

PRACTICAL EDUCATION

A Monograph on Education in India

BY

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WITH A FOREWORD BY

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MADRAS

B. G. PAUL & CO., PUBLISHERS

FRANCIS JOSEPH STREET

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FOREWORD

BY DR. GEORGE S. ARUNDALE

I have much pleasure in introducing to the public this second edition of Principal Gokhale's well-known book on "Practical Education." This new edition is not only revised, but is considerably enlarged by a number of valuable appendices dealing with physical education, art and music, agriculture in rural schools, industries in urban schools, and including a note on a plan of education to be developed within a period of ten years.

Principal Gokhale's object however, in writing his book is less to establish educational principles and practices, for he recognises that there can be no hard and fast rules as regards either, but rather to stimulate thought about education, so that the Indian public in particular may grow increasingly education-conscious.

India, from having had in ancient times a system of education of extraordinary interest and practical value, now finds herself in the grips of a system which, however good it may be for the people for whom it was originally designed, is actually foreign to her spirit, and must, with the very best will in the world be a misfit.

Principal Gokhale would probably welcome radical educational changes throughout the country, as would many others interested in an education for India, specially competent to awaken in India's younger citizens the capacity to live in every detail of their lives as Indians first and foremost. But he knows that time alone can substitute one form of education for another; and his object, therefore, is to suggest ways and means whereby present methods and practice may become more harmonious with India's essential needs so that there may be at least edu-

cational reform, even if educational revolution be as yet out of sight.

As might be expected from a Principal of an Engineering College every chapter bears the imprint of a scientific approach to educational problems; but being an Indian, Principal Gokhale recognises to the full the place of religion in all true education—not a religion of form but a religion of life, as he himself says. He also perceives the value of right Patriotism, art and music, and the Classics; and he demands that at every stage education shall be practical, so that Being may be achieved largely through Doing.

I have read "Practical Education" with both interest and profit, and I do not hesitate to say that every teacher will find that a study of many chapters, with the invigorating life that runs through them, is widening his or her educational outlook, to a fuller membership of one of the noblest of life's vocations. Books on education are legion, but there are very few which delve into eternal foundations for the better building of a modern and practical superstructure. "Practical Education" frees us from conventions and places realities before our eyes. And if a teacher be not concerned with the Real, with what, in the name of life, is he concerned? Yet our educational systems reek of forms and conventions and superstitions, and the result is the world as we see it to-day. Principal Gokhale's book cries halt to all these, and bids us educate, bids us summon the Real in every child and youth, to make effective contact with the actual.

Adyar, Madras,
17th Feb. 1936.

GEORGE S. ARUNDALE

PREFACE

(To the second edition)

In the first edition I tried to present the Educational problem in India, as I saw it eight years ago. Since then I have had the good fortune of continuing as the head of the Nadirshaw Eduljee Dinshaw Civil Engineering College, Karachi, and of working on a Government Committee for the reorganisation of education. In the light of the experience thus gained I have revised my opinions to some extent, and have added some additional information at the end. The problem is now presented in a more complete form.

Presenting a problem or even offering a solution is one thing and putting it into practice is another. Looking backwards twelve years, I cannot help being struck by the number of things "not done" as compared to what little we have been able to do. The responsibility no doubt rests on the heads of those of us who are entrusted with this work; but while "Democracy" is so much in the air, and the proportion of Hindus and Moslems and now the Harijans seems to occupy the whole mental horizon of the Nation, even the Educationists find it impossible to keep out of it. And then, the time they can give for educational reform is naturally limited.

We seem moreover to have come to a point in India, when nothing can be done without compulsion. Temporally I would like to claim the freedom to go to the

very devil, if I want to: but as a Nation where all the other innocents will have to come with me, that prospect is not very pleasing. That is why I have come to the conclusion that some sort of Military discipline alone will make men of us. That is where the wedge must be driven. Military training is no "education"; but is the only means of inculcating "Discipline" without which real education has become impossible, in India at any rate. That is why I have given it a very important place in the Ten-year Plan. Here again it is a question of belling the cat; but if we are all convinced that that is the only way, even WE can do it.

G. N. GOKHALE

Benares,
14th Aug. 1936.

INTRODUCTION

(To the first edition)

I am not an educationalist, but it fell to my lot to work as the Secretary of the Sir Visvesvarayya Committee on Technical education in 1921, and during the last four years I have had to look after an Engineering College. Beyond this I claim no familiarity with educational problems.

The ideas set forth in these pages are neither new nor original, but I have collected them from sources, too numerous to acknowledge. I am grateful to them all. I have only set down on paper the ideas as they came to me, hoping that they may prove useful in the form in which I have put them. Many of these have been given a trial in our College, and found successful, as far as they can go.

The general arrangement of the subject is this. The need for reform in small points as well as in larger problems is first stated. Then the underlying principles as I understand them, are explained. Then I point out how these are either lost sight of, or distorted in present day practice, and suggest remedies. I have dealt with all the principal aspects of education, and have tried to show how they are all inseparable from one another. Education, like life itself, cannot be divided up into water-tight compartments, and Educational Reform must take account of them all. A little tinkering here and there, or

patching up, will do no good. Our whole outlook towards education must be changed before we can expect results.

The need for such a change in India was never greater than it is to-day. All talk of our raising ourselves in the scale of nations is futile without it. That is why I have ventured to place these few thoughts before educationists in India, to be taken for what they are worth. I do not of course expect everyone to agree with all I have said, and if this little book sets wiser heads thinking, I shall feel amply rewarded.

G. N. GOKHALE

Karachi,
20th Feb. 1927.

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PRACTICAL EDUCATION

I. WHAT SHALL I DO ?

How often do we hear that fateful question? Every decent man considers it his primary duty to help his children to get on in life, and so spends as much as he can for their "education," often at a great sacrifice. He bears it cheerfully, for their future happiness. The children spend years of their life at it. First they get a smattering of their mother-tongue. Then they study a foreign language, through which alone they can hope to learn other subjects; and later in a college they cram into their heads all sorts of subjects. When their brains are sufficiently full, they are branded as B.A's or M.A's by the University and are entitled to add these letters after their names. All are not equally fortunate, and many have to leave the factory before they get to the branding stage, and vast numbers never enter the machine at

all. At whatever stage they get out, as soon as the money orders from the parents stop, comes the question "What shall I do?"

Fifth Caste Schools

2. The young man till then has a high opinion of himself, but he finds the world unwilling to share it, at any rate to give it a money value. Whenever he seeks employment, his prospective boss asks him what *he can do*, and very often he finds that a good knowledge of the English language is all he can boast of. We need not wonder at it, because was not the supply of competent and trustworthy servants of the Company, which involved the acquaintance of the Company's "native" servants with the language, modes of thought and ideas of their masters, one of the chief reasons which induced Lord William Bentinek to initiate the present system of education? It certainly does that fairly well. In the earlier years, the reward obtained by thus studying the foreign language was out of all proportion to the trouble involved, and the result was an indiscriminate scramble for this new profession of "John Company's servants," creating a sort of a distinct fifth caste of people drafted from the four main castes. The priest's son whose brain was better

fitted to the study of a new language got into it quicker, and found that it paid better to do so; and he has had his day. The goldsmith's son also felt the attraction and he too had his brief turn and now it is the Musalmans and Harijans who are having their innings. Yet the schools remain the same; and hundreds of boys and girls rush to the present day **Fifth Caste schools and colleges**, but the new caste cannot absorb them all and hence the question at the end of course "What shall I do?".

Our Education begins and ends with words

3. That unemployment in India is confined more to the "educated" is well-known, and this is felt more keenly, because after all the trouble we take and the money we spend we naturally expect a better return—for which we wait in vain. The miseries of these "educated" unemployed, to which class we solemnly add hundreds at each convocation, are well-known to every father, but we have all grown callous to those, and still continue to send our sons to the same factories hoping like Mr. Micawber that something may still turn up. Our sons are in the position of the young Persian, educated both in Europe and America, and the master of many languages, who confessed to Henry Ford

that his education began with words and ended with words and that when he went back to his country he had nothing to offer to his people. He had been taught the contents of a certain number of books, and was only capable of teaching the same **words** to others. Our country is full of such educated teachers and professors, but as Ford says **most of them can do very little that a gramophone cannot do** and yet—it costs more to keep them than to keep a phonograph. Hence the unemployment.

Origin of Caste

4. In the olden days (in spite of our vaunted present-day civilization) we must admit that they managed things better. At least in India a priest's son always became a priest, and a goldsmith's son a goldsmith; and this had the great advantage that everyone knew what he was going to be. Heredity and environment did half the work, and a little training made the boy fit and able to follow his father's vocation. This gradually crystallised and later hardened into the caste system in India: but the same practice prevails in other countries, in a less systematic manner. Have we not heard of the "guilds" of olden days, and of the families of Englishmen who sent out

their sons as civil servants to India, generation after generation, little Cottons or Younghusbands following in the footsteps of their sires?

Heredity a guide

5. Western science has now fully established that parents do transmit certain characteristics to their offspring. Our ancient view, believing in reincarnation, goes further. We hold that the offspring chooses suitable parents. At any rate it is the common experience of mankind that a son resembles his father in many respects. It was presumably the recognition of this great truth that made the castes hereditary; and when each caste was really composed of men following that particular vocation, it worked well. But when a priest's son turned warrior (to take the famous case of the Peshwas), two centuries ago, or becomes an Engineer today, the very laws of heredity would point to his son being more suited—not for priesthood—but for the army or the P. W. D. But heredity takes time to act, and if this son makes up his mind to get back to the original vocation, he ought to find it easier to do so. Heredity can only help or hinder, and it would be wiser to take advantage of it; but we have ample authority from olden scriptures, as well

as from present day experience for stating that a man can learn any vocation he likes by dint of labour, and heredity *alone* can never be the sole deciding factor.

Environment

6. Environment also plays a very important part in deciding what a young man can do best. It is well-known that in childhood we grow mainly by imitation and even idiosyncrasies in children can often be traced to those round about them. The child-mind takes impressions very quickly, so much so, that often it is very difficult to get rid of them. A child would most easily pick up all it sees his or her parents doing at the house and its standards of conduct are often determined by this. A child of civilised parents if kidnapped in an early age and brought up amongst a cannibal race would very probably consider murder a fine art, and the slaughter of an inoffensive stranger, specially if accompanied by a little risk, an achievement of the highest manhood. If brought up amongst Turkomans, it would consider polygamy, if among Todas polyandry, as the natural and proper relation of the sexes. Many ideas and capacities that a child would thus acquire simply on account of his surround-

ings, apart from any special teaching, would make many vocations easy for him. A pleader's son would be better fitted for the vocation of a pleader, not only because of a Degree, but because he has seen in his boyhood how his father dealt with his clients, and thus has learnt something of the art of getting clients—an art not taught at the law college. Possibly he finds his father's clients being transferred to him *en bloc*, if he happens to grow up at the right moment. Descendants of pleaders thus stand a better chance of success in law than an engineer's son.

Foiled Hopes

7. While it is the hope and expectation of everyone of us that our son will enter the I.C.S. and become a Revenue Collector, in practice he has often to be contented with collecting Railway tickets. It seems to me that a correct estimate of these two factors—heredity and environment would help us in the choice of a vocation for our young men, and would be very advantageous to society, only if we do not allow it again to fossilise into a cast-iron caste system. But what is more urgently needed is a thorough over-hauling of the present educational system.

II. EDUCATION—A PREPARATION FOR LIFE

Man, an educated beast

8. What is education if not a preparation for life? Is not that the main difference between animals and men? The young of animals come into the world with certain instincts and go through life with these. A young duck even if hatched in a hen's roost, will take to water at once, while chicks will pick up food and run away from a hawk, the first day they are able to walk. These actions they continue to do till the end of their lives. Not so—man. He too derives certain faculties from heredity, but in addition he "educates" his young. He, first makes available for the child the experience of past generations, then explains to him how a particular cause is followed by a particular effect, and teaches him to apply these laws to each new experience. By modifying the causes, man is thus able to get any experience he likes.

9. Of course this preparation must relate to the whole man physical, moral, mental and spiritual. In our present system of education we hardly recognise that a man can be said to be properly educated or prepared only when

Education—A Preparation for Life

all these aspects are attended to. Such a man with a healthy well-developed body, wide sympathies, sharpened intellect, and equipped with the knowledge of generations past, must be able to do his work more efficiently, and fill his appointed place in society more usefully than his uneducated brother. Or else the education would not be worth the trouble.

Education must be practical

10. Then again different people are placed by nature in different environment. They have different problems and different solutions. Each one has to make the best of the situation in which he finds himself and these situations are so varied. **If Education is Preparation for Life**, this preparation must evidently take account of all the different needs. The education of a farmer ought not to be the same as that of a fisherman, or a professor. Each must be taught what he has to do. Thus **Education must be practical i. e. such as can be put into practice by each man in his own sphere of life.** Judged by these standards let us see if our present system of education will stand the test.

Three types of schools even in pre-British days

11. It is interesting to note that in pre-British India this fact was fully recognised, and even villages had three distinct types of schools of which the 1884 Education Commission says "The Vedic Pathashala was mostly reserved for Brahmins. The Hindu law enjoined it as a duty on a brahmin that he should teach and there were numerous learned brahmins and also mahomedans doing this. Most of these pathashalas were free and often the students were boarded at the gurus. There were two other types of schools—the ordinary and the bazar school. In the former all but the untouchables were taught reading, writing, mental arithmetic and liberal education in the form of versified Puranic legends. In the bazar school—Saraf schools—special attention was given to the needs of the trading class. They were really commercial schools. Accounts, writing-out bills and drafts, book-keeping and mental arithmetic were the subjects usually taught. In a typical school, the guru usually confined his attention to the older pupils, and they taught the younger ones." To-day life is a much more complicated business than it was in those days, while our system of education does not differentiate even to that extent.

Proper Education for an agriculturist

12. In India agriculturists form seventy per cent. of the population. Let us see what sort of education would suit them. For his life-work a farmer needs first a well-formed, healthy and hardy body, and any system of education which does not take this into account cannot be said to be satisfactory. Some system of physical culture—the old gymnasium or the new type of open air system in use in the army ought to be provided for in every school; and all students must be regularly made to exercise their bodies under the supervision of the school. It is also the business of the school to see that the boys at the tender age get proper nourishment, without which physical exercises are likely to do more harm than good. Again the literary teaching must not be such as would give the boy a distaste for manual labour—a very common result. For this purpose some sort of manual work suited to local conditions—clay-work, a little carpentry, working in a school garden—should be insisted on. It should be impressed upon the boys that it is not inconsistent with an educated man's dignity to work with his own hands, and whenever highly educated men visit the school for inspection pur-

poses, they might set an example by taking part in the boys' "manual work." It is only in this way that the farmer will get over the prejudice he has against the existing School.

13. In the olden days when the struggle for life was not keen and grain produced in one place remained there, it was perhaps unnecessary to bother about increasing the yield per acre. But now that—willy-nilly—the whole world has been thrown together, food production has become a problem of the highest importance. By dint of labour, in Europe and America they have been able to increase the produce tenfold, and it is suicidal to keep the farmer ignorant of the scientific principles of agriculture in India. The school is not the place to teach a boy how to plough—his father can do it better on his farm—but in the school alone can the boy learn the great importance of seed selection, or the laws of conserving moisture, so important in a dry country like India, or the comparative value of manures. If the boy grows some seed indiscriminately taken, side-by-side, with the selected seeds in a pot and the same when treated, he will see with his own eyes what difference it makes, and such facts impressed upon his tender mind, are not likely to be forgotten. A scheme on these lines adapted from

the French system is given in appendix (D). Similarly a course of studies suited to the needs of Urban areas is detailed in appendix (E).

14. Again the school is the place where the boy may be taught elementary principles of personal and social hygiene. The dirty condition of an average Indian village is well-known, but the cure must begin with the children. The advantages of leading a clean life must be brought home to them not by commandments, but by making them experience what a clean life means. Amongst very dirty children, as has been tried in certain schools, a bath and washing their dirty clothes—the school providing clean ones while these are laid out to dry—should be the first lesson. The child should also be taught how a dirty man or a dirty house infects the whole neighbourhood, and that it is his duty to help his neighbour to be clean as well, thus adding to the hygiene, ideas on social service.

15. Then would come the ability to read and write, for this alone would make further self-improvement possible. This ought to be combined with other subjects. A boy can learn to read and write by reading lessons on hygiene or agriculture, or liberalise his mind with versified puranic legends at the same time. He will

have occasion to write letters to others and to read letters received from them and his writing should take that form. An elementary knowledge of arithmetic and accounting to enable him to see that he gets proper value for his crop, and enough interest calculation to bring home to him the folly of borrowing money, would be very useful.

16. To this may be added some fine art, with which he may nobly amuse himself in later life. Some ideas of the fundamental unity of God and of religions, each according to his own beliefs, are quite necessary. It may be that for a very evolved person like Huxley religion may perhaps be unnecessary, but an average farmer has it. He lives in the midst of religion, and perhaps has to take part in the annual sacrifice. Instead of leaving him to his own resources, it should be the duty of the school to explain to him how an all-merciful God cannot possibly like the killing of innocent creatures in His name, and thus to wean him from the evil incrustations that have grown on his religion.

Farmer not to blame

17. Of course some of the details set forth may need changing, or it may not be possible to

include them all in our educational system in a day, but that would be the ideal to be aimed at, and only when we give each of our villages an education of this sort, can we be said to prepare the farmer to live. A little consideration will show that our present system of education hardly touches a tenth part of the programme. Every farmer sees with his own eyes that an "educated" boy's health is ruined, that while perhaps he can talk glibly of cleanliness, he will not deign to help him in cleaning the cow-pen, or that he is unable to turn a straight furrow with his plough. He knows hardly anything worth knowing, from the farmer's point of view. And so the father concludes that his educated son is in no way better fitted than himself for the struggle of life. Is it then surprising that he does not care for such education? His opposition to giving his son this education does him credit, and we need not malign him for not falling in with our ideas. Those who have experienced how patient and long suffering an average farmer is, will think twice before charging him with depriving his sons of education in order to benefit by their little earnings. As long as we left it to him to "educate" his son or not as he liked, it did not matter much, but now that we want to make it compulsory, it is high

time that we examine a little more carefully, what, we are about to force upon him. Before talking of spreading education we must see that it takes into account the differing needs of life *i. e.* it is more practical.

Our system—Topsy-Turvy

18. Surveyed from this point of view, our whole educational system would be seen to be unsuitable for our new needs. While we were contented to be "East India Company's servants," it served its purpose; but now that we have made up our mind to regain our lost place in the scale of nations, it is totally inadequate. At best it is an imitation of the West—in which the most important features are omitted—and others often turned topsy-turvy. Thus in India agriculture is essentially a widely spread democratic art, and the land owned by big Zamindars is ultimately partitioned off into small plots each cultivated by the poor Hari or Kunbi. There are millions of these petty farmers, and each one is a unit by himself. It is only by reaching each of these units that improvement can be effected. Not so in the case of Industries. They are essentially aristocratic. The Tata concern is managed not by the votes of the share-holders, but by the Managers, in

whom all power is concentrated—indeed it cannot be otherwise. There the whole concern is one unit and only a few men at the top can and do decide what is best for the concern, however large it may be. If the Tata industries are not really national—as many think—it is because the managers at the head, however efficient they may be, are not National in their outlook. In the case of industries therefore it is the places at the top for which our young men must first be trained, while in the case of agriculture the reform must begin at the bottom—with each individual farmer. In our system of education we have begun just at the wrong end—with an agricultural college and industrial schools. It is no use teaching carpentry in industrial schools—the local carpenter can do it better—and it is equally futile to expect better produce from our land by starting an agricultural college, which cannot reach the individual farmer. All this has to be changed.

III. FEMALE EDUCATION

Practical spirit glaringly lacking

19. This practical spirit is nowhere more glaringly lacking than in our system of education for women. That woman as such, is not inferior to man in brain-power and can successfully compete with him in every intellectual field, no one would seriously question, but with the exception of a handful who want to follow independent careers for themselves, the average woman certainly leads a different life, and thus needs a different preparation. For those who want to be doctors or professors, the present system will serve as well or as badly as in the case of men. But in the great majority of cases, other factors have to be taken into consideration.

Hindu ideal of women

20. "Woman as she presents herself to Hindu imagination (and much of this could be supported by a Mahomedan) is the priestess of the home, watering the sacred plant, keeping the sacred fire, guarding sacramentally the purity of the food by her ablutions and prayers. Her household service is an act of **bhakti** (personal

devotion). She goes abroad only for pilgrimage. But within the house she is the centre of all activity, not shut off in any way from males of varying ages, and generations, but influencing vitally their home-talk, thought, and actions. In the wife and the mother, deity is immanent. She has never been regarded as unfit for arts and accomplishments.”* What do we do, to make women fit for this role in life?

Women's needs

21. All married women rich or poor have indirectly or directly to look after the feeding of the family, and principles of scientific dietetics ought to find a prominent place in their education. It often falls to their lot to attend to sick persons—old and young—in the family, and some ideas, or better still, practice in home-nursing would not be unwelcome. Then there is their sacred function of motherhood. In the last great war thirty men died out of every 1,000 combatants, whereas in India, out of every 1,000 women 250 die of childbirth and every one of our girls runs a far greater risk than the forced recruit. Does our education take account of this appalling state of affairs? In the olden

*The Education of India by Arthur Mayhew. (Faber and Gwyer)

days the closed fumigated room for lying-in was successful in its own way; if the woman did not die of suffocation, she could not die of any bacterial disease. We have just taught her to open the windows, to air as well as to a host of bacteria, and it is necessary now to show her how to protect herself from these bacteria before we can reduce the death rate.

Place of mother in society

22. The mother's influence on the growing child has been known to be far more important than all the "education" we can give him in after-life, and there is a great deal of truth in the suggestion, that if we want to get on faster, we should close all our schools for boys, and spend all the money we have in properly educating our girls, the mothers of the next generation. No nation can hope to rise, without good mothers, and it is our duty to teach our women the science of bringing up children—how the child is not a wee-tiny mite that it looks but a soul as evolved as the parents or perhaps better, trying to find outward expression through a vehicle, it very imperfectly understands, and how it is necessary to be very patient and loving, if you want to draw out the best that is in him or her. Then the child all over the

world wants stories, and story-telling was with our grand-mothers a great art, which we have now almost lost. In Europe they are systematically recovering it and it is necessary for us to do the same, especially because the moral appeal can be most effectively made to children through stories. And if morality must have a foundation of religion, as we shall try to show later, religious education perhaps of a different type is even more essential in the case of women than in the case of men. Then there are the arts which brighten the home. For this purpose the music with musical instruments of the East and the West must be taught, and painting, embroidery and other fine arts should also find a place.

Man's education unsuitable for women

23. How much of this do we attend to in the education of our women? In some high schools some differentiation is no doubt made, and a little needlework is taught, along with action songs, on edifying subjects, like a "steam roller," by way of culture. Domestic science is now an optional, rather an additional, subject for girls, so that they have to study harder than the boys. At a later stage they join the same colleges as boys, and go through the same

grind. We acclaim a girl when she passes her B.A. with pure Mathematics and she may even proceed to Cambridge. "What for" is a question no one seems to ask. No wonder a woman does not care for this sort of education, and contents herself with what she gets from her "uneducated" mother.

24. Before we can expect female education in our schools to progress faster, we must recognize the differing needs and make separate arrangements for women. Co-education would be allright upto a certain stage, but when we come to their vocation, a differentiation ought to be made. Do we insist upon doctors and engineers being taught at the same college? Why then should a separate college for women be considered as in any way derogatory to their dignity, as some imagine. We are not unaware of Prof. Karve's efforts in this direction, but he does not meet with the success he deserves, because the public do not yet recognise that "education is preparation for life," and are fascinated by our "fifth caste" branding machines, in which their womanly qualities are effectively killed. The only thing that these women can do is to serve as Inspectresses of Schools, and these "fifth caste" posts are so few that unemployment among lady-graduates

has already begun. On the contrary women's education is so backward in India, that women educated as women, if need be, can find an honoured place in society as teachers, if they are content to live on a subsistence allowance. But for this the whole attitude towards women's education must change.

IV. LIBERAL EDUCATION

A cross between classical and scientific systems

25. We have seen how the system of education in our schools takes no account of the needs of seventy-five per cent. of our population, and leaves out what is really necessary for the better half of India. In our colleges—we give them all, what we call, liberal education. Here we started practically with the old classical system, together with a good deal of pure mathematics. And of late we have grafted on to it Modern Science. On the whole our liberal education is a strange cross between the two; and it is interesting to examine how far it meets the requirements of even the small percentage, it caters for.

Pure mathematics is half of logic

26. Of these, we shall deal with the part Science plays in our education, in a later chapter, but here we shall begin with mathematics, as that has been considered the pinnacle of our educational edifice which the cleverest can reach. The Indian brain likes to plunge into abstract mathematics as a duck takes to water;

and mathematics is also necessary for science. At the same time, a mathematical process is the most logical process known, and works as an unerring machine for the intellect. It will give absolutely correct results, *only* if the premises, with which we started, are correct, and contain no fallacies. Finding these fallacies is the business of the science of logic, and these two subjects cannot be kept in two water-tight compartments, as we do at present. There is no better illustration of logic than Euclid's propositions, and no better introduction to mathematics than a small book on logic. And in omitting Euclid in our modern methods, we entirely miss this logical training. Another way of discovering fallacies is by applying the results to life. If we arrive at conclusions, which we feel are absurd and unworkable in life, we know that our premises must be wrong, and we try to correct them. The process is threefold—premises corresponding to sensations, pure mathematics to intellection and applied results to motor activities. In studying mathematics we try to "purify" it, by confining ourselves to the middle aspect and that with the logic of Euclid omitted. Our students are seriously asked to neglect the weight of an elephant in their problems, and to calculate the contents of a conical

drinking cup two feet at top. Whether a man can possibly drink all that, is not for the student to ask. Neglecting the weight of an elephant now and then may do some good to the Westerner, whose outlook on life is far more material; but in the case of our students it tends to make them less conscious of the realities of life, to which they are already too prone. The infallibility of the mathematical process further gives them a sense of false security. They often confound the conclusion with the process, and such "pure" mathematicians are often the most gullible of men. In India we have scores of brilliant men caught in that trap of pure mathematics. The only thing they can do well is to teach the same sort of mathematics to others. Given a decent left hand side of an equation they will give you the result quite correct, but they have never been trained to get the left-hand side for themselves, and so are unable to apply their tons of mathematics to one practical problem in life.

Mathematics—science of numbers and form

27. Besides being a logical process, mathematics is also the science of numbers and form, but here again it has to be studied by constant reference to facts of life. Before the mind can

get a precise idea of the different forms in nature, the forms have to be correctly drawn, and in the case of solids, accurately made. Drawing and manual training, which we shall discuss in detail later, thus have a very important bearing on this aspect of mathematics, and should go together. Whenever a teacher, at least in the earlier years draws a crooked line on the board and asks the boys to imagine that it is a circle, he is doing harm to them, because most of them simply cannot do it, and thus lose their interest in the circle itself. Except a very few boys, who are naturally intelligent, very few can form a correct conception of what a parabola is like, inspite of all the conic sections they learn. Fewer still can imagine a solid figure, although they can often talk glibly of the properties of solids. This training of the imagination is very essential in Engineering and Architecture, and generally for a correct appreciation of beauty in form; and that is why the Greeks gave such a high place to the study of Geometry. In India we have yet to realise this aspect of Mathematics.

Language—logic—literature

28. A mathematical and scientific education is meant to form in us a habit of arriving

at a correct judgment, based on facts in nature, seen from an entirely detached point of view. In fact that is the only way in which a man can come to a conclusion for himself without resort to authority. This is perfectly in consonance with the spirit of democracy, which now pervades the whole world. This spirit has already taken firm root in India, in the present Kali-yuga, and if we want it to grow in the right manner, and to blossom into brotherhood, scientific trend to all our education is inevitable. This goal is however very distant all over the world and a very large majority of mankind today are content to take ready-made opinions. They do not care to know what the facts are, but want to find out how they will affect themselves. For them it is even unnecessary to know the correct meaning of words, as long as they can guess what the other fellow means. Such men can and do get on well in life, if the authority, they bow down to, is based on a sound scientific judgment, and if they understand its meaning correctly. Right education in the case of these men as distinguished from that of men of independent temperament thus consists of (a) teaching them first the meaning of words—the commodity they principally deal in, (b) how to distinguish between a good authority and a

bad one and finally (*c*) in placing before them the various authorities themselves. Rupawali or language, then Tarka or logic, and lastly the Darshanas or different Philosophies and literature—these formed the classical education in old India, and ought to be the basis of our liberal education. Language—logic—and literature is the order, and these constitute the cultural aspect of classical education.

The English language

29. Languages are also learnt for their commercial possibilities, as when an Englishman learns Zulu or Marathi; and these two motives, cultural and commercial, are so often confounded together. We have already pointed out how the present system of education originated in the necessity of having native servants conversant with the language, modes of thought and ideas of their masters—the East India Company, and as the Education Commission of 1884 remarks “A knowledge of English became a means of livelihood to natives at the centres of Government and a demand arose for English instruction.” It must be admitted as Mayhew says:—“Underlying Bentinck’s policy was a deep-rooted conviction of the superiority of Western Civilization and culture to anything

produced or capable of being produced in the East, and a firm belief that the one type of civilization by its intrinsic superiority could easily and without friction expel the other." Even in Bentinck's time there lived a Sir Thomas Munro, the sturdy and experienced ruler of the South, who was of opinion that "if civilization is to become an article of trade between the two countries, I am convinced that England will gain by the import of cargo." Still English was exalted to the position of the classical language of the new Indian culture. A century of such education has no doubt produced some men imbued with the best aspects of English culture, a great many with its worst features, but a very large majority of the educated Indians have never been convinced of the superiority of English culture over their own. To quote Mayhew again, "When we think of what, through our instruction the Indian can do and must do to gain livelihood, we imagine him in his government or mercantile office, pleading in the law courts, practising in the hospitals, and even doing in executive councils or ministries, the work that for a century, has been reserved to the "Heaven-born" of the Civil Service. Here he is a Westerner and one with us. . . . But if we follow the clerk home from his

office.....and watch his employment of his leisure, his search after happiness in his family or communal life (which is a more correct criterion of his culture) we shall find the oriental and not the occidental. It is not merely a change from professional attire into the loin-cloth of domestic life. Practically every thing is shed that has been acquired at such cost from school and college and contact with the West." Nor is this surprising, if we bear in mind, that if culture in English literature can be summed up in a phrase, it is "Britons never shall be slaves," and that we judge of the culture of a person not from what he talks but from what we see him do every day. Arthur Mayhew, C.I.E., I.E.S., retired Director of Public Instruction, speaks of himself "I felt surprised and sorry that, in an official atmosphere, I had grown so very un-English." So as far as this culture is concerned when we see every Englishman in India radiating his love of freedom, it will be time to understand and imbibe it. We hope, the day is not far distant. But for the present to us English is only a commercial necessity.

A century's achievement

30. Considered as a language we have been at it now for well-nigh a century. We teach

English here, there, and everywhere. No man in the land dare call himself "educated" without a knowledge of English. And what have we achieved? The following extract from a report of Examiners of English at the B.A. of the Bombay University speaks for itself: "It was our melancholy duty to examine nearly 570 candidates more than half of whom were apparently quite unfit to stand the test, while quite a half of the rest seemed unfit to be in the B.A. class at all. It must be confessed that at the end of his college career many a student leaves the portals of the University without a grasp of the nature and use of the articles, and the distinction between active and passive and the proper use of synonyms. The candidate is apt to wax eloquent about similies and metaphors without being always able to spell these words correctly, and he will sometimes tell us a lot about "dixan (diction) and style" of an author, or about his 'passimistic' attitude or his 'discriptions' of nature by mechanically repeating the same thoughts, in a number of successive sentences or paragraphs." To remedy this state of affairs we have now raised the standard of English at the Matriculation, and on the eve of the second century of English teaching many of our best brains are busy finding out whether

the direct method or the translation method is superior. We are determined to improve our English at any cost.

Mastery of a foreign language

31. Is it worth it? Is it after all so very essential that every educated Indian must understand the use of the article, an institution of which he has not seen the like in his vernaculars? Which foreign linguist correctly understands the genders in our vernaculars? For that matter, how many Englishmen are there in India, who can talk correctly in any of the vernaculars for ten minutes, after years of stay amongst us; and yet all these Englishmen get on in India for thirty years of their life, and many of them are rightly honoured as friends of India. Some of them cannot pronounce three Sanskrit words in the way they are pronounced in India, but have succeeded in getting even at the old Hindu culture far better than many Indians, and are recognised as scholars. As against these people we too have Indians who can write better English than many Englishmen. So many of us can make ourselves understood in English and according to Mayhew "the matriculate's mastery of English, despite all the ridicule unjustly bestowed on

Babu English, is far more complete and practical than that shown in the normally intelligent and industrious English boy at the same age in any of the languages, ancient or modern, to which he has devoted special attention." And yet we ask for English and still more English, in our *vain and unnatural desire* to outdo the Englishman in his mother-tongue. A system of education in which the whole educational field is strewn with wrecks in English, and where in the final test "a half and half of the rest" fail to reach the standard, stands self-condemned, and has to be changed. But for this purpose it is first necessary to recognise that for a majority of Indians, English has always been and will continue to be a necessity only for its commercial possibilities. Our object is only to get at what is in the other fellow's mind, and for this purpose "diction" or "dixon," "through" or "thru," as the Americans make it, is all the same, at least for a very large majority of Indians. It is of course necessary to have a few men in every nation—scholars—who will keep a watch on all these changes in the words, but here too it will be better for us to confine our attention to our own language, trusting the Englishman to do the same for his mother-tongue.

Japan's example—German and French

32. Once we get rid of the "supreme importance of all educated Indians knowing the correct spelling of every word in a foreign language," we shall be in a position to give the English language its rightful place in our scheme. Besides being the language of our Rulers, English is the only language in which people from different parts of India can and do communicate with each other. English to us is the language of science and is fast becoming a world language. And that is why, as Mr. Sharp says "There is so much anxiety on the part of the Japanese to learn English: so much that in middle schools alone nearly 100,000 youths are grappling with it, and that the very policemen engage lady missionaries to teach them." But they do not vainly try to Anglicise themselves, they Jap the English. Here is a specimen from "Things Japanese"—"After the Japan seconds army had a bravery fight on the China Tokuiji all the Russia soldiers is picture to leave." And the Japanese too know science, have commerce all over the world and beat Russia once, and are preparing to do so again. If English is the language of science, French and German also can claim some thought on this subject, and so

in Japan these are also widely studied. To quote Mr. Sharp—"The most important of them is German required from most students of medicine, agriculture, forestry, science, and pedagogy and taught in one of the middle schools and many of the higher institutions." I am a Bombay Bachelor of Science in Physics and Chemistry, and feel ashamed to confess that I cannot understand the German instructions I get with scientific apparatus, nor can any of the older M.A's and M.Sc's surrounding me help me out of it. I admit that we are paying some attention to these in our post-graduate courses, but it is not a question of merely adding German and French to our curriculum. We have to take a saner attitude towards English, and then alone shall we have time to attend to other things, far more vital to our life.

No culture without classics

33. This leads us on to the study of our own vernaculars and classics, about which a great battle is waging in India at present. The vernacular is the language in which the vast majority carry on their daily avocations, and as Mayhew says "The use of English as a means of instruction and the inability of Government to develop the vernaculars have widened the

gulf, that separates the intelligentsia of India from the masses." So it is now rightly felt by many that we must bestow greater attention on the vernaculars. This means that time has to be found for the study of these in our already crowded curriculum—crowded with unessential things. The vernacularists are perhaps anglicists themselves, or they are unwilling or unable to touch English, and so they want to oust the classics. These men are helped by another set of persons in whose mind Sanskrit is associated with Brahmins, and both with their own downfall in particular and of India in general. All these persons turn their battery against the classical languages—the *dead* languages, towards which, they want to adopt the commercial attitude which we advocated towards English, forgetting their cultural value. Classics may be called dead languages, because we do not use them daily, but they are the languages in which the living dead pass on their message to the living, and this message colours the daily life of every nation. Of the vital need of giving this culture its rightful place in our scheme of education, we shall speak later; but we will reiterate here that no nation can preserve its ancient culture if it neglects its classics. The vernaculars are no doubt necessary for daily

life; and if they ought to be dear to us like the Moon, we cannot forget that the classics are the Sun from whom they derive their light. The vernaculars revolve round us, while we ought to revolve round our ancient Sun, instead of both trying to go round the Saturn, the English language. If there are some men in the world to-day who do not consider us all as coolies, we can rest assured they are not looking at us, or our vernaculars, but to the culture in our classics, and I do wish our vernacularists will calmly think over this aspect.

Methods must be changed

34. In saying that no man has a right to call himself educated without a passing acquaintance with his own classics, the storehouse of his culture, we do not mean that he must begin with the rules of grammar as we do at present. We are aware of the great disciplinary value of grammar, and we would insist on it being properly taught for the vernacular. In the High School stage science and manual training ought to give all the discipline we need and more. Dr. Bhandarkar's books are exceedingly good books, and Panini's grammar is better still, but these should be required of those who want to specialise in Sanskrit. For the

average man it is quite unnecessary to know the fine distinction between the past, perfect and aorist, and the result of forcing this upon a boy is what makes Sanskrit so difficult for him. We ought to begin with Panchatantra, pass on to selected stories from Mahabharata and perhaps to selected poems of Kalidasa. Correct pronunciation should be insisted on in every teacher, and his business should be only to explain the substance. The stories in these books are generally so well known that if the boy knows the vernacular grammar, which in most cases is based on Sanskrit, he should find no difficulty in following them. Literal translation and grammar should be attempted in the higher standards, higher grammar, and subtle distinctions being reserved only for those who want to specialise in that language. Taken in this manner Sanskrit will cease to frighten a boy as it does at present, and will create in him a taste for the classics and make it possible for him to dip into the great storehouse of experience and knowledge, which even the one book the Mahabharata contains. What is more, it would enable him to understand his vernacular better, in which, of course he should specialise later on if he likes. Vernacularists might benefit by the experience of Japan, who achieved their end by

flooding their language with “a crowd of translations, and other works intended to popularize the new conceptions and Fwakura’s world embassy published a number of volumes which helped to open the eyes of the public, by their descriptions of the history, politics, finance, education and military organisation of the different states visited.” So far as we are aware, the Osmania University is the only University in India which has put its hand to this work; and the older seats of learning might follow their youngest sister, with great benefit.

How to study*

35. In our schools and colleges we teach quite a large number of subjects—useful or otherwise, but to explain to the students “How to study these” seems to be no one’s business, with the result that our mathematics students read algebra like a novel, and literature students seldom use a dictionary. Thesaurus is almost unknown, and every one looks to ready-made keys and notes. The least we can do to banish these “notes” is to make a rule that no one writing them will ever be appointed an examiner. Our modern education contains a

* *Vide Appendix A.*

great deal of memory-work, and those who have experienced what a great aid rhythmical compositions are to memory, feel surprised that not a single new "Karika" should have been made in the last century. That is because we never study "How to study," and each student has to discover his own method anew, and often it is too late by the time he does so. Indexing and classifying knowledge is now a science and a little attention given to this subject will be of great use. Music, painting, find no place in our present scheme of liberal education, and they obviously deserve to be included. A Bachelor of Arts with Science is an anomaly. It would be better to confine the degree of B.A. to those who follow the literary method, but it should be recognised that no degree should be granted in literature unless the man knows something of science and no degree in science, without a passing acquaintance with literature. Real specialisation should be restricted only to the Master's degree, but before that time the outlook should have been sufficiently widened. It is only with such an outlook that a man can properly specialise even in a small branch without danger of being too narrow. That would be real liberal education.

V. SCIENTIFIC EDUCATION

Science for useful information

36. One of Bentick's object in initiating the present system of education was "the increase of India's material resources and prosperity," which, it was considered, could be done by teaching Indians "useful information" of a scientific nature, and even as early as 1821, "rumour reported an indent for a complete philosophical apparatus including a whirling table, and the appointment of a professor of experimental philosophy." But what with the "Orientalists" and "Anglicists" each pulling his own way this object somehow seems to have got lost, and till very recent times education in India was predominantly "literary." It was left for the 1884 Education Commission to again suggest that a "modern side" to deal with scientific education should be started in High Schools, and now science is a subject generally taught in all schools and colleges, but with very meagre results. India has yet to produce scientists of repute (with two or three honourable exceptions for whom the educational system certainly is not responsible), nor have

Indians succeeded to any degree in increasing the country's material resources and prosperity. Is it only for want of time, or is there any radical defect in our method of teaching science, that we seem to be so sterile in inventive genius?

Education—Cultural and Informative

37. All education has two aims—the cultural and the informative. The useful information which we cram into our head for examination purposes is soon forgotten, and what remains after that—the habits we may have formed, and generally our mental outlook would constitute the “cultural” portion. This is by far the most important and according to some, **the only portion that counts.** To understand what this cultural effect of scientific education ought to be we must recapitulate what scientific method as at present understood is.

Science—no respecter of persons

38. A scientist does not believe a thing because “Mr. Always Right” says so, knowing that a person's beliefs are often coloured by his wish to believe. He first observes a number of facts: observes them as accurately as possible; measures them by certain impersonal standards, sifts from them all tacit assumptions, and then tries to find a sequence among these facts. In

his search for truth he varies the conditions if necessary so as to separate one fact from another, and questions nature anew. Then he formulates an explanation—a Hypothesis which fits in with all known facts, and sticks to it just as long as another new fact, not met by the law is discovered. His truth of yesterday may be falsehood to-day and may again be truth to-morrow; and no man of science will assert that his view is the only and final form of truth. As Faraday says “He should be a man willing to listen to every suggestion, but determined to judge for himself. He should not be biassed by appearances: have no favourite hypothesis: be of no school: and in doctrine have no master. Truth should be his primary object. If to these qualities be added industry he may indeed hope to walk within the veil of the temple of nature.” A scientist can thus never be a respecter of persons, but of things impersonal. *Do we see any signs of this cultural effect in our society?*

Faulty teaching

39. No wonder that we do not, because in our method of teaching do we ever put our young men in the position of a scientific investigator at all? In our schools we teach Science just as we teach history. Schools with labora-

tories are very rare, and if there is a cup-board, it is filled with costly apparatus purchased from foreign countries, which the teacher, most naturally, is very unwilling to allow the boys to touch, lest they break it. The teaching is confined only to the lecture room. The teacher talks and the boys—sometimes—listen. All facts are told, principles stated, and occasionally verified by the teacher in the presence of the class or by students in some schools. The boy's power of observation is seldom called into play, and his judgment never. In a college a student gets more lectures, more facts, and out of these he generally verifies a few—just enough to give him an impression that Ganot and Newth are infallible. This is the cultural effect that remains.

Result—one more superstition

40. In a College the student is considered old enough to understand the various relations between facts as propounded by science and these theories are for the sake of clarity stated as mathematical expressions—*formulæ*. Once we get into this mathematical machine, we get into the rut of deductive logic, and again into “words,” “words,” “words,” or rather “letters,” “letters,” “letters,”—just what

Bacon strove so hard to get us out of. Very few of our students can get at the first principles or give a physical interpretation of these formulæ, and when it is remembered that these theories of science are (unfortunately) called "laws," we can understand how the student begins to dread them like the criminal procedure code, and all independent thinking becomes impossible; and so it is that it is very rare to find in India a man who dare question the accuracy of what an F. R. S. may happen to write. Scientific Education has thus added to the numerous superstitions, a new "scientific superstition," and we see the phenomenon of M.A's trying to prove a thing by quotations from Huxley and Ingersoll. *This is what we get by way of culture.*

Scientific method required

41. It seems to me that the whole mischief springs from our faulty division of science into water-tight compartments—Physics, Chemistry, Botany, Zoology and the like. Our Universities will confer a degree in Science, if a candidate learns one or two of these branches of science. A man who has studied some Mathematics and Physics, but knows nothing of Biology may call himself a Bachelor of Physics,

if he likes, but has no right to masquerade as a Bachelor of Science, because all Science is one and you cannot learn one without knowing something of others. In its cultural aspect we have to study not this or that science, but as Prof. Armstrong puts it "We have to give a training in the A B C of scientific method by making all education scientific with the object of putting thinking heads on the shoulders of the rising generation." In fact a good classical education did as much in olden days, but now that "science" confronts us at every turn, a purely classical method is out of question. "Scientific method" has to be or can be taught through the study of scientific facts. But to be of any use, the student must be given a chance of observing these himself, and drawing his own conclusions, and if they do not agree with other people's conclusions, try to find the way out of it.

Students must handle things

42. For this the student must handle the things. The apparatus used at present is generally obtained from foreign countries. Nice looking and convenient as it is, it is necessarily costly and so the teacher is naturally unwilling to hand it over to the boys. The imported appa-

ratus has the further very grave result that the boy begins to think that an "experiment" is possible only with certain peculiar-shaped glass vessels, which Baird and Tatlock alone can make. These are difficult to get and expensive, and so even if an idea of making an experiment—questioning nature anew—came to his mind in his after-life, he would not do it. A very salutary rule in all schools and to a certain extent in colleges would be to insist upon all the apparatus being locally made, out of such things as glass tumblers, empty bottles or chutney jars, which can be had at every place. A few pieces of glass and rubber tubing ought to complete the apparatus. Only when student can see that science is possible with these things will he start experimenting on his own hook, and thus will scientific culture spread over the land.

Japan's Example ?

43. In the informative aspect of western science it is interesting to recall, how Japan took to it. Mr. Sharp thus describes it. "As it was, the march of events was greatly hastened by the appearance of the American Commodore Perry in 1853 with his demand for a treaty. . . . Those who wielded authority saw that during

her long seclusion Japan had fallen so far behind the western nations that she was utterly unable to resist them by force. The only alternative was to learn the secrets of their power. Amongst others Rev. Dr. Griffiths was engaged as the teacher of science. . . . Dr. Griffiths recently stated that only three days after his arrival in Fuchin he was asked to teach them how to blow up warships with submarine mines." The Japanese started with such an objective and did succeed in blowing up the warships of Russia, one of the then biggest powers in the world.

India's Achievement !

44. In India we purchased a complete philosophical apparatus, including a whirling table in 1821, and have been "learning science" now for over a hundred years, with results any man can verify. In spite of our Physics, we have to call a watch-maker to regulate a pendulum clock. With all his knowledge of "sound," the educated man knows no music. His "knowledge" of heat will not enable him to light a fire or to cook a meal. He may be full of Hydrotatics and Hydraulics, and still get drowned. He begins his study of electricity with an ebonite rod and a silk handkerchief, because thus began the science of electricity, but has to leave

off before he learns how an electric lamp burns, and a B.Sc. who can replace a burnt fuse and restore electric lights at a feast, would be acclaimed a great man. He may have learnt a great deal of Chemistry, but is unable to remove ink stains from his clothes, or oil stains from his mother's costly sari, without ruining the clothes. He may have studied Botany very thoroughly and still not be in a position to distinguish edible fruit from non-edible and poisonous fruits, or to say what antidote he should take if a certain poison happens to get into his system. In his Zoology he may have learnt all about cockroaches, and still he is incapable of getting rid of these vermin from his own house. He may announce a learned discourse on mosquitoes, and be unable to deliver it, because he has caught malaria.

We want "science in every-day life"

45. It may be argued that all these things are beyond the scope of pure science, but it is necessary to recognize that in the informative aspect the only excuse for learning western science is that it bears on our physical well-being—physical culture, dietetics and hygiene, personal and communal. These will of course include all the known branches of science; but it

is the point of view that will be different. We shall then—study not pneumatics, but ventilation, not the atomic weights, but the food values and medicinal properties of different organic and inorganic substances, not Hydrostatics and Hydraulics, but water supply. General scientific education will have only one subject. “SCIENCE IN EVERY DAY LIFE,” and in other courses like Engineering and Medicine, students will extend their knowledge in certain special directions, but every one including the specialist will always refer back his studies to the main objective—the physical well-being of mankind.

More elasticity needed in our courses

46. If we make that our starting point, the present artificial bars and cast-iron rigidity would vanish. To-day in the Bombay Presidency a man can extend his scientific knowledge in three directions, civil, mechanical and electrical engineering, medicine and surgery, and agriculture. Before a student can get a degree he has to take the whole of the course in one of the branches, with the result that a man who wants to study medicine, with a view to manufacture of drugs, is compelled to learn surgery, and has no time to learn anything about a steam

engine, because that is not in the M. B. B. S. course. A man who wants to engage in scientific agriculture with modern machinery, must study veterinary sciences, and be ready to treat his bullocks, but cannot know anything—about his tractor, because that is not in the agricultural course. It does not matter if a civil engineer wants to work on a railway or a canal. He must mug up all that is known about both, even if he wants to practise as an architect, but of architecture he can learn nothing because it is not in the Engineering course. All these anomalies must be removed if the aim of our education is “Preparation for life.”

VI PRACTICAL EDUCATION

47. We have seen how the "Practical spirit" is thoroughly lacking in our whole system of education; and that our education has very little to do with Life at present. It was not so bad, when "producing English-knowing clerks" was the goal, but as a training for citizenship it is quite inadequate. We need an education which prepares us for Life. We all want knowledge—yes—but what for is a subject well worth pondering over.

Knowledge is power

48. Knowledge must result in action before it can be said to be of any use; and this was fully recognised in India of old. All our abstruse and subtle philosophies were studied with one end in view, the attainment of Moksha, complete freedom from all the miseries inevitable in this transitory world; and in the treading of the path, strenuous exertion was essential. If our learned men usually retired to forest, it was only because those who had that one objective, attached greater importance to the control of the mind which could be better done in the

forest. But even from the forests they helped others whose aim was Dharma-Artha-Kama; and so in the case of a warrior's son archery was not neglected. "Knowledge for the sake of knowledge," as the phrase is understood in India to-day, was unknown in those days. They were fully conscious that "knowledge was power," and so it was jealously guarded from falling into unworthy hands. We now chafe against that guarding, and have now decided to broadcast all that we know. We therefore put every conceivable subject in our curriculums, and still fail to achieve anything because we have to bear in mind that knowledge is power only when practised.

An average Indian boy will not do things

49. In India as soon as a child learns to walk about, even to crawl vigorously, almost the first thing his or her mother asks him to do is to "keep still—keep still like God"—obviously the brass image is held out to him as the ideal to be followed, at an age when its mental activities manifest themselves in purely motor form. Crying loudly is the only motor activity available and is often helped by the mother washing the baby along with her brass pots. The father wonders as to why the child should cry and

administers a slap or two to make it "keep still." The child in the beginning will refuse to do so, and for some time it is a constant struggle between the child and the parents. The constant inhibition is successful in the majority of cases; but we do occasionally meet with some who refuse to be overawed, and are left as "hopeless vagabonds." The others by the time they grow up, succeed in becoming as dull as the brass gods, and refuse to move a hand, because they cannot. All joy in life—which at this stage is "motion—activity" is systematically killed out of them. Later on their life is further darkened by the unfortunately mistaken interpretation—which is perfectly consistent with the model brass god—of our religion that the whole world is full of ills and the result is that an average Indian will not sew on a lost button or pick up a broken bottle on the street at which fifty people may stumble one after the other. We may take a daily bath and do, but will not clean our shoes unless compelled to, and if we have a nail sticking up in our boot, we shall wait till it makes a hole in our socks, and our very flesh. We may even complain of the nail, but will not take a hammer and hit it on the head. Life is no doubt full of ills, but there are a great many of them, which can be

removed with a little exertion, by any ordinary man, *if he will do it.*

We are very sensitive, and sulky

50. If we all were really indifferent to the many ills of life, perhaps it would not matter much, but the fact is that we are not, and yet pretend to be so. We as a nation have "neither attained salvation, nor are we beasts," as the Sanskrit poet lays down, and so are an extremely sensitive set of persons, in whose breast a passing word of taunt or insult will rankle for years. Our sensory nervous system is all aglow, but it is our motor system that is in a way paralysed and we are unable to act as far as our hands are concerned. Talking and writing are also motor activities, with which we are acquainted, and as the sensory energy has to find an outlet in some form, we often talk and lecture about our ills, make stirring speeches (which stir no one to action) or write articles—as I am doing here. It is for the same reason that so many of us acclaim Mahatma Gandhi's gospel of the charkha, with one voice, but when it comes to turning the wheel for an hour every-day, the model "brass gods" find their hands covered with the hide of a rhinoceros. It is perhaps the "hopeless vagabonds" who find it

easier to respond, but they too find the activity too uninteresting. While our educational system takes no account of our emotions perhaps it is better that our motor nerves are benumbed as they are. But when we remember that bad emotions are more potent sources of trouble, that poison the nation's life far more than a few foolish actions, I cannot sometimes help feeling that it were better that the poison came out in action as ugly ulcers, and thus force on our attention the existence of the virus inside. A man may continue to harbour wrong thoughts for years with impunity, but if he acted on these he would find his mistake soon enough. Even if the emotions be of the right kind, they cannot reduce the misery in the outside world, unless acted on, and so it is that, I think, our educational system of the future must pay very much greater attention to our motor nerves, than it does at present.

Will develops with success

51. Not only has this motor activity to be cultivated, before Indians can achieve anything in the world, but modern psychology has conclusively proved that motor activity in turn reacts not only on our sensory activities themselves, but on our intelligence and will. When

a child perceives that some sensations are pleasant, it wishes to repeat them. Its motor activity begins; it succeeds, and its whole consciousness glows with increased satisfaction. The desire to repeat the experience becomes stronger, and thus is will, which is after all the driving power in the world, developed. The satisfaction of having achieved something—however trivial that something may be—gives a zest to life, and leads him on to attempt greater things. Life is all a constant battle between the will to achieve and the outside environment which opposes the achievement, and every success increases the will, while every failure weakens it. If we want the tender wills of our children to grow, we must provide them with enough motor activities, in which they **shall not fail**. There is a very great deal of truth in the proverb that nothing succeeds like success; and the American society for the promotion of industrial education have after a careful study come to the conclusion, that “more cases of lack of initiative can be traced to some big discouragement than to any other single cause.” Plenty of suitable and well directed motor activities, in which there will be no such failure and no such discouragement, is what we must have. If only all our mothers realised this, I am sure, they would never ask their kiddies to “keep quiet.”

Physical Education in Schools *

52. A man has hundreds of muscles in his body, but the motor activity of all of them is not of equal importance to him. Of the numerous activities possible, those which react on his other sense impressions ought to be encouraged to a greater extent, *i. e.*, they should have a quality. The effect on the intellect depends upon its preciseness, and so the motor activity should moreover be capable of a quantitative measurement, and these two considerations have to be constantly kept in mind in choosing the various activities. Thus an obstacle race is more useful than mere running, and games are better still. In drill or physical training we have the advantage of cultivating sharp and brisk motor activities and thus they affect the intellect more than games. But the latter have the advantage of cultivating team spirit and so both should be used. Some attention to these is paid in our present system of education, but the time spent upon them is looked upon as more or less wasted, and they are relegated to a corner heap in the school curriculum, to be attended to out of school hours if possible. Games are sometimes even made "compulsory" on the poor

* Vide Appendix (B)

kiddies, after tiring them out, with a full day's attendance in the school. The physical trainer or drill teacher is generally from the gymnast class, but whether he has cultivated his mind along with his muscles, we do not care to ask. The result is that neither his colleagues nor he himself can feel that they are equals. The boys take their cue from the elders, and very soon come to look upon all drill as an imposition, as it certainly is, after a full day's work. The general public, and so many teachers themselves seldom realise that the physical training and games are not only necessary for the development of the body, but of the mind itself. If we recognised this, we would insist on at least two hours being spent on games and physical training in all primary schools, and at least an hour every day in secondary school all **within** the working time. In the primary stage a ten minute romp between two periods, would do a great deal of good. In selecting our physical trainer, we would look more to his knowledge of psychology than muscles, and then alone will he be able to impart his spirit to his colleagues and improve the tone of the whole school. In choosing games moreover there is, as in other things, a tendency to imitate foreigners irrespective of whether the games are suited to our

temperaments and means. If England is made on the cricket field of Eton, India may perhaps be built equally great on the atya-patya grounds of our schools.

Noise in Schools*

53. The ten minute romp in the school may be objected to as liable to make the school too noisy. It is a matter of common experience that whenever our emotions surge up, and are trying to find an outlet through a motor activity, we cannot help shouting for joy or howling for grief. Motor activity is necessarily associated with speech, and happiness with both, and it is a crime to suppress this in children. All that we can do is to convert "noise" into "sound," and here comes the place of music, still less recognised in our schools. Some attention is paid to recitation of poetry, and loud reading of prose, but with large classes while one pupil is reciting the other thirty-nine have to keep quiet. Each one talks for a minute and listens for an hour. No wonder the boys cannot keep up their attention. Some take refuge in day dreams and all sorts of wool-gathering. Others cannot help whispering to one another, until the

* Vide Appendix (C).

wrath of the teacher is aroused. If he is a strong man he succeeds in suppressing the whispers; in other cases, the rising whispers drown the teacher's voice. The same characteristic continues in later life, where people sulk and keep mum only when they are compelled to keep quiet, and burst into long speeches as soon as they are allowed to. In most cases all these effusions are so much "noise," for when did we ever learn to convert it into sound?

Congregational Music

54. What we want is congregational songs, in which all can join, and when it is a matter of shouting you can depend upon it that no boys will drop out. In all schools the day should begin with music, simple singing in unison. First perhaps a sweet and solemn song or reverent chant, then something merry and human. The first song should be changed every year, and the second as soon as the boys have picked up the tune properly. A few selected boys should be trained separately, and others should only follow them. The tunes should be simple and not necessarily all Indian either. A selection from both eastern and western music, National songs of various countries in their original language and tune, sung reverentially in

every school in the world will do more good than the League of Nations. All these along with folk-songs of the district should be included in the repertoire and will give the required variety, without which even music may be made uninteresting. For the opening songs, the whole school should preferably meet together, and later on, it would do no harm at least in the primary stages, to allow all the classes to shout some song, in their own rooms, at stated intervals. It will enable the kiddies to explode their pent-up energy, and ensure better attention for the next lesson. In high schools facilities should be provided for teaching more music to those who have a liking for it, and various notation systems—the language of music—should be taught, the science of music being taken up in the college. In the school our aim is not to make a musician of every boy, but to provide him with a suitable motor activity which will at the same time teach him what harmony is, and generally brighten his outlook on life. At present an educated man in India is so much weighted down by the leaden load of learning, that he is distinguished by his serious looks, bordering on sulkiness, and the more educated the man the longer the face he has. Music will broaden it. If we want

to regain our lost place in the world, we must learn to sing "Tra-la-la" while bullets are whizzing past, and if our boys and girls—in whose case music is of greater importance—have never known "Tra-la-la," in their childhood how would they ever sing it, when grown up?

Food and medical aid for children

55. All these motor activities will do no good unless the physical body of the child is free from radical defects, is well-nourished, and maintained in a clean condition. The first is ascertained by medical inspection in schools, and in some cities in India this has been started. Eminent physicians measure the growing boy's height, note down his weight and chest, the condition of the spleen, the colour of his hair and defects in his vision and ears, if any. The results are tabulated and we have the satisfaction of knowing, for the sake of knowledge, that fully fifty per cent of our boys have enlarged spleens. But here we stop. Instead of doing something to remedy the defects, we spend our time in discussing whether we should not tabulate the teachers as well. We forget that where defects are concerned ignorance is bliss, unless we are prepared to take remedial measures. The same is the case with bad nourishment due

to scanty or unsuitable food. That it is the duty of the nation, to provide sufficient food for the growing children at least in the earlier years, in the case of those who are unable to procure it, has yet to be recognised in India. Nor have we ever bothered ourselves with the suitability of the food, and it is not unusual to see so many schools surrounded by hawkers, selling things which little kiddies ought never to eat. Cleanliness of the body is a subject on which we talk a great deal, but, as in other things we never pause to ask if we are practising it. In localities where baths are rather rare, bathing as a first lesson has been tried in certain schools, with excellent results, not only on the children, but on their parents as well. A monthly tooth-cleaning and eye-washing parade in primary schools will do greater good than lessons on these subjects, providing for the boys, a suitable motor activity.

Visual Education

56. Providing a suitable motor activity, instead of trying to suppress them will also solve our problem of getting the boys to attend to subjects where the mind is concerned. After prancing a bit, like a good horse the body will settle down a bit to a milder carouse. But even

here we can hold it steadier by appealing to the eyes in such cases, rather than to the ears—hence the value of visual methods in our education. The blackboard and chalk—white or coloured—maps, diagrams and pictures all come under this category, but I specially mention them here because somehow from the word “visual,” our mind generally flies to a magic lantern alone. The luminous picture which we can throw on the screen by its aid is no doubt “magical” and has a charm of its own. Such lanterns are commonly used in India, but the illuminants in most cases are very unsatisfactory. The result is that in almost all cases, the pictures are shown in the school after dark. After a full day’s work, perhaps after compulsory games in addition, pictures can hardly interest the boys. In a great many cases the parents are naturally unwilling to allow them to remain in school after night-fall; and the teachers themselves are by that time too fagged to do justice to the extra lesson thrust on them. The slides available are often a motley collection and a lesson has to be manufactured to suit them, instead of their being made to illustrate the lesson. This takes away all the magic and only a dull imitation of the western lantern remains.

Magic lantern and cinema

57. We must bear in mind that the magic lantern is only a visual aid to a lesson, and must come along with it, by day at the correct time. Electric light and new "day light screens" on the market make this possible; but in India sunlight is even better. The usual glass slides are too cumbrous, fragile and expensive. Instead, the same pictures taken on standard-size film, give the same results, and a set of fifty such pictures for one lecture, costs five rupees and can be sent by post for one anna, without any fear of breakage. The foreign-made lanterns get too hot in our climate, and this has to be corrected. And then the sets of slides have to be made in India to suit our subjects. Next in importance comes the stereoscope, which ought to be more extensively used. The cinematograph is another visual aid extensively used for educational purposes, in foreign countries, but on the whole is too expensive to be of general use in India at present. "Non-educational" cinemas exist in hundreds in India and are already spreading their "non-educational" influence far and wide. To have a better control and guidance over these is a great desideratum in the interests of adult education.

VII. MANUAL TRAINING

Distaste for Manual Labour and Government Service

58. "One common criticism levelled against education has been that it has tended to give the youths a distaste for manual labour." This is a quotation from the Report of the Royