, aided by mechanical appliances, have done much, and will from year to year do more, to bring the *facsimile* of art, if not art itself, within reach of the humblest citizen. Progress in that direction may undoubtedly be quickened by Art Congresses. The popularity and success of the "International Art Congresses for the development of drawing and art teaching and their application to industries" may be thus explained. Three such Congresses have been held. The first in Paris in 1900, and subsequently in Berne in 1904, and in London in 1908. To fulfil their objects and to retain their freshness such Congresses must combine illustration with exposition, and should not be held too frequently. One reason, possibly, why the National Association, which held its first meeting in Liverpool, and its last

a year later in Edinburgh, was unsuccessful, may have been that it was *National* and not *International*, and that it made no appeal to the artistic faculty of observation by any exhibition or display of works, illustrating the different subjects under discussion. No doubt, too, the Association proposed to meet too frequently.

Sir Frederick Leighton never for one moment supposed that the evils and shortcomings of which he spoke in his address could be remedied or removed "by the gathering together of a number of persons to listen to a series of addresses." But he was hopeful that some good might follow even from such efforts, and, if he had lived till now, he would not have been altogether disappointed. He at least believed that artistic feeling and an appreciation of art could be cultivated among our people, and that the desire would grow and strengthen to live among things, however simple, bearing the stamp of beauty. "I believe," he said, "that an art desired by the whole people and fostered by the whole people's desire would reflect—for such art must be sincere—some of the best qualities of our race: its love of Nature, its imaginative force, its healthfulness, its strong simplicity." They were not all artists who were asked to make some contribution to this Art Congress. Among outsiders may be mentioned W. C. Roberts-Austen, who discoursed on "Gold and Silver in Metal Work," Professor Geddes on "Arguments for the Encouragement of the Fine Arts," A. Harris on "Industrial Art in Germany," and Canon Rawnsley on "Country Industrial Schools." After some hesitation, I have included in this collection of educational papers the short address which I delivered at the first meeting of the Association. It will serve at least to show the progress we have made in some directions of art-teaching, during the twenty years that have elapsed, since the address was written.

Early in the year 1895 the people of this country were again seriously reminded of the effect of German competition on our trade and commerce. If we except Japan, probably no country has made such rapid advance in manufacturing industry as Germany. When the Commissioners on Technical Instruction first visited that country in 1882, they were struck with the

signs of enterprise and activity which met them in such towns as Barmen, Elberfeld, Dortmund, Iserlohn and Aachen, in the district of the lower Rhine, and in Chemnitz and other cities in Saxony. For some years, however, after the publication of our Report, the startling effects of this great industrial development were not fully realized by the British public, and it was largely owing to the shrill note of warning sounded by Earl Rosebery, who, like a prophet of old, emerges from time to time from his self-imposed solitude and silence, to arouse the people to a sense of its dangers and its duties, that something like a wave of anxiety spread over the country as to whether our educational efforts were adequate to stay the incursion of German goods into our own and neutral markets, and to maintain the position of British commerce. The cry of "Made in Germany" was everywhere heard, and the unwise regulations of the Merchandise Marks Act, requiring foreign-made goods to bear the stamp of their place of origin had given an unnecessary advertisement to the products of foreign industry. In November, 1895, I had called attention, in a short article in *Nature*, under the title of "A German Imperial Institute," to the newly erected *Reichsanstalt* in the neighbourhood of the Charlottenburg Polytechnic, an institute which I had recently visited. By the very title of the article I desired to contrast the valuable work carried on in the *Reichsanstalt* of Germany with that conducted at the time in the Imperial Institute at South Kensington, though latterly, under the guidance of Professor Dunstan, very useful research work, undoubtedly helpful to India and the Colonies, has been undertaken in that Institute. The scientific researches pursued in the Berlin Institution were intended to have a direct effect upon the industries of the country, and its objects were similar in many respects to those of the National Physical Laboratory at Kew under the direction of Professor Glazebrook. In my article I stated: "The Physical Technical Imperial Institute is the crown of the series of co-ordinated institutions which afford facilities for technical instruction, and opportunities for advanced research. In the city of Berlin, are well represented the various educational agencies, which have contributed so largely to the greatness of Germany; and the improvements which have been made of late years in

the lighting and sanitation, in the postal and telephone arrangements of Berlin, are so many practical indications of the value of the education which the State and the City jointly provide. The Physical Institute is literally a temple dedicated to science, and its two divisions correspond with the twofold character of all scientific work—that which is undertaken with the sole object of widening the area of knowledge, and that which enables knowledge to be applied to the useful purposes of life." At the time when the above was written, the German Imperial Institute was in receipt of an annual Government grant of £15,000.

Dr. Arthur Shadwell, in his instructive book on *Industrial Efficiency*, first published in 1905, says, with reference to Berlin, that the city represents "the most complete application of science, order, and method—pre-eminently German qualities—to public life. It is a marvel of civic administration, the most modern and the most perfectly arranged city that there is. If one wanted to show some visitor from another sphere or some distinguished *revenant* from the past the most complete embodiment of modern ideas in the way of civilization, one must take him to Berlin."[1]

In September, 1896, when the British public were looking for further accurate information with respect to the progress of German trade, as compared with our own, I joined a small party consisting of the late Mr. Woodall, M.P., Sir Swire Smith and Mr. G. R. Redgrave, and, armed with letters of introduction from our Foreign Office, we made a brief visit to some few of the industrial centres of Germany, with a view to ascertaining the extent of the advancement of German education and its effect on German trade since 1884, the date of the publication of the Commissioners' Report. We were away but a short time, but long enough to inform ourselves of the untiring energy of the German people, of their unquenched, and apparently unquenchable, belief in the value of the higher education in its application to industry, and of the startling advances which they had made in manufacturing and commercial enterprise. On our return to London we wrote a short report of our visit in the form of a letter to the Duke of Devonshire, then President of the Council. That letter was printed as a

[1] Longmans & Co. New edition, 1909, p. 130.

Blue Book, and presented by command of H.M. to Parliament.[1] The Report, consisting of not more than thirty-five pages, was widely read and reviewed, and was not without effect in hastening the changes which unified our educational administration.

When distributing the prizes in October of the same year to the students of the Bolton Technical Institute, I took occasion to give a brief *résumé* of the result of our inquiries, and, judging from the comments that appeared in the press, considerable surprise and some alarm were manifested at the rate of German progress. It was in the application of electrical science to industrial operations that the advance was most marked, but the influence of the teaching in the secondary schools, to which I referred, in creating habits of assiduity and of attention to details, which form so striking a characteristic of German method, did not escape notice. *The Standard*, commenting in one of its leaders on our Report, drew special attention to a "single sentence" in my address, as the best commentary on our defects. I had said, "A German boy leaves school with a large stock of useful and available knowledge and with carefully formed habits of industry and accuracy, of ready obedience to superior authority, and with a recognition of the necessity of close attention to detail in every kind of work"; and the writer pertinently asked, "Is that a picture of the average British school boy, from whatever school he comes; or of the British workman, whether in or out of a trade union?"[2]

It is, however, to this spirit of order, to this power of co-operation, to this skill in organization, rather than to any special genius, that the success of the Germans in so many varied branches of industry is undoubtedly due, and these qualities, which are generally recognized as characteristic of the people, are exactly those which school discipline is capable of forming, and which are inadequately developed by our present school system. I have referred above to the visible influences

[1] "Report on a Visit to Germany, with a View to ascertaining the Recent Progress of Technical Education in that Country, being a Letter to His Grace the Duke of Devonshire, K.G., Lord President of the Council, by Sir Philip Magnus, Gilbert R. Redgrave, Swire Smith, William Woodall, M.P. Presented to Parliament by Command of Her Majesty." Eyre & Spottiswoode. 1896.

[2] *The Standard*, October 29, 1896.

of the higher scientific instruction in the municipal life of Berlin, and Dr. Shadwell, in his survey of German methods and German character, arrives at a similar conclusion. "The Germans," he says, "unlike the French, the Italians, the Americans, and the British, have no special line of their own, but they can learn everything except the French sense of elegance; and that they are very deliberately learning. They can make things as solid and durable as the British, as light and convenient as the Americans: they build ships and engines and turn out cutlery as well as we can; they weave better; they make electrical and light automatic machines as well as the Americans; and, in the application of science, to which the future belongs, they easily beat both."

Much of what we stated in our Report, thirteen years ago, is even now equally true. At that time "we were greatly impressed by the progress which had taken place in many of the leading branches of manufactures since 1882. We were also struck by the marked improvement in the standard of living of the wage-earning classes, and by the growing tendency to the shortening of the hours of labour," [1] and the recent achievements of the Germans in producing, at least as rapidly as we can, the gun-mountings and other accessories of warships, have brought home to us the fact, that "nearly all the advantages on which we prided ourselves in the past are possessed in a greater or less degree by our rivals, and count for little as compared with scientific knowledge and its ready application to the needs of the manufacturer." And, as regards the social condition of the workpeople, we stated, "We are convinced, from our inquiries, that there has been in the past, and that there still is in progress, a levelling up of the inequalities between the physical and social condition of the workers here and those in similar trades abroad. In all skilled industries the wages in Germany are rising, and the hours of labour tend to decrease. Child labour has practically disappeared in German factories, as in no case at any works visited by us did we see any children employed." [2]

In an article on "Trade and Training in Germany," contributed to the *National Review* in April, 1897, I endeavoured,

[1] Report, p. 4. [2] Report, p. 15.

by quoting figures from a Board of Trade report, to bring home to British readers the rapid strides which Germany was making in many branches of manufacturing industry. The statistics on which the article was founded had been prepared by Sir Courtenay Boyle, and published as a Memorandum on *Comparative Statistics of Population, Industry, and Commerce in the United Kingdom and some leading Foreign Countries.* No conclusions were drawn by the author of the Memorandum from the statistics it contained, but they pointed to the fact that, whilst Great Britain was still ahead of Germany in the sum-total of her exports and imports, the rate of progress of Germany was much more rapid than our own; and the question of importance to us then, as now, was not so much whether our trade was still in advance of other countries, as whether the trade of other countries was advancing more quickly than our own. The figures quoted in the Memorandum clearly showed the relatively great advance of German manufacturing industry over that of the United Kingdom during the period 1873–1893, and Sir Courtenay Boyle, from the survey of his figures, was led to the conclusion: "If peace is maintained, both Germany and the United States are certain to increase their upward movement"—a conclusion which subsequent events have fully verified. In summarizing the points in which German education was at that time superior to our own, and might be regarded as a factor in explanation of German progress, I referred particularly to the better organization of education in Germany.

"We find there examples of voluntary effort, of communal and individual experiments; but all those efforts are brought into relation with one another, and between the elementary school and the technical high school or university there is an intelligible and well co-ordinated system, which gives unity to the entire scheme of education. One great advantage of this organization is the more economical expenditure of the funds available for educational purposes. There is little or no overlapping. To each part of the educational machinery is assigned its special function, and no one school interferes with the work of another. In this way is obtained the maximum of efficiency at the minimum of cost. In order that the parts of such a system may be properly welded together and the whole machinery

kept going, there must be intelligent direction and control. The heads of departments must be educational experts, and the members of local councils must be selected on some principle indicating their qualifications for the duties they have to discharge. At present our schools are only *disjecta membra* of what we hope may one day become a system. There is no responsible authority to supervise or grade our several educational institutions, so as to bring them into organic relation with one another. In Germany, care is taken that the influence of the Minister of Instruction and of those who advise him shall penetrate into every small rural school board. Persons having special knowledge of educational matters, and in touch with different parts of the great school system, are appointed to preside over, or to assist in, the deliberations of the several school commissions. In the constitution and in the *personnel* of such authorities, in their relation to one another and to the State, and in their appreciation of the real seriousness of educational problems, we see some explanation of the generally admitted excellence of German schools and German training.

"Any comprehensive reform of school organization in this country is, I fear, scarcely to be expected for many years to come; and meanwhile we can only proceed step by step, sometimes forward and occasionally backwards, content to gain our ends at a cost far greater than would be needed if our schools and colleges were intelligently graded and co-ordered. We may go on dreaming of a Minister of Education, assisted by a council of 'knowers and lovers of education,' the supreme centre of authority for all grades of schools, from the primary to the university, with committees or departments dealing with separate branches of the subject, standing in well-defined relation to the local authorities throughout the country, such authorities consisting of men and women in touch and sympathy with school life, of proved administrative ability, delegating their functions, when necessary, to smaller district boards—all linked together by the unity of their aim and purpose. Towards some such goal our several efforts may be directed."

Thirteen years ago, when the above was written, I did not anticipate the great forward movement in education, which marks the short but memorable reign of King Edward VII.,

and which is largely due to the legislation of 1902. The educational outlook is undoubtedly more hopeful now than it has been for many years, and if our trade and commerce do not, in the near future, respond to recent efforts and advance as rapidly as in Germany or in any other country; if the position of the wage-earning classes does not improve, and if the proportion of unemployed shows no sign of permanently decreasing we must, I fear, look to other causes and conditions for the explanation and the remedy.

In the summer of 1903, I was asked to give the opening address at a conference at Oxford in connection with the University Extension movement on "The Relation of Science to Industry," a wide and well-worn theme, to which much of what I have here written refers. The year was a memorable one, for it was in the month of September that Mr. Joseph Chamberlain wrote to Mr. Balfour, then Prime Minister, announcing his intention to withdraw from the Government, in which, as Colonial Secretary, he had rendered such signal service to the State, in order that he might be freer to explain to the constituencies, and to impress upon the country, the full significance of his views on fiscal reform. His well-remembered pronouncement had been made on May 15 of the same year, in a speech to his constituents at Birmingham. The subject was exciting general interest, and was freely discussed in the press, at all political gatherings, and by some of our best-known university professors.

In thinking what I should say to my Oxford audience, I could not escape from the consideration of the grave issues raised by Mr. Chamberlain's propaganda, and these seemed to be in some way, even if remotely, connected with the scheme which had been suggested by Lord Rosebery in a letter to *The Times* for establishing in London an institution, well-endowed and well-equipped, for the higher technical instruction and research somewhat on the model of the technical high school at Charlottenberg. In soliciting support for this great scheme, attention was necessarily drawn to the assistance which Germany had derived, in the development of her trade and commerce, from the splendid facilities for the higher technical instruction which were provided largely by State aid. On the general question of

Tariff Reform, I had at that time an open mind, but I inclined to the belief that the balance of advantages and disadvantages was in favour of our long-established practice of Free Trade, and that there was nothing in the industrial position of our country which seemed likely to induce manufacturers to desire to return to a policy of protection. At the same time, I was not among those who regarded Free Trade as an axiom of political economy, and I recognized that the growth and needs of our Empire and the increasing burden of direct taxation might demand some change in our fiscal system. I saw, too, as many others saw, that the question could not be settled by reference to the dicta of Adam Smith or John Stuart Mill, that the economic conditions had greatly changed, and that the position of England, as a manufacturing country, was no longer the same, in relation to Germany and the United States, as it had been over a half-century ago. A new position had been created, and new factors had to be considered, some of which could not be weighed against one another. In my address I referred incidentally, and with some reserve, to one of these considerations, to which, it seemed to me, that too little attention had so far been directed. It is scarcely necessary to point out that, altogether apart from the abstract bearing of the purely economic principles underlying the question of Free Trade, there are political considerations to be kept in view to which due importance must be attached. To these I did not refer. I have selected extracts from the address delivered on that occasion for inclusion in this volume. I have omitted several passages which were written with a view to illustrate by concrete instances the benefits arising from the application of the results and methods of science to industrial operations. I have also omitted references to the advantages which manufacturers, engineers, and employers generally are certain to derive from the further provision of facilities for advanced technical instruction. To dwell on these points is to preach to the converted. The necessity of the higher scientific and technical instruction and of its specialization to industry and commerce is generally realized. No one doubts it. The questions now engaging attention are the kind of training that should lead up to it, the best means of providing avenues

through which the children of our elementary schools may pass to the higher technical institutes, the character of the teaching most suitable for children after the elementary school age, and the relation between university and technological instruction. To some of these considerations, attention is drawn in my Presidential Address at the Annual Meeting of the Association of Technical Institutions, held in Manchester in January, 1906, reprinted in this volume.

There are many difficult educational problems now awaiting solution, and we may look in the near future for very fundamental changes in our educational ideals. But our efforts will certainly tend more and more in the direction of substituting the teaching of Nature for some of the artificial lessons of the schoolroom, of securing to every child, in whatever rank of life he may be born, the opportunity of developing his abilities to the highest educational level, and of recognizing the close relation to be maintained between training and environment.

V

SOCIAL CHANGES AND SCHOOL WORK

At this distance of time, it is difficult to realize the earnestness and strength of the demand for technical education a quarter of a century ago. There was, at that time, a severe depression of trade, and a Royal Commission had been appointed in 1885 to inquire into its causes. It was generally recognized that, foremost among these causes, were our educational defects, and it was hopefully anticipated that the remedy for many of the evils due to foreign competition would be found in improved technical instruction. It is certain that, but for the efforts which were then made and which have since been continued, our commercial position would have been very different from what it is at present. The Consular Reports of that time are filled with warnings of the effects of the enterprise and knowledge of our foreign competitors in wresting from us our fair share of trade in the markets of the world, and the constant cry was, "better education"—education adapted to modern industrial needs. And that cry has no doubt gone home to the intelligence of our British manufacturers, of our men of business, and of successive Governments, with the result that, so far as technical instruction is concerned, it cannot be said that we are now far behind any of our neighbours. It may be that, as regards facilities for the higher scientific and advanced technical instruction, we have still leeway to make good. In this country there is not the same enthusiasm for education, the same self-sacrificing spirit as may be found in Germany, Switzerland, and in the United States, but we are fully alive to its necessity, and although in certain grades of education, and in some of the methods of instruction, we may look forward to further improvement, particularly in our efforts to secure for children,

by more continuous training, the fruits of the lessons they bring with them from their schools, we shall not be able, in the near future, to ascribe to the absence of facilities for technical instruction any failure on our part to compete successfully with foreign manufacturers and merchants.

Nevertheless, and notwithstanding our efforts, to which reference is made in the preceding pages, to place our country more nearly on a level with other countries in the provision of schools and colleges of different grades, the problem of unemployment still gives grave cause for anxiety, and care and discrimination will be needed in the endeavour to discover the most appropriate remedies. On the other hand, the wealth of the country has greatly increased, and the position of the wage-earning classes has improved, and might be, by a more provident use of the resources at their command, still further improved. The standard of living has been raised, and this very fact brings into stronger contrast the position of those who are, and of those who are not, able to find remunerative employment. It is certain, however, that education alone cannot solve the great social and industrial problem which the presence in our midst of large numbers of unemployed workers painfully presents.

For remedial measures, if they are ever to be found, we must look to the combined effect of many co-operating causes. The demand for labour may increase, new avenues of employment may be opened up, discovery and invention may create fresh industries. But of this we may be sure, that no effective remedy will be found in the removal of those inducements to self-help which co-exist with the free play of competition. Many so-called social reforms, intended to lessen the force of competition, can only be regarded as conditions precedent to that re-organization of society, which is now, and has been in the past, the day-dream of a certain section of economists. During the last few years we have advanced some considerable distance in the direction of State interference with individual liberty and activity. We have withdrawn from parents of the wage-earning and poorer classes the necessity of making any provision for the education of their children. That duty has been thrown upon the State, and avenues for advancement

from the elementary school to the university, are opened up, free of cost, equally to the children of all classes. Obligatory contributions from rate-payers are made towards the feeding of necessitous children, and the medical inspection of such children, with incidental medical attendance, is gratuitously provided. These privileges are received as among the recognized facts in the new social state, and not as charitable offerings, for which gratitude is expected. The acceptance of such assistance would have been regarded, not many years ago, as a sign of poverty and would have been avoided as long as possible by the more self-respecting members of the wage-earning classes.

It is an educational commonplace that our school system, both as regards organization and methods of instruction, must be adapted to our surroundings, and to the state of society in which we live and work. In a community, moulded on distinctly socialistic lines, it would need to be different from that required under a competitive *régime*. There can be no doubt that, with the advance of democratic institutions, ethical ideals will undergo far-reaching changes, and the obligation will be thrown upon our educational administrators to consider what modifications should be made in our school teaching to meet these new conditions. Unless this problem is seriously discussed, and unless such action as may be needed is promptly taken, it may be found that the very gifts which the State is, every year, more bountifully distributing, may conduce to an accentuation of the evils which those gifts are intended to remedy. So far, we have advanced only some few steps along the broad way common to social reform and socialism, and we have trodden it too recently to be able clearly to determine whither it is leading, or the full effect of the policy that has so far guided us, but there can be no doubt that it is a policy that would have been strongly condemned by the older economists, who regarded with serious misgivings the growth of State interference with the freedom of individual action. It may be difficult, if not impossible, to draw any hard and fast line that shall separate cases of State aid that are helpful from such as are harmful. Even Adam Smith grudgingly recognized the necessity of providing at the public expense

for the elementary education of the poorer classes. Indeed, he emphasized the importance of public attention being directed to the education of the children of "the common people." But the State has gone much further in its interference with individual activity in the aid which it now provides. Schemes are put forward for throwing upon the community the duty of finding employment for all who, from one cause or another, may be out of work, and it is suggested that poverty may be permanently relieved by doles, in the form of wages, for labour, that would not be needed under the free play of economic laws. In many ways, the State now intervenes between the parent and the child, and legislates as to details of domestic life. Parents are relieved to a degree that only a few years since would have been generally condemned from the burden of the up-bringing of their offspring. Rules of conduct are embodied in Acts of Parliament, and penalties are exacted for any breach of them. Many of these, but certainly not all of them, are wise regulations; but the intervention of the State in purely domestic matters relieves the parent of part of his responsibility, and to that extent his freedom of action is curtailed. As a consequence of these enactments, the relations which should subsist between the parent and the child—relations the full significance of which it was one of the duties of the school teacher to emphasize—are being slowly dissolved; and, while the parent's control is thus sensibly weakened, the child learns to rely more and more upon the authority of the law, to which the parent is obliged constantly to appeal for guidance and support. There are provisions in the Act, known as the Children's Charter, which will be found to operate in this way, and incidentally to undermine the force of parental influence. Much as that measure has been praised, and no one can doubt the good intentions of its author, there are many who view with some misgivings the tendency and ultimate effect of some of its provisions. The mischief of all such measures is that they transfer to the State, as represented by the police officer, the authority that by natural right belongs to the parent, and it is, on the whole, a lesser evil that the control of the parent should be occasionally misdirected than that it should be

altogether superseded. Any policy that implies distrust of parental influence is an unwise policy. It is true that, by means of legal enactments, moral conduct may be outwardly enforced, but such enactments do not touch the springs of action, and the character of the child cannot be created nor even strengthened by such sanctions.

It is not, however, parental influence alone that is thus weakened, but equally that of the teacher, who occupies, during many years of the child's life, a position subordinate only to that of the parent. There is much in our social legislation as to conduct that implies distrust of the potentialities of education, the main object of which is to build for the future and to improve the coming generation. We spend millions of money annually on school training, and seem at the same time to be losing faith in its formative power. By throwing upon the State an ever-increasing share of the responsibility that properly belongs to the parent and to the teacher, we are neglecting opportunities of permanently remedying in the future the evils of which we at present complain. The aim of moral and religious instruction should be to encourage respect and reverence for parents, a willingness to submit to their guidance and control, a desire for self-improvement, and a belief in the all-sustaining power of personal effort; but these essential lessons are hindered by the ever-present interference of the State, by its freely-given bounty, and by its curtailment of individual liberty in some of the smaller details of life. As the State advances in the endeavour to fix social habits by sanction of the law, the authority of the teacher is to that extent superseded. This progressive action may, or may not, tend to racial improvement, but the fact that it is progressive cannot be overlooked, and its probable effect on character and conduct must be carefully considered by the educator.

There can be no doubt that the general dependence on State aid in the up-bringing of children must help to withdraw the stimulus to individual activity and the display of energy, which the struggle against adverse circumstances affords, and will make the task of the teacher still more difficult and more onerous than it is at present. Children will realize at an early age the extent to which they and their parents are

assisted out of public funds. As they grow older, they will see around them the idle and improvident in receipt of wages, regulated, not by their own efforts or merits, but merely by their needs. They will see their school-fellows coming from thriftless and untidy homes, served with meals more satisfying than those which their own parents, at some personal sacrifice, provide, and the aged poor, those who have worked well, and equally those who have wasted life, in receipt of pensions. I am not venturing to pronounce any opinion on the wisdom or otherwise of these reforms, which of late years have been borne in upon us, and could not, I am free to admit, have been resisted. Indeed, they were unavoidable; but I am dealing here with facts as they are and as they will be. For good or for evil, they have become, and they will remain, a part of our social system, and will be multiplied as years roll on. I am not even considering whether they will make for more diffused contentment and for greater happiness. I am concerned here only with their bearing on the educational problem.

"It may well be asked," however, "whether the old energy, self-reliance, and resourcefulness of English character will continue unimpaired under this education of perpetual legal regulations; whether it is really advantageous to cripple by rigidly uniform rules the flight of superior industry, capacity, or daring; whether great industries, which are now barely retained in this country, may not easily be regulated or taxed out of existence; whether the growth of a vast bureaucracy of inspectors and other officials, and the constantly increasing mingling of questions of industry with questions of politics, do not foreshadow grave evils to the State."[1]

The conditions of life and the social environment are undoubtedly changing, and these new conditions must be considered in connection with the aims and objects and methods of our educational practice. It is a trite saying that the purpose of education is to enable us to discharge, in the most efficient manner, our several duties in the circumstances in which we live. If, then, these circumstances are undergoing marked changes in consequence of the social reforms which

[1] *Democracy and Liberty*, by W. E. H. Lecky. Longmans & Co. 1908.

are crowding in upon us, it follows as a necessity that the kind of education provided in our schools must be modified accordingly. The influence of these changes, in so far as they may tend to weaken the energy and to militate against the resourcefulness and self-reliance of the people, must be counteracted by school training. The social atmosphere which the child breathes, the incentive to work which his surroundings provide, the kind of occupation in which he is likely to be engaged, are important factors that cannot be eliminated in determining the type of education best suited to his needs, and the recognition of these factors is essential to any correct theory of education. It is partly because we have been slow to realize the economic changes and commercial developments in social and industrial enterprise, that the provision of suitable facilities for technical instruction was so long delayed, and our system of education had become unsuited to our national requirements. If, as I have endeavoured to show, there has been a great upheaval of late years in the social condition of our wage-earning classes, it is necessary that we should reconsider, by the light of these changes, the foundations on which our present system of education is raised.

This comparatively new phase of social life demands that the school shall take cognizance of the child's altered relation to the State, and that the benefits which he receives from the community, and his reciprocal obligations to it, shall be fully explained to him by means of appropriate lessons to be included in the school curriculum. The duty of patriotism and all it covers—loyalty, obedience and sacrifice, should be inculcated so as to influence the thought and conduct of the child. It is by no means necessary that such instruction should rule out the Fifth Commandment. On the contrary, the child's obligations to his parents should be strongly enforced, but the significance of the commandment should be widened. For, seeing that the State shares with the parent that close concern in the child's upbringing, which, till recent times, belonged to the parent alone, it follows as a necessary consequence that the reciprocal duties which the child owes to the parent must be extended to the State. At the Moral Education Conference, held in London in 1908, teaching of this kind was strongly advocated.

Professor Sadler, in his introduction to the Report of the International Inquiry, says—

"Our evidence shows that school training, especially when supported by the influence of the home and by the influence of the religious body to which the parents of the child belong, may make a deep and lasting impression upon character, and may, as in Japan, diffuse to a remarkable extent throughout the nation the sense of personal duty to the State."

In order to give the highest sanction to such teaching and equally for other reasons, it should be closely associated with the religious lessons given in the school. Indeed, it is only by emphasizing the obligation of the child to the State and to the community, and by encouraging the practice of the sacrifices it involves, that any sufficient corrective can be found to the enervating effects of communal help, unaccompanied by personal effort, on which the individual citizen may, if he will, rely in all periods of his life. In no other way, it seems to me, can the school enforce self-dependence and stimulate activity. The new social conditions necessitate the insistence on communal duty as a moral obligation of the same kind as respect to parents. How, then, is this personal duty to the State to be discharged? It may be discharged in many ways; but, first of all, by service that shall render the State safe and secure from outside attack. Whilst the moral instruction provided in the school should explain fully and in detail the child's personal obligation to the State, the physical exercises of the school should prepare the child for active service, if required, in its defence. To be trained to act skilfully, should occasion arise, as a citizen soldier, is surely the essential element of that personal duty, which every one should willingly discharge, in return for the services which the State is ready to bestow upon him in early childhood, in sickness, in want, and, if necessary, in extreme old age.

Such training need not make for militarism, nor tend in any way to encourage a military spirit; but it will have an educative and moral value altogether apart from, and independent of, its more immediate object. The discipline it involves will help in enforcing self-control, self-denial, and willing obedience to the authority of others, and will implant in the

mind of the youth a deep-seated consciousness of his relative position to the community as a whole. Unless our young people are to grow up hopelessly inert, to care only for a soft and easy berth, to lose all desire for self-dependence, and to fail in the power of initiative and in resourcefulness, systematic physical exercises of a distinctly military character, to be followed later on by field service, should form part of the school curriculum. In Germany, what are called social reforms, as distinct from socialism, have made further advances than in this country; but they are so ordered and regulated as to encourage thrift and individual exertion; and whilst the State is by no means chary in the help it gives in relieving distress and in preventing poverty and unemployment, it rightly demands personal service in return, so that the moral fibre and independent spirit of the citizen may not suffer. To this ideal of social duty we have not yet attained.

No theory of education is sound which, neglecting the conditions that surround the child, is deduced from the physiology and psychology of child-life alone. To the constant and common factors of such life must be added the ever-changing environment, in which the physical and mental capacities are exercised, and the scientific educator's attention must be directed quite as much to the circumstances that condition conduct, that act and re-act upon it, as to the means of developing, to the fullest extent, the child's faculties of thought and action. The highest function of education is to create mental and moral habits, that shall enable us to exercise, by our own will-power, a controlling force on external influences, and to shape them to some well-considered and desired end.

Of late years a great change has been effected in the methods of intellectual instruction, which cannot fail, in course of time, to afford a stimulating discipline and to help in strengthening the character of our young people during their school life. Till recently, to impart knowledge was the main purpose of school teaching. To know was an end in itself. How the knowledge was gained mattered little. At different phases in a youth's career he was required to show that he had acquired larger stocks of knowledge; the passing of an examination opened a gate from one position to another. Knowledge *per se* was

sought as the light to guide him on his way through the world. The energy needed to push forward was assumed, for the conditions of life were such as made the push essential. It is, however, these conditions that have changed, and school training must now provide the push, without which mere unassisted knowledge can avail little. As a new generation, trained amid these new conditions, will realize how food and raiment and other necessaries of life may be provided for them without any great or continued effort, the incentive to personal energy will be proportionately weakened. The light that guides is of little help without the force that drives, and the force may be found wanting. We must look to education to do something more for us than to impart knowledge. It must stimulate mental and physical effort. Gradually, but surely, this fact is being borne in upon us. If we look back upon our aims and objects during the last decade only, we see how they have shifted with the new conditions. The real causes of this shifting may have been hidden from us, but its necessity has been ever present. The multiplication of facilities for learning has to some extent lessened the recognition of its efficacy. In olden times the value of knowledge consisted largely in the search for it. "I love them that love me," it is written, "and those that seek me diligently shall find me." But it is essential that they should seek. At a time when opportunities for acquiring knowledge did not surround us, as they now do; before education was free and obligatory,—posters at every wayside corner inviting us to a feast of literary, scientific, technical, and commercial instruction, to be had for the asking—some effort on our part was needed to obtain it, and the knowledge thus sought with difficulty was more highly valued. Indeed, the exercise of energy displayed in seeking it was in itself a discipline, helping us to surmount fresh obstacles. But this state of things no longer exists. It is well that it should be so. We have no reason to complain. On the contrary, we desired it and we have got it. What we have to do, however, is to take note of these altered circumstances, and to modify our scheme of teaching accordingly, and this, as regards methods of instruction, we have been doing. We recognize now that book-learning, by itself, fails to afford

any adequate mental training. Carlyle's dictum that a "true university is a collection of books" no longer applies. It is true neither of a university nor of an elementary school. The student or pupil in either must be trained in the methods of discovery. When the term "workhouse" has shed its present meaning, it will connote the dignity and usefulness that attach to every educational institution. Teaching must be the active discipline of the search for knowledge. The energy which, once upon a time, was put forth in the endeavour to obtain instruction must now be exacted in the giving of it. The teacher's functions are consequently widened. He has to stimulate in his pupil activity of thought, and must not assume that it is there. This change of method is illustrated in the substitution of laboratory practice by the student for lecture-room demonstrations by the teacher. We hear a good deal now of the necessity of smaller classes, so that each pupil may have more individual attention. That no doubt is desirable; but it is equally necessary that the teacher should refrain from too much teaching, that he should stand aside and guide his pupils instead of over-instructing them. A spirit of research has entered into every branch of learning, and has leavened all teaching, and, as a result, activity and effort on the part of the pupil should accompany all lessons. The addition of class-room accommodation is less essential than the provision in every school building of a laboratory, a workshop, and a library, in which the pupils may be free to learn largely by themselves. This great change of method is tersely expressed in the phrase, now generally accepted as a pedagogic principle, "Learning by doing."

What I desire to emphasize is the fact, that this important change in our theory of education has come about without any apparent connection with the altered social conditions of life, which have made it necessary. Many circumstances just now combine to induce us fundamentally to review our educational machinery. Thirty years ago we began to realize the necessity of adapting our scheme of education, and our subjects of instruction, to our industrial needs, but we have now to recognize something more, viz. the close relation that should subsist between school training and the social conditions in

which we live. Wherever this fact has failed to be recognized, harmful results have followed. No greater educational mistake can be made than to neglect considerations of race, religion, and climate, of social and industrial habits, in determining the kind of education best adapted to different conditions of life. Such a mistake, it is feared, we may have made in providing for certain sections of the native population of India an education in many respects similar to that which has been adopted in this country. The consequences of that mistake we are beginning, none too soon, to realize, though possibly too late to avoid. It has been well said, by a writer thoroughly conversant with the subject, that "the first step for us is to realize the need of a radical reform in the corrupt and faulty education which we have established in India." This fact is fully recognized by those who have seen the results of a system of training out of harmony with the life, the habits, and the social condition of the people. Lord Morley very recently has said, "The demand and necessity of an improved system of education in India call for comprehensive and urgent recognition." [1] I have referred to the case of India as an illustration only of the consequences of imposing upon a people a system of education that is suited neither to their habits, nor to the circumstances in which they live and work. The case I have quoted is an extreme one, but the moral is applicable to our own conditions.[2] These conditions, as I have shown, have changed and

[1] In answer to a question to the Under-Secretary of State for India, April 14, 1910.

[2] In one of the series of interesting articles on "Indian Unrest," which appeared in *The Times* of August 27, whilst these pages were passing through the press, the writer, dealing with the educational question, has clearly stated in the following extract what would seem to be the cause of our failure: "Try and imagine for a moment, however absurd it may seem, what would have been the effect upon the brains of the youth of our own country if it had been subject to Chinese rule for the last 100 years and the Chinese, without interfering with our own social customs or with our religious beliefs, had taken charge of higher education and insisted upon conveying to our youth a course of purely Chinese instruction imparted through Chinese text-books, and taught mainly by Englishmen for the most part only one degree more familiar than their pupils with the inwardness of Chinese thought and Chinese ethics. The effect could hardly have been more bewildering than the effect produced in many cases similar to that which I have instanced on the brain of the Indian youth when he emerges from our schools and colleges."

are rapidly changing, and our system of education must change also.

Among the altered circumstances of to-day must be noted and considered the multiplication, due to democratic progress, of official posts, which are rightly open to the children of all classes who can qualify, by examination or otherwise, to obtain them. During the last few years only, there has been a marked and rapid increase in the number of Government and municipal positions, carrying fixed salaries, which necessarily attract a large number of competitors. Every Act of Parliament, introducing some new social reform, involves the appointment of new officials, commissioners, overseers, and clerks of different grades, increasing the cost of Government and of local administration. The number of such positions that have been created during the past five years only has been considerable. It is estimated that over a thousand new officials have been appointed within this short period, at a very large annual cost to the State. The training suitable as a preparation for such official positions is necessarily largely of a literary character. The duties are mainly clerical. The regulations of the Board of Education, requiring secondary schools, qualified for full grants from the State, to receive annually 25 per cent. of their new pupils from the public elementary schools, must gradually tend to influence, in a manner not yet thoroughly appreciated, the character of the training given in the schools, from which the pupils come, and in which their education is continued. It is to be feared that one of the effects of these regulations will be to withdraw from active practical pursuits some of the ablest and most intelligent of the children of the wage-earning class. The fixed salary, the more "gentlemanly" position, the easier duties, will certainly induce large numbers of parents to aim at securing one of these berths, and they will endeavour to send their children to the secondary school, which will offer the best training preparatory to the qualifying examination. It is quite right that these places should be open to the children of all classes; but for one who obtains the coveted post, there will be scores who fail, and the question meets us, whether these failures may not eventually swell the ranks of the

unemployed. Not unnaturally, they will look to the State for employment, and it may be difficult to discover work for which their education will have proved any adequate preparation. This is one of the problems which the Poor Law reformers have to solve. Labour Exchanges may help, but only to a limited extent. The organization of labour cannot create an increased demand for it. But what may happen is, that some of those, whose education has unfitted them for industrial pursuits, will seek employment, provided by the State, on work that is economically unremunerative, whilst others will secure, with difficulty, posts as ill-paid clerks, or will fail to find any means of maintaining their independence. In either case, the money spent upon their education will have brought no satisfactory return. Where a free place is accompanied by a scholarship, the pupil's chances of being able to derive the full advantage of the instruction he is receiving and of subsequently obtaining employment are increased, and it would seem only reasonable, that the school authorities should advise as to whether it is really to the pupil's advantage to remain for the entire period in the particular school in which he has been entered. The problem is largely one of education, and this the Poor Law Commissioners have realized. The abolition of half-timers; obligatory continuation schools; the raising of the leaving-school age, are suggested remedies for meeting an acknowledged difficulty; but they will all fail of their object, unless the instruction provided in our day or evening schools is of such a kind as will train the youth, by means of practical and manual work, for industrial and trade pursuits.

At present, few of our secondary schools, into which so large a percentage of our children are drafted, are so organized as to give the kind of training that is urgently needed. The Board of Education have clearly expressed their belief in the importance of correlating manual work with other subjects of instruction. This fundamental change of system and of method has been the main object of my writings and addresses. It is the leading theme in many of the following pages. But so far, very little has been achieved, and there is consequently, even now, a break between the teaching of the elementary and

secondary school, which prevents continuity of instruction, and necessitates the transfer of children at too young an age from the one school to the other. In the interests of the children themselves, and in order to give them the best possible training for their future work, whatever it may be, it is surely unwise to allow them to spend so large a portion of their school time in literary studies. Even those children who display special literary ability, as some undoubtedly do, and whose intellectual bias unfits them for purely manual work, will be found no less competent to pursue their future studies on the linguistic side, by having been brought, during the early period of their school life, into direct contact with things, and by having learnt to be careful in observation, thoughtful in reasoning and accurate in expression. It is impossible to look into the near future without realizing that the solution of many difficulties that now face us will be found in education and in the changes we are prepared to make in our school organization and curriculum. All indications point to the urgency of hastening these educational reforms, the need of which has been long foreseen. Much has been accomplished during the past few years. The efforts of our pioneers have not been wasted. The forward movement may have been less rapid than some of us may have desired, but it has been no easy task to keep pace with new conditions that have arisen, the full significance and import of which are not yet clearly understood. The spirit of democracy has gathered strength more quickly than might have been anticipated. Changes of policy, affecting the economics of trade and commerce, of manufacturing industry and agriculture, are seen to be fast approaching, and it cannot be doubted that they will give rise to new conditions of social life, for which we are not yet fully prepared. Not only here, but in other countries also, there is a state of political and social unrest. Everywhere is movement. We cannot stay it, even if we would; but we may be able to direct it. The educator must look abroad, and take a wide view of his possibilities and duties; and the schoolmaster must work laboriously at home.

There is also a danger that the education of the people may be misdirected by its too close connection with political objects.

Public education should be organized and controlled from a platform high above, and altogether detached from, party politics. Even the religious question might be dissociated from political considerations. The heads of the Education Department, with their expert knowledge and wide experience, might be expected, as in the case of foreign policy, largely to control educational development, directing it by a far-seeing outlook on the future needs of the people. Social conditions even now are undoubtedly complicated, and the future may be difficult to discern. But the problem will be easier of solution if removed from the conflict of party tactics. In the organization of education, it is necessary to take a broad view—to approach its consideration with some insight into future conditions. We must learn to think of our school children of to-day as the citizens of the future, as the parents of children yet unborn; and, if we are to improve the generation that is to come, we must educate our children to discharge thoroughly and well all the responsible duties of parents. Education, if it is to be efficient, cannot be regulated apart from the changes that the social state is undergoing. It must recognize existing tendencies and must not hesitate, so long as it is possible, to correct any that seem to make for moral or intellectual decay; indeed, it must strenuously oppose them, how strongly soever they may for the time being receive popular support. There is no branch of human activity in which independence of thought and ability to act on the matured decisions of those most competent to judge, are more essential. Educational theory and practice should always be somewhat in advance of immediate industrial and social needs, and one of the highest efforts of educational thought should be to create ideals that may be realized in the coming generation. The true educator will refuse to yield to pressing claims that are ill founded, but will try at least to prepare the way for a higher and a better life, by removing stumbling-blocks from the path of the people.

In some of my recent addresses I have tentatively urged these views. They were indicated in the address delivered in September, 1909, at Lancaster, at the annual meeting of the Lancashire and Cheshire Union of Institutes, and in distributing prizes, very recently, at the Borough and the Battersea

Polytechnic Institutes. But these addresses are not included in this volume, and I have therefore dwelt somewhat more fully on the social aspect of the educational problem in this concluding part of my introductory remarks. In the Articles and Addresses now published will be found some of the aims I have had in view, and the efforts I have made to give effect to them during the past thirty years. In my administrative work, extending over the whole of that period, which has brought me into close and intimate connection with the educational needs of all classes of the community, I have endeavoured to utilize the experience I have gained, not only in developing that work, but in directing attention to changes in our system, which were urgently demanded for the better training of the future citizens of our Empire. Some of these changes have been in part effected; others are not yet realized, nor is their necessity even now fully recognized. The fresh publication, however, of these Addresses, setting forth what have been my aims and efforts, may not be altogether void of interest, even if it does no more than incidentally add some few facts to the history of our educational progress during the last thirty years.

Part II.—ARTICLES AND ADDRESSES

I

MANUAL TRAINING IN SCHOOLS: ITS ORIGIN AND PURPOSE[1]

[1894]

In addressing you for the first time, as President of your Association, it may not be out of place that I draw attention to some of the principal objects of the society. The Association aims at disseminating educational views on the question of manual training; it watches the various Acts of Parliament relating to manual training and technical instruction; and takes action in matters affecting the interests of manual training teachers. These objects are not unimportant, and show the prominent position which, in the short space of seven years, manual training has taken in our educational system.

Although this Association has been in existence scarcely three years, its members already number about 100, the majority of whom are engaged as teachers in London. Most other large towns are represented by one or two members, and I think the Association may be congratulated on this accession to its ranks. It is a sign of healthy development in any movement, when its workers feel the necessity of associating themselves into a society for the advancement of their objects and common interests. Nor has the Association been idle during these few years. In the successive revision of the circular on manual training, issued by the Education Department, the representations of the Association have not been without effect; and in one important particular, in associating

[1] Presidential Address at the formal inauguration of the National Association of Manual Training Teachers (Nov. 15, 1894).

the teaching of drawing with the practical exercises in woodwork, the action of the Association appears to have been attended with very satisfactory results.

One of the remarkable features of the educational movement of the last ten years is the rapidity with which changes, amounting almost to a revolution in method, have been introduced into our system. Foremost among these changes is the introduction into our schools of manual training. Seven years ago, carpentry was taught in a few isolated schools, and in these rather as an amusement and recreation than as part of the discipline of education. It was taught generally without method, and as an extra out of ordinary school hours. At the Central Board School, Sheffield, and at the Allan Glen School, Glasgow, manual training had its most favourable trial. The question of introducing woodwork into our elementary schools naturally engaged the attention of the Royal Commissioners of Technical Instruction when they visited France in 1881. At that time they noted with interest the growing feeling in favour of such teaching, and in their preliminary report, issued early in 1882, they somewhat hesitatingly recommended its introduction into some of our schools. But with the usual caution of commissioners, they protected themselves by adding, "The consideration of the expediency of a grant from the Education Department for instruction of this kind may well be deferred for the present." Some of the commissioners, however, were individually strongly impressed with the importance of such instruction, not so much on account of the value of the skill imparted, as of its general educational discipline and of its significance in modifying the theory of education which was then commonly accepted. In my inaugural address at the opening of the Finsbury Technical College in 1883, and in a paper read the same year at the Society of Arts, I strongly advocated the inclusion of manual training as part of elementary education; and from an experiment which, in conjunction with Canon Barnett, I had the opportunity of trying, I was able to show that the children's literary education, as tested by grants on results, in no way suffered by devoting a portion of the ordinary school hours to manual work.

In 1884 the commissioners' final report was published. During the three years occupied by their inquiry they had seen a great advance in European opinion on this question, and from the United States very important testimony was adduced by Woodward, Runkle, Ham, and other practical teachers, as to the value of the instruction. As the result of these further inquiries, the commissioners recommended "that proficiency in the use of tools for working in wood and iron be paid for as a specific subject," although it was still suggested that such instruction should be given "as far as practicable out of school hours," showing thereby that the true meaning and function of the teaching were even then not fully appreciated. At the Educational Conference held in London in 1884, and between then and 1886, when the next Conference was held at Bordeaux, the question of manual training was generally discussed, and the prevailing opinion was favourable to its receiving a fair trial.

At the Birmingham meeting of the British Association, 1886, I read a paper dealing with the practical details of the subject, which was subsequently published and widely circulated; and in the autumn of that year, with a view to preparing teachers in advance, a normal manual class was formed at the Central College of the City Guilds' Institute, and many of the most prominent teachers of the present day received their early training at these classes. Early in 1886 a letter was addressed by the School Board of London to several of the Livery Companies and to the City Guilds' Institute, asking help towards the introduction of manual training into some of our elementary schools. But so imperfectly were the objects and methods of manual training even then understood, that from the words of the application the instruction was evidently regarded as a sort of trade teaching, which it was suggested might be adapted to the industries of different parts of London. In his letter to the Livery Companies, dated April 30, 1886, the Clerk of the Board, after pointing out that "the Board gratefully recognize the munificence with which the Corporation and the City Guilds have laid the foundation of a national system of training, more especially by the establishment of technical schools and by the subsidizing of such schools in

London and in the country," went on to say, "The Board are of opinion that, in certain districts, subjects should be selected which concern the trade peculiar to the neighbourhood; and any subsidy which your company might be disposed to give could, under special arrangement, be applied exclusively in maintaining classes for instruction in those trades in which your company is more especially interested." The City Guilds' Institute, which in its annual reports had frequently referred to the importance of manual training as a school discipline, readily responded to the invitation of the School Board, although unwilling to encourage the kind of teaching suggested in the Board's letter; and the Drapers' Company, having separately offered to contribute a large annual sum towards the expenses, a joint committee of the City Guilds' Institute, the School Board, and Drapers' Company, now well known as the pioneer of many practical reforms in elementary education, was constituted in 1887.[1] Before I became a member of the Board, it was part of my duty to attend the meetings of that committee in a consultative capacity, and I had the opportunity, therefore, of making suggestions as to the character of the teaching, and of arranging for the equipment of the shops.

Prior to the formation of this committee, but subsequent to the letter of the clerk, a committee of the School Board had been appointed, under the chairmanship of Mr. William Bousfield, to inquire into and to make recommendations with reference to the subjects and modes of instruction in public elementary schools. Before that committee I gave evidence, and the committee, among other recommendations, reported:—

"(1) That manual work be always taken in connection with school teaching of underlying science and of drawing.

"(2) That no special trade be taught."

One of the first questions which the joint committee had practically to settle was the nature of the qualifications of the teachers. A few certificated teachers of elementary schools had been trained at the Central institution, and the committee had the opportunity of appointing a teacher so trained, or a skilled artisan with some knowledge of the principles of science and drawing. It was only natural that the decision

[1] The committee was dissolved in December, 1900.

should have resulted in a compromise. Two organizing teachers were selected, one an elementary school teacher, and the other an artisan. The six schools—three in the north and three in the south of London—were visited by all sorts and conditions of men and women interested in school work, from all parts of the world; and there was a general consensus of opinion that the experiment—for experiment it was—had succeeded beyond the expectation of the most sanguine. It was shown that the instruction stimulated the intelligence, and improved the physique of the children; that the discipline was pleasant to the learners, and that, whilst it gave reality to much of the abstract teaching of the school, it endowed the young workers with manual skill and adroitness, which remained with them a permanent possession for life. These advantages, proved unmistakably by the results of the experiments, were not lost sight of by H.M. inspectors, who reported so favourably of the instruction to the Education Department, that the Code of 1890 contained regulations for the teaching of woodwork under conditions carrying recognition and money grant from the Government. Never, perhaps, was a revolution so scientifically effected, and so clearly the result of carefully prepared experiment, as that which gave to manual instruction a prominent place in our system of elementary education. Since then the joint committee has done other good work; but its successful endeavour practically to establish the fact that manual training may, with advantage, be substituted for some part of the instruction, which had previously occupied nearly the whole of school time, is a real educational gain, and will give to that committee the right to be remembered among those who have largely contributed to the improvement of our system of elementary education. Gradually, as the aims and objects of such teaching came to be better understood, the advantage of employing, as instructors, men who had been trained in the methods of teaching and who had gained some acquaintance with child-nature, was more generally recognized; and everywhere teachers were in demand who were capable of instructing children in the use of tools. The City Guilds' Institute, which, through the joint committee and separately, had taken so active a part in promoting manual

training, prepared a detailed syllabus of a course of instruction in woodwork for elementary teachers, covering a period of two years, and undertook to grant certificates on the results of a practical and written examination. The publication of the syllabus led to the formation of classes in all parts of the country, and the number of students and candidates for examination rapidly increased. In the year 1892, when the first examination was held, 615 candidates presented themselves; in 1893 this number increased to 1141. During the session 1893–4, 145 classes were registered, whilst at the recent examination, 1766 candidates presented themselves, all of whom were trained teachers in public elementary schools.

The teaching of woodwork has been adopted not only in our elementary day schools, but also in evening continuation classes, particularly in rural districts, and these classes are much frequented by young persons who have left the ordinary day school at a comparatively early age. The practical teaching in these classes is attractive and useful, and when associated with drawing it is educationally valuable. The Inspectors of the City Guilds' Institute have visited a large number of these classes in Hampshire, Surrey, Essex, and Yorkshire; and I have endeavoured to ascertain from the organizing secretaries of the Technical Instruction Committees of County Councils, the number of classes in which manual instruction was given during the past session. From a few centres I have not yet received returns. I have received answers from forty-two organizing secretaries, and have ascertained from the particulars which they have kindly forwarded to me that during last session manual instruction was given in 625 classes to over 8000 pupils. These classes, I should say, are in addition to those in wood-carving, in which the number of students is probably still larger. From the returns made to the Science and Art Department, showing the manner in which County and Borough Councils are devoting funds to technical teaching, it appears that in the session 1892–93 there were sixty-three centres in which instruction was given in the use of wood-working tools. These figures show the great development of manual instruction, consequent on the general opinion now held of its practical and educational value.

It is, however, to manual instruction as a part of the education of an ordinary elementary school that most importance should be attached. I have quoted figures to show the eagerness of teachers to obtain the necessary training in workshop practice and drawing to enable them to give instruction in this subject. From the statistics of the Education Department, it appears that manual instruction was given last year in 430 schools provided with workshops, some of which serve as centres for the instruction of children from many different schools. Under the School Board of London alone there are sixty-five centres for woodwork, receiving pupils from 194 schools, and the number of children taught is 17,200. In addition to these, 1400 pupils receive instruction in the schools under the Joint Committee.

It is the introduction of this teaching into our elementary schools which marks the greatest change in our educational ideas. We are passing away from the idea that acquired knowledge or even acquired skill is the be-all and the end-all of education. We are recovering gradually from the effects of the reaction against literary studies, and are ceasing to regard the acquisition of even scientific facts as the true educational aim. It may be useful and interesting to learn something about the play of forces, the motion of the heavenly bodies, the growth of plants, the habits of animals; but the possession of this knowledge does not necessarily mark the educated man. In a paper on "Method and Science Teaching," read this year at the College of Preceptors, I said:—

"With the first feeling of intoxication which the breathing of the atmosphere of science excited, there was a strong reaction against the teaching of subjects apparently useless, as mere instruments for mental gymnastics. There was a loud cry for useful information; but gradually better views prevailed, and it was recognized, although very slowly, that information is not the first object of science teaching, and that, valuable as is the information which science conveys, such information is of little use, unless the process of informing serves to train and discipline and educate the faculties."[1]

This is equally true of manual training. You must not

[1] *Educational Times*, March, 1894.

let the advantage of being able to use ordinary tools, or of knowing the properties of different kinds of wood, blind you to the real purpose of the instruction, viz., *Training*. We are coming round to an old theory of education, that training is its true end and aim — the training of all our faculties — muscular, intellectual, and moral. The training obtained from the use of tools refers more particularly to the senses—the muscular sense, the sense of sight and touch; but so intimately connected with intellectual operations is the development of any one sense, that working with wood serves not only to train the hand and eye, but also to quicken our perceptions, to stimulate the faculty of observation, and to create in us habits of accuracy, self-reliance, and truth. Remember the saying: "Sow an act, you reap a habit; sow a habit, you reap a character." It is as an instrument of education, as a means of development, that manual training has its real value in school teaching. Incidentally, the child acquires useful skill, some knowledge, and general adroitness; but the acquisition of such skill is not the main object of the lessons; and the teachers should recognize this fact and teach accordingly. It is, of course, desirable that children, during their school course, should acquire knowledge and gain skill. But neither the knowledge nor the skill is the main purpose of the teaching. What we have to do is to train the physical and mental faculties of the child, so as to fit him for the varied duties of life. We have to strive after the *mens sana in corpore sano* of Locke, and to discover the best means of securing this ideal state, having regard to the wants and requirement of the fully-developed man or woman. Now, nothing has been more conclusively shown of late years, and herein lies one of the chief characteristics of the New Education, than that this healthy development of mind and body cannot be attained except by the exercise and use of the organs that bring our mind in relation to the external world, that is, by *doing*. This is the principle of the Kindergarten, which should be pursued throughout school life. The passive reception of facts and truths, although it may increase our store of knowledge, does not afford a complete education. Our children, like the rootlets of a plant, must seek out for themselves the required

nutriment. For this reason they must learn by doing. It is not enough that they listen and repeat, that they read and store up, they must put forth their energies in active work, so as to acquire by successive trial and error those habits of thought which make accuracy and truth and self-reliance a second nature.

It is in the school workshop that this training may, at a comparatively early period in the child's school-life, be opportunely acquired. It will not be found in simply teaching the child to make useful objects, as a young apprentice might be taught his trade. It will not be found unless the teachers keep steadily in view the real purpose of the child's instruction, and are guided by the endeavour to make their lessons a means of intellectual training. If they do this, they will see the necessity of exactness in measurement, of accuracy and truthfulness in every operation. Woodwork admirably supplies the means of inculcating these lessons. Each instrument must be handled with care and used with precision. The preliminary measurements must be accurately made, and the saw or chisel or other tool must be so used that each stroke does the exact work it is intended to do. It should realize the mental image. All subsequent chipping and scraping and filing should be discouraged and avoided, as an attempt at best to retrieve an error, and at worst to hide the signs of it. Better let the pupil try and try again till his strokes are clean and true, than rest content with work that gives any false impression of the process by which it has been finished. For this reason I venture to think that the system of woodworking generally adopted in this country is superior in value, as an educational discipline, to the Sloyd teaching of Sweden, and is economically more useful. In Sloyd the advantages of actual tool manipulation are less evident. The knife which is so freely used gives short undecided cuts, and the work is too often finished with glass paper, a method which tends to destroy that self-reliance which should be one of the chief moral results of manual training.

In other respects, particularly in the relation of drawing to woodworking, exercises in school carpentry compare favourably with Sloyd. The models employed in Sloyd are not so well

adapted to illustrate correct geometrical principles, or to train the student in the interpretation of working drawings, as the construction of joints and of models exemplifying such joints. In this work, too, the gradation of exercises, combining drawing and construction, is facilitated. The teaching of Sloyd affords, undoubtedly, useful practice in the modelling of curved surfaces; but such exercises do not so readily admit of graded lessons, and it is open to question whether wood-modelling cannot be equally efficiently executed by the use of the gouge and carver's chisel,—tools commonly used for this purpose. Indeed, it would seem that for the realization of curved lines and surfaces, modelling in clay affords the best exercise—a branch of manual training which is receiving now more attention than in former years. It must, however, be admitted that we are deeply indebted to the advocates of Sloyd for bringing prominently forward the educational advantages of manual training; though it would be unwise to follow too closely in the lines of the Swedish system. It is better to adopt the views underlying it, and to apply them to the fuller development of hand and eye training, as afforded by the use of different wood-working tools, combined with practice in drawing.

In what I have said I have endeavoured to indicate the high aims which manual instructors should set before them. As the science of education is further developed, it will generally be recognized that the real end of education is the formation of character, and the relative value of different subjects of instruction will be estimated according to their possible influence in developing useful mental or moral attributes. The acquisition of knowledge will hold a secondary place in the educator's scheme. The development of the faculties for acquiring knowledge will count for more. But both these objects will be subsidiary to the strengthening of the intellect and the will in the direction of rational and right-minded action. The new education differs from the old in that we learn to do rather than to know. "The old education," says Quick, "had one object, and that was learning. . . . The new education treats a man not so much as a learner as a doer and a creator. The success of the education is not determined by what the educated *know*, but by what they *do*, and what they *are*."

It is of the essence of good teaching that it shall involve fresh thinking. The manual instructor who allows his pupils to repeat processes with which they have grown familiar, processes which they perform mechanically without any new display of actual thought, is as blameworthy as the teacher who, with the view of imparting information, leaves his pupil to learn by heart long passages from books. The teacher of practice has to watch the moment when the hand is capable of working without any effort of the mind, in order to change the lesson for some other which shall stimulate fresh mental energy. It is this constant endeavour on the part of the teacher to supply the pupil with work, which simultaneously and yet progressively, exercises brain and muscle that distinguishes the manual instruction of the school from the trade teaching of the shop. Equally opposed to true education is the routine of drill as the fluency of cram. You must always remember that the machinery of manual training, the lessons in drawing and construction and in the properties of materials, are only instruments in the ordinary education of a child, in which you take part. You do not enter the elementary school as a carpenter or joiner, or metal-worker, but as an educator, and you do your part with the implements of the bench as the science teacher does his with the apparatus of the laboratory.

The establishment of the new education lifts a burden from the shoulders of the teacher and gladdens the lives of the learners. In the near future, the teacher will not be so much the oracular authority, as the friend and guide of his pupils in their search after knowledge. He will put them in relation with the world of matter, with Nature in its widest sense, and will leave them to discover by the same processes as they have to employ in life, the properties and uses of the things around them. All the characteristics of the new method of teaching and of learning are well illustrated in manual training. Remember you have to be learners as well as teachers, and, to be successful as either, you must have enthusiasm and love of work. Above all things, avoid the slough of routine, the decline and fall into methods of mere drill. It is by constant creation you will succeed. By looking for new directions for the flow of energy, by thinking for yourself and stimulating thought in others.

The subject of manual training is as yet in its early infancy. It suggests many interesting educational problems, to which time does not permit me to refer, that are well worthy to be considered and discussed by this Association.

I have already spoken of the difference between the Swedish Sloyd and the English woodwork. But this is only part of the general question of the best system of instruction to be adopted in our schools. Under this heading must be considered the kind and order of the exercises, the extent, if any, to which useful objects should be made, whether as illustrations of the exercises, or whether for the purpose of adding to the interest of the lessons. There is the question of the relation of drawing to the practical work, whether it should be taught independently, with or without reference to the workshop instruction, or whether it should be taught exclusively by the manual teacher, and in connection with the workshop lessons.

There is the important consideration of the relation of manual training to the physical development of the pupils. On this question I made a communication to the Health Congress held in London in 1891, and I need not therefore further refer to this branch of the subject. It is, however, a matter that must not be lost sight of. The kind of teaching in our schools has to be considered not only as regards its intellectual and moral value, but also in connection with its influence upon the health of the children.

Then, too, there is the further question of the position of metal work in the ordinary school curriculum. The tools and appliances for metal work are very different from those employed in woodwork. There are some persons who regard metal work as a mere advanced form of woodwork, without reference to the question whether the instruction is similar in kind, and can be made a means of continuing the intellectual and moral training of woodworking exercises. It may be, I do not say it is so, that the manual training involved in chipping and filing, and in the use of the forge, does not admit of that gradation of easy exercises which gives to woodwork its variety of interest, its succession of new ideas, and creates muscular aptitudes without undue muscular fatigue. Metal workshops have begun to be introduced into our schools, and it is a matter

still open for discussion whether the instruction given in such shops may be regarded as a part of general education, or whether it more properly belongs to apprenticeship. I assume that the functions of this Association are pedagogic. Methods of teaching trades do not come within the range of subjects it considers. The difference is great. The constant practice of some single operation with the view to acquiring commercial efficiency is the business of the trade shop. The practical exercise purposely designed for the exercise of some faculty of the mind and the formation of some intellectual or moral habit, and having for its secondary object the development of skill or the acquisition of knowledge, is the true function of manual training. It is for this Association, therefore, to consider whether, and if so, under what conditions and within what limitations, metal working may be made a real educational discipline.

To determine the most suitable preparation for teachers in woodwork or in metal work is not the least important or the least difficult of the problems still requiring solution. The City Guilds' Institute has, as you know, earnestly applied itself to the settlement of the question. It recognizes that pedagogic training is all-important for workshop instruction, and for this reason, those only who have received such training are eligible to compete for its certificates. To that extent the Institute was compelled to assume a dogmatic attitude. But the question is not placed beyond the region of discussion. The Institute does not claim finality for its decisions. On this question, as on so many others which may be regarded as still unsettled, this Association is entitled, after careful deliberation, to pronounce an opinion, and its suggestion would, I am sure, be thoughtfully considered.[1]

I trust the Association will not take a too exclusively trade-

[1] Subsequently, artisans were admitted to the Institute's qualifying examinations for teachers. In a Report on "Manual Instruction in Public Elementary Schools," prepared by a committee of Inspectors, and recently issued (1910) by the Board of Education, the committee state: "Theoretically it is certainly desirable that all the instructors should be certificated teachers. . . . On the other hand, we should hesitate to recommend the Board to discontinue the present practice in regard to the recognition of properly qualified artisan teachers."

union view of its aims and objects. To protect the interests of teachers, to carefully watch all legislation on the subject of manual training, are duties which it owes to its members; but I would like the Association to do more than this—to seek to advance and improve the methods of teaching by bringing to bear the knowledge and experience of its members upon some of the important educational problems to which I have referred; by inquiries into the working of foreign systems; and by publishing from time to time the results of such inquiries. I see a wide area of usefulness which this society may occupy. Manual training stands in the front of the revolution which has enthroned the new education. It is typical of the change. Let those who advocate it, those who direct it, its officers and workers, take counsel among themselves, so that they not only protect the line of their advance, but continue to improve their instruments and weapons, using them for the benefit of the children of to-day, and thus enabling the men and women of to-morrow to think and act with more precision, and with stricter devotion to accuracy and truth.

II

HANDWORK AND HEADWORK IN ELEMENTARY SCHOOLS: A FORECAST[1]

[1903]

In the several addresses which it has been my privilege to deliver, since first you did me the honour of electing me as your President, I have endeavoured to bring under your notice the different aspects of manual training in its relation to school education, and to place before you certain ideals, which, in your teaching, you should strive to attain.

In this, the last address I shall deliver from your presidential chair, I find it difficult to resist the temptation to pass in review the results of our ten years' efforts, and to show how your Association has grown in numbers and in influence, and how the work in which you are interested has developed. I cannot refrain, however, from referring to the fact that, whereas in 1893, when we began work, there were no schools nor scholars earning Government grants for manual instruction, and whereas in 1898 there were only 295 such schools with 18,390 pupils; in the year 1902 there were 1749 schools and 100,932 scholars receiving grants from the Board of Education in this subject.[2]

To-day I propose to look forward, to venture on a forecast, and to indicate, as well as I can, how handwork is likely to be associated with headwork in the schools of the future, and

[1] Address delivered before the National Association of Manual Training Teachers on Tuesday, April 14, 1903, at the offices of the London School Board.

[2] So rapid has been the progress since the above was written that in the year 1907–8, the number of schools whose pupils received handicraft teaching was 3674, and the number of registered scholars was 201,692.

the extent to which manual training will influence education in the years to come. The subject I have selected for my address is, however, so far-reaching that I can only hope to treat it in the briefest manner, and to give you a mere outline of the modifications in our methods of instruction, which the more general recognition of the value of handwork is likely to effect; and my suggestions and anticipations will have reference only to elementary or primary education.

There can be no doubt that the introduction of the workshop into our ordinary elementary schools, whether for the teaching of carpentry or cookery, was the beginning of a great change in our system of instruction. In the last few years many developments have taken place in man's activities affecting the methods of production, the means of locomotion, and, indeed, all the arts of peace and war, and such developments cannot be without influence on the progress of education. We cannot escape from the necessity of adapting the teaching of our schools to the changed conditions of our environment; and we have already discovered that the attempt to use the old education as a preparation for the new professions and the new activities and needs of life is foredoomed to failure. While, therefore, the aim and purpose of education may remain the same, the instruments we employ must vary with the conditions under which in different ages we live and work.

It has been often said that man is a tool-using animal. As his intelligence develops, he realizes the advantage of bringing himself into closer touch with the external world, by enlarging and intensifying his powers of apprehension and perception.

The use of hand-tools gives us a greater command over all sorts of bodies and a fuller knowledge of their properties than we are able to gain by our unaided hands, and the use of machine tools widens and strengthens that command. The help which ordinary tools give to the hand, the telescope and microscope give to the eye, the telephone to the ear, and the telegraph to our means of communication. These implements are all new, and the means we now commonly employ in seeing, in speaking, and in moving from place to place are very different from what they were only a few years since. In thousands of ways the conditions of living have changed, and we are more

dependent than we were on the use of instruments of diverse kinds to supplement what our hands unaided can effect, and what our senses unaided can perceive. The school workshop is the emblem of the change in our methods of instruction, which corresponds to these changed conditions of existence.

It is not so long since it would have been heresy to suppose that children go to school with any other object than to acquire knowledge. But we have now begun to realize the fact that the acquisition of knowledge is not the sole aim or purpose of a child's school training. It is enough if, in our elementary schools, we can show how knowledge may be sought. The knowledge itself may be acquired later on—indeed, throughout our entire life. The recognition of this fact is already effecting a considerable change in the arrangement of school work; and in the near future much of the time now spent in implanting, so to speak, different bits of knowledge in the child's mind will be saved. We shall no longer require children to learn, by constant repetition, scraps of history, geography, and grammar, nor try to teach them fragments of so-called science. The daily hours devoted to these tasks will be applicable to the creation of mental aptitudes, and will be utilized in showing children how to obtain knowledge for themselves. Instead of trying to make children *know*, we shall train them to *do*. Learning in all its stages will be *action*, a search after knowledge, and the care of the teacher will be to prepare his pupils for the search. In future, the main function of education will be to train our hands and our sense-organs and intellectual faculties, so that we may be placed in a position of advantage for seeking knowledge. Then, and then only, we shall become resourceful, capable of utilizing every implement that augments our power, whether it be a book or tool or other instrument. It is for this reason that the instruction given in the workshop is so important a factor in modern education. It is there that we are brought into direct contact with real things, and learn the use of tools in giving us a mastery over matter. It is there that the knowledge we acquire is gained by actual practice, and that we learn the great lesson of life,—that knowledge springs from power.

I doubt whether we yet fully realize the change in educational method which workshop instruction involves. Before

long, the central feature in all our schools will be the work-room —the room or shop or laboratory in which children work with their own hands and gain their knowledge by ordinary experimental methods. It will transfigure the entire teaching. It will remodel the school buildings. In the near future no head master will be appointed who is not familiar with workshop methods, or who is unable to apply those methods to the teaching of other subjects in the school curriculum.

While workshop instruction in some form or other will certainly become the dominating factor in elementary education, more time and thought will be given to reading and writing than those important subjects have hitherto received. The scope of the lessons will be enlarged. Children will be taught to read in order that they may desire to read, and to write that they may be able to write. The teacher's task will not be accomplished when he has taught his pupils to join letters into syllables and syllables into words, nor when he has shown how words may be expressed in writing.

Much that is now separately taught, as history, geography, and grammar, will be included in the reading lessons. The children will be taught *how* to read and *what* to read; how to use books as means of gaining information on a variety of subjects, in which the teacher will endeavour to arouse their interest. It will be the teacher's aim to create in his pupils a desire for knowledge, and consequently a love of reading, and to cultivate in them, by a proper selection of lessons, the pleasure which reading may be made to yield. The main feature of the reading lesson will be to show the use of books, how they may be consulted to ascertain what other people have said or done, and how they may be read for the pleasure they afford. The storing of the memory with facts is no part of elementary school work. Now-a-days libraries are within reach of all, and will be still more accessible in the future. It is well, therefore, that children should learn at school how to utilize them, as means of obtaining the knowledge that they may require on any particular subject, as instruments or tools for enlarging their experience and as a source of intellectual enjoyment.

What I have said as regards reading is applicable to writing.

It is not enough that a child should learn how to write, he must know also *what* to write. He must learn to describe clearly what he has heard or seen, to transfer accurately to written language his sense-impressions, and to express concisely his own thoughts. In a word, writing should embrace the art of literary composition, and with the simplification of elementary education more time will be given to this all-important art, so that children may grow up, possessing to a far greater extent than they now do, the faculty of clear, concise, and accurate expression. I have prefaced what I have to say on handwork by a reference to the teaching of reading and writing, because a knowledge of these subjects is necessary in the workshop, and because I want it to be understood that in the scheme I am suggesting for bringing nearly all the instruction to be given in an elementary school under the direct influence of the teacher who is furnished with workshop practice, I look forward to more time and greater attention being devoted to the literary training of the children.

But the central feature in our future schools will be undoubtedly the workshops, or, as I should prefer to call them, the work-rooms, as distinguished from class-rooms—the rooms in which children will be taught to handle tools and measuring instruments, to discover by their own observation and experiment the properties of real things, and to learn how to judge and to reason.

Just as the literary education of the child will grow out of his reading and writing lessons, so his instruction in all other subjects of a distinctly practical character will grow out of his training in the workshop. Under workshop practice our teachers have been already accustomed to include much more than modelling in clay, or the manipulation of wood or iron by appropriate tools. Manual training as a part of school education has been shown to mean much more than this, and every competent instructor now knows how such training may not only secure manual dexterity and skill, but may become a means of intellectual and moral discipline and an educative force of the highest value. How the energy of manual training may be converted into lessons that help to form character and conduct, I have endeavoured to show in the several addresses

I have had the honour of delivering from this chair. Thus much I may assume, therefore, that workshop exercises, following upon those of the kindergarten, may be made an instrument of intellectual and moral training. What I want to show is how other elements of primary education are likely to be taught, in future, in close connection with workshop practice.

The Code states that manual instruction "must be connected with instruction in drawing—that is to say, the work must be from drawings to scale previously made by the scholars under the personal supervision of the manual instructor," and it was largely owing to the representations of this society that the teaching of drawing has been thus closely associated with the lessons of the workshop.

The results have justified the experiment. It has been found that children take more interest in their lessons in drawing when they realize its connection with the practical work they are doing in the shop.

The manual instructor is thus already constituted the instructor in drawing. I want to show what fresh duties he will have to discharge. Workshop exercises afford practical illustrations of geometrical methods and problems, and the geometry thus taught in direct relation to the children's work becomes a real thing, and the method of instruction adds greatly to its value, quickening by the interest it excites the progress of the pupil.

Now, the principle underlying this method, that children take more interest in learning a subject when they realize its connection with the work in which they are engaged, is, I think, susceptible of wider application than it has yet received.

Surely arithmetic might be, and I believe will be, similarly taught. Probably there is at present no subject which is taught with less regard to its practical usefulness, or by methods more wearisome to the pupil, than arithmetic. The time spent in simplifying complex fractions such as never occur in actual work, in finding the greatest common measure, in mastering the rules of practice, and in solving the numerous difficult problems which fill our text-books, is to a large extent time wasted. If we consider for a moment the kind of problems that we are required to solve in our ordinary work, even when it is

of a technical character, we shall realize how very little of the abstract arithmetic which we learn at school is of any practical value to us in after-life. It may be said that exercise in the solution of such problems, even although they occur only in examination papers, is a good mental discipline. I very much doubt it. But even so, we must try to get our mental discipline from intellectual efforts, the results of which are of some use to us in the realities of life. The period of elementary education is too short, and its cost is too heavy, to admit of unnecessary time being given to mere mental gymnastics.

Now, it will be found that for the purposes of elementary education certainly, arithmetic, like drawing, can best be taught in connection with the handwork of the shop. The first exercises at the bench involve measurement—actual physical measurement—and measurement means reckoning and calculation. Among the early lessons in the workshop is the use of scales. The divisions and subdivisions of a scale illustrate all the lessons in decimal and vulgar fractions which a child needs, and the use of such scales familiarizes the pupil with the metric, equally with our own more complicated system. The measurement of areas and of solids is also best illustrated by actual practice, and the calculations based thereon can again be verified by the measurements of real things. In this way the workshop exercises may be closely associated with the teaching of number. Some knowledge of monetary arithmetic all children acquire in their own homes, and very little more is needed, but such further exercises as may be required should be given by concrete examples in connection with things with which the child has gained some knowledge at school. Abstract arithmetic should be wholly banished from the school curriculum. The intellectual discipline of verifying in the workshop all calculations will be of far greater value than the correct working of hundreds of the complicated exercises which fill our text-books.

It may be thought that by teaching arithmetic in connection with workshop practice, it would be taught unsystematically and without reference to orderly progress. But this by no means follows. A properly graduated system of instruction would be evolved, and teachers would be trained in the use

of appropriate methods. It is the ability to present lessons in a natural sequence, subject succeeding subject in a logical and natural order, that distinguishes the trained from the untrained teacher. I readily admit that, as the theory of education is developed, and the methods of instruction are improved, the art of teaching must become more difficult, and will demand more thorough and more careful training from those who practise it. The teaching of arithmetic in connection with workshop exercises will undoubtedly require more skill, and probably more patience, on the part of the instructor, than is shown in the so-called explanation of rules, and in the selection of examples to be solved by the pupil. But the educational results will be very different. The power acquired by the pupil will be far greater. He will have gained a command of numbers and the ability to use them, which will remain with him as an abiding aptitude, and with far less expenditure of time, and without the mental fatigue and sense of weariness, which the teaching of arithmetic, as an abstract subject, too often produces.

The teaching I have described will necessitate the use of measuring instruments, and will involve some little practice in scientific method—*i.e.* in the method of independent investigation and verification. But the child, even in the elementary school, must acquire something more than a knowledge of form and number. He must proceed one step further, and must be shown how he may gain a knowledge not only of the dimensions of bodies, but also of some of their simple properties. Here again, it is not so much the knowledge itself, as training in the method of acquiring it, which is essential; and in the elementary stage of a child's education it is enough if the foundations of certain aptitudes can be formed. This elementary training in scientific method can easily be arranged in connection with workshop exercises. Very early in his studies the child will perceive certain physical differences in the two materials, wood and iron, of which nearly every tool is formed; and, later on, he will recognize similar differences in the kinds of wood he uses. He will notice that some substances are heavier than others, without knowing how to estimate accurately their differences. But he may soon be led on to determine for

himself how these differences in density may be measured and numerically expressed. Other substances in common use, such as oil and turpentine, will afford material for further physical exercises. Again, in the handling of tools and in the explanation of their construction, examples occur of some of the simpler problems in mechanics; and the burning of a piece of wood is a suggestive illustration of chemical change, which, in the hands of a skilful teacher, may prepare the way for the subsequent study of chemistry.

It must not be supposed that the system of handwork I am advocating is inelastic, or that it would be less adapted to the requirements of rural than of urban schools. The method of concrete teaching is applicable to different conditions, and lends itself equally to nature-study as to elementary physical investigation. The systematic object-lessons which the workshop exercises suggest may be directed under well-trained teachers along different lines, according to local needs. An inquiry into the conditions of plant life may easily grow out of the consideration of wood fibre, and may lead to investigations connected with every variety of field work. Moreover, although what I said has special reference to boys' schools, the method is equally applicable to the training of girls. In the work-rooms for girls what is known as domestic economy will become the dominant subject of instruction. The problem of developing a practical curriculum for girls from the scientific teaching of cookery and needlework and their allied subjects has yet to be solved; but there can be no doubt that as soon as these subjects are better taught than they are at present, they will regulate and affect the entire course of practical study in our girls' schools.

These are but a few instances, and they might be multiplied indefinitely, of how the teaching of scientific method may grow out of workshop exercises. For such teaching no costly apparatus is needed. The school work-rooms may easily be fitted with the necessary appliances for enabling the pupils to carry out the simple experiments required at this early stage of their education. It is, however, an essential feature of the instruction that the children shall work out their own problems, that they shall make their own calculations, their own

measurements, their own drawings, and shall determine for themselves some of the simple properties of the materials they handle, just in the same way as they themselves plane and saw, and shape with the chisel, the rough material they use.

An important feature of the educational system, of which I have been able to give only the barest outline, is that it embodies an idea, and is governed by a simple and, I hope, an intelligible principle. It brings all the subjects of instruction into relation with one another, and gives unity to the school curriculum. Although there are indications that we are moving gradually in the direction of the changes I have suggested, we are not likely to realize them for some time to come. I have therefore called my address: "A forecast." But I have hopes that the new educational authorities will be in a position to try experiments in the schools under their control, and that they will not be too tightly bound by the rigid rules of any central authority, nor fettered by requirements connected with the earning of State grants. It will be seen at once that before such a reform can be effected in our primary education, many of the existing provisions of the Code must be modified. Manual instruction must commence at an earlier age than is now prescribed,[1] and some method must be devised of continuing without break or interruption throughout the child's school life the practical teaching of the kindergarten. Workshop instruction must cease to be regarded as an *extra* or special subject, on which additional grants may be earned; indeed, all special subjects must be abolished, and the school curriculum must be regarded as a whole. In the future, manual training will be closely associated with the teaching of drawing, geometry, arithmetic, and so-called elementary science, and will govern and give unity to the entire scheme of study.

The changes I have indicated in our system of elementary education will involve corresponding changes in the construction and equipment of our school buildings. In future, the workrooms will be the principal features in these buildings, and what are now known as class-rooms will be only incidental adjuncts. Manual training centres, to which children from different schools are drafted, will cease to exist, handwork

[1] In the Code for 1908 the age was reduced from twelve to eleven.

constituting part of the curriculum of each separate school. Already teachers in training are required to go through a course of manual work, which is indicative of the coming reform. But the teachers of the future will need a far more thorough training than they receive at present, and their professional status will be correspondingly raised.

The curriculum which I have suggested for our elementary schools will embody all that primary education now includes, and while the number and scope of the subjects taught will be more limited, the teaching will be more thorough and more efficient.

I believe that under such a scheme as I have indicated, both sides of a child's education, the ideal and the real, would be strengthened. The imagination will be developed through the reading lessons, by the study of suitable pieces of prose and poetry, by pictures, by drawing, and by the child's own compositions, and the handwork would give reality to all other parts of the child's education.

We must remember that there is no grade of education, the efficiency of which is of more importance to us nationally, than that given in our elementary schools. In these schools the great bulk of the population receive their entire school training —the training that must serve them as a preparation for their life's work, whether in the field, the factory, the office or the shop; or as a foundation for subsequent advanced instruction. It is a matter, therefore, of the utmost importance that the conditions of primary education should be most carefully determined. Equally important is it that the education should be not only efficient, but also economical—economical of the child's time and of the country's purse; and to this end it should aim at creating abilities and aptitudes that grow into, and form part of, the physical and mental character of the child, exercising a permanent influence for good over his thoughts and actions.

I must not detain you longer. I have given you the rough outline of a scheme of elementary education, towards which we are slowly but surely drifting, a scheme in which the members of your Association are destined to play the most conspicuous part. The time is fast approaching when your interests will be

identified with those of teachers generally, when of special subjects and special grants there will be no more mention.

I want to urge you in these few last words to rise to a full sense of your growing responsibilities. I want you to see that by improving in every way you can your own education, by raising the standard of qualification for the admission of new members into your ranks, by taking a wider view of the important duties you will be asked to discharge in the education of the coming generation, you will help, to that extent, to anticipate the time when handwork will be closely and generally associated with headwork in all our schools, and when the direction of the curriculum will come under your control.

And what a change in method and results all this implies! It means the inversion of the system under which our children are now generally taught. It means nothing less than beginning at the other end. True, we are told as a pedagogic principle that we should proceed from the concrete to the abstract, but as a fact most of our teaching follows the opposite course. True, we have read: "He only is a sincere learner who learns the secret of labour, and who by real cunning extorts from nature its sceptre." But our teaching is still largely the teaching of words, the attempt to fill the mind with facts which are soon forgotten.

Gentlemen, we cannot hope to reach perfection all at once; but we may aim at it. "To recognize a period of transformation, and to adapt ourselves honestly and rationally to its laws is, perhaps," as Matthew Arnold has told us, "the nearest approach to perfection of which men and nations are capable." The period of transformation is at hand; and clear is the writing on the wall which tells us that our old methods have proved defective, and suggests the changes that are to come. In the factory and counting-house, in the ranks of the army and the navy, in Parliament and in our schools there is a feeling of educational unrest, indicative of change. It is for you to read these signs, to ponder over them, and to act upon them. Remember what Bacon says: "Good thoughts are little better than good dreams except they be put to act."

I believe that by making our children's education grow out

of the conditions with which in early life they are familiar, by interesting them in all their work, by widening their circle of ideas and creating in them a desire for knowledge, while at the same time we show them the exact methods by which it may be gained, we shall develop in them a quickness of perception and resourcefulness in action, we shall make them vigilant and alert, and capable of overcoming the unexpected difficulties, which now and again impede our progress in every undertaking.

It is for you to assist in hastening this transformation, and by endeavouring to apply the methods of instruction I have somewhat vaguely indicated, to make the school training of the future a real preparation for complete living.

III

HANDWORK IN SCHOOL LIFE: DOMESTIC SUBJECTS [1]

[1903]

THE subject of the present address is one in which I have taken, and continue to take, a special interest. It is a very wide subject, and I cannot expect, nor do I desire, to treat it exhaustively in this address. What I have to say this evening will refer mainly to handwork in girls' schools. It is important, however, for parents to realize that education, as now understood, is a very different process from that of filling children's minds with facts, or of even satisfying their curiosity by answering their innumerable questions, and that "practical work," in which the hands are necessarily engaged, forms an essential part of intellectual and moral training.

You probably know that the history of educational theory is largely occupied with the struggle between the so-called *Humanists* and *Realists*, between those who preached that "the proper study of mankind is man"—*i.e.* of man's thoughts and actions—and those who placed *things* before *words*, and taught that Nature, in any of its numberless and marvellous manifestations, should form the basis of a child's education. The antithesis has been variously presented, and is continually recurring. It is seen in the contrast between book-learning and object-lessons, between the lecture theatre and the laboratory, between the class-room and the workshop. There is nothing new in the theory that handwork is an important factor in education, although the methods by which it may be

[1] A paper read at the Seventh Annnal Conference of the Parents' National Educational Union, on Thursday, October 29, 1903.

taught, and the mental training it may yield, are matters which have been largely developed in the last few years. Among our earliest educational writers are found earnest advocates of handwork. Comenius, Locke, Milton, Rousseau, Pestalozzi and Fröbel, not to speak of many others, gave a strong impulse to practical teaching, to manual training, and to a system of education in which new ideas were derived from sense presentation. Of all these writers, none anticipated the modern methods of instruction more fully than Rousseau in his *Emile*. It was he who insisted on the importance of measurement as an instrument of education. It was he who taught that the foot-rule and the balance were schoolroom tools; and now, as you know, the progress of physical science depends largely on the results of accurate measurements, and the theory of the constitution of the universe hinges on the determination of the size of the atoms which make up what we call matter.

During the last quarter of a century, owing to many causes, a strong protest has been made against the purely literary education which our schools afforded. This protest has not been due entirely to any higher conception of the aims of education, nor to any wider knowledge of its conditions, but has resulted rather from the more commercial spirit of the age, and from the belief that the teaching in our schools failed to give the knowledge, aptitudes, and training needed for the practical business of life. From this belief in the inefficiency of our school teaching first arose the cry for technical education. Now, although that cry succeeded, where perhaps no other would have proved equally stimulating, in making people think about the theory of education, its aims and methods, and in hastening that hopeful educational renascence, to which is due our meeting here this evening, still it must not be supposed that educational Realists of to-day base their advocacy of handwork and science teaching on its commercial usefulness, nor on its applicability to the practical needs of life. As a fact, the commercial idea has tended rather to retard than to hasten the reforms which have been urged, owing to the imperfect methods of instruction which it encouraged. The Realists, equally with the Humanists, recognize that education should prepare us for complete living, and both sides maintain with equal urgency

that education must be considered as a formative process, its final aim being the building up of character. The Realists, however, hold that the study of things rather than words, the study of Nature, even more than of language, helps as a discipline in developing and improving character. This claim of the Realists receives generally but scant justice. Nor is it surprising that their views should be misunderstood, seeing how imperfectly science has hitherto been taught, and the incorrect ideas which are current as to its educational value.

It is only within the last few years that efforts have been made to introduce science into our schools, not as a subject to supply useful knowledge, but as one of equal formative value with classics or mathematics. As you know, any subject of instruction may be regarded from a formal or a didactic point of view. Formal studies are those which are essentially disciplinary, and aim at the development of the faculties, at improving the powers of observation, the memory, and reasoning, whilst didactic are supposed to yield information, to increase knowledge, and to provide skill. I need not say, no such division can be thorough-going. The two classes overlap. Every subject of study can be looked at from two points of view, according to the value of the knowledge it imparts, or the help it affords in developing the faculties and in creating habits. In determining the subjects of school instruction, we should carefully compare the two sides of each. We should never lose sight of the value of the information they severally afford, but we should also consider whether they can be taught by methods of disciplinary value. If we accept provisionally Herbert Spencer's statement, that the function of education is to prepare us for complete living, we see that knowledge of the world, of men and things, is essential, but that even more important is the aptitude to deal with men and the power to control things, and the attainment of that trained character, that commands respect and enables us to rise superior to circumstances.

It is because handwork in some form or other—handwork associated with headwork, and applied to the determination of the properties of *real* things, and to the investigation of the causes of change in natural phenomena—has been proved to

supply a vast field of useful knowledge, and at the same time to create these aptitudes, that it has found a place which is likely to be permanent in our modern scheme of education. A reason of the success that has attended the endeavour to introduce manual training into our boys' schools, is that its advocates had, from the first, a clear and correct conception of its purpose in education. They resisted the attempt made by those who failed to grasp its meaning, to dwell upon the commercial advantage of teaching boys to use their hands. This might, and probably would, be a gain to them. But it was not to facilitate the entrance to a trade that handwork was advocated as an essential part of school instruction. It has won its way, because from the very first it has been taught with a view to its formative influence. In the method of instruction, due thought was given to the *formal* and to the *real* side of the training. In this respect it was more successfully started than science teaching. The didactic side of science was brought into too great prominence. Too much importance was attached to the *value* of the information it afforded. Science was too attractive a study, and its formal side was too little considered. Every one insisted on the importance of teaching children something about the structure of the Earth, the habits of animals, the names of plants, the mechanical powers, the wonders of the heavens, the properties of matter, the laws of health, and so on, and the child's mind was filled with unassimilated, unassociated facts and vague ideas, which in no way acted on his will, and added nothing to his resourcefulness, to his power of initiative, to his judging or reasoning capacity. Against this tendency of so-called science teaching, there has been, in the last few years, a strong reaction, and efforts have been made to shunt the methods of instruction on to right lines. But the progress of education has been greatly retarded by the erroneous aims and methods which so long prevailed. A whole chapter in the history of educational thought might be written on the paralysis of school life, which has resulted from the intrusion of science into the school curriculum, without any well-conceived idea of its purpose or of the proper method of instruction, or of the means of correlating it with other school subjects.

It is strange that now, when the function of science as a part of general education is beginning to be understood, when school teachers are honestly endeavouring to prove its disciplinary value in creating mental and moral habits and in forming character, there should be signs of a new crusade in favour of literary studies as against workshop or laboratory instruction. The reasons of this reactionary movement are very complicated and are due to many erroneous conceptions. It is fostered to some extent by the remarkable influence which Herbart, the German philosopher and educational writer, has exercised of late in this country, in Germany, and in the United States. Born in 1776, a century and a quarter ago, he founded a training school at Königsberg, which was not very successful, and wrote several treatises and pamphlets on the philosophy of education. His system helped very greatly to stimulate what, for want of a better word, is called "culture." He attached great importance to the enlargement of the circle of the pupil's thoughts, and made some useful suggestions as to the necessity of suitably preparing the child's mind for the reception of new ideas. There is much that is valuable in his suggestions for bringing new ideas into relation with those previously in the mind by means of which our knowledge is enlarged; but his system of teaching, founded, to a great extent, on the well-known laws of association, was too mechanical. He laid too much stress on the acquisition of ideas, without sufficient regard to the methods of instruction by which clear and simple ideas may best be formed, and the tendency of his theories was, to quote the words of one of his exponents, to make instruction "the chief, though not the exclusive, task of the educator." There is much, however, in the views ascribed to Herbart which is of great value in education, particularly as regards the importance of investing schoolwork with interest, and creating a sort of centre around which school studies should be grouped, and out of which a simple scheme of instruction may be developed.

This digression is intended to show that so-called Herbartianism, for it is really an influence rather than a doctrine, has tended to lay stress upon ideas rather than upon things, and, while thus creating a somewhat misleading contrast, to

emphasize the importance of literary studies, of history, and language as opposed to the study of real things.

The strangeness of this movement and its unexpected development, is that Herbart taught, and to some extent rightly, that character was determined largely by what one may call breadth of view. According to him, "all action springs out of the circle of thoughts," and by widening the circle of thoughts, by creating in the mind many-sided interests, the path to right conduct was made easy. Virtue was found in intellectual pursuits, and character was moulded by ideas. As the aim of education is the formation of character, the function of the educator was to instruct, to enlarge the circle of ideas, by imparting information on a variety of subjects. Now, it was owing mainly to the fact that the interest of science lay in the information it afforded, and that the science teacher aimed mainly at instruction, that science teaching failed as a means of real education; and it is by a reversion to the disciplinary ideal, by treating science as a formal study, by laying stress upon *method* rather than upon *facts*, that the advocates of handwork, and of practical training, are endeavouring to secure for science its proper place in school life. According to modern educational theory, the very subject which is of widest interest, which yields most rapidly the largest number of new ideas, and which is, perhaps, the most effective in widening the circle of thought, derives its value in education, not so much from the information it supplies, nor from the ideas it stimulates, as from the discipline it affords in self-help, in accurate observation, in clear conception, in truthful expression, in correct judgment and decision, and in other habits that go to form character. Here would seem to be a well-marked difference between the disciples of Herbart and the present-day advocates of handwork as a means of training. There is, indeed, some danger, both in this country and in America, that Herbartian theories may tend to lessen the wholesome influence which Pestalozzi, Fröbel, and Herbert Spencer have exercised. This is the more to be regretted because the method of instruction involved in the well-recognized maxims, "Things before words," "Formation before information," and "Research everywhere," which have grown out of science

teaching, are equally applicable to the study of history and physics, to humanistic and to realistic culture.

In pleading for the introduction of handwork into our elementary and secondary schools, I have constantly drawn attention to its *formal* aspect. I have endeavoured to show that handwork is formative of valuable habits which influence character. In my several presidential addresses to the members of the Manual Training Association, I have pointed out in detail how workshop instruction in the hands of a skilful teacher may become an instrument for forming not only useful practical aptitudes, but also intellectual habits of thought, of service in the real work of life. I have kept in the background the advantage to the future artisan, or mechanic, of school training in workshop methods. This advantage I have always considered of secondary and incidental importance. The true value of workshop training is in the making of men, and not of tradesmen. It is in enlarging the circle of ideas through practical pursuits, but it is, above all, in the *method* of attaining to ideas—clear and correct ideas—and in the development of self-help and spontaneous activity, that manual training is so valuable a factor in all education. It creates aptitudes which no purely literary education can give, and for this reason its inclusion in the curriculum of our schools must be accounted the chief educational achievement of the last decade of the nineteenth century.

In an address, which I gave in April last, on "Handwork and Headwork," I ventured to prophesy that before long the workshop would become the chief feature in all new buildings for elementary schools, and that classrooms would be only incidental adjuncts. I still adhere to that opinion. I believe that the central point—the pivot of our elementary teaching—will be the workshop instruction, and that manual training will give unity to our elementary school curriculum. In endeavouring to group school studies around some one subject, I may claim the support of Herbartian authority. It is a merit of the Herbartian teaching that stress is laid on the correlation of school studies, on the grouping together of subjects of instruction, and on associating them with one another. In this way the interest of the study is increased, the attention

of the children is stimulated, and the ideas hold together more closely. Certainly no Herbartian ever thought of making manual training the centre of instruction. This place of honour was given to history. "Other subjects," we are told, "should be connected with this and subordinate to it." I am not going to quarrel with the Herbartians as to the centre of instruction. It is not generally recognized that such concentration, or even correlation, of studies is possible, and the recognition of the fact is an important point, to which too little thought has hitherto been directed. But I have endeavoured to show that, as regards elementary education certainly, the teaching of arithmetic, of physical science, and to some extent of English composition, may be made to arise out of, and to centre around, workshop instruction. It is true the purely literary side of education must stand a little apart, and needs to be developed around a subsidiary centre. But that centre should be reading—one of the three "R's." The reading lesson may be the means of interesting children in biography, in history, and through history, in geography. It may also be used so as to show children *how* to read, how to read aloud—a by no means unimportant art—how to appreciate the beautiful in our beautiful literature, and so to acquire a love of reading, and a knowledge of the use of books.

Much of what I have said as regards workshop instruction may seem to apply to boys only, but it applies also to girls, with a difference. And this difference brings me to a very important consideration. Should there be any essential difference due to sex between the education of boys and girls? To this question I unhesitatingly answer, Yes! There should be a difference in subjects, if not in method. The principles of education apply equally to the training of boys and girls. But the application of those very principles requires us to take into consideration the physiological and psychological differences of the two sexes, and also the aim and purpose of the education. If we consider the end of education as the formation of character only, even then we must admit that the character, made up of habits of thought, which should be stamped on girls, is not identical with that we should desire for boys. But the aim and purpose of education cannot be considered apart from the

conditions of environment, and they are not the same for both sexes. The meaning of the phrase, "complete living," for which education is the preparation, is different, viewed from the male and female standpoints. The teleological aspect of education cannot be overlooked. It is not enough to think of the *formal* value only of any particular study, or group of studies. We are bound to consider training in relation to environment, and to the life and occupations for which it helps to prepare us.

Now it seems to me that our women educators have hitherto failed to grasp, or certainly to act upon, this important principle. They have done all they can to assimilate the education of women to that of men, but they have not attempted to develop any scheme of training, which, taking into account women's nature and women's future occupations, should be specially applicable to their own sex. On the contrary, they have made their own schools an almost exact imitation of the schools for boys, even to the repetition of the faults and failures. It is difficult to point to any new departure in education, specially applicable to women, which women have originated.

I am unwilling now to pursue this subject further, although it admits of much illustration, and opens up a wide field of interesting inquiry. I admit, and I accept the admission as a partial explanation, that women were eager to emancipate themselves from the traditional fetters which curtailed women's freedom in choosing an occupation, and implied on their part a marked intellectual inferiority to men. They were desirous of proving, and they have proved, that they are as capable as men of acquiring knowledge, whether literary or scientific, and even of sustained mental effort; and the results of university examinations show unmistakably that as regards such knowledge and capacity as can be tested by examination, women require only a fair field and no favour to compete successfully with men. Let this be granted; but the question still to be answered is whether the same training is equally applicable and equally serviceable to women as to men, and I, for one—and I believe I find myself in a lessening minority, if not in an increasing majority—think it is not. There is nothing I more desire than that women should devote their intellectual energy to the

consideration of the question: What is the best curriculum for different grades of girls' schools?

Now, as regards workshop instruction, I think practical training is as necessary for girls as for boys, and I have no doubt that the workroom will be the centre around which the practical studies of girls will group themselves. But although woodwork and metalwork might prove as useful to girls as to boys, considered from the point of view of discipline only, those subjects are not of equal educational value to both sexes; and we must look to the future occupation of women, to the work in which all, more or less, will be engaged, to discover the subjects to be taught in the workshops of girls' schools. These subjects are undoubtedly the domestic arts—*cooking*, *cleaning*, and *clothing*. In everything relating to the management of a household, a girl finds scope for manual training and the study of scientific method. Properly taught, the domestic arts are probably of higher educational value, as centres of instruction, than woodwork or metalwork. They are richer in ideas, and may be made the means of extending even more widely the circle of thought. It is, however, necessary that the subjects should be taught educationally rather than professionally. This is true as regards secondary as well as elementary schools. We cannot expect in our elementary schools to train cooks, or laundresses, or dressmakers, but we may succeed in training girls in the principles which shall enable them to act intelligently in the one capacity or another. In the evening continuation classes these domestic subjects may be taught as branches of technical education; and if the pupils come to the classes well prepared in the practice of scientific method, and with some knowledge of the rudiments of science and of drawing as applicable to these arts, they will soon acquire the technical skill needed to render them competent and efficient workers. It is a bald truism to state that all women need, as essential to their well-being, some knowledge of the principles of domestic science and some skill in the practice of the domestic arts. Granted that all women do not marry; still the great majority of women cannot escape from the responsibilities and duties of motherhood, and this fact must determine the character of the education which women generally should receive. Even the minority who work for their own

living and remain spinsters, must, either as mistresses or servants, exercise some control over household matters. I need not labour this point. I refer to it only to show that the workroom instruction of girls should consist of domestic subjects, and that these should occupy a large portion of a schoolgirl's time. The remainder of the day should be given, as in the case of boys, to bookwork, and to all that reading includes; and in secondary schools to the study of other subjects, and certainly of at least one foreign language. The workroom teaching should lead up to, and embrace, the study of those elementary principles of science which cooking and cleaning suggest, and also to lessons in drawing and design, a knowledge of which is of recognized use in all kinds of needlework, and in household management. What an abundance of insight into the principles of chemistry and physics and scientific method the most ordinary domestic practices disclose! You cannot light a fire or boil an egg, or wash a piece of flannel, without applying certain principles of science. The economic cooking of the simplest dish involves the use of weights and measures. The management of income, expenditure on rent and rates, the furnishing of a single room suggest innumerable calculations, in which the child may be made to take an interest. The careful cutting out of garments depends on accuracy of measurement, for which tape and rule are needed and some ability to draw, while dressmaking and millinery in their simplest forms give occasion for practice in design. Nearly everything which the children in our elementary schools need to learn, and much of what our higher schools should teach, can be developed from lessons in domestic science. Apart from purely literary studies girls may gain, in their domestic workrooms, a practical knowledge of the fundamental principles of science; training in the methods of investigation; and a large amount of useful information, which will qualify them for any duties that they may have to discharge, and will serve as a suitable preparation for their special work in life. I am glad to find that this view of the educational value of domestic economy, as a part of the general education of girls, is now attracting attention. In the United States there are schools for girls in which the teaching of physics, chemistry and physiology, of botany and hygiene, is made ancillary to the general

instruction in domestic science. In Ireland a scheme of instruction, to which I have recently referred in a long letter to *The Times*,[1] has been published by the Central Educational Authority, which gives full details of a course of study in domestic economy, embodying these ideas. What we want in this country is the assistance of intelligent, unbiassed, broad-minded women, with a knowledge of the world, and of social needs, to reform our system of girls' education, so as to make it character-forming, and at the same time practically useful.

I have briefly indicated the kind of change which intelligently applied handwork may bring into our scheme of instruction. I claim for such work a richer harvest of serviceable ideas, than from any other form of instruction; and I hold that such ideas, acquired by individual activity, abide as permanent possessions, permanent possibilities of fresh thoughts.

I take it that one of the objects of this Society is to arouse in parents an intelligent interest in their children's education, and to enable them to understand something of the principles that underlie its methods. No society could have a worthier or more important object. I look to parents to help to bring about that reform in girls' education which is one of the great desiderata of our times. The whole question needs to be thought out from the beginning, and to be considered in relation to the end and purpose which education has to serve. In the solving of this problem parents can undoubtedly assist. Hitherto, the character of school training has been determined too exclusively by teachers. Changes must come from outside; and who are so interested in effecting changes beneficial to their children as parents? If I have succeeded in awaking your interest in the subject, in showing you the importance of practical training in the education of our boys and girls, and in indicating the special class of subjects most deserving of scientific treatment in our girls' schools, I shall feel I have done something towards securing your help and the help of your Society, in giving effect to some of the changes in our methods of instruction which I venture to think are now widely needed.

[1] September 4, 1903.

IV

MANUAL TRAINING IN RELATION TO HEALTH [1]

[1891]

Among the many changes that have taken place in the system of national education during the last decade, by no means the least important is the practical recognition of the principle that education is the right development of all, and not of some only, of the faculties of mind and body. As regards the mental faculties, we were accustomed, in times not so long ago, to speak of the five senses as the sole agencies through which mind and the external world were brought into close relation. Of these, the eye and the ear were the chief sense organs that were exercised in education, and these only in so far as they served for the training of memory. Education consisted mainly of repeating facts acquired at second hand. The senses themselves, as organs of perception, were very little cultivated, and among these the muscular sense was not included. Yet it has now been long known that much of knowledge which we acquire by the direct action of the eye is the result of muscular changes, and that by far the greater part of our knowledge of the external world is due to the action of the limbs, and to the muscular impressions produced upon the brain through the calling into play of the appropriate nerve centres.

[1] This paper was read in the year 1891 before the Educational Section of the First International Health Congress, over which King Edward VII., when Prince of Wales, presided. It is reprinted, in part, as showing the importance then attached to bringing into prominence the hygienic aspect of manual work, which had only recently been introduced into some few schools. It was published in 1892 in the January number of the American *Educational Review*, edited by Dr. Nicholas Butler.

With all this, physiology has made us fully familiar. But education (which from its theoretic side may be regarded as an applied science) has been slow to recognize the necessity of cultivating the muscular sense as a means of acquiring knowledge. Indeed, the acquisition of knowledge at first hand has been little considered. The revolution that is associated with recent theories of education is little more than a protest against teaching by authority, and the substitution therefor of teaching by observation and experiment; and this new departure implies the training of all the organs which are concerned in giving exact notions of the things about us. This is a great advance on learning by memory only. The new education demands the careful training of all the organs by which knowledge is primarily acquired. It rests, therefore, on a psychological and physiological basis. Manual training is claimed as a subject of school instruction because it serves to exercise conjointly, and in harmony with one another, the muscles and nerve centres of the hand and eye which are concerned in perception.

This is the intellectual side of the argument for the introduction of manual training into our schools.

Although of importance in the education of all children, it is of more importance in the training of those who have mainly to employ their hands in the work of life, as helping to create aptitudes and fix sense-impressions in the brain, which will subsequently prove serviceable to them. Regarded from the economic or industrial point of view, much has been said of late in favour of manual training, in connection with the question of technical education. To our young artisans there is little doubt that instruction which serves to exercise the hand and eye, to teach exact notions of form and size, of mass and hardness, and to enable the hand to represent on paper, and to reproduce in material what the eye perceives, is most serviceable; and if at the same time the instruction can create aptitudes for using instruments of precision, and can develop handiness, concurrently with the training of the intellect, its educational value must in the course of time be generally recognized.

There is another aspect in which manual training may be considered, which is of equal importance with the intellectual and industrial points of view, and that is in its relation to the

health of the children. Experience and theory both show the value of the instruction as a mental exercise and as a serviceable preparation for the actual work of life. In education, the *corpus sanum* has to be considered as well as the *mens sana,*—the healthfulness of an occupation as well as its intellectual character and utility. In visiting recently a large number of foreign schools, I was struck with the superior physique of the boys engaged in the school workshops over those occupied the whole day in sedentary pursuits, and these observations have left no doubt in my mind that manual training conduces to physical growth and development. But casual observations such as these do not count for much, and the subject is one well deserving further inquiry.

Some few years ago there was a great outcry that the children in our elementary schools were being over-instructed, and that their minds were being educated at the expense of their bodies. The cry of "overpressure" was everywhere heard, and there were some who took advantage of it to proclaim that we were injuring the physical constitution of our future working classes, and were training a body of short-sighted, narrow-chested, muscularly weak artisans, whose smattering of learning would prove no adequate compensation for their deterioration in physique. The outcry did some good, for it drew attention to the condition of elementary education, and accelerated some of the improvements which have since taken place. Careful investigation showed that children suffered more from *underfeeding* than from *overpressure,* and soup kitchens and penny dinners have since been more liberally provided. But the causes of underfeeding could not, unfortunately, be permanently removed; and, allowing for some exaggeration in the "overpressure" cry, it was ascertained that the conditions of our primary instruction did tend to encourage undue pressure of both teachers and pupils. The competition for money grants on results was altogether unwholesome, and has been gradually discontinued. But apart from that, the education provided in our schools was shown to necessitate too much sitting, too much reading and learning by heart, and to take too little account of the natural and spontaneous activity of the child.

It failed to develop the child as a whole, in accordance with its physical constitution, and the natural overflow of vital energy was restrained instead of being directed into channels of future usefulness. The remedy for this could not be found in mere physical exercise—in drill, gymnastics, or in ordinary recreation; for these exercises occupied a large amount of time, and could not well be made educational in character. The school hours, if devoted exclusively to book-learning and employed in sedentary occupation, were too long, and proved too great a tax upon the child's strength, and the system failed to insure at once healthy development of body and intellectual progress. What was needed was a subject of school instruction, which, through the exercise of the muscles, should stimulate the brain and at the same time secure intellectual discipline. This was found in manual training. Experience has shown that where manual work has been introduced into schools, it is helpful in maintaining the body in a healthy condition, while serving at the same time to stimulate the mental powers. Theoretically, this is only what one would expect, but experience has verified the expectation. M. Salicis, the founder of the Ecole Tournefort at Paris, to whom the movement in favour of manual training is largely due, tells us, after an experience of sixteen years of Paris schools: "The children thrive, notwithstanding that their attendance in school is longer by two hours than the regulations provide." And the instructions, placed at the head of the programme for manual training now observed in all French schools, fully recognize the advantage of such teaching from a hygienic point of view. In defining its object we are told: "Manual training has a double purpose, one of which is to strengthen the body, to invigorate the constitution of the child, to place him in the hygienic conditions most favourable to a general physical development." From all countries we have testimony of the salutary influence of this training, and our own experience shows that, apart altogether from the industrial advantages which children derive from the aptitudes it creates, it quickens their intelligence, and increases their interest in their ordinary lessons, enabling them to fix their attention with less loss of energy upon their other studies.

There can be no doubt that the concurrent development of

all the functions and faculties of the child is an indispensable condition of healthy education. Without some kind of manual training, this cannot be effected. We are told that the brain consists of distinct parts which subserve separate offices, and that certain nerve centres, situated within the brain, regulate and initiate through the will distinct muscular actions. These nerve centres appear to control actions which are more susceptible of educational influences than the reflex actions referable to the spinal cord, and the development of these motor centres, and, consequently, the due development of the brain of which they form a part, depends upon their being called into use and properly exercised.

It would appear, moreover, that each such centre has a definite period of growth during which the exercise of the organ it controls conduces most to its development, and that if this exercise is neglected the nerve action in the brain is enfeebled, and the activity of the organ is impaired. It is important, therefore, that education should seize upon the organ during the period of development of the corresponding nerve centre if the organ is to be trained to most advantage. Experience fully confirms these inferences from experiments, and shows that manual dexterity and nearly all other aptitudes are best acquired during childhood, and that no amount of exercise in after life can compensate for omissions in our early youth. Sir James Crichton-Browne tells us: "The nascent or development period of the hand centres has not yet been accurately measured off; it probably extends from the first year to the end of adolescence, but there can be no doubt that its most active epoch is from the fourth to the fifteenth year, after which these centres become comparatively fixed or stubborn." And he goes on to say that boys and girls whose hands have been left altogether untrained up to the fifteenth year are practically incapable of high manual efficiency ever afterward. In this statement we have a powerful argument, from the economic point of view, for making hand and eye teaching concurrent with other instruction throughout the whole period of a child's primary education. But I do not desire now to dwell upon this aspect of the question, but to indicate rather the general effect of such training on a boy's health. On this point the same authority may be again quoted

with advantage. He says: "The boy who is reared with his hands bandaged, physically or morally, or who is by any means withheld from ample exercise and varied discipline of these wonderful and willing organs, must grow up to some extent feeble and incapable;" and he adds, "Depend upon it, much of the confusion of thought, awkwardness, bashfulness, stutterings, stupidity, and irresolution which we encounter in the world, and even in highly educated men and women, is dependent upon defective or misdirected muscular training, and that the thoughtful and diligent cultivation of this is conducive to breadth of mind as well as to breadth of shoulders."

It may be accepted, therefore, that, without exercise that brings into discriminate use the muscles of the hand, the brain itself is only imperfectly developed, and the general vitality is lowered in the same way as if any other sense is not utilized. It is owing to the general and uniform muscular development by workshop exercise properly directed, that the health of schoolboys between eleven and fifteen years of age is undoubtedly improved. To the children of all classes such training may be considered, on purely intellectual grounds, a necessary part of school education, and it is satisfactory to know that workshops have been recently attached to a few of our public and endowed schools. But to the children who frequent our elementary schools, and who form the bone and sinew of our population, such training is still more important, not only intellectually, industrially and morally, but also in its effect on muscular development. The conditions under which they live give fewer opportunities for healthful physical exercise than are enjoyed by children who are placed in more favourable circumstances; and the fact that the majority of these children will be occupied with manual work during the greater part of their lives is an additional argument for utilizing a portion of their school days in the training of those organs on the usefulness of which their future progress so greatly depends.

It is a fact of some importance that the introduction of workshop instruction into schools has the effect of lessening the necessity for punishment. I think we may assume that any education in which punishment is frequent is an unhealthy

education. The effect of punishment is to depress the nervous system and to diminish the intellectual energy needed for school work. Even where, under the influence of fear, some better results are temporarily obtained, the general vitality of the child is lowered by punishment, and the educational results are less satisfactory than they might have been. The progress of educational science is shown nowhere to greater advantage than in the decrease of punishment as a means of school discipline, and the effect of these improved methods on the health of children generally, and particularly of children of nervous temperament, cannot be overestimated.

Handwork is a school exercise which is not only interesting in itself, but one that quickens a child's interest in many of his other lessons, and the desire to take part in the workshop instruction is a wholesome inducement to attention and to general good behaviour. There is little doubt that by adequately exercising, without subjecting to any painful strain, the various intellectual organs, all school lessons will be made sufficiently interesting to render punishment quite unnecessary. The addition of manual work to the curriculum of schools marks a very important step in this direction.

But in order that workshop instruction may yield its maximum value, it must be given under conditions favourable to health. First of all, the school workshop must be constructed on approved sanitary principles. Hitherto, we have been content to take any spare room, to fit it with benches, and use it as a school workshop. But with the general adoption of manual training, the construction of the school workshop has to be carefully considered, both as regards its size and shape, and the best means of lighting and ventilating it. Then as to fittings, we have to determine the proper height and arrangement of benches, the best kind of tool racks, etc. The mode of handling tools, and the position to be occupied by boys at work so as to prevent injurious muscular development, are also matters of importance in their bearing upon the health of the children. On these and on many other points the teachers will require to be instructed, if manual training is to be a really healthy exercise and is to occupy a prominent position in the school curriculum.

To some of these questions experience has already provided answers; others still await solution. A top-lighted shop, for instance, is not as good as one lighted from the sides. As regards the character of the instruction, lathe exercise is not considered as healthy as bench work. Most of the French schools are provided with lathes, and the boys work in groups of three to each lathe; but on this point M. Sluys, the Director of the Normal School at Brussels, well says; "The turner's work is always difficult, and not without danger; besides, it calls for a one-sided effort. We cannot, therefore, give it a prominent place in school work. In a word, woodwork without carving or turning is sufficient to attain the end, and ought." This view has guided those who have had the direction of manual training in this country, and is in accord with the opinions expressed by other educationists. Rousseau says: "The trade I should prefer my child to choose would be that of a joiner" (and by trade Rousseau only means "manual exercise"); "it is neat, it is useful, it can be practised in the home, it keeps the body in tolerably good condition."

I need scarcely say that not only the intellectual but also the health value of the instruction depends very much upon the intelligence and training of the teachers; and on this point I may be pardoned expressing some satisfaction that most authorities seem now to concur in the opinion I have elsewhere stated, that the "teachers should be trained schoolmasters." "It is among the primary instructors," says M. Sluys, "that the recruiting of teachers for this work is to be done;" and further, "the experiments of Basedow, Francke, and others in regard to mutual training—the educational bearing of which these teachers well understood—have failed, chiefly because the instruction in this work was intrusted to *artisans*, who considered the school a *workshop*, and treated the pupils as *apprentices*."

It will be seen that there are several important questions connected with the hygienic value of manual training as a school exercise on which it is desirable to collect more exact information than we yet possess.

Information as to the results of manual training under various conditions will serve as a guide in framing rules for such instruction with a stricter regard to its healthfulness than has

yet been done. It is very desirable that accurate measurements should be made of the children under instruction, so as to ascertain its effect in increasing muscular development.[1] Records should be kept of the absences of children through illness, of their progress in other studies; and the results of these observations should be considered in connection with the system of instruction adopted. In this way further guidance in directing the teaching on the best lines might be obtained. It must be remembered that manual training is yet, and is likely to remain for many years, a new subject. Its introduction into our schools marks an important change in our system of education. But it is still in its experimental stage. One of its chief advantages is to correct and mitigate the harmful results of that combination of circumstances peculiar to the conditions under which the poorer classes have hitherto been educated, and known as "overpressure." "In ordinary lessons," says M. Sluys, "pupils remain at their desks many hours. This sitting position is bad; it enfeebles the body and in this way reacts upon the mind. Gymnastic exercise has its *raison d'être* in the need of preserving the organic equilibrium. It increases the functional energy, and through this the moral. Manual exercises, if they are properly chosen, produce similar effects." That manual training may be made the means of developing muscular strength and of preserving and improving the health of the children in our elementary schools, there can no longer be any reasonable doubt; but it is important, both for the intellectual as well as the hygienic value of the instruction, that the best methods of training should be adopted, and such methods can only be secured by accurate observations and careful deductions.

[1] These anthropometric records can now be kept under the Act of 1907, which provides for medical inspection.

V

THE APPLICATION OF SCIENTIFIC METHOD TO EDUCATIONAL PROBLEMS[1]

[1907]

NOTWITHSTANDING the fact that the greater part of my life has been spent in educational work, in teaching, in examining, in organizing, and in the investigation of foreign systems of instruction, I have experienced considerable difficulty in selecting from the large number of subjects that crowd upon me a suitable one on which to address you as President of a Section of the British Association devoted to educational science.

At the outset I am troubled by the title of the section over which I have the honour to preside. I cannot refrain from asking myself the question: Is there an educational science, and, if so, what is its scope and on what foundations does it rest? The object of the British Association is the advancement of science, and year by year new facts are recorded in different branches of inquiry, on which fresh conclusions can be based. The progress of past years, whether in chemistry, physics, or biology, can be stated. Can the same be said, and in the same sense, of education? It is true that the area of educational influence is being constantly extended. Schools of every type and grade are multiplied, but is there any corresponding advance in our knowledge of the principles that should govern and determine our educational efforts, or which can justify us in describing such knowledge as science? If we take science to mean, as commonly understood, organized knowledge, and if we are to test the claim of any body of facts and principles to

[1] Presidential Address to the Educational Section of the British Association at the meeting held in Leicester, August, 1907.

be regarded as science by the ability to predict, which the knowledge of those facts and principles confers, can we say that there exists an organized and orderly arrangement of educational truths, or that we can logically, by any causative sequence, connect training and character either in the individual or in the nation? Can we indicate, with any approach to certainty, the effects on either the one or the other of any particular scheme of education which may be provided? It is very doubtful whether we can say that educational science is yet sufficiently advanced to satisfy these tests.

But, although education may not yet fulfil all the conditions which justify its claim to be regarded as a science, we are able to affirm that the methods of science applicable to investigations in other branches of knowledge are equally applicable to the elucidation of educational problems. To have reached this position is to have made some progress. For we now see that, if we are ever to succeed in arriving at fixed principles for guidance, in determining the many difficult and intricate questions which arise in connection with the provision of a national system of education or the solution of educational problems, we must proceed by the same methods of logical inquiry as we should adopt in investigating any other subject-matter.

In order to bring education within the range of subjects which should occupy a place in the work of this Association, our first efforts should be directed towards obtaining a sufficient body of information from all available sources, past and present, to afford data for the comparisons on which our conclusions may be based. One of the five articles of what is known as the Japanese Imperial Oath states: "Knowledge shall be sought for throughout the whole world, so that the welfare of the Empire may be promoted"; and it may certainly be said that, as the welfare of our own Empire is largely dependent on educational progress, a wide knowledge of matters connected with education is indispensable if we are to make advances with any feeling of certainty that we are moving on the right lines.

There can be no doubt that of late years we have acquired a mass of valuable information on all sorts of educational questions. We are greatly indebted for much of our knowledge of what is being done in foreign countries to the reports of

different Commissions, and more particularly to those Special Reports issued from the Board of Education, first under the direction of my predecessor in this chair, Prof. Sadler, and latterly of his successor at the Board, Dr. Heath. But much of the information we have obtained is still awaiting the hand of the scientific worker to be properly co-ordinated and arranged. A careful collation of facts is indispensable if we are to deduce from them useful principles for our guidance, and unfortunately we in this country are too apt to rest content when we have provided the machinery for the acquisition of such facts without taking the necessary steps to compare, to co-ordinate, and to arrange them on some scientific principle for future use. Within the last week or two a Bill has passed through several stages in Parliament for requiring local authorities to undertake the medical inspection of school children; but, unless the medical inspectors throughout the country conduct their investigations on certain well-considered lines laid down for them by some central authority, we shall fail to obtain the necessary data to enable us to associate educational and physical conditions with a view to the improvement of the training given in our schools.[1] On the other hand, although I personally am sceptical as to the results, we have reason to believe that the inquiry recently undertaken into the methods adopted here and elsewhere for securing ethical, as distinct from specifically religious training will be so conducted as to give us not only facts, but the means of inferring from those facts certain trustworthy conclusions.

The consideration of education as a subject capable of scientific investigation is complicated by the fact that it necessarily involves a relation—the relation of the child or adult to his surroundings. It cannot be adequately considered apart from that relation. We may make a study of the conditions of the physical, intellectual, and ethical development of the child, but the knowledge so obtained is only useful to the educator when considered in connection with his environment and future needs, and the means to be adopted to enable him, as he grows

[1] Since this was written, the President of the Board of Education has stated in the House of Commons that "it was the intention of the Board, if the Bill now before Parliament passed, to establish a medical bureau, which would guide and advise the local authorities as to the nature of the work they would have to do under the Act."

in physical, intellectual, and moral strength, to obtain a mastery over the things external to him. Education must be so directed as to prove the proposition that "knowledge is power." It can only be scientifically treated when so considered. Education is imperfectly described when regarded as the means of drawing out and strengthening a child's faculties. It is more than this. Any practical definition takes into consideration the social and economic conditions in which the child is being trained, and the means of developing his faculties with a view to the attainment of certain ends.

It is in Germany that this fact has received the highest recognition and the widest application, and for this reason we have been accustomed to look to that country for guidance in the organization of our schools. We have looked to Germany because we perceived that some relation had been there established between the teaching given to the people and their industrial and social needs, and, further, that their success in commerce, in military and other pursuits was largely due to the training provided in their schools. Unmindful of the fact that education is a relation, and that consequently the same system of education is not equally applicable to different conditions, there were many in this country who were only too ready to recommend the adoption of German methods in our own schools. Experience soon showed, however, that what may have been good for Germany did not apply to England, and that, in educational matters certainly, we do well to follow Emerson, who, when addressing his fellow-citizens, declared: "We will walk on our own feet, we will work with our own hands, and we will speak our own minds." Still, the example of Germany and the detailed information which we have obtained as to her school organization and methods of instruction have been serviceable to us.

Whilst all information on educational subjects is valuable, I am disposed to think that in our efforts to construct an educational science we may gain more by inquiring what has been effected in some of the newer countries. Wherever educational problems have been carefully considered and schemes have been introduced with the express intention and design of training citizens for the service of the State and of increasing knowledge

with a view to such service those schemes may be studied with advantage. Thus we may learn much from what is now being done in our colonies. Their efforts are more in the nature of experiments. Our colonies have been wise enough not to imitate too closely our own or any foreign system. They have started afresh, free from prejudice and traditions, and it is for this reason that I look forward with interest to the closer connection in educational matters of the colonies with the mother country, and I believe that we shall gain much knowledge and valuable experience from the discussions of the Federal Conference which has recently been held in London, and which, I understand, is to be repeated a few years hence.

But, valuable as are the facts, properly collated and systematically arranged, which a knowledge of British and foreign methods may afford us in dealing scientifically with any educational problem, it is essential that we should be able to test and to supplement the conclusions based on such knowledge, whenever it is possible, by direct experiments applicable to the matter under investigation. We have not yet recognized the extent to which experiments in education, as in other branches of knowledge, may help us to build up an educational science. Some years since there was established in Brussels an *école modèle* in which educational experiments were tried. I visited the school in the year 1880, and I could easily point to many improvements in primary education which found their way from that school through the schools of Belgium and France to our own country, and, indeed, to other parts of the world. From a special Report on Schools in the North of Europe, recently published by the Board of Education, we learn that in Sweden the value of such experiments is fully recognized. We are told that in that country "it was early felt that the uniformity in State schools was of so strict a kind that some special provision should be made for carrying out educational experiments," and experiments in many directions have been made, mainly in private schools, which receive, however, special subventions from the State. We gather from the same Report that the State regards the money as well earned "if the school occasionally originates new methods from which the schools can derive profit." I venture to think that

experimental schools might with advantage be organized under the direction of some of our larger local authorities. The children would certainly not suffer by being made the subjects of such experiments. The intelligent teaching which they would receive—for it is only the most capable teachers who should be trusted with such experiments—would more than compensate for any diminution in the amount of knowledge which the children might acquire, and indeed such experimental schools might be conducted under conditions which would ensure sound instruction. Many improved methods of teaching are constantly advocated, but fail to be adopted because there is no opportunity of giving them a fair trial. As a general rule, it is only by the effort of private individuals or associations that changes in system are effected, and teachers are enabled to escape from the old grooves on to new lines of educational thought and practice. It is not difficult to refer to many successful experiments. The general introduction into our schools of manual training was the direct result of experiments carefully arranged and conducted by a Joint Committee of the City Guilds and the late London School Board. Experiments in the methods of teaching physical science, chemistry and geometry have been tried, with results that have led to changes which have revolutionized the teaching of those subjects. The age at which the study of Latin should be commenced with a view to the general education of the scholar has been the subject of frequent trial. I would like to see such experiments more systematically organized, and I am quite certain that the curriculum of our rural and of our urban schools would soon undergo very considerable changes, if the suggestions of competent authorities could receive a fair trial under conditions that would leave no manner of doubt as to the character of the results.

It would seem, therefore, that, if our knowledge of the facts and principles of education is not yet sufficiently organized to enable us to determine *à priori* the effect on individual or national character of any suggested changes, education is a subject that may be studied and improved by the application to it of scientific method, by accurate observation of what is going on around us, and by experiments thoughtfully conducted. This is the justification of the inclusion of the subject among

those that occupy the attention of a separate section of this Association. Our aim here should be to apply to educational problems the well-known canons of scientific inquiry; and, seeing that the conditions under which alone any investigation can be conducted are in themselves both numerous and complicated, it is essential that we should endeavour to liberate, as far as possible, the discussion of the subject from all political considerations. Such investigations are necessarily difficult. We have to determine both statically and dynamically the physical, mental, and moral condition of the child in relation to his activities and surroundings, and we have further to discover how he is influenced by them, how he can affect them, and the character of the training which will best enable him to utilize his experience and to add something to the knowledge of to-day for future service.

Notwithstanding the undoubted progress which we have made, it cannot be denied that in this country there still exists a large amount of educational unrest, of dissatisfaction with the results of our efforts during the last thirty years. This is partly due to the fact that there is much loose thinking and uninformed expression of opinion on educational questions. No one knows so little as not to believe that his own opinion is worth as much as another's on matters relating to the education of the people. In this way statements, the value of which has not been tested, pass current as ascertained knowledge, and very often ill-considered legislation follows. In this country, too, the difficulty of breaking away from ancient modes of thought is a great drawback to educational progress. Suggestions for moderate changes, which have been most carefully considered, are deferred and decried if they depart to any great extent from established custom, and the objection to change very often rests on no historical foundation. Occasionally, too, the change proposed is itself only a reversion to a previous practice which was rudely broken by thoughtless and unscientific reformers. The opposition which was so long raised to the establishment of local universities was largely due to want of knowledge on the subject; and certainly the creation, some seventy years ago, of a teaching University in London was actually hindered through

a mere prejudice, which broader views as to the real purposes of university teaching and fuller information on the course of university development would have removed.

There never was a time, perhaps, when it was more necessary than now that education should be regarded dispassionately, apart from political bias, as a matter of vital interest to the people as a whole. Education now-a-days is a question which affects not only the life of a few privileged, selected persons, but of the entire body of citizens. The progress that has been made during the last few years in nationalizing our education has been very rapid. It may be that it has been too rapid, that sufficient thought has not been given to the altered social and industrial conditions which have to be considered. We have witnessed a strong desire and a successful effort to multiply secondary and technical schools and to open more widely the portals of our universities. The object of the desire is good in itself. As the people grow in knowledge the demand for higher education will increase; but the serious question to be considered is whether the kind of education which was supplied in schools, founded centuries ago to meet requirements very different from our own, is equally well adapted to the conditions which have arisen in a state of society having other needs and new ideals. Very rightly our students in training for the profession of teachers are expected to study the writings of Locke, Rousseau, Milton, Montaigne, and others; but many are apt to overlook the fact that these writers had in view a different kind of education from that in which modern teachers are engaged, and that their suggestions, excellent as many of them are, were mainly applicable to the instruction to be given by a tutor to his private pupil, and had little or no reference to the teaching of the children of the people in schools expressly organized for the education of the many. Only recently have we come to realize that a democratic system of education, a system intended to provide an intellectual and moral training for all citizens of the State, and so organized that, apart from any consideration of social position or pecuniary means, it affords facilities for the full development of capacity and skill wherever they may occur, must be essentially different in its aims and methods from that under which many of us now living have been trained.

It has also been brought home to us that the marvellous changes in our environment, in the conditions under which we live and work, whether in the field, the factory, or the office, have necessitated corresponding changes in the education to be provided as a preparation for the several different pursuits in which the people generally are occupied. Yet, notwithstanding these great forces which have broken in upon and disturbed our former ideals—forces the strength and far-reaching effects of which we readily admit,—we still hesitate to face the newly arisen circumstances and to adapt our educational work to its vastly extended area of operation and to the altered conditions and requirements of modern life.

When I say we hesitate to face the existing circumstances I do not wish to be misunderstood. As a fact, changes are continually being discussed, and are from time to time introduced into our schools. But such modifications of our existing methods are generally isolated and detached, and have little reference to the more comprehensive measures of reform, which are now needed, to bring our teaching into closer relation with the changed conditions of existence, consequent on the alterations that have taken place in our social life and surroundings.

Four years ago, it will be remembered, a committee of this section was appointed to consider and to report upon the "Courses of Experimental, Observational, and Practical Studies most suitable for Elementary Schools." That committee, of which I had the honour to be chairman, presented a report to this section at the meeting of the Association held last year at York. It is too early, perhaps, to expect that the suggestions made in that report should have borne fruit; but I refer to it because it illustrates the difference between the spasmodic reforms which from time to time are adopted, under pressure from bodies of well-meaning representatives of special interests, and the well-considered changes recommended by a committee of men and women of educational experience, who have carefully tested the conclusions at which they have arrived.

There can be no doubt that, as regards our elementary education, there is very general dissatisfaction with its results, since it was first nationalized thirty-seven years ago. Our

merchants and manufacturers and employers of labour, our teachers in secondary and technical schools, all join in the chorus of complaint. They tell us that the children have gained very little useful knowledge and still less power of applying it. There is enough in this general expression of discontent to give us pause and to make us seek for a rational explanation of our comparative failure. The inadequacy of the results attained to the money and effort that have been expended is in no way due to any want of zeal or ability on the part of the teachers, or of energy on the part of school boards or local authorities. They have all discharged the duties which were imposed upon them. It is due rather to the fact that the problem has been imperfectly understood, that our controlling authorities have had only a vague and indistinct idea of the aim and end of the important work which they were charged to administer. If we look back upon the history of elementary education in this country since 1870, we cannot fail to realize how much its progress has been retarded by errors of administration due very largely to the want of scientific method in its direction. It is painful to reflect, for instance, on the waste of time and effort, and on the false impressions produced as to the real aim and end of education, owing to the system of payment on results, which dominated for so many years a large part of our educational system. We must remember that it is only within the last few decades that education has been brought within reach of all classes of the population. Previously it was for the few —for those who could pay high fees; for those who were training for professional life, whether for the Church, the Army, the Navy, law, or medicine, or for the higher duties of citizen life. This had been the case for centuries, not only in this country, but in nearly all parts of the civilized world. If we read the history of education in ancient Greece or Rome, or Mediæval Europe, we shall see that popular education, as now understood, was unknown. All that was written about education applied to the few that got it, and not to the great mass of the people engaged in pursuits altogether apart from those in which the privileged classes were employed. Trade and manual work were despised, and were considered degrading and unworthy of the dignity of a gentleman. I need scarcely say that these

social ideas are no longer held. The fabric of society is changed, and we have to ask ourselves whether the methods of education have been similarly changed, whether they have been wisely and carefully adapted to the new order of things. What is it that has really happened? Is it not true that we have annexed the methods and subjects of teaching which had been employed during many centuries in the training of the few and applied them to the education of the people as a whole—to those who are engaged in the very callings which were more or less contemned? Surely it is so, and the results are all too manifest. We have applied the principles and methods of secondary education of the Middle Ages to our new wants, to the training of the people for other duties than those to which such education was considered applicable, and it is only within the last few years that we have begun to see the error of our ways. In the report of your committee, to which I have referred, it is pointed out that the problem of primary education has been complicated by the introduction of the methods which for many years prevailed in secondary schools, and at a meeting of the National Educational Association, held only a few weeks since, it was truly said: "In this country secondary education preceded primary by several centuries, and so the nation now finds itself with the aristocratic cart attempting to draw the democratic horse."

Let it not be supposed that in the days not so far distant, yet stretching back into the remote past, the people as a whole were uneducated. This was not so. But we have to widen the meaning of "education" to include the special training which the people then received—an education that was acquired without even the use of books. It cannot for one moment be said that the artisans, the mechanics, the farm hands were wholly uneducated in those far-off days. In one sense possibly they were. Very few of them could read or write. But from earliest childhood they had received a kind of training the want of which their descendants have sadly felt in the cloistered seclusion of the modern elementary school. They were brought face to face with Nature. They learned the practical lessons of experience; and as they grew up their trade apprenticeship was an education which we have been

trying vainly to reproduce. They gained some knowledge of the arts and sciences, as then understood, underlying their work. Their contact with their surroundings made them thoughtful and resourceful; for Nature is the most exacting and merciless of teachers. The difficulties they had to overcome compelled them to think, and of all occupations none is more difficult. They were constantly putting forth energy, adapting means to ends, and engaging in practical research. In the field, in the workshop and in their own homes, boys and girls acquired knowledge by personal experience. Their outlook was broad. They learned by doing. It is true that nearly all their occupations were manual; but Emerson has told us: "Manual labour is the study of the external world."

Compare for a moment this training with that provided in a public elementary school, and you cannot be surprised to find that our artificial teaching has failed in its results; that our young people have gained very little practical knowledge, and that what they have gained they are unable to apply; that they lack initiative and too often the ability to use books for their own guidance or the desire to read for self-improvement. We seem to have erred in neglecting to utilize practical pursuits as the basis of education, and in failing to build upon them, and to evolve from them, the mental discipline and knowledge that would have proved valuable to the child in any subsequent occupation or as a basis for future attainments. We have made the mistake of arresting, by means of an artifical literary training, the spontaneous development of activity, which begins in earliest infancy and continues to strengthen as the child is brought into ever closer contact with his natural surroundings. We have provided an education for our boys which might have been suitable for clerks; and, what is worse, we have gone some way, although we have happily cried a halt, to make our girls into "ladies," and we have run some risk of failing to produce women.

If we are to correct the errors into which we have drifted, if we are to avert the consequences that must overtake us through having equipped our children for their life-struggle with implements unfitted for such purpose, we must consider afresh the fundamental ideas on which a system of elementary

education should be based. Instead of excluding the child from contact with the outer world, we must bring him into close relationship with his surroundings. It was given to man to have dominion over all other created things, but he must first know them. It is in early years that such knowledge is most rapidly acquired, and it is in gaining it that the child's intellectual activities are most surely quickened.

It is unfortunate that we failed to realize this great function of elementary education when we first essayed to construct for ourselves a national system. The three R's, and much more than that, are essential and incidental parts of elementary education. But what is needed is a *Leitmotif*—a fundamental idea underlying all our efforts and dominating all our practice, and I venture to think that that idea is found in basing our primary education on practical pursuits, on the knowledge gained from actual things, whether in the field, the workshop, or the home.

Instead of fetching our ideas as to the training to be given in the people's schools from that provided in our old grammar schools, we should look to the occupations in which the great mass of the population of all countries are necessarily engaged, and endeavour to construct thereon a system, with all such additions and improvements, as may be needed to adapt it to the varied requirements of modern life. By this process—one of simple evolution adjusted to everyday needs—a national system of education might be built up fitted for the nation as a whole—a system founded on ideas very different from those which, through many centuries, have governed the teaching in our schools. In the practical pursuits connected with the field, the workshop, and the home, and in the elementary teaching of science and letters incidental thereto, we might lay the foundation of a rational system of primary education.

These three objects—the field, the workshop, and the home—should be the pivots on which the scheme of instruction should be fixed, the central thoughts determining the character of the teaching to be given in rural and urban schools for boys and girls. It was Herbart who insisted on the importance of creating a sort of centre around which school studies should be grouped, with a view to giving unity and

interest to the subjects of instruction. I have elsewhere shown how a complete system of primary education may be evolved from the practical lessons to be learned in connection with out-door pursuits, with workshop exercises, and with the domestic arts, and how, by means of such lessons, the child's interest may be excited and maintained in the ordinary subjects of school instruction—in English, arithmetic, elementary science, and drawing. In the proposals I am now advocating I am not suggesting any narrow or restricted curriculum. On the contrary, I believe that, by widening the child's outlook, by closely associating school work with familiar objects, you will accelerate his mental development and quicken his power of acquiring knowledge. I would strongly urge, however, that the child should receive less formal teaching, that opportunities for self-instruction, through out-door pursuits, manual exercises and the free use of books, should be increased, so that, as far as possible, the teacher should keep in view the process by which in infancy and in early life the child's intelligence is so rapidly and marvellously stimulated. Already we have discovered that our unscientific attitude towards primary education has caused us to overlook the essential difference between the requirements of country and of town life, and the training proper to boys and girls. Our mechanical methods of instruction, as laid down in codes, make for uniformity rather than diversity, and we are only now endeavouring, by piecemeal changes, to bring our teaching somewhat more closely into relation with existing needs. But the inherent defect of our system is that we have started at the wrong end, and, instead of evolving our teaching from the things with which the child is already familiar, and in which he is likely to find his life's work, we have taken him away from those surroundings and placed him in strange and artificial conditions, in which his education seems to have no necessary connection with the realities of life.

The problem of primary education is to teach by practical methods the elements of letters and of science, the art of accurate expression, the ability to think and to control the will; and the ordinary school lessons should be such as lead

to the clear apprehension of the processes that bring the child into intimate relation with the world in which he moves. During the last few years the importance of such teaching has dimly dawned upon our educational authorities, but, instead of being regarded as essential, it has been treated as a sort of *extra* to be added to a literary curriculum already overcrowded. What is known as manual training is to some extent encouraged in our schools, but it forms no part of the child's continuous education. It is still hampered with conditions and is uncoordinated with other subjects of instruction. Moreover, no connecting-link has yet been forged between the teaching of the kindergarten and workshop practice in the school. We speak of lessons in manual training as something apart from the school instruction, as something outside the school course, on the teaching of which special grants are paid. Twenty or thirty years ago people used to talk about "teaching technical education," and from this unscientific way of treating the connection that should exist between handwork and brainwork our authorities have not yet entirely freed themselves.

It is true we have long since passed that stage when it was thought that the object of instruction in the use of tools was to make carpenters or joiners; but judging from a report recently issued by the Board of Education, it would seem that it is still thought that the object of cookery lessons to children of twelve to fourteen years of age is the training of professional cooks. Until the Board's Inspectors can be brought to realize that the aim and purpose of practical instruction in primary schools, whether in cookery or in other subjects, is to train the intelligence through familiar occupations, to show how scientific method may be usefully applied in ordinary pursuits, and how valuable manipulative skill may thus be incidentally acquired, it does not seem to me that they themselves have learned the most elementary principles of their own profession. An anonymous teacher, writing some weeks since in the *Morning Post*, said, "The cookery class can be made an invaluable mental and moral training-ground for the pupils, the most stimulating part of primary education. It teaches unforgettable lessons of cleanliness and order, of quickness and deftness of movements. The use of the weights and scales demands

accuracy and carefulness, and the raw materials punish slovenliness or want of attention with a thoroughness which the most severe of schoolmasters might hesitate to use. Practical lessons in chemistry should form an important feature of each class. . . . The action of heat and moisture on grains of rice provides an interesting lesson on the bursting of starch cells, and the children's imagination is awakened by watching the hard isolated atoms floating in milk change slowly to the creamy softness of a properly made rice-pudding. The miraculous change in the oily white of egg when it is beaten into a mountain of snowy whiteness gives them interest in the action of air and its use in cookery."

Can the teaching of grammar or the analysis of sentences provide lessons of equal value in quickening the intelligence of young children?

I must add one word before passing from this suggestive illustration of the value of scientific method in the treatment of educational questions. We live in a democratic age, and any proposed reform in the teaching of our primary schools must be tested by the requirement, that the revised curriculum shall be such as will provide not only the most suitable preparatory training for the occupations in which four-fifths of the children will be subsequently engaged, but will, at the same time, enable them, or some of them, to pass without any breach of continuity from the primary to the secondary school. There must be no class distinctions separating the public elementary from the State-aided secondary school. The reform I have suggested is unaffected by such criticism. The practical training I have advocated, whether founded on object-lessons furnished by the field, the workshop, or the home, would prove the most suitable for developing the child's intelligence and aptitudes, and for enabling him to derive the utmost advantage from attendance at any one of the different types of secondary schools best fitted for his ascertained abilities and knowledge. The bent of the child's intellect would be fully determined before the age when the earliest specialization would be desirable. No scheme of instruction for primary schools can be regarded as satisfactory, which is not so arranged that, whilst providing the most suitable

teaching for children who perforce must enter some wage-earning pursuit at the age of fourteen, or at the close of their elementary school course, shall at the same time afford a sound and satisfactory basis on which secondary and higher education may be built. And I hold the opinion, in which I am sure all teachers will concur, that a scheme of primary education pervaded by the spirit of the kindergarten, which by practical exercises encourages observation and develops the reasoning faculties, and creates in the pupil an understanding of the use of books, would form a fitting foundation for either a literary or a scientific training in a secondary school.

I have purposely chosen to illustrate the main subject of this address by reference to defects in our primary instruction because the success of our entire system of education will be found, year by year, to depend more and more upon the results of the training given in our public elementary schools. We have scarcely yet begun to realize the social and political effects of the momentous changes in our national life, consequent on the first steps which were taken, less than forty years ago, to provide full facilities under State control and local management for the education of the people.

At present all sorts of ideas are afloat which have to be carefully and scientifically considered. The working classes have to be further and somewhat differently educated, in order that they may better understand their own wants and how they are to be satisfied. We have placed vast powers in the hands of local bodies, popularly elected—powers not only of administration, for which they are well adapted, but powers of determining to a very great extent, by the free use of the rates, the kind of instruction to be given in our schools, and the qualifications of the teachers to impart it. Moreover, these local bodies have shown, in some few instances, a distrust of expert advice, and a desire to act independently as elected representatives of the people, which cannot fail, temporarily at least, to lead to waste of effort and of means. It was said years ago, when the centre of our political forces received a marked displacement, that we must educate our masters. Our masters now, both in politics and in education, are the people, and it is only, I believe, by improving the education of the people, that we can enable them

to understand the essential difficulties of the problems which they are expected to solve, and can induce them to rely, to a greater extent than they do at present, on the results of the application to such problems of scientific method, founded on the fullest information obtainable from historical and contemporary sources.

I might have illustrated my subject by reference to the acknowledged chaotic condition of our secondary education. This chaotic condition is intimately connected with the questions relating to primary education which I have been engaged in considering. If we construct a system of primary education which serves equally for children of all classes, apart from social conditions—a system educationally sound both as a preparation for immediate wage-earning pursuits and for more advanced and somewhat more specialized training in a secondary school, many of the difficulties which confront the Board of Education, and which are largely of an administrative order, would disappear. The difficulties are in part dependent on the question of curriculum, to the discussion of which a day will be devoted during the present meeting.

University education in this country, and indeed in other countries, has also suffered much from the hands of the unscientific reformer. In Germany, owing to many causes, the higher education has made considerable advances during the past century; but even in that country a more critical study of the development of university education and a truer recognition of the twofold function of a university might have prevented the early separation, in distinct institutions and under separate regulations, of the higher technical from university instruction. Only within recent years has France retraced her steps and returned to the university ideal of seven centuries ago.

Our conception of the functions of a university has undergone many violent changes. Between the ideal of the University of London, prior to its reorganization, and that of a mediæval university, in which students were never plucked, obtaining their degrees whether they did their work well or badly, there have been many variations; but I think it may be said that, recently, at any rate, we have come to realize the fact that our

universities, to fulfil their great purpose, must be schools for the preparation of students for the discharge of the higher duties of citizenship and professional life, and institutions for the prosecution of research, with a view to the promotion of learning in all its branches; and that examinations for degrees, necessary, as they undoubtedly are, as tests of the extent of a student's acquired knowledge, must be regarded as subordinate to these two great functions.

I will not detain you longer. I have endeavoured to show under what limitations education may lay claim to be included among the sciences, and how a knowledge of the history of education and the application of the methods of scientific inquiry may help in enabling us to solve many of the intricate and complicated questions which are involved in the establishment on a firm foundation of a national system of education. I have taken my illustrations mainly from the reform of elementary, or, as I prefer to call it, "primary," education, and I have sought to indicate some of the errors into which we may fall when we fail to apply to the consideration of the problem the same principles of inductive inquiry as are employed in all investigations for the attainment of truth.

I believe that this section of the British Association has the opportunity of rendering great service to the State. Numerous educational societies exist in which questions of importance are discussed, and all, perhaps, do useful work. But none is so detached from separate and special interests; none stands so essentially apart from all political considerations; none is so competent to discuss educational problems from the purely scientific standpoint as are the members of this Association. If, in the remarks I have offered, somewhat hastily prepared under the pressure of many different kinds of work, I have contributed anything to the solution of a problem the difficulty and national importance of which all will admit, I shall feel that I have not been entirely unworthy of the honour of occupying this chair.

NOTE.—The Report of the Committee on *Manual Instruction*, appointed by the Board of Education in 1908, was published in the summer of this

year 1910, and came under my notice whilst these pages were passing through the press.

The recommendations of the Committee are far-reaching. They are briefly :—(1) That handwork should be regarded as an essential feature in the curriculum of every elementary school; (2) That the course of handwork should be continuous throughout the schools, from the infants' stage upwards, and that it should be regarded as a method rather than a separate subject of instruction; (3) That a knowledge of handwork principles should be an element in the training of all future teachers; (4) That the ideal to be aimed at is that all forms of handwork should be taught in the schools themselves by the ordinary teachers.

It will be seen that these recommendations, if generally adopted, will give effect to many of the suggestions embodied in the above series of Addresses, and will be welcomed as an important step forward in the reform of our present system of elementary instruction.

VI

PREPARATORY TRAINING FOR HIGHER EDUCATION[1]

[1905]

When I received the invitation of your Council to accept the Presidentship of your Association for the year 1905, I was on the point of leaving London for Sicily, intending to spend there my somewhat brief annual holiday. I was rejoicing at the thought that I should be away from all official duties, from Blue Books, and indeed from everything connected with education; but this very fact made me hesitate to accept your invitation, knowing that, attached to my acceptance was the duty of delivering an address. My hesitation was accentuated too by the knowledge that I should have to succeed to Sir John Gorst, whose official life has been identified with so many useful measures, and whose knowledge of the subject is so much greater than my own. But your Council so flatteringly assured me that it was the wish of the Association, and particularly of its Manchester members, that I should accede to their request, that, while fully conscious that I should be unable to discharge the duties of the office to my own satisfaction, and should need to crave your indulgence for unavoidable shortcomings, I consented. And I must own that my hesitation was fully justified. For during the last few weeks I have heard rumours of several educational Conferences having been held in England; but the results of their deliberations did not reach me, and in Sicily I failed to find any suitable material which I could work up into a presidential address to an

[1] Presidential Address at the Annual Meeting of the Association of Technical Institutions, Manchester, January 27, 1905.

Association of Technical Institutions. During my brief stay in Taormina, the most picturesque spot in the island, I often watched from the window of my mountain hotel, the light clouds creeping around the shoulders of snow-capped Etna, and the blue sea stretching from its feet to the shores of Greece and Palestine and Egypt. But beautiful as was the outlook, it failed to suggest any appropriate theme for an address on technical education; and even the interesting remains of Greek and Roman temples and theatres close at hand, abounding in marks of the ancient artificers' skill, gave rise to a train of thought which seemed to run counter to the objects which we are met here to promote. For not only in Sicily, but throughout Southern Italy, one sees monuments of the truest and most attractive forms of art in nearly every provincial town. The remains of ancient buildings testify to the excellence of the constructive work executed more than twenty-five centuries ago; while among the unearthed treasures of buried cities, we find jewellery which Bond Street cannot match, and silver-plate that would excite the envy of a City company, and vases which Staffordshire can only vainly try to imitate, and statues in bronze and marble, which justify the recent *Punch* cartoon, depicting the dread of Shakespeare's ghost that London might desire to erect a statue to his memory. But nowhere, amid all these ruins of things beautiful and useful, are found the remains of any technical institutes, where these arts were taught and practised.

It was only when I went to Syracuse, and remembered that Archimedes was one of its old inhabitants, and that to his inventive genius we owed many of our modern mechanical appliances, that I began to realize the contrast between the world of Science and the world of Art, and how, for good or for ill, as tending to increase our happiness or otherwise, the application of scientific method to the investigation of Nature's secrets and to the disclosure of her hidden processes had changed the conditions of existence, that my thoughts reverted to the subject of my address, and I recognized the necessity of a kind of teaching appropriate to the altered life we live. For, is it not largely owing to the power of making human labour more productive, which such men as Archimedes have discovered, that

our present surroundings differ from those revealed in ancient monuments? Machinery, the product of invention, has been multiplied, and has helped to satisfy modern needs. The relics of bygone times, stamped with the beauty of design and form and colour, and telling of the constructive skill of former artificers, were produced in circumstances very different from those that now prevail. The keen competition between city and city and between country and country, which has driven the leisure out of life, and forced on us, instead, a constant state of push and rush, was then unknown. The intellect and soul of a man went into his work. He moulded the raw material into the thing he wished it to be. There were no trade unions then, to cramp and fetter the quality or quantity of the work he did. The young apprentice watched his master and caught his inspiration, and from imitating gradually improved on what his master wrought. But now all this is changed. The machine turns out in thousands, cut and stamped by iron hands, the things formerly produced in units, each differing from the other, and all bearing the marks of human thought and effort. To-day, there are few branches of industry (and these are constantly becoming fewer) in which the artificer sees his work shaped and completed by his own hands. Steam and electricity have entered into the organism of production, and the growth of new needs and the demand for cheap goods have necessitated the general adoption of economic principles of labour, which have developed the factory system and converted a group of individual artisans into a social unit. As a consequence, there is now neither time nor opportunity for the individual teaching known as apprenticeship. Except in a few handicrafts, all endeavours to revive it, as it was, are doomed to failure. It cannot exist in the atmosphere of a modern factory. Some substitute was indispensable. The individual asserted himself, as he will and must do, in any socialistic scheme. He cried out for separate treatment and consideration; and hence arose the demand for the specialized instruction which it is the function of these technical institutions to provide. They are the natural product of modern industrial methods, and flourish now in every civilized country, even amid the ruins of ancient Rome and Greece and Egypt.

Some of your former Presidents have been at pains to tell you in their inaugural addresses how such institutions have multiplied in recent years, and how keenly alive are all manufacturing countries to the necessity of yoking together Science and Industry, with the view to the more economic production and profitable interchange of their different wares. They have given you full details as to the number of schools, where workmen of all classes are trained, and have excited your envy and admiration by telling you of their size and cost, of the perfection of their equipment and the completeness of their teaching staff. They have contrasted the machinery we have created to deal with this great problem of the education of the people with that in active operation in other countries, and by pointing out our several deficiencies they have endeavoured to enlist your help in stimulating our Government to greater and more systematic efforts. It is not for want of telling if we still lag behind our neighbours, and fail to realize the sacrifices they are making to gain the mastery in the struggle for existence and development. As a fact, we have been almost surfeited with information and with warnings, illustrated and emphasized by facts gathered from the Reports, bristling with figures, of Royal and other Commissions and of inquiries undertaken by State officials, consuls and private persons.

I need scarcely say I am fully alive to the value of the information we have gained. Indeed, I have had some share in collecting it, but I feel that our energies must be now directed into other channels. There is a time for learning and a time for action, and we certainly cannot longer delay to apply the knowledge we have acquired. Without deprecating, therefore, even further investigation into the methods of our neighbours on specific points of detail, I do not propose, in the few remarks I have the privilege of offering to the members of this Association, to institute any comparison between our own and foreign systems of education, nor to improve the occasion by showing you how success in trade and commerce, in military and naval operations, ultimately depends on the application of science and scientific method. The magnitude of the efforts which other nations are making to equip their citizens for the full discharge of their several duties in life is now a matter of

common knowledge; and, within the last few months, indeed, I might say weeks, this country has been stirred to its very depths by the events occurring in the Far East. The lessons of the history now in process of making in those distant parts will not be lost on us. Since the Boer War we have been alive to the fact, that if we are to hold our own among the nations, we must be up and doing, availing ourselves of every opportunity of self-improvement, and that the cost, great as it is, increasingly great as it will be, of efficiently educating the people, is, in the end, an economic expenditure of public funds.

It is satisfactory to note that we have seriously begun, although none too soon, to set our house in order. Of late, some progress has been made. We have not failed to profit by the example of our competitors and rivals, and are slowly taking to heart the lesson they have taught us. We recognize, however, that to each country must belong its appropriate methods, and that a people's educational ideals are as much the product as the cause of national character.

This revival is not much older than the century, but during this short period of time we have accomplished much. A strenuous effort has been made to improve the administration of education in this country. We have created new machinery, and have not hesitated, like many a faint-hearted manufacturer, to scrap the old. Our School Boards, having served their purpose, have been discarded. The transfer of their work to our municipalities and county councils was a great step in advance. Although political difficulties may prevent our seeing, in true perspective, the full effect of recent changes, history will give credit to those true reformers who, by their wise measures, have converted our long-endured educational chaos into something approaching a regulated system. The closer association of the two often-opposing authorities, Whitehall and South Kensington, the abolition of that educational anomaly, a separate Department of Science and Art, and the recognition of the true place of science and art teaching in the curricula of all schools; the creation of one central authority for elementary and secondary education, and the acknowledgment that technical instruction, although no part of either, is a matter of State concern, as supplementing both;—these great changes which,

owing to the simplicity of the Act of Parliament by which they were introduced, seem small and unimportant, will be recorded by future chroniclers as epoch-making incidents in the history of education in this country. No less important, too, was the consequent legislation of 1902, creating local authorities, endowed, subject to State control, with somewhat similar functions, and with the further power of raising money from the rates for the purpose of education generally. There may be details of administration, as to which differences of opinion may exist, but it may certainly be said that never till now have we possessed in this country any organized system of education susceptible of adaptation to our varying requirements.

One great advantage of the unification, under the same authority, of the powers of providing and directing schools of different grades and types is, that a number of persons, representing all classes and sections of the people, are being gradually trained to take a deeper, wider, and more living interest in school matters. Those of us who were consistently opposed to the mode of election and to the partial jurisdiction of the old School Boards believed that this would be so, and our anticipations have been justified. Members of county and borough councils are beginning to realize the significance of their great trust and the character of their enlarged responsibilities. Their duties are so wide and so elastic that they have no temptation to magnify them. There is no longer any possibility of a case for a Cockerton judgment, and the main causes of overlapping in school organization have been removed. Our councillors are being trained in the belief that education is a matter of national concern, that its problems are not void of interest and will repay careful study; and we may confidently predict a gradual growth of sympathy with teachers and learners, developing into something akin to that enthusiasm for education, which, till now, was wanting in the English people.

What is the lesson we have learned from the band of educational experts who, last year, published the results of their visit to the United States? Was it not this,—that the American people believe in education? It is true they found greater facilities for university and higher technical instruction, and that secondary education was more general and better organized;

but almost with one voice they told us that our real inferiority lay in the fact, that the citizens of the United States had more faith in the possibilities of education than we have, that their whole heart was in their work as ours has never yet been. This is the great difference between them and us; and it is to this belief, this ardour of faith in the efficacy of training, that the Germans and Swiss—and we may now say the Japanese also—owe largely the measure of success which has crowned their efforts. Now I believe that the outcome of the Act of 1902 will be to arouse in Englishmen that enthusiasm for education, that deep-seated conviction in its influence and potency, that desire to master its complicated problems, which has been hitherto confined to a few specialists and faddists. Our local authorities have been constituted but a very short time. The men and women who sit on the committees are new to their work: and yet the signs are not wanting that they will not only fulfil their trust and spare no pains in providing the best possible training for the children confided to their care, but will by their example excite in all classes and strata of society an interest and belief in the value of education, which, before long, will make us the imitated rather than the imitators of other countries.

I have struck a hopeful chord in what I have so far said. But because I have done so, because in the fruition of the efforts in which some of us have been engaged for years, I feel we have reason to rejoice, it must not be supposed that I do not see much hard work to be accomplished, obstacles to be overcome, and difficult problems to be solved. Though we have cause to be thankful, this is no time to rest. In the relation of local authorities to the managers of schools and governors of institutions such as those represented here to-day, there is need of mutual understanding and concession. The religious question in non-provided schools is still a cause of friction, although we may hope that the practical commonsense of Englishmen, free from the bias of party politics, will, before long, find a basis of common agreement. Then, there are grave considerations connected with the conflict of studies in our secondary schools and the appropriate curricula for different classes of pupils. There is the question of the best means of selecting

and training teachers, the true function of examinations and their relation to inspection, the building up of the scholarship ladder, and many other thorny matters, all ripe for discussion and full of difficulties. And, besides these subjects, which are mainly connected with the machinery of education, there are questions concerning methods of instruction, requiring for their determination the sympathetic co-operation of the professors of different branches of learning with school teachers.

There is, moreover, one problem, which presses for solution, of special interest to the members of this Association. It is the consideration of the character and scope of the education qualifying for technical instruction, the preliminary training needed to enable students to take full advantage of the teaching, which the institutions here represented now provide.

This is a large and important question, and one which so intimately concerns the members of this Association that I am sure it will not be thought inappropriate if I refer to it in some detail. It has often been remarked that no country offers fuller opportunities for the practical instruction of artisans in the scientific principles cognate to their several crafts than are to be found in the technical institutes of Great Britain. They are, on the whole, better equipped, and the teaching is more systematically organized. The programme of the City Guilds Department of Technology contains more detailed information as to the courses of instruction, applicable to different branches of trade, than will be found in any foreign publication, and the pages of that volume reflect the work now being carried on in the technical schools of this country and in many of our Colonies. The complaint, however, is very general, that the living material, with which the teachers have to deal, is insufficiently manipulated when it reaches their hands, that the students who attend even the most elementary of their technological classes are, in too many cases, insufficiently prepared to profit by the teaching. They are deficient in power of expression; they lack practical knowledge of arithmetic and the rudiments of science and the necessary skill in drawing. In a word, their training in the elementary schools of the country has not produced the best results. The high

ideals which have been set before our school teachers in Mr. (now Sir Robert) Morant's preparatory memorandum to the Code, issued last year, are still ideals—conditions to be aimed at, but not yet attained. But the fault of which our technical instructors complain appears to be due rather to the subjects and methods of instruction than to any want of capacity or effort on the part of our elementary teachers.

I have referred elsewhere, and on other occasions, to the necessity of associating our elementary teaching with hand and eye training, and of stimulating the child's intellectual activity by constant reference to concrete object-lessons. We have happily discarded in our schools the teaching of isolated branches of separate science subjects, by which, in former times, grants were earned. But there is still wanting that regulated connection between the different subjects of elementary school instruction, which would help to hold them together as correlated activities or associated concepts, readily available as a basis for subsequent technical instruction.

An indication of the desire of the Board of Education to move in this direction is shown by the very recent appointment of an inspector to advise as to the best means of utilizing nature-study in promoting technical education in rural districts. This is another important forward movement. It may be the means of creating home industries where they are much needed; but, apart from this, the training of the hand and brain by suitable lessons in practical work is educationally of the highest value, and shows that the Board of Education are alive to the necessity of introducing some such changes as have been suggested in the methods of elementary instruction.

I am fully aware of the great help which ordinary continuation classes may afford in bridging over the gap between the elementary day teaching and the specialized instruction given in our technical schools. Such teaching will, I hope, in the course of time be properly co-ordinated with technical instruction. In Berlin, attendance at such schools has recently been made obligatory under certain reservations, on all pupils under the age of seventeen, who cannot show that they have sufficiently profited by instruction in the common schools. But after making due allowance for the help which continuation

classes may afford in supplementing the defects of earlier training, it is in the elementary day schools that the great mass of our children must be prepared for their real work in life, and we are reluctantly obliged to admit that the preparation which such schools now afford is not as well adapted as it might be to the end in view.

And here a word of warning may not be out of place as to the potential dangers inherent in the scholarship schemes which County Councils and other authorities are now elaborating. Much may be said in favour of the proposal for the annual award of from 2000 to 3000 scholarships to the children of the London schools. To provide the means of utilizing the brain power and the best intellect of a great city in the service of the country is an idea which appeals to the patriotic instincts of all classes. At the same time we must take care that the method of selection shall secure the best elements and does nothing to impede the intellectual growth and development of the more backward children, of those who may not so quickly rise to the surface. Sir William Anson has well said that our local authorities "should pay at least as much attention to the schools as they do to the scholarships." The details of the London scheme would seem to require further consideration before being accepted as a model for other authorities. The qualifications to be looked for in our future artisans, in those who may be best able to profit by the instruction of our technical institutes, are not necessarily the same as those required in our future elementary teachers. Indeed, as regards the latter, it would seem that further encouragement might be given to the endeavour to select some of our teachers from the pupils of higher secondary schools. The influence of teachers, bred and trained amid other surroundings than those of the children to be taught, is a factor of some importance. But what we have especially to guard against in any scheme of scholarships is, that the interests of the children generally are not sacrificed to any hothouse cultivation of the few. The strength and vigour of the population does not depend so much upon the cream that is separated as upon the milk that remains. Our immediate efforts, therefore, must be directed towards making the instruction in our elementary schools a fitting

preparation, not so much for the higher secondary education as for the practice of the many technical pursuits in which the overwhelming majority of the children will be subsequently engaged. This is the real end to be steadily kept in view.

If the survey of foreign educational systems proves anything, it is this, that a country succeeds and prospers in proportion to the excellence of its methods and the completeness of its organization of popular education. A Russian general is reported to have said that the difference between the Japanese and Russian soldiers was that the former were educated and the latter were not. We scarcely realize sometimes the weight of responsibility that rests upon our elementary teachers. It is they who have to shape the thoughts and fashion the ideas of those who in a few years constitute the nation. We therefore look to them to direct not only the mental and physical training preparatory to specialized instruction, but to provide also the discipline and teaching which shall enable their pupils to carry into the work of life the lessons and the methods they have learned at school. But we look to them for more than this. It is in the elementary school that that indefinable something aptly called "the soul of the nation" is created; and if it be our desire to develop, as some of us hope, into a great confederacy, of English-speaking peoples, united by common interests, by common aspirations and ideals, then we must look to the teachers of our elementary schools, by the lessons they impart and the influence they are able to exert, to train up a new generation, breathing the spirit of the Empire, prepared for the sacrifices and responsibilities it may involve, and competent to fulfil its mission in the future history of the world.

There is another aspect of this question—the preparatory training best suited for technical instruction—which cannot be without interest to this Association. I refer to the training preliminary to the higher technological teaching of university standard. Many of our technical institutions—as, for example, the splendidly equipped school in which we are privileged to hold our present meeting—have courses of advanced instruction in the application of the higher branches of science to specific industries. The relation of these institutions to our universities, in so far as they provide such teaching, is not yet fully

adjusted. In London many of our technical teachers sit upon Boards of Studies, and are "recognized" by the university, and their students are regarded as, and have all the advantages of, "internal students." Both with respect to such students and to others who frequent the technical institution, often with a view to obtaining there the preliminary training for the university, the character of the entrance or matriculation examination is one of grave importance. It affects equally our secondary schools; and, owing to the action of the older universities, the question is now exciting considerable interest. What may be the outcome of the present whirlpool of discussion it is difficult to predict. In London, we have arrived, at least temporarily, at a satisfactory settlement. Our matriculation examination is many sided, and one facet at least affords a suitable opening to advanced technological instruction. It gives sufficient freedom to the candidates and to the schools where they are trained. It has been settled, after much discussion and some compromise, on the basis of supplying many openings to the university, so that each faculty may practically prescribe for its own students the terms of entrance to its courses. Negotiations have taken place between London and the older universities as to the conditions under which its matriculation may be accepted in lieu of Responsions and the Little-go. The difficulty of arriving at a satisfactory settlement is due to the fact that both Oxford and Cambridge still demand some knowledge of Greek from all candidates for admission, whilst neither of the classical languages is any longer an obligatory part of the London Matriculation.

I am not proposing to discuss here the vexed question of the value of Greek as a subject of school education. I am prepared to admit its value, particularly when taught by such methods as have recently been advocated by the Lord Chancellor[1] and others. Indeed, I am in full sympathy with those, who would regret that either classical language should cease to be studied in secondary schools. I recognize that a training in the "Humanities" is an essential part of a liberal education, but we must remember that the term includes much more than

[1] Lord Halsbury.

the Greek and Latin languages. Indeed, I am not sure whether it might not be more fittingly applied to the literature and history than to the language of a people. Of recent years, humanistic studies have been too much neglected in certain types of secondary schools. We have been lured on by the apparently attractive and utilitarian aspect of a form of science teaching, now almost generally discarded, to give too little thought to the literary side of education, and as a result the pupils of such schools lack power of expression, have read little and show no love of reading, and are wanting in sympathy with leading social movements. Of the humanizing influence of Greek and Latin culture on those who are able to profit by the study, there can be no doubt. The question which concerns this Association is, whether those pupils of secondary schools who desire to enter upon a special course of technical instruction and who can never hope to acquire such mastery of either Greek or Latin as would enable them to read with ease its literature, gain from the study of its grammar and construction only, the same mental discipline and training as they might obtain from other studies, which would form a fitting preparation for their university work, and might be systematically and continuously pursued. This I humbly submit is the question which our universities have to consider, and to which eventually, if not now, only one answer will be given.

What I cannot avoid thinking must happen, if Oxford and Cambridge insist on requiring from all candidates for admission a knowledge of both Greek and Latin, is that students of engineering and of other branches of applied science will flock to London and to the newer local universities, and that Oxford and Cambridge will be in the future, as they were mainly in the past, the great schools for humanistic studies. There is indeed much to be said in favour of the co-ordination of the more advanced teaching, and of creating in each of the universities of Britain special schools for one or more of the higher grades of learning. With the widening of the area of science and its more detailed study, it might be thought unnecessary that every university should aim at providing complete courses of instruction and facilities for research in all

branches of knowledge. Some division of labour might be desirable. But the trend of effort of the two older universities has not been of late years in that direction. They have shown a real desire to add to their traditional departments of learning newer branches of study. They have erected laboratories and museums and have employed large funds in extending them. They have made the teaching of pure and applied science a special feature of their work, and the names of some of our most distinguished scientific men are intimately associated with those ancient seats of learning. To many it would be a matter of deep regret, particularly having regard to the unique position which the older universities occupy in England and throughout the Empire, that they should restrict within narrower limits the instruction they provide, or do anything to discourage the admission to their halls of students in the newer and more practical branches of learning. Yet this exclusion must, I fear, gradually follow, if the universities continue to offer no alternative to Greek at their entrance examination.

For these reasons mainly, I regret the resolution adopted by the headmasters at their recent conference, and I do not share their fears as to the consequences of the proposed change. I do not believe, that if Greek were made an optional subject it would cease to be studied in our schools. I know it is thought that this might be the case, and I see it stated in the Introductory Review to the Schoolmasters' Year Book for 1905 that "Greek only exists at all because the two universities demand it, and some parents desire their sons to go to one of them." But surely no weaker argument can be used for its retention. If Greek can hold its place in our schools only as a "protected" subject, its relative educational value must surely be exaggerated. We are told that a training in Greek grammar and elementary composition is essential as an intellectual discipline for all students, even for those who desire to specialise in some branch of applied science. But can we suppose that intelligent parents, many of whom have themselves undergone the training, are so insensible to its advantages as to desire to withdraw their sons from its stimulating influence, unless convinced that the time devoted to it might be more profitably employed? I believe that the endeavour

of the schools, under cover of the universities, to force upon their pupils the study of any particular subject must be harmful to secondary education in this country generally; and the fact that our head masters should appeal to the universities to assist them in this endeavour, seems to me to be scarcely consistent with the dignity of their profession, and calculated to lessen the influence which they should be able to exercise. While, in common with most of those I am addressing, I consider that the teaching of science should form part of the instruction provided in schools of every grade and type, I very strongly urged, when the question was under discussion at the Senate of the London University, that science should be included among the optional subjects at the matriculation. I did so, believing that it might stand on its own merits, and that it would be taught, no less generally and far more thoroughly, by not being made an obligatory subject for examination.

But this suggests another question connected with the curriculum of secondary schools, which has not yet received the attention it demands. Is it the function of the university, by means of its entrance examination, to control or even to exercise any determining influence upon the course of study in our secondary schools? I should say not. If we consider the question apart from the traditions which have grown up around it, we must recognize that the matriculation should be a test, and nothing more, of the ability of the pupil to enter upon the course of instruction in the particular faculty of the university in which he desires to pursue his studies. As such, it has no necessary connection with the general curriculum of the secondary school where the pupil was educated. It is no part of the matriculation examination to test, by means of the knowledge which the candidates present, the entire work of any particular type of school, nor the extent to which the scholars have profited by the instruction they have received in the several subjects of the curriculum. Although properly the function of the State, it is very desirable that the universities, by a system of inspection and school-leaving examinations, should exercise an elevating influence upon school work generally, and should help in maintaining a high standard of teaching; but the entrance examination to a University

should not be made the means of endeavouring to effect this object. The real purpose of such an examination is not to test what the schools should teach, but what the scholars know. The disadvantage of making the matriculation serve these two purposes is that it fails to fulfil either. It includes a certain number of irrelevant subjects, which we are told every schoolboy ought to know, without adequately testing the entire school work; while the standard for passing in those subjects, a knowledge of which is essential as a basis for higher teaching, is necessarily made unduly low, and, as a result, a large number of imperfectly trained students gain admission to the university.

I plead, therefore, for many doors of entrance to the university, and for a sufficiently high landing-stage to each.

It will be seen that the question of compulsory Greek affects prejudicially to a greater extent than might have been supposed the higher scientific instruction given in our universities and technical institutes. It does so, because in the schools where the students are prepared, owing to the desire of a few to go to Oxford or Cambridge, nearly all the pupils are subjected to the same discipline. In such schools a disproportionate amount of time is given to the study of the classical languages, while English literature and composition, mathematics, science, drawing and modern languages are correspondingly neglected. If we ask what is done in Germany, we find an altogether different state of things. It is true, a leaving certificate involving a knowledge of Greek is required for entrance to certain faculties of the university, but not to the Technical High School, which, although of the same rank as the university, is, as regards its teaching and organization, entirely distinct from it. To gain admission to the Technical High School, which corresponds with the faculties of engineering and applied science in the universities of this country, candidates are not required to possess a knowledge of either classical language. Indeed, they are admitted with the leaving certificate from any one of the three types of higher secondary schools, in only one of which Greek is an obligatory subject of instruction.

It is unfortunately the fact that the professors of our universities, particularly on the technical side, complain very

generally that the pupils from the best secondary schools, who succeed even in passing the necessarily easy entrance examination, come to them very imperfectly prepared for higher instruction. In many cases they are equally deficient on the humanistic as on the practical side of education. This is partly due to the pressure which Greek exerts on the teaching of all subjects in our higher secondary schools. The recognized defects of the modern sides of many of our schools, and the acknowledged fact that the best boys are not found there, are due to the same cause. There can be little doubt that so long as Greek remains an obligatory subject for entrance to Oxford and Cambridge, any proper organization of secondary education, such as is found in Germany, France and Switzerland, is impossible, and our professors will continue to complain that the preliminary training which their students receive in the secondary schools does not qualify them to take full advantage of subsequent technical instruction. This would apply to all branches of engineering and to the higher military and naval education. Speaking only a few days since at the opening of a course of lectures on military subjects, Mr. Arnold-Forster said that he was not altogether satisfied with what the public schools were now doing for the army. I am not prepared to say that the faults of which he complained are not primarily due to the character of the examinations for which the schools are bound to prepare their pupils. Probably they are. But if so, it only shows how necessary it is that such examinations, including the University Matriculation, should not unduly fetter the freedom of teaching in our schools. There is much force in what Mr. Arnold-Forster said, "that what this country is now feeling acutely is that we have so long subsisted on an educational basis inadequate to the needs of modern life." This statement supports my contention that our professors are handicapped in their endeavours, in the time allotted to them, to turn out men duly equipped with the necessary knowledge and practical requirements for professional work. It is recognized that the course of instruction in most branches of engineering must be extended to at least four years, and that unless the early school training is improved, a preliminary year of general instruction may be needed. This is a very serious

matter. For even when a student leaves the professional school or technical side of the university, it is necessary that he should serve for some time in practical work before he is qualified to undertake professional duties. His apprenticeship is thus unduly prolonged and he begins his practical career too late in life.

The remedy for this state of things must be sought in the better organization of our secondary education. Our classical schools do, I believe, provide a satisfactory training for the particular professions to which they lead; but the modern sides of our secondary schools must be improved. They should be placed on the same footing as the classical sides, and the scholars should know that they have the same chances of gaining university distinctions, proceeding from one side as from the other. It is not enough that the laboratories and workshops should be well equipped; they must be staffed by teachers of the same eminence and ability as the masters who preside over the classical sides of our great public schools, and they should be paid equal salaries. Moreover, the curriculum should be so modified that sufficient time is given to science and to those humanistic studies which will prove useful to the student in his subsequent work. These necessary changes do not imply any early specialization in our secondary schools; specialization of study should not occur till the university stage of education is reached. They only indicate the great educational principle, that different groups of studies may be made to yield an equally liberal education. *The Times* in a recent article very truly said: "What we miss in the discussions of this subject by our leading schoolmasters is, to speak plainly, breadth and foresight. They 'ignore, as it seems to us, the inevitable tendencies of modern thought and life, and are slow to recognize the necessity for some alternative to the hitherto accepted standards of a liberal education."

Referring to these discussions, an eminent professor said to me the other day that technical education is now under a cloud, that it no longer excites the interest and attention which it received a few years since, and that the funds devoted to it may possibly be diverted towards other kinds of instruction. Well, this must not be. There are periods of action and reaction in education as in other sociological movements. They

occur even sometimes in politics. But as regards technical education there must be no standing still and certainly no reaction. Our national defence, the success of our trade and commerce, the prosperity and well-being of our people depend now, as much as they were thought to depend a quarter of a century ago, upon the diffusion of appropriate technical instruction among all classes of the population. It is important, indeed, it is essential, that the foundations of technical education should be securely laid in our elementary and secondary schools. But care for the solidity of the foundations must not make us unmindful of the absolute necessity of raising thereon a superstructure of professional training, of commercial and trade teaching, which shall enable us to hold our own among rival nations, and bind together in a great forward movement all the separate parts of our vast civilizing Empire.

I cannot conclude these somewhat desultory remarks without referring to the fact that the Association has this year made an important new departure. Since its foundation more than ten years ago its annual meetings have been uniformly held in London. Like a once celebrated band of minstrels it "never performed elsewhere." But this year, for the first time, the Association, recognizing that there is nothing essentially metropolitan in its constitution, has decided, I think wisely, "to act" out of London; and, having so decided, there was certainly no city where it could more happily or more properly hold its meeting than in Manchester. This great city has always been to the fore in all educational efforts. It was the first city to break away from the traditions of the past and to establish what, even years ago, it was in reality, but has since become in fact and in name, a Local Teaching University. Its old Mechanics' Institute was one of the first to develop into a School of Technology, and in its transformation, I was permitted, as representing the City and Guilds of London Institute, to take a humble share.[1] In other educational directions

[1] On July 27, 1882, standing in the grounds of the house of the late Mr. Oliver Heywood, I addressed some of the manufacturers of Manchester, and offered, by the request and on behalf of the City Guilds Institute, a contribution from its funds, for three years, if the people of Manchester would undertake to convert the old Mechanics Institution into a suitable Technical School.

Manchester has given an example to other cities, which they have not been slow to follow. I congratulate the members of the Association on their wisdom in selecting Manchester as their place of meeting; and, on behalf of the Association, I offer our warmest thanks to the city authorities, to Sir James Hoy, to Principal Reynolds, and to Sir William Mather, our first and much-esteemed President, for the genial and hearty welcome they have accorded to us.

VII

LONDON UNIVERSITY IN RELATION TO THE EMPIRE [1]

[1901]

THE reconstituted University of London is no new creation, but the evolved product of the conditioned thought and efforts of the last decade of the nineteenth century. The epoch is in many ways an interesting one. It is marked in this country by the birth of an enlarged sentiment of patriotism, embracing all our colonies and dependencies, which we call Imperialism. A nation's educational institutions should be vivified by the spirit of the times; and in many ways the new university may be expected to respond to the Imperial idea.

As an examining body, the university has been for many years an Imperial institution, and will remain so. Its degrees are open to all comers, and its examinations are held not only in London and in a large number of provincial centres, but also in the colonies. The services it has rendered to the provincial colleges are fully appreciated, and the loyalty of the graduates outside London is very marked. In several of our colleges university education has been encouraged and usefully directed by the London examinations; and in London itself the accessibility of a university degree has stimulated more advanced teaching in many institutions intended mainly for the instruction of the working classes. The regulations for the recognition of teachers of polytechnic and other institutes will tend gradually to increase the proportion of "internal" students, whilst the establishment of new local universities will have the effect

[1] This article appeared in the second number of the *Imperial Review*, March, 1901, and is republished by permission of the editor.

of lessening the number of external candidates seeking the London degree. It is certain, however, that so long as the present high standard of the examinations is maintained, the reputation already acquired by the London degree will continue to attract to the university candidates for its examinations from all parts of the Empire.

The problem of real difficulty with which the new senate has to grapple is the organization of the higher education within the area assigned to it. On its teaching side, the university is an aggregate of different institutions, each with well-defined interests and objects of its own. To unite these objects and to reconcile these interests is the special task of the new senate, and the influence of the university as an intellectual force will depend upon the success with which that task is accomplished.

It is almost unnecessary to dwell upon the importance of the higher education as affecting not only the growth of knowledge, but our ability as citizens to take part, with any measure of success, in the pursuits of industry and commerce, or in any of the different grades of professional activity. For the purposes of comparison, however, it may be well to point out that such successes as the Germans have achieved have been due mainly to the educational facilities their high-schools offer—facilities of which the youth of America, Russia, and Japan have not been slow to take advantage.

In the German Empire there are twenty separate universities, in addition to eleven technical high-schools, besides schools of forestry and other institutions of university rank. These schools are attended by nearly 45,000 day students. In England and Wales the number of day students receiving a university training, including the students in attendance at the medical schools, does not exceed 13,000; and comparing the entire population of Germany with that of England, it would seem that the proportion of male students in Germany receiving university education is about twice as large as in England.

There is abundant opportunity, therefore, for the new university of London to develop its teaching side, without lessening the number of students in attendance at any existing institution. Indeed, the London of the new university will have a population of nearly seven millions—half as large again

as that of Scotland with its four universities and 5500 students —and will occupy an area of thirty miles radius from the university building.

Within this area there are a number of institutions giving university education which are scheduled as schools of the university, and there are others providing lecture and laboratory instruction under recognized teachers. The university is already, therefore, spread over a large portion of its area. It has ganglia in different parts of London, and the problem to be solved is the co-ordination of their respective functions, and the creation of the links that shall unite them with one another and with the senate, as an organic whole. Until now, owing to the complete absence of any associated action among the institutions in London giving higher education, there has been, and there still is, a serious waste of effort and an unnecessary duplication of schools of the same kind, none of which are sufficiently complete favourably to compare with similar schools abroad.

From pressure of circumstances the chief London colleges have been compelled, to some extent, to subordinate educational aims to financial considerations, and have sought rather to attract students by the variety of their subjects of instruction, than to correlate their teaching with that provided in other schools. The results have not been wholly satisfactory. Men of the highest eminence, who might have devoted their energies to impressing with their own individuality a number of devoted students, eager to learn, and capable by previous training in the methods of research of adding to our sum of knowledge, have been compelled to exhaust their strength in giving, year after year, elementary instruction to mere beginners. This has proved a serious waste of effort, and has tended to keep university education in London at a comparatively low level. It is hoped that the new senate may be sufficiently independent, and in possession of the funds necessary to organize university teaching for the benefit of London as a whole, assigning to each institution the particular educational work it is best fitted to discharge. So organized, the university should exercise a very important influence upon the intellectual life and commercial interests not only of London, but of the whole Empire.

In its libraries and its museums, and in the meetings of its learned societies, London possesses advantages over every other city that should attract to its university the ablest teachers; and the professors in each faculty, working together, would form schools of thought and practice, which in course of time might be expected to draw to the Metropolis students from all parts of the world. Every day distances are lessened, and communication between this country and its colonies and dependencies is made quicker and more frequent. It is now almost as easy for the residents of Montreal, Sydney, or Cape Town to send their sons to London as it was a few years since for English or Scotch parents to send their sons to Leipzig or Zurich. Provided always that the university of London can offer facilities for the highest teaching, its special and unique features would help to fill its schools with students from all English-speaking countries. Situated in London, and answering to the needs of London, it would be extra-local, much in the same way as are the universities of Oxford and Cambridge; and even as they receive students from all parts of the Kingdom, so London may hope to draw students from all parts of the Empire, growing on its teaching side into an Imperial, as distinguished from a local, or even a national, university. The facilities for that wider professional training which contact with men and institutions affords are greater in London than in any other city; and if the schools, properly equipped, are placed under the direction of professors of repute, and if the teaching is sufficiently specialized, we may look forward to the time when many of our Indian fellow-subjects and the more cultivated colonists will send their sons to the Metropolitan University, for the sake of the exceptional advantages they would there enjoy.

And not only for these, but for our English-speaking kinsmen in the United States the new university should prove attractive. Till now, American students have gone from home in large numbers to profit by the facilities for advanced teaching, and for original investigation which the German and Swiss universities afford. But there is no reason why London should be backward in offering equal advantages; and who can fail to recognize the mutual benefit to England and America of the

co-education of the youth of both countries in the same city? To the United States it would surely be a gain that their future lawyers, merchants, engineers and civil servants should be trained amid the free institutions of England, rather than in Germany, where political ideals differ so widely from their own; and equally helpful to our own youth, in enlarging their views of the economic and social conditions of life, would be the companionship, as fellow-students, of the sons of citizens who approach the problems of self-government from a standpoint with which many are too little familiar.

The statutes of the university expressly provide that its internal students may, in accordance with the practice in German universities, pursue an approved course of study in more than one institution, whether it "be a school of the university or not;" and this provision opens the way to the reception of students from India, the colonies, and other parts, for the completion of their studies under London teachers. The statutes further contemplate that special facilities shall be provided for post-graduate study, and for admitting to the courses of instruction and higher degrees graduates from other universities.

Whilst the new university may thus help in strengthening what is best in the Imperial idea, by bringing together at the most impressionable age those who in after years will take an active part in the administration and development of our distant colonies and possessions, it will remain essentially democratic, corresponding to the spirit of the age that has given it birth. Its close connection with the great technical schools of London, and the fact that its students will be largely recruited, by means of the county council scholarships, from pupils of the public elementary schools, fully establish its claim to be regarded as the university of the people. Indeed, in accordance with the statutes, the door to its internal courts will remain open to every citizen of London, be his social position what it may.

It is true, admission to a degree can be gained through the matriculation examination only, but we may expect, in the near future, important changes in the character of that examination which will have the effect of widening the portal. During many years the matriculation examination has exercised an

important influence on the secondary education of the country. Under the special Board recently appointed for its regulation, that influence will doubtless be increased, and the university will have the opportunity of broadening and strengthening the basis on which higher education may be raised. Hitherto, the examination has not been an unqualified success. It has halted between its two main objects—that of serving as a university entrance and as a leaving school examination, and has not proved quite satisfactory as either.

In many ways, particularly in the early encouragement it gave to English studies and the teaching of science, the examination has done good work; but it is generally admitted that its rigid conditions and its want of elasticity have harassed and impeded the educational efforts of some of our best schoolmasters. No one desires that the standard of the examination should be lowered. On the contrary, there are many who think it might with advantage be raised. But the question will have to be considered whether equivalent standards cannot be arranged, adapted respectively to the curricula of classical, scientific, and commercial schools, so as to give greater freedom and variety to secondary education. The statute enabling the Senate to hold "separate matriculation examinations for different classes of students having regard to the courses of study which the students propose to follow," will prove most serviceable in connecting secondary with higher education, and in adapting the teaching given in different types of schools to university requirements.

In America, it has been found possible to standardize different courses of instruction, and to establish a unit of value, called a "norm," for a course of training in any particular subject, according to its quality and quantity. Something of this kind may be thought desirable in London, and the university may decide to accept a certain number of such "norms" as equivalent to matriculation. If, whilst the standard of scholarship is maintained, the selection of subjects be considerably widened, the examination will serve far better than now, both as the *terminus ad quem* and *terminus a quo* for secondary and higher education respectively.

There is a large amount of comparatively elementary

teaching which the university through its constituent schools and classes must continue to provide. It must receive students after matriculation, and give them the training and instruction that will enable them to graduate in their respective faculties. It must arrange courses of teaching with special reference to the proposed careers of different groups of students. Gradually, however, but not at once, the university will develop into something more than a collection of institutions where students are prepared for a degree; and its reputation as a seat of learning, as a seminary for scholars, and as a workshop for the production of new knowledge, will depend largely upon the help it is able to offer to students liberated from the trammels and conditions of examination.

The old University did nothing, except perhaps in connection with the Brown Institution, in the way of rendering direct help to the higher learning. As reconstituted, it will be able, as soon as its funds permit, to build up around it, partly from material already existing, special schools for the prosecution of advanced study and research. The professors attached to these schools will be recognized authorities in their respective subjects. Each science is now so broadened and so subdivided that no one person can pretend to be profound in all its sections. Chemistry, physics, and biology are no longer subjects in which a single professor can expect to be proficient. The reputation of the German universities is largely due to the appointment to each faculty, or division of a faculty, of a group of teachers, each an expert and acknowledged authority in his own department. The poverty of the London Schools and the absence of organization have hitherto prevented any such arrangement.

Owing to the conditions under which the new University has been established, the schools in which the higher teaching will be provided cannot be all grouped in the same locality. They will be scattered in different parts of London. But the concentration of teaching essential to the creation of such schools cannot be secured unless existing institutions, recognizing that they are but parts of one great teaching body, cooperate with one another, prepared to renounce what may be asked of them and to accept such offices as the Senate may require.

It would be premature to attempt to indicate how the higher schools of the faculties will be distributed, or how the concentration of teaching may be best obtained. For the teaching of science, South Kensington offers special facilities. New laboratories are now being erected immediately opposite the university building; and although University and King's Colleges are entitled to the credit of having been the first to provide practical instruction in engineering science, it seems likely that the seat of the high school in that faculty, at least, will be located at South Kensington.

Of the faculties of the University, those of engineering and economics, newly added to it, are the most closely associated with Imperial development. By recognizing the claims of these subjects to be represented by faculties, the statutory commissioners took a broad view of the requirements of a modern university. It is fortunate that they avoided the mistake, made years ago in Germany, of separating the teaching of engineering science from university education, a mistake which the present Emperor has done his best to rectify. The engineering profession, more perhaps than any other, brings its members into close touch with world-wide problems. Questions relating to the construction of docks and railways, the building of engines, telegraphic and telephonic communication, the utilization of water power, mining operations, naval architecture and ordnance, are largely extra-national, affecting the growth and development of the Empire as a whole. If the speed of a foreign-built vessel exceeds that of any of our own construction; if the building of a new line of railway is entrusted to foreign engineers; if a gun from the works of Schneider or Krupp carries further than one of English make, we are at once warned, and rightly so, that our Imperial interests are threatened.

The scientific training of the engineer, from an imperial point of view, is a most important function of a modern university. The application to industrial purposes of new chemical discoveries is largely the work of the engineer; and it is a knowledge of engineering that distinguishes the technologist from the purely scientific chemist. We are constantly reminded, too, that the development of our trade and commerce

is largely dependent upon the higher education of our industrial leaders, and the necessity of protecting our commercial interests has been the main cause of some of our recent wars, and of the consequent widening of the boundaries of the Empire. Indeed, among civilized nations, the keenest competition is found to prevail in the provision of facilities for the scientific education of manufacturers and engineers. The splendid institutions recently erected in Germany, Switzerland, Russia, Japan, and the United States, fitted with every necessary appliance, are for the most part special schools of university rank for young men about to enter some one of the many branches of engineering or manufacturing industry.

In this country, also, the advance in university education is most marked in the engineering faculty. Large sums have in recent years been spent in the installation of laboratories in London, in Cambridge, and in other cities; and although we are now less distanced by our Continental neighbours than we were a few years since, we are still behind some of them in the equipment of our schools, and in the provision of facilities for advanced professional instruction. It is only by bringing together the scattered forces, which now compete with one another, that we can hope to organize in London a School of Engineering and Technology, adequately staffed, and sufficiently specialized in every branch of it, to hold its own among the high-schools of Europe.

For some time to come it will be in the faculty of engineering that the imperial character of the university, on its teaching side, will be most marked; and if the schools now providing the highest instruction in this subject can be united under the university, we may expect to see its students largely recruited from, and when trained usefully employed in, many parts of the Empire. It would seem from the appointment, as two of the four Crown members of the Senate, of the eminent engineer, Sir John Wolfe-Barry, and the distinguished Agent-General for New Zealand, Mr. Pember Reeves, that this idea of the relation of the faculty of engineering to the university, as an imperial institution, was present to the minds of the advisers of the Crown.

What has been said of the engineering faculty is true,

although at present to a less extent, of the new faculty of economics and political science (including commerce and industry). The building up of a complete high school of economics must be a work of time; but a good beginning has been made in the school under Professor Hewins, which before long will have a building of its own in Clare Market. The greater attention which of late years has been given to the study of economic science and commercial problems, both here and abroad, gives reason to hope that a systematic course of instruction in these subjects will become one of the recognized avenues to a London degree. Apart from the value of the study in its connection with the duties and responsibilities of citizenship, no one can aspire to a knowledge of the commercial relations now existing between different countries and between Great Britain and its self-governing colonies and dependencies without some training in economic science; and to those who may desire to take an active and intelligent part in municipal government, and still more so to the few who may look to the consular service as their profession, or to statecraft as their career, a knowledge of economic science is indispensable.

Both in engineering and in economics, there will be less difficulty in arranging for the necessary consolidation of teaching than in those older subjects in which the educational conditions are more definitely fixed; and it is through the teaching in these newly added faculties that the university may gain for itself a reputation entirely its own, and become a centre of attraction for students from many different parts of the Queen's dominions.

Space prevents any reference to the future co-ordinating influence of the university in those older branches of study in which, by means of its examinations, it has already exercised so beneficial an influence on the higher education. Its medical faculty has long since attained to a position of exceptional eminence; but the organization of the medical schools is a problem which the commissioners have recognized as one of considerable difficulty, demanding the thoughtful attention of those members of the profession who now occupy seats on the Senate. A school of law in connection with the university has yet to be created; and much is required to evolve from

the faculty of arts special schools for the pursuit of literature, and for the promotion of historical and philological research, comparable with those of many of the older universities. In affording some encouragement and direction to the study of theology, and also of architecture, for which a new faculty is needed, the university has open to it large tracts of uncultivated ground; and the existing schools of music cannot yet be said to culminate in any one school worthy of the country.

Starting into life with the opening of the new century, and of a new page in the history of our destinies, the university of London, whilst utilizing the experience of former ages and of other countries, will break away from the traditions of the past and adapt itself to coming needs. As the older universities endeavoured, whilst advancing learning in all its branches, to equip the youth of each generation with the knowledge applicable to the practice of theology, medicine, and law, and to train them to the full exercise of their national and civic duties, so the newest university will seek to expand in all directions our birthright of science, to liberalize all professional careers, and to educate our young men and women for the discharge of those wider and more responsible duties which citizenship of such an Empire as ours demands.

The opportunities of the new university are vast; but its means are at present wholly incommensurate with what we may assume are its ideals. To give even partial effect to what is expected of it, and to what it is capable of doing, the university must possess ample funds absolutely at its own disposal. Hitherto, it has existed on examination fees, supplemented by a small and constantly decreasing Treasury grant. Freed from the payment of rent and the cost of stationery and printing, the subvention it received last year did not exceed £10. On its examining side, the university has been for some time practically a self-supporting institution. But in order that it may develop on its teaching side into a university with special schools for the promotion of learning and the prosecution of research, and in order that its professors may be free from the duties of schoolmasters which they have hitherto been obliged to discharge, adequate resources are absolutely essential.

Without the necessary means, it will be unable to advance a single step, and the work of the committees and commissions will have done nothing more than to give the university a new and somewhat cumbrous constitution, and a complex machinery for regulating teaching, which it will be powerless to provide.

Already, application has been made to Government to endow the university with an independent income. But we cannot expect that State aid alone will suffice for the full organization of university education in London. An opportunity now occurs for some of the many men of wealth, who have attained to fortune through the enlargement of the Empire, to help in providing that higher education by means of which alone the well-being of the Empire may be maintained. As Lord Reay has told us, "For Imperial defence the Board of Education is as important as the Admiralty or the War Office;" but still more important, as concerned with the training of our professional leaders and captains of industry, of our men of science and our civil servants, is the university, in the influence it may exercise through them on the destinies of the Empire.

Among the four hundred million inhabitants of the countries governed by the Queen, there must be thousands to whom the phrase "Citizen of the Empire" is more than a vain boast, men who are capable of appreciating the services which a university, situate in London, but open to students from every English-speaking country, may render to the Imperial cause. To such, these pages are intended to appeal. In the prosperous States across the ocean such an appeal would be soon answered. There, the patriotism of the citizen finds practical expression in the rich endowment of seats of learning, in which his children and descendants may acquire the discipline and training that will enable them to add to their country's greatness. Here, such signs of loyal love of country are more rare. But within the last few years there has grown up a widened interest in the Empire's welfare. Its boundaries have been enlarged, and from every part of it its sons have gathered, ready to die in the cause of its essential unity. This strengthened sense of patriotism should prove as powerful in times of peace as it has proved in war; and we may surely

hope that those who are asked for lesser sacrifices will freely respond to the appeal, and will help by their offerings to make possible in London the creation of a teaching university, a high-school for all the services, a training college for those who, in one profession or another, in industry or commerce, may help to consolidate and to develop our imperial inheritance.

VIII

LECTURES AND LEARNING[1]

[1893]

SOME time ago, your Principal asked me if I would give one of the Saturday evening lectures at this college, in the work of which he has taken so deep an interest. A request from Sir John Lubbock, whose friendship dates back many years, is to me almost equivalent to a command, and so I set myself to think of some subject which not inappropriately might be brought under the notice of the students of this college. The selection of a suitable subject, on which to lecture to an audience which has had the privilege of listening to Sir John Lubbock has been no easy task; but, seeing how varied and frequent are the lectures that have been given in this hall, and how attractive many of them have proved, it has occurred to me that it might not be out of place, if I were to invite you critically to consider the real purpose of such lectures, as aids to learning, both in themselves and in relation to other means of acquiring knowledge, such as reading and research.

In these days, when the number of institutions is daily increasing, where lectures on literature, science, and art are given to crowded audiences, it may not be time wholly wasted to question ourselves as to their real value, as a part of the present means of instruction.

I well remember when I left University College school to enter the college, that I regarded the substitution of lectures for class lessons as one of the essential marks of the higher education I was about to receive. I am not, however, by any means certain that it was so. However, there is no doubt that

[1] An address to the students of the Working Men's College, January 23, 1893.

for years the prevailing and indeed almost the only method of instruction adopted in our universities and colleges was the system of lecturing, and that between the professor and his students there was too little interchange of thought and ideas.

Before the middle of the fifteenth century, the era of the printing press, books were less easily multiplied than now, and the lecture was almost the only means by which the knowledge acquired or procured by one person might be imparted to others. About the period of the rise of the universities, and subsequently when the accumulated stores of classical learning were pouring into Europe, the lecture was the recognized medium of instruction, and large numbers of eager students crowded round the lecturer to gather knowledge and information which could not otherwise be obtained.

In earlier times, when the inheritance of knowledge was comparatively small, lectures did not constitute so general a form of instruction as now. But the lecture continued to be the means, not only of diffusing popular knowledge, but also of the higher education, long after the multiplication of books by printing; and even now, when books are so universally accessible and are published to meet every class of reader, and every kind of educational want, our halls are as thronged as ever, and lecturers who are capable of interesting an audience are listened to with no less eagerness or attention than when William of Champeaux lectured on logic and his pupil Abelard on theology. The question, therefore, naturally arises, Why is it that, notwithstanding the multiplication of books, the lecture still holds its place in university teaching, and that numbers of people are willing to listen to what a man has to say, although they refuse, even in the quiet of their own rooms and at their own leisure, to read what he has written?

But before considering the relative value of lectures or oral teaching and the reading of books, it may be well briefly to refer to some of the conditions of instruction that prevailed in earlier times before there existed any large amount of acquired knowledge, which it was the function of the lecture to diffuse.

Neither in Palestine nor in Greece, in which countries, as we know, the pursuit of knowledge was highly esteemed and

learning was very carefully cultivated, can the lecture be said to have been adopted as a general method of instruction. There was nothing in Greek education, so far as has been ascertained, to lead us to suppose that learning by means of what we now understand by lectures was common. Oral it certainly was; but the system was different from that of the professor of to-day. The teaching of the Sophists, in whose hands was the higher education, was very different, and no doubt approached more nearly to the system of interrogation pursued by Socrates, with which every reader of the Platonic dialogues is familiar. Nothing could be more dissimilar to the modern lecture than the method of rigid questioning, by means of which Socrates endeavoured to elicit truth. At the same time, it must be remembered that the object of such teaching was not to *inform*, but to *define*. Its purpose was not to impart knowledge which had been laboriously acquired by others, but rather to draw out from man's consciousness and experience exact expression of the meaning of ideas vaguely present in the mind, and to that extent it was akin to the methods of inquiry now adopted by the best teachers. It was a method of *investigation* rather than of *information*. Indeed, there existed little knowledge in those early days which was sufficiently definite and exact to admit of being imparted on the authority of others. Socrates always assumed the very opposite attitude of the modern lecturer. He supposed his audience to be wiser than he was, and, appearing rather to be seeking information than conveying it, he deliberately proceeded to criticize the loose statements of his pupils with the view to arriving at clear and definite conceptions.

In the Palestinian schools, which flourished three or four centuries before the Platonic dialogues were written, a system of instruction existed which also differed essentially from the modern lecture. Learning was advanced by discussion and in place of the modern lecturer or professor, we find a teacher who, by his acknowledged subtlety and power of argument, was recognized as the master, or rabbi. In these schools there was the liveliest interchange of thought between the master and his disciples. No one then held the enviable position of being free to discourse for a whole hour without interruption.

Every word, as uttered, was subject to criticism and investigation, and in the discussion that ensued, the arguments of the disputants were pointed by illustrations from very different sources. Much of the science which then existed found its way into the reports of these discussions that have come down to us; but the display of knowledge was incidental and subservient to the elucidation of the question under consideration. In these conferences all sorts of questions were asked, and the truth of the possible answers was very rigorously tested. As may be supposed, the introduction of foreign matter was frequent, and long parenthetic dissertations are found on a variety of subjects, with seemingly very little reference to the context. Thus, in the works that have come down to us, long paragraphs, running into pages of closely printed matter, have to be waded through before the consideration of the main subject is resumed. But all these questions and answers, illustrated as they were by seemingly adventitious matter, had for their object the elucidation of difficult and important problems, which at that time engaged the serious attention of the learned. It is quite clear that the mental attitude of those who took part in these discussions was very different from that of the listeners to a modern lecture, and that such a method of instruction had a very marked effect in quickening the thought and in stimulating the reasoning powers.

In the period commonly known as ancient history, education consisted mainly of physical, ethical, and æsthetic culture. The acquisition of knowledge was of secondary importance, and the methods of instruction were mainly directed to the cultivation of the faculties. There was very little trustworthy information to impart, and there was consequently very little scope or opportunity for the lecturer. But, when after many centuries, there was a revival of learning, and news began to filter from the East into Western Europe, the desire to know something about the conditions of life and the state of civilization of the peoples who had lived in Rome and Athens, in Jerusalem and Alexandria grew very keen, and those who were able to satisfy this desire were eagerly sought after and heard. About that time societies were founded in Italy, France, and England, which, later on, became the seats of universities, and these

schools differed from those of Greece, in making the learning of the past the chief subjects of instruction. Authority took the place of reasoning, and the lecture was substituted for the symposium. What the people then wanted was information, and the lecturer was distinguished rather for his power of exposition than for his subtlety in reasoning. The learning of the old world had to be brought into the new, and, as books were difficult to obtain, and could not easily be multiplied, the lecture became the vehicle for the dissemination of knowledge. So it came to pass that lecturers travelled from place to place, like the bards of still earlier times, informing people as they went along, and creating an appetite for knowledge, which gradually led to new and fresh discoveries. After a time, these lecturers settled in favourable localities, and sought special privileges for their order, and a society of lecturers so formed together with their students constituted what came to be known as *studium generale*, and developed into a *Universitas Magistrorum et Scholiarum*.

I have often been struck with the similarity in origin between the old universities of Bologna and Paris and the new societies connected with the movement for university extension. Both consisted originally of a society of lecturers, owning neither buildings nor funds, and dependent upon others for the use of lecture rooms. They formed a voluntary association of persons who had themselves gathered information from books or travels, and were eager to impart it, with such additions and interpretations as their own investigation had enabled them to offer. The students who gathered round these lecturers did not belong to the privileged or wealthier classes. They were the sons of traders, farmers, and yeomen—the children of the people. The days chosen for these lecturers to teach were generally market-days, and Cambridge itself is said to owe its fame, as a university city, to its proximity to Stourbridge, the great mart to which traders from Germany and the Netherlands resorted to buy and sell at the annual fair.

The popular movement associated with university extension is very similar in its origin and general character to that which gave rise to the universities eight or nine centuries ago. The analogy is very marked. Then, as now, there had grown

up a mass of new knowledge which those who had acquired it were desirous of disseminating among the people. Then, as now, societies were formed of persons united by a common mission, and seeking, with a view to their objects, funds and recognition from the State. Then, as now, the chief instrument of such instruction was the lecture. In this analogy, and in the contrast between these small beginnings and the present position of our great universities, the societies for the extension of university teaching will find satisfactory ground for hope and expectation.

But what strikes us in all this is the persistence of the lecture as a vehicle of information. It might have been thought that the power of multiplying copies of a lecture which the invention and development of printing secured would have superseded the lecture as a means of instruction. It would almost seem that, when every one could be supplied with a printed copy of what another had to say, the lecturer would be no longer needed, and might be regarded as a mere survival of pre-printing times. But this is not so, and now, when we can obtain written lectures and text-books on every kind of subject about which we may seek information, and our monthly magazines and weekly reviews, and the "leaders" in our daily papers, supply us with written lectures on all sorts of current topics, the good lecture is as popular as ever. If we care to know what the master-minds of bygone days have said or thought upon any subject, we can purchase for a few shillings, or borrow for still less, the books in which these sayings are recorded, and the circulating library brings to our doors the latest thoughts of living thinkers on every subject of passing interest. Nevertheless, the societies for providing lectures grow every day more numerous, and seem to increase rather than diminish with the spread of knowledge through the multiplication of books and pamphlets. Surely there must be some special value about oral teaching which cannot be conveyed in written words to account for this seeming anomaly.

Nor can it be said that this interest in lectures is due to any want of appreciation of the value of reading. Now, every one can read, and most people do read. Moreover, the value of books is a favourite theme with many writers. Your Principal

has even ventured to pick out the best hundred books. But I know of no one who has dared to decide as to the best hundred lectures.

"Books," says Plato, "are immortal sons deifying their sires." "A taste for books," Gibbon tells us, "is the pleasure and glory of our life." But no one could say of a good lecture what Milton said of a good book: that it is "the precious life blood of a master spirit." Nevertheless, lectures have a special merit of their own, which we are all able to appreciate. Any one, who has been present at the opening meeting of the British Association, or at the Friday evening lectures of the Royal Institution, would agree that lectures have a special charm and value of their own to attract both young and old, and to induce a love of knowledge and to stimulate high thought.

Notwithstanding the fact that lectures form a very important part of the machinery of higher education, as the means of popularizing knowledge, we frequently find that lectures are unfavourably contrasted with books as aids to learning. "Books," says Sir Egerton Bridges, "instruct us calmly, without intermingling with their instruction any of those painful impressions of superiority which we must necessarily feel from a living instructor." Carlyle, in a well-known passage, says, "If we think of it, all that a university, or final highest school can do for us, is still but what the first school began doing—teach us to read. . . . It depends on what we read, after all manner of professors have done their best for us." Nevertheless, since this was written, one university has been established in England, a new one is now in process of formation in Wales, and colleges and other institutions in which university education is given, and mainly through lectures, have multiplied, and the number of students in attendance has largely increased. Darwin very pointedly says: "To my mind there are no advantages and many disadvantages in lectures compared with reading." And Professor Sidgwick, not long since, devoted ten pages of one of our reviews[1] to show the subsidiary place which, in his opinion, lectures should occupy in university education. "I regard," says he, "the ordinary expository lecture—in most subjects, and so far as the most

[1] *The New Review* (Longmans), May, 1890.

intelligent class of students are concerned—as an antiquated survival, a relic of the times before the printing press was invented," and he adduces many weighty reasons for his preference for books over lectures. He tells us, "The student who reads has two capital advantages over the student who listens: he can vary the pace at will, and he can turn back and compare passages." It is quite true that there are some professors who, secure in the lucrative seats they occupy, fail to realize what are the essential requisites of a lecture in order that it may fulfil its purpose. When I was a student, I often felt how much more economically my time might have been spent in reading some recent work than in attending lectures which were scarcely varied from year to year, and the full benefit of which might have been obtained by studying the note-book of a student of a previous session. This was certainly the case as regards many lectures which I attended, years ago, at the Berlin University. There, the custom was for the professor to deliver a lecture occupying about forty minutes, which, either he had learnt by heart, or read, year after year, from the same MS. But there are good lectures and bad lectures, even as there are good books and bad books, and it would be no difficult matter to name hundreds of books, of which it certainly could not, with any truth, be said: "The greatest pleasure of life is that of reading." It may, of course, be answered that one is not bound to read bad books, but then it often happens that one has to read them to find out how worthless they are. What Bacon said about books is well worth remembering, "Some books are to be tasted, others to be swallowed, and some few to be chewed and digested."

But we cannot properly contrast books and lectures, nor even reading and listening. Both are aids to learning, and each helps the other. In nearly all cases, lectures must be supplemented by books, whilst there are many books which are better understood if we get our first taste of them by listening to lectures.

It is quite certain that, if knowledge could be acquired only by the reading of books, the number of well-informed persons would be considerably less than now. There are many persons who listen with real pleasure to a lecture, who would not read

the same matter in a printed form. They experience a certain mental excitement in hearing a subject expounded by a good lecturer, which is often missed when the same subject is presented in the pages of a book. The personal influence of the lecturer is a factor, the force of which every one recognizes. The very fact that, if we are to follow the lecturer, our attention must be fixed on his words, induces a concentration of thought that enables us more easily to grasp the subject and to retain it in our memory. Of reading, it is accounted an advantage that we can turn back and re-read what we have failed at first to understand. But it is equally a disadvantage; for the very consciousness of this ability begets often a languid state of mind when we are engaged in reading, which affords little exercise to the mental faculties, and is fatal to the clear comprehension of the subject. If any one tests this by his own experience, he will find it to be a fact. I remember when a student at University College, London, that I not infrequently found that I could clearly follow a series of closely reasoned arguments on a mathematical problem, expounded by the late Professor De Morgan, the sequence of which afterwards in my own study, with my notes before me, I failed to reproduce. The mental tension was relaxed, and the reasoning powers were less acute. To understand what the lecturer says, we must concentrate our attention, and this attitude of mind stimulates the intellectual faculties. Apart, therefore, from the information conveyed, there is much to be said in favour of listening to lectures as an educational discipline.

Then, again, there is the indefinable influence of the lecturer, which brings our train of thought into harmony with his own, and enables us to follow the reasoning processes in his own mind, and seemingly without effort to anticipate his conclusions. When we listen to a good lecture, we are often able to realize the full effect of the mind's action upon mind, and to feel in our own brains the influence of the nervous currents which the lecturer's thoughts spread around him. Indeed, we seem to come within the field of his mental force. The effect of this is that, whilst he is speaking, subjects previously bristling with difficulties become to us clear and intelligible. I remember reading with the fullest attention the theory of International

Value and Foreign Exchanges in Mill's *Political Economy*; but such light as ever dawned upon my mind in connection with that subject was refracted through the medium of a course of lectures which I subsequently attended. This influence of oral teaching is partly due to the lecturer's ability to change and adapt his forms of expression, so as clearly to convey his meaning to the minds of his hearers, and partly to the fact that the lecturer can bring home to his audience the processes of thought by which he, himself, has arrived at his conclusions. To this extent at least he can associate his hearers in his labours and researches, and can enable them to share his difficulties and doubts, and to realize the intellectual pleasure of final victory in the discovery of the truth. There is a refreshment in drinking from the running stream which is beyond the mere satisfaction of our thirst, and so are the living words of a teacher compared with the written statements of a book.

A most useful function of a teacher is to direct the reading of his students, to introduce them to the bibliography of his subject, and to suggest chapters from different books which may be read in connection with his lectures. This guidance in our reading is one of the great advantages to be derived from attendance at lectures. Not all parts of a book, any more than all books, are equally worth reading, and we gain much by being told what to *read*, *think*, and *avoid*. By assisting us in the choice of books and parts of books which we should study, the lecturer shows us something of the labour and research which attend the complete mastery of a subject. The teacher who thus guides his students shares with them, in some measure, the fruits of his own personal investigations; he tells them the sources whence his facts have been derived; he takes them over the ground he has traversed, and shows them how he has followed up every clue that promised to throw some new light upon the subject,—how he has collected and compared and pieced together fragmentary evidence, and finally how he has established his results. And, if his hearers cannot fully realize the joy of the chase which he has experienced, they will understand what Lessing meant, when he said, if God would give him truth, he would decline the gift, and prefer the honour of seeking it for

himself, and they will at least have gained some insight into the methods by which knowledge is created.

It might be said that all this could equally well be read in print, but it is not so. The plan and purpose of a book are different from those of a lecture or a series of lectures; and the very fact that a lecturer holds his audience, and that they cannot easily escape from him, as they can from the pages of a book, weighs with him in determining what he shall say, and how he shall say it, so that he may avoid telling his audience what might equally be learnt by reading.

Another advantage of lectures, as aids to the higher learning, is in showing us how far the labours of previous investigators have brought them, and the direction in which new discoveries may be looked for. This is true of all branches of learning, but particularly with respect to nature-knowledge. Our acquaintance with the phenomena of nature is so rapidly extending, that before attempting to investigate afresh, it is necessary to know how far previous explorers in the same field have reached. The knowledge already gained is a possession we inherit, and like capital, it may be employed in the production of new intellectual wealth. Our ignorance would be profound, if we neglected to avail ourselves of the results of the labours of those who have preceded us. Newton explained his ability to see further than others by saying that he stood on the shoulders of giants; and Milton has told us that "the light which we have gained was given us, not to be ever staring on, but by it to discover onward things more remote from our knowledge." Now, no book can be so close abreast of the most recent discoveries in any subject, whether it be the interpretation of a difficult passage in a classical author, the conditions that regulate wages, the relation of mind to matter, the source of the sun's heat, or the nature of electrical currents, as the teacher who studies the writings bearing on these subjects issued from the various learned societies in his own and in other countries. For this reason, the student gets knowledge that is newer and more easily assimilated from the lectures of the best teachers than he can possibly obtain from the study of any book.

Lectures which are illustrated by experiments have a

very distinct advantage over books in which those experiments are described. There is no comparison between the advantage of seeing an experiment performed and of reading about it in a book. In the one case our senses of sight and hearing are at once impressed, and in the other we have to imagine sounds and colours and other phenomena, which might be at once perceived. Indeed, such visible experiments are now recognized as an indispensable adjunct of every good science lecture, and, although the intellectual gain of seeing an experiment performed by another is different in kind and degree from the educational exercise of preparing for, and doing the experiment oneself, it is far greater than that obtained from any description of what might be seen or heard, however graphically and clearly it may be expressed. In the teaching of science, there is no doubt that books by themselves fail as even a serviceable means of instruction, and it is partly because natural and physical science cannot be properly taught, even in lectures, except by direct appeal to the senses, that the value of the instruction as an intellectual discipline is so highly appraised.

Professor Sidgwick, in his "Lecture against Lecturing," to which I have referred, admits this. To his general condemnation of lectures, he admits exceptions. "Thus I except," he says, "lectures of which the method is dialectic and not simply expository: and lectures on science or art, in which the exhibition of experiments or specimens forms an essential part of the plan of instruction; and again lectures on art or literature, so far as they aim at emotional and æsthetic, not purely intellectual effects." These are important exceptions, but my contention is that lectures which are mainly intended "to convey information," such as are expressly regarded by Professor Sidgwick as "an antiquated survival," can be so delivered as to render that information more capable of being understood and assimilated than when presented in the pages of a printed book.

I have thus far compared written with oral teaching, and have sought to show that, notwithstanding the multiplication of books and the facilities that exist for spreading printed matter, lectures on all subjects have a distinct value of their

own as aids to learning and have certain advantages over reading.

But, after all, it must be remembered that when we read a book or listen to a discourse, we are only receiving the results of the labour, the researches and the thought of others; we are not creating anything for ourselves. In reading or listening our mental attitude is *receptive:* it is not *productive.* The chief object of all books and lectures is to tell us what other persons have done and thought. But *doing* and *thinking* are operations very different from *reading* and *listening,* and I assume that we would all learn to do and to think if we could. Thinking alone is a very different process from reading. We sometimes take up a book to kill thought, and we certainly often read all kinds of literature without undergoing any part of that mental exercise which is properly called thought. Mr. (Lord) Goschen, in one of his addresses, well said: "Even intellectual men do not like thinking: they do not like thinking in the real sense of the word. There is a negative thinking criticism. A great many people like that very well. You have your material before you, and you can begin to work upon it." This is true, and explains how it is there are so many more critics than authors, so many reviewers and so few who are capable of productive thought. But we very often read attentively, annotate our author, and still fail actively to exercise our higher faculties. We busy ourselves with our book and illude ourselves at the same time with the idea that we are deeply occupied in thought. Sir Joshua Reynolds, in one of his instructive addresses, tells us: "A provision of endless apparatus, a bustle of infinite inquiry and research, and even the mere mechanical labour of copying may be employed to evade and shuffle off real labour—the real labour of thinking." Now, without the real labour of thinking, we may be amused, but we gain very little either from books or lectures.

Two sources of knowledge are open to us. We may acquire it by making it for ourselves, or by receiving it from others; just in the same way as we may become rich by inheriting a fortune or by creating one. And, as in the commerce of ordinary merchandise, there are those who produce and those who distribute, and those too, who do both, so it is in the case of that

spiritual wealth, the price of which is above rubies. It is one of the achievements of modern education to have shown that the acquisition of knowledge, from books or lectures, does not alone suffice for the proper training of the intellectual faculties of men or women, that we must learn by actual observation and by practical work how knowledge has grown and how we may create it for ourselves. This higher training is beyond the scope of the ordinary lecture. The lecture is very helpful, but, by itself, is insufficient. To be trained in the methods of investigation and research we must go outside the lecture-room into the workshop, into the laboratory or the observatory, or into the society of actual men and women. Every day, such practical training is becoming more closely associated with the work of education, not for the special purpose of producing original investigators, but because the methods employed in establishing scientific truths are available in the ordinary business of life, in estimating the value of evidence, in avoiding error, and in arriving at correct conclusions.

Now it is frequently urged against lectures, and particularly those relating to scientific subjects, that they are of little use in teaching science, and this is quite true if, by teaching science, we mean the training of persons in the practical methods of investigation. It is therefore highly desirable that we should not ascribe to lectures or to books more efficiency, as aids to learning, than they really possess. But because we cannot expect to become a chemist or a physicist without practice in the laboratory, nor an astronomer without the use of the observatory, nor a physician without experience in hospitals, nor a historian without exploring ancient archives, nor indeed an economist without the study of mankind, that is no reason why we should underestimate the value of lectures in giving us, in doses we can easily assimilate, some of the knowledge which such specialists have acquired. We all admit that it is preferable to drink from the source, but many would perish from thirst had they no other means of quenching it. So it is better to get knowledge on the authority of others than to live in ignorance. Too much emphasis is sometimes laid on the importance of research as the means of acquiring knowledge. We cannot all aim at being original investigators, but

we all desire to know something of the lives of the men and women who have influenced our own, and of the different conditions of society, out of which modern civilization has been evolved. We value such knowledge altogether apart from any consideration of the uses to which we may apply it, or of the sources whence it was derived, or of the mental training which the acquisition of it may have afforded. It is a possession which adds to our enjoyment of life. It projects our thoughts into other times and into other lands; it widens by imagination our experience; it links us with past generations, and deepens our interest in all classes of our fellow-men.

To many persons, variously occupied, a course of lectures conveys in the most serviceable form the exact kind of information which is needed to supplement their everyday pursuits. It is not possible, for every one who uses it, to raise the precious ore from its native quarry. We must be satisfied to obtain it coined, or even in the form of notes. Credit is of use in the world of science, as in the world of commerce, and serves a like purpose. One accepts a piece of paper, representing a sum of money, on the authority of the individual or bank that offers it. So, too, we accept a vast amount of knowledge on trustworthy authority, without the attempt to verify it. What, however, I have endeavoured to make clear is that, although the highest intellectual training is that which leads to original investigation, whether its object be to discover new combinations of the elements of matter, new methods of subjugating forces, new facts in the evolution of life, of society, of language —the knowledge which may be gained through lectures, apart altogether from the uses to be made of it, is a possession which enlarges our mental wealth and adds to our enjoyment of life.

Lectures serve one important purpose, to which I have not referred, and that is, they awaken an interest in scientific and literary subjects among persons whose attention might otherwise have never been directed to such matters. How many are there who can date from their attendance at a lecture their first interest in a subject, the pursuit of which has coloured their whole life? As a rule, we are all too much interested in our own particular occupations. It cannot well be otherwise. When we are young, we are advised to concentrate our attention

on the work in which we are engaged. "Whatsoever thy hand findeth to do," we are told, "do it with thy might." As we grow older, it is difficult to escape from the associations that cling around our special calling. "The world is too much with us," and that applies even to the little tiny world which each of us has made his own. Even our reading is necessarily limited to books, or articles, or reports, that bear upon our industry or study. The ill effects of the division of labour become more pronounced as our years multiply. We all specialize as we advance. To many of us so placed, who in youth find it necessary to concentrate, and are compelled to do so as age advances, the occasional lecture comes as a source of refreshment, directing our attention to things outside the circle of our ordinary business and awakening in us new interests. We have all experienced at some time this force of spoken words in diverting the current of our thoughts, in creating the desire for new endeavours, and in stimulating fresh efforts.

In all schemes of education the lecture has its proper function, although for many years it usurped the place which properly belongs to other methods of instruction. It is, however, in the education that continues long after we have left school or college, that lectures play so important a part as aids to learning, and there is no indication that the dissemination of printed matter will lessen the pleasure or advantage of listening to a good teacher, or that lectures will cease to be regarded as the best means of popularizing the results of others' labour—the labour of those men and women whose lives have been given to the discovery of truth.

IX

SOME ECONOMIC ASPECTS OF THE APPLICATION OF SCIENCE TO INDUSTRY[1]

[1903]

THE time is very opportune for the unbiassed consideration at this ancient seat of learning of the relation of science to industry. The conditions that affect national commerce have become questions of the highest political importance, and before many months have passed the country may be asked to determine its choice of government by reference to the views which the contending parties hold as to the causes that stimulate and direct the flow of commercial activity between nation and nation. Of all economical questions, there is none more difficult to grasp, none the conditions of which are more subtle and difficult to trace than that of international commerce; and to the philosophic inquirer it seems unfortunate that the policy of the nation on a matter which must affect for weal or for woe the prosperity of the country and its future relations with other countries, and also with its colonies and dependencies, is to be settled by the votes of the people, the great majority of whom are quite incapable of forming a sound judgment on so complicated and intricate a question.

Without venturing to say a word as to the practical advantage of attempting, by the construction of dams, or by raising artificial barriers, to regulate the flow of commercial energy, there can be no doubt that whatever tends to increase within a country the productivity of labour and the economy of capital helps to promote its prosperity and to build up its

[1] An address delivered at the University Extension Meeting, Oxford, August 21, 1903.

trade and commerce. To pursue the analogy further, it is certain that the irrigating benefits of a great river, and the consequent productiveness to the country through which it flows, may be artificially increased by protective barriers, although the volume of flowing water remains the same. Whether any similar interference with trade currents can add to a country's industrial activity it is not my present purpose to inquire. Admitting, however, that, in some form or other, there must be a balance between a country's exports and imports, it is clear that any increase in the value of its exports, due to greater facilities or power of production, must result in a corresponding increase of imports, and must add to the sum total of commodities at the service of the people. Both parties in the coming economic struggle accept this fact, although they differ very widely as to whether, and if so how, the commercial traffic between countries may be developed and improved.

It cannot be denied that our efforts of late years to promote technical education, as a means of yoking science with industry, have been largely determined by the desire to increase thereby the productivity of labour and the consequent purchasing power of our manufactured exports, and it is therefore in its economic aspects, as affecting our commercial interests, that the relation of science to industry assumes national importance.

So intimate is now this relation, that one may truly say that no industry can be successfully pursued without some help from science. In the distant past, before machinery had displaced hand-work, it would seem that industry gained relatively more from its alliance with art. The products of labour which have come down to us from former generations show the extent to which their value was enhanced by the beauty of their form and colour. The artist's skill and taste still add greatly to the value of the craftsman's work. There are, however, just now many causes, some of which are not remote from the great fiscal problem before the country, which tend to withdraw industrial products from the refining influence of art, by setting before producers economic ideals connected with supply and demand, instead of the higher national ideals of beauty of design and perfection of finish. In the application of science to industry, however, we note a continuous record of

almost uninterrupted improvement, and the efforts which have led to this improvement are a factor to be considered in any general theory of commerce. It is only during the last few decades that scientific investigation has been rewarded by the discovery of entirely new forces, of agencies apparently unknown, or unknown as regards their applicability to the methods of construction and to the processes of manufacture. The rapid growth of industry during this period is directly attributable to inventions, which the progress of science has rendered possible; and there is no reason to doubt that the future will reveal new powers still more wonderful and unexpected than the past has yet disclosed. The history of discovery proves that we can find everything in Nature—matter in endless variety of form, means of transmuting it undreamed of by the alchemist of old, and sources of energy hitherto unknown. If we consider for a moment how the products of man's labour have been multiplied, how his activity as a mobile being has been increased, how his capacity of seeing, hearing, and holding converse has been enlarged, so that things which were far off have been brought near unto him, we shall realize the abundance of facts, which, as regards what still lies hidden, justify our saying, "Search and ye shall find."

It would be repeating a well-known tale to quote examples, showing how each step forward on the road of abstract science, whether by the discovery of new elements in the atmosphere or of new properties of the rarer substances, may prove of unexpected service in preparing the way for further improvements in agriculture, engineering, or manufacturing industry. The pure science of to-day is the applied science of to-morrow. If we trace back the history of any of the great inventions, which, during the last century or less, have revolutionized the conditions under which the trade of nations is now conducted, whether it be the steam engine, the telegraph or telephone, the use of electricity as motive power, the photograph, the production of artificial dye stuffs or manures, we shall see how each was dependent on the previous state of scientific knowledge, and in how many different ways the recent discoveries became available in assisting the inventor.

We may confidently assert, therefore, that the progress and development of trade depend to a very great extent upon the intelligent and constant application of science to every detail of productive industry.

The intimate connection between industrial progress and scientific activity does not admit of question. But if positive proof is needed, it will be found in the concurrent development of the trade of Germany, and of the facilities provided in that country for the scientific training of the people. Other causes have undoubtedly contributed to the commercial prosperity of Germany; but, after making every allowance for these, we are confronted with the fact that Germany has appropriated various industries which might have been our own, that these industries depend for their successful working upon the application of the most advanced scientific knowledge, and that the German people have recognized this dependence by providing, at a cost vastly exceeding any like expenditure by this country, the best possible facilities for scientific training and research. The great success that attended Germany's early efforts to acquire the chemical trades was followed by similar endeavours to appropriate a large number of electrical industries; and no expenditure has seemed too lavish for the equipment of her leaders of industry with the best available knowledge, or for the endowment of institutions in which science is methodically pursued. This fixed policy has changed Germany from an agricultural to a manufacturing nation. "In 1871 Germany was a nation of 39 million of inhabitants, of whom 60 per cent. were engaged in agricultural pursuits. In 1901 it had increased to an empire of 58 million inhabitants, of whom 35 per cent. were engaged in agriculture and 65 per cent.—nearly two-thirds—in industry and trade." Between 1870 and 1900 the number of students at German universities, at technical and other high schools, has increased from 17,761 to 46,520, or from 8·89 students to 10,000 of the male population, to 16·78, showing not only that the number of students has nearly trebled itself during that period, but that the proportion of highly trained scientific men has been doubled. From a statement in Dr. Rose's recent report on German Technical High Schools, it appears that the net cost of each student to the State is

about £12 a year, and the total contribution of the German Government to the higher education cannot, therefore, be less than £500,000 a year.

When we consider that Germany has deliberately incurred this heavy expenditure with a view to strengthening her industrial position, and has persevered in the same policy for nearly fifty years, and when further we note the marked success of her efforts, we have very strong evidence of the commercial gain to a nation of closely associating the results of scientific investigations with industrial work. Moreover, the annual expenditure in Germany of a half-million sterling on the higher education would be represented by a much larger sum in this country. First, because salaries are at present a little higher here than in Germany, but mainly because the money is there judiciously and intelligently expended without the waste due to the overlapping of effort, and to the rivalry among different institutions engaged in the same work, and competing with one another for the same students. The absence of any efficient direction of our higher educational institutions, such as exists in Germany, where they are financed and controlled by the State, is one of the causes which have hitherto prevented our possessing schools of the same teaching power as are found in Germany and in the United States. This lack of organization is most marked in London, where, except in one or two branches of industry, the facilities for the training of students in the application of science, engineering, and manufacturing industry are still inadequate.

Although very large funds are needed to endow London, as the capital of the Empire, with the necessary facilities for the higher scientific training and research, still much more might be accomplished with available means, if the teaching given in different institutions were better co-ordinated and more economically controlled. It is very important, therefore, that, before any fresh expenditure is incurred in adding new departments to existing institutions, a complete scheme should be carefully prepared by competent authorities for the concentration of existing efforts, for providing full and adequate opportunities of study and investigation in connection with all the most important branches of industry, and for the

co-operation of the most eminent professional teachers, experts in their several departments, in order that the instruction may, where necessary, be duly specialized. It is desirable, too, that the professors should have sufficient freedom from the ordinary routine of teaching to pursue their own independent inquiries, whilst assisting the more advanced students in research work under their personal influence and guidance.

For the successful application of science to industry it is essential that a country should possess an army of highly trained and intelligent scientific men capable of directing the different kinds of engineering work, and of constituting what is so much needed — an intelligence department to every factory. Hitherto, our manufacturers have been too indifferent to the aid which science, properly applied, may bring to productive industry. But matters have improved of late, and before long the laboratory will be regarded as a no less important part of a factory than the drawing-office or counting-house. It will constitute, in fact, the brain of the machine which grinds out our manufactured goods. Attached to it will be a band of scientific men engaged in testing all materials that enter, and all products that leave, the works; in investigating all new methods, and in carefully following up every clue that promises to lead to some discovery of possible commercial value. By such means economies would be effected in the cost of production, and unexpected discoveries would be made, which would give birth to subsidiary industries. The history of invention shows how frequently these by-products of experiment prove of more value than the results of the original investigation. To take one instance only, I may refer to the experiments in the manufacture of glass for chemical purposes, which have given Germany almost a monopoly in the production of certain classes of lenses and optical instruments.

But, in order that we may reap the full advantages of the application of science to industry, it is not enough that our schools shall turn out annually a sufficient number of adequately trained scientific experts. Our manufacturers and employers of labour must have received the training that enables them to estimate at its real value the help which

science may render to industry. In Germany, the value of expert aid is fully recognized. At the date of the report to which I have referred there were over one hundred scientifically trained chemists at the Badische Anilin and Soda Fabrik alone, and we were informed that thirty engineers were there employed. Mr. Beilby, in giving evidence on this question before a committee of the London Technical Education Board, said: "I attribute the leading position of Germany in certain chemical industries more to the appreciation of her commercial leaders of scientific methods than to the mere possession of a multitude of highly trained graduates in science."

This faculty of appreciation is nowhere more marked than among the manufacturers of the United States. In no other country is a suggestion more readily or more gratefully received, or an invention more quickly utilized by the managers of industrial concerns, from whatever quarter it may come. If the suggestion has the semblance of value, it is at once referred to the Intelligence Department of the Works, where it is carefully tested and receives a fair trial. If its value is proved the author is rewarded, and the improvement is adopted. Even when it involves the scrapping of existing machinery at a considerable outlay, the manufacturer is thankful to be in advance of his competitors. Trade secrets are soon revealed; but long before the improvement finds its way into English factories, the cost of production in America of the particular commodity will have been permanently reduced. Whether protective tariffs afford to the American producer any help during the period of alteration of his processes and methods, I am not in a position to assert or deny; but it is a fact that he is more alert, and quicker to recognize the value of any new invention than his British competitor in trade.

Finally, in order that the application of science to any branch of industry may prove commercially successful and useful to a country, producers must find and be able to retain a market for their goods. This is, of course, a self-evident proposition; but we are too apt to overlook the fact that markets are *made*, and do not spring up ready to receive the cheapest products. The course of trade does not, unaided, follow the strict law of supply and demand, nor does it always flow from places

of higher to places of lower cost of production. The old political economy took too little account of the human element in its generalization and laws. As a fact, the direction of trade currents depends very much upon the commercial experience and alertness of the trader. There is a law of inertia in commerce as in physics, according to which trade tends to remain in the same channels, and consequently those who first make a market are best able to retain it. No one can have studied the valuable Consular reports, issued from our Foreign Office, without realizing the losses that our manufacturers have sustained for want of commercial knowledge and commercial enterprise. All that has been written and repeated about the advantages of knowing foreign languages, of presenting price-lists in the coinage of the purchasing country, of packing goods in convenient quantities and in attractive form, etc., shows that there are many artificial conditions which interfere with the general economic laws regulating international trade. The advantages of technical education, the gain to a country of being first in the field in the discovery of new applications of science to industry may be entirely lost, unless her manufacturers are men of business, and unless her traders and commercial agents are able to discover new markets and to create consumers of the cheapened product.

It has been difficult, in discussing this question of the relation of science to industry, to keep clear of some of its economic aspects, and of their bearing on other matters which have unexpectedly assumed political importance. We cannot overlook the fact that all State-supported technical education partakes of the character of a bounty on the trades which the special education is supposed to improve, and this is particularly the case when the assisted industry is one in which we compete with foreign rivals. This position was assumed till quite recently by the Government of this country. The fear of helping some industries at the expense of others appears to have been one of the reasons which prevented the Treasury from making grants for distinctly technological instruction. Indeed, it was mainly owing to this limitation of Government aid to scientific instruction other than trade teaching, and to the urgency of supplementing State action by assisting and

encouraging science teaching in its special application to different branches of industry, that the City and Guilds of London Institute was first established. The Technical Instruction Acts subsequently gave powers to County Councils and to municipal bodies to provide aid which the State continued to withhold, but even these Acts prohibited the teaching, at the public expense, of actual trades. It is only since the passing of the Education Act of 1902, and the repeal of the earlier Technical Instruction Acts, that the State has recognized its responsibility to apply public moneys to the improvement and retention in this country of British industries by such help as education can afford.

I know it is an economic principle, that if we leave international trade to follow its natural course, each country will provide those commodities, which, owing to climatic and other conditions, it is best fitted to produce, and will export such of them as other countries want. This is a very simple principle, but one scarcely calculated to invigorate a country, or to stimulate it to fresh efforts. Who can say what are the commodities a country is best fitted to produce? What would Switzerland be now doing if it had been content to accept this doctrine? Or, how would Germany ever have acquired the artificial colour trades, seeing that the raw material was largely exported to Germany from this country, and brains are not an exclusive German product? Or, again, if our India and China markets keep our Lancashire manufacturers fully occupied in producing cheap and tawdry prints, whilst Alsace supplies London, Paris, and the home market, with goods stamped with harmony of colour and beauty of design, are we to rest content with this division of labour, as having been ordained by Nature, and to make no effort to raise the national taste, and place our productive power on a higher level of intelligence and skill?

I have no intention to supply an answer to these questions. I desire only to show that a nation must not be satisfied to produce those things only, for which it can most readily find a market, but must be always striving to break the general economic law, and to contest its neighbour's monopoly, employing in the struggle every weapon to be found in the armoury of art or science.

This country is to be congratulated on the fact that the attitude of the State towards industrial education, whether technical or commercial, is now more nearly approaching that of other countries, and differs mainly in its parsimony and reluctance to spend on the higher education the money that is needed, to give us equal advantages in the keen international competition for trade.

To protect its home trade and to increase its exports are the chief objects which any nation has in view in encouraging scientific research as applied to industry. All the arguments we constantly hear from public platforms in favour of technical education have reference to the help which scientific training may afford in improving trade; in other words, in raising the value of our exports. Those who plead for State aid, and appeal to patriotic men of wealth to endow universities and schools for the higher scientific study, desire that their country may produce not only what is cheapest, but also what is best, and that the national intelligence and taste may be so raised that any disadvantages in climate, soil, or in mineral wealth, or even in temperament or character, may be overcome by discipline and study, by the stern determination to wrest from Nature the means of supplying native wants, and to quicken industry by utilizing science as a motive power.

X

NOTES ON THE TRAINING OF INDUSTRIAL ARTISTS[1]

[1888]

When invited to be present at this inaugural meeting of an Association for the Advancement of Art, and to take part in its proceedings, I hesitated for some time, feeling that I could contribute nothing out of my own limited sphere of experience that would be suitable for such an audience. I can lay no claim to art knowledge nor to artistic skill, and I am fully conscious of my boldness in addressing you. An acquaintance, however, with some of the more important educational institutions of Europe, and especially with those in which education has a direct bearing upon industry, has brought under my notice some broad differences that prevail in the system of teaching industrial art, and it occurred to me that the significance of these differences might be better understood if fully discussed by the members of this section of the Association. Of the importance of the question from a commercial point of view there can be little doubt; but the teaching of industrial art is a matter of interest to us all, not only in so far as it may help to give greater value to the products of our industry, but also in its bearing upon the tastes and habits, and upon the social and moral condition of the people.

It may be assumed that if art is to enter into the lives of the people it must stoop to beautify the things we use, and the objects that constantly surround us. It must descend from the region in which Truth and Feeling are depicted under various aspects, and in the infinitely varied garbs in which Nature

[1] Address delivered at the first meeting of the "National Association for the Advancement of Art," in Liverpool, December, 1888.

clothes them, to the work-a-day world, where ordinary things of daily use await its skilful handling to be touched with beauty.

In the term "Industrial," as applied to art, is involved a limitation—indeed, a number of limitations—which depend upon the nature of the material in which the artist is required to work. The distinction between fine art and industrial art, of which we hear so much, seems to me to consist in the fact that of fine art the purpose is served when Nature is truthfully and beautifully represented, without reference to the material in which the representation is produced; whereas the industrial artist has to consider carefully his material, and to adapt his skill to its particular requirements. All art involves certain limitations. In the case of pictorial art they are reduced to those of the surface which receives the picture, and of the pigments in which it is drawn. With the complexity of the material in which the art effect is to be realized, the limitations multiply under which the artist works. The painter's canvas is indifferent to the character of the picture it is to carry. But not so the sculptor's marble; and many of the conventional statues and statuettes draped in modern costumes and modelled by some of the Italian artists of to-day are a protest against the attempt to ignore the relation and suitability of the material to the forms and ideas to be wrought into it.

Metal work, again, produces other limitations, of which the skilled industrial designer must take due heed; and designs that might be suitable for bronze or iron would be ill adapted to wood or stone. Ruskin tells us that in the graphic arts "skill, beauty, and likeness" must be always present, "balanced and co-ordinate;" but whilst "skill and beauty" should be found in all art work, the extent of "likeness" to natural objects, which is possible in industrial art, depends upon the properties of the material in which, and upon the means by which, the likeness is to be produced. Then, again, the use to which anything is to be applied affects the character of the design it is fitted to receive, so that every art industry has a *technique* of its own. In fabrics produced by mechanical appliances, such as the hand-loom, further limitations in patterns and designs are imposed by the particular structure of the

fabric and by the contrivances required to create it. And where machinery is extensively used and takes the place of handwork, as in lace-making, or in calico-printing, a new set of conditions comes into operation, which tend still further to restrict the power of the artist in design. It appears, therefore, that in the endeavour to add beauty to the things around us, the industrial artist works under limitations imposed—

(1) By the use to which things are to be put,

(2) By the material in which the design is to be wrought,

(3) By the appliances by which it is to be produced.

The question arises as to the extent to which the designer and artistic craftsman can be helped by special instruction to acquire the particular skill needed for his work, and to understand the industrial conditions by which the exercise of this skill is limited and controlled.

This is an educational problem, which, mainly on account of its mercantile importance, has engaged the attention of artists and of other experts in the different countries of Europe. The methods of instruction in France and Germany present some points of difference which are not unworthy of careful consideration. At home, complaints have from time to time been heard that in our local schools of art, which were originally intended to be schools of design, the instruction is not sufficiently well adapted to local industries, that the teachers are often unfamiliar with trade requirements and with the limitations due to the processes, often of a scientific character and involving complicated machinery, by which art effects may be produced. It has been said that in our schools of art the students are trained to become inferior artists rather than skilled designers, and that it is owing to the defects of training that foreign designs have been so largely used by English manufacturers. These complaints, which are now less frequently heard than formerly, were grounded on the belief that the industrial artist requires a special and distinct training. It may be well, therefore, briefly to indicate the prominent features in the system of art teaching adopted in France and Germany, and to consider whether the methods adopted in our own country for training industrial artists might with advantage be improved.

Among the educational establishments of Germany the

industrial art school, or *Kunstgewerbeschule*, holds an important place. The aim of the instruction given in these schools is to train designers and art workmen. The pupils learn not only to draw, to paint and to model, but also to work in different materials and to design for different trades. Facilities are afforded for performing experiments with a view to the discovery of fresh processes, involving the application of different branches of science; for producing new artistic effects; for the production of new colours in pottery, porcelain, and glass; for the enamelling of metals; for photography, etc. The school consists of several departments, in which different kinds of art work are carried on. The Dresden school, for example, contains three *Fach Schulen*, or special trade schools, one for constructive art work, such as is needed in the furnishing and equipment of buildings; a second for plastic art work, including modelling and sculpture in wood and other materials; and a third for drawing and painting, including sections for decoration, the preparation of designs for textiles, for porcelain painting, lithography and printing. The course of instruction lasts three years, and there is a preliminary course of drawing for those who are not sufficiently advanced to follow the more advanced instruction in applied art. Adult artisans, having some knowledge of drawing, are admitted to the school for shorter periods by special arrangements. The instruction is given by a large number of specialists, each familiar with his own branch of applied art. The staff of the Dresden school consists of twenty professors, some of whom are entrusted with the teaching of particular sections of industrial art, such as metal work, wood engraving, designing for textiles; whilst others lecture on the history of art, on mythology, and on the anatomy of man and other animals, on architecture, prospective drawing, shadows, etc.

The Art School of Munich is itself a university of applied art. The ceramic department is fitted with a furnace, in which the students fire the ware after painting on it, as at Sèvres. The school also contains a room in which students are engaged in full-sized decorative work, such as a builder or architect might be required to execute. In the textile department the pupils work out designs on "point" paper, which are largely

used by manufacturers. There is also a department for glass staining, in which designs are prepared and completed. The school in Vienna is very similar. It contains special departments for wood carving, wood engraving, metal-chasing, furniture-designing, designing for textiles, etc. The lace-designing class is frequented by numbers of lace workers from the country, who come there to study the history of the art, and to profit by the splendid collection of patterns contained in the museum which is connected with, and forms an essential part of, the school. The instruction throughout is essentially practical. In the metal-working class, for instance, the student first draws his design, he then makes a model in clay from the drawing; he then makes a casting in bronze or other metal, and finally he chases and finishes it.

All these industrial art schools receive large subventions from the State, and the fees for instruction are very low.

Nothing exactly corresponding to the German industrial art school exists in France, although latterly a tendency has shown itself to introduce the German system of specialization in trade work into some of the local schools. Nowhere is the teaching of art more general than in France. For educational purposes, the distinction between fine art and industrial art is scarcely recognized. Students who are being trained to become trade designers are taught art. Their eyes are saturated with Nature, and their hands are taught to represent it.

Throughout France the evening art schools are filled with artisans, who are instructed in the general principles of design, but who are encouraged to find in natural objects, and particularly in the human figure, their inspiration. Nearly all French teachers emphatically protest against the idea that there are two sorts of art. Art, they say, must be taught as art, and not with a view to its application to silk weaving, calico printing, china painting, paper staining, or any other trade.

It may appear singular that there should be so little special training for designers in a country which has been so successful in supplying to other countries trade designs. The *ateliers* in Paris, in which designs are produced for lace, silk-brocades, cretonnes and other textiles, are a special feature of the French

capital. Till recently, the manufacturers of Manchester, Nottingham, Macclesfield and other towns in England, obtained nearly all their designs from Paris. Most of the French towns were also supplied from the same workshops. Although Lyons and St. Etienne possess excellent art schools in which the instruction is, to some extent, specialized with a view to the silk trade, the manufacturers of those towns still procure their principal designs from Paris, which has been for many years the centre of the designing industry of France.

Notwithstanding the absence of special training schools for industrial artists, such as exist in Germany, it is not difficult to trace the connection between the excellence of French designing in particular branches of trade and the general system of art education in France.

We may, I think, take it for granted that what is wanted to make successful designers is skill in drawing; a knowledge of the limitations of the material in which the design is to be fixed, and of the processes by which it may be produced; an observant eye, and the power of combining, rearranging and representing the elements of things observed—in other words, a well-developed imaginative faculty. Now, in France the teaching of drawing is practically universal. Exceptional facilities are afforded to artisans working in different crafts to acquire art knowledge and artistic skill; and trade museums are found in nearly all trade centres, and are largely frequented and intelligently used by all grades of workpeople. In these provisions, we seem to have the necessary conditions for the training of industrial artists, and I propose very briefly to consider them *seriatim*.

I. General Instruction in Drawing

For many years the teaching of drawing in the public elementary schools in which our artisans receive their early training has been widely advocated. The advantages of such instruction have been so frequently pointed out that I need only refer to them in their special bearing on the production of industrial artists. Drawing, we have often been told, is a valuable educational discipline, and that, for this reason

alone, it should form part of the curriculum of our primary schools. But it has other advantages. By teaching drawing to all children, the means are provided of selecting from the mass of those who receive instruction the most capable for further and special training. Moreover, by familiarizing the children of the poorer classes with beauty in form and in the combination of colour, and by placing before them objects, as models, exemplifying these qualities, we assist in elevating and improving their taste; and we thus help them to appreciate beautiful things, and induce in them a desire to live among such things. In this way, too, we create an increased demand for products of industry in which beauty and utility are combined.

It is in raising the standard of taste, in making people dissatisfied with ugly shapes, and with tawdry arrangements of colour, that the teaching of drawing may help to exercise a valuable æsthetic influence upon the working classes. A general elevation of taste cannot fail to work an improvement in the social condition of the people. Moreover, by teaching drawing to children in our elementary schools, we are planting the seeds of artistic perception in the minds and fingers of our future artisans. Trade designers should be sought from among those practising the trade. The artisan and artist should be united. The artist unfamiliar with the practice of a trade, out of touch with the material in which his design is to be produced, is likely to make drawings which may be beautiful in themselves, but may be quite unsuitable as trade designs. Not so the artisan who has become an artist. Hence the great advantage of laying the foundation of artistic training in the early education of our future artisans.

In France and Germany great importance is advisedly given to the teaching of drawing in all public schools. At home this is not yet the case. It is only in a few schools that drawing forms part of the course of study, and even in these the means of instruction compare unfavourably with the methods in some of the best foreign schools.

From the returns furnished by the Science and Art Department it appears that since 1880 there has been an almost constant falling off in the numbers of separate elementary

schools examined in drawing. In 1880, the number was 4262; in 1883, 4011; in 1884, 3979; in 1886, 3890; and in 1887, 3415. It is true there has been some, although only a slight, increase in the total number of children examined, owing to the fact that drawing is now taught more continuously throughout the schools than formerly; but still the amount of grant paid has actually decreased from £38,358 in 1880, to £31,618 in 1887, and has been during this period as low as £25,069. Many causes are assigned for this decrease. In girls' schools, the regulation that those girls only who learn cookery may take drawing has discouraged the teaching of the subject. It is also pleaded that the number of subjects to be taught is embarrassing, and that the struggle to reach the present high standard of the code is very great. Nevertheless, the total number of schools throughout the country in which the children take drawing is less now than in 1880, notwithstanding the fact that drawing is taught in all the schools under the London School Board, the number of which has greatly increased during these years.

II. Local Schools of Art.

For the further artistic training of the artisan, evening schools are indispensable. These are now found in nearly all our industrial centres, and the question arises as to the extent to which it is advisable that the instruction should be specialized with a view to local industries: Shall the student be taught the art of designing for his special trade? Shall he be taught to work in any particular material rather than on paper, or on canvas, or in clay? This seems to be the really important question to be considered in the training of industrial craftsmen. What we want to know is, how can machine-made goods be rendered more beautiful, and how can art and manufacture be united?

In France, the evening art teaching is organized on broad and liberal lines. The curriculum of these schools is wide, embracing, besides drawing, painting and modelling, the applications of geometry to architecture and to anatomy, to which special attention is given in some of the higher schools, and the history of art and of design in reference to local industries. The schools are mostly free, and are well attended. The more distinguished

of the students are selected, by examination, for further training in Paris; and some of the best students are permitted to visit Paris for about a week during the summer at the expense of the Government. Between 100 and 150 students annually avail themselves of this opportunity of enlarging their experience. I find from the Report of the Science and Art Department that a somewhat similar system prevails at home; but with what different results? "During the year 1887, eighteen qualified students and masters of schools of art received aid to enable them to visit London, Paris, and other centres of art instruction."

Our own art schools are not sufficiently utilized by artisans, and the number of artisan students tends to decrease rather than increase, the returns showing a falling off of 994 for whom payments were made in the year 1887. This may be owing to the fact that very few of them have learnt the elements of drawing, and are, consequently, unprepared to take advantage of the instruction. It is, however, by the art-training of our artisans that we shall best succeed in creating industrial artists. An adult workman is too old to commence the study of drawing. The students must be taught the elements as children. As regards modelling, the statistics are more unsatisfactory. It appears that during the year 1887, only 531 candidates from every part of the Kingdom were examined in modelling, and that of these, only 294 succeeded in satisfying the examiners, the total subvention of the State towards the teaching of this branch of art—the most important, perhaps, from an industrial point of view—amounting to £274 5*s*. Looking at the numerous arts for which skill in modelling is indispensable, this result of our efforts to train industrial artists must be regarded as almost contemptible. Then, again, many of our art schools are still imperfectly supplied with the necessary appliances for art teaching; and insufficient opportunities are afforded to the decorative artist of drawing and painting from female models. I have been unable to obtain statistics on this point; but I believe the number of schools in which artisans have the opportunity of drawing, painting, or modelling from the female figure would be found to be exceedingly small. The schools of Paris are crowded at night time with artisan students, drawing and painting from the living figure, nude and draped.

III. Trade Museums.

In connection with the school teaching of industrial art, trade museums form an important feature in the means of education provided in France and Germany. Such museums are found attached to the local art schools of France, and to the *Kunstgewerbeschulen* of German cities. They contain collections of patterns, and of objects illustrating the history of art, of choice specimens of the work of the best masters, of the tools and mechanical appliances used in the production of designs. Where original specimens of the best artists' work cannot be obtained, reproductions are substituted for them; but in many of the principal seats of industries—as in Limoges—the museums contain some of the most beautiful specimens of art work, carefully arranged in their historic order. Such museums are not overcrowded with the heterogeneous and ill-assorted objects which are found collected together in many of our own local museums. They are arranged for educational purposes, and form a department of the school. In many of the chief foreign industrial centres, besides these museums, annual exhibitions are held of the newest patterns and designs, contributed by local manufacturers. In this way manufacturers loyally help one another, and unite their forces, so as to be able to improve their own industry, to keep the trade in their own hands, and to compete successfully with foreigners. At home, the value of museums, as educational appliances in the training of the industrial artist, is very far from being fully understood or appreciated. Many of our local museums contain specimens of art work, the careful study of which would prove of the greatest service to the trade designer. But they are very little frequented for educational purposes, and the efforts that have been made from time to time to induce students to profit by the advantages they offer have generally failed. This arises from several causes.

The museums are often filled with objects of little or no interest from the industrial point of view, and the specimens bearing upon local trades are arranged with no special regard to their educational use, and are often with great difficulty disentombed from the mass of objects which have been received

from persons who are glad to pose as benefactors by the gift of things they do not want.

Then, again, the faculty of observing has not hitherto been successfully cultivated in the early education of the children of the people. Their training in the elementary schools has crowded their minds with a great many facts, but has left them very much like the idols of old, which have eyes but see not. They have not been accustomed to fetch their knowledge from the study of things, and are therefore unable to profit by such advantages as museums offer. We must look mainly to science teaching and to drawing lessons to remedy this defect. The educational value of science has been often likened to that of drawing in stimulating accurate observation. Not until teaching, through the medium of real objects, is more generally introduced into our schools, can we expect our children to develop into intelligent men and women, capable of carefully observing the things they see around them, and of detecting and appreciating the marks and attributes that may be of interest to them in their work. It is owing greatly to the deficiencies of early training that men and women are seen to prowl through exhibitions and museums, attracted only by what is big and glaring, but uninstructed and unimproved by all the vague and indistinct impressions produced upon their minds by the groups of objects at which they vainly stare.

Lastly, the importance of studying the works of former artists, with the view to enrich the mind with fresh material, is possibly not sufficiently recognized in this country in the training of the industrial designer. Design in art, like invention in science, is too often regarded as the immediate result of inspiration or genius. But both are capable of being acquired by appropriate training. And in art, the great value of stocking the mind with images of others' work in order to create new combinations and arrangements has been generally recognized. Here I am inclined to differ from those who fear that the influence of museums tends to cramp originality and to create imitators. Whilst Nature is the never-failing source of all inspiration, the student of art, by making himself familiar with the works of the great masters, is able to see nature through the medium of their eyes. What he misses by direct contact with

nature he gains by entering into the thoughts and feelings of the master spirits of past ages. In every good picture there is a likeness to something in nature which may be called the objective worth of the picture, and there is a special beauty in connection with it, which the student might never have beheld with his own unaided vision; and so every good piece of constructive art is full of suggestiveness, which the industrial artist may utilize without becoming a mere copyist. Sir Joshua Reynolds says: "When we have had continually before us the great works of art to impregnate our minds with kindred ideas, we are then, and not till then, fitted to produce something of the same species." And again, "The great use of studying our predecessors is to open the mind, to shorten our labour, and to give us the result of the selection made by those great minds of what is grand or beautiful in nature."

Among the most important of the educational appliances for the industrial training of the people are trade museums—that is, collections of objects properly arranged with a view to the purposes of instruction. But, valuable as are such collections in their immediate relation to school teaching, their usefulness will never be fully realized until opportunities are afforded to artisans to visit them at such times as they have rest from their daily work and the leisure to observe and to profit by what they see.

I have now briefly referred to some of the conditions that enter into the education of the industrial artist. It will have been seen how directly and indirectly the possibility of training trade designers depends upon the character of the teaching given in our elementary schools. Trade designers should be raised from the children of the working classes; they should be selected from trained artisans rather than from amateur artists. Other appliances are needed; but the ability to profit by these, when provided, will be found to be largely due to the success of the early training of hand and eye, and to the means adopted for developing the observing faculties of the child.

From a commercial point of view the question of the training of industrial artists is one of great importance, for the value of any article is often due as much to its excellence of finish and to the beauty of the design that is impressed upon it, as to the

quality of the material of which it consists. In the textile trades this is particularly the case. It is the style that sells the goods, and in certain products of the loom the quality of the material counts for little as compared with the novelty and charm of the pattern. It is a matter, therefore, of the greatest importance to determine the best means of training successful designers and artistic craftsmen, on whose skill depends, to a great extent, our ability to compete successfully with our continental neighbours in many branches of trade.

It may be said that if we need them, we can always obtain foreign designs by purchase, and foreign craftsmen without incurring the expense of training them for ourselves. There are many manufacturers who adopt this view, and some who are selfish enough to profit by it. But not only do we act unjustly to our own workpeople if we neglect to provide them with adequate facilities for obtaining the higher wages of skilled labour, but by using foreign designs and by employing artists from abroad we educate our people to prefer foreign to native art; and we make it every day more and more difficult to free ourselves from the yoke of foreign tastes. Happily, our art schools are enabling us year by year to utilize more largely native skill. Several important industries have been wholly emancipated from foreign help. In others, we still look to Paris mainly for our designs; but gradually we may expect not only to free ourselves entirely from foreign influence, but to employ native artisans for the production of many different classes of goods which, owing to their artistic excellence, are still largely imported into this country; and I have no doubt that the light that has been thrown upon the subject at this Art Congress will hasten the realization of this desirable end.

INDEX.

THE END

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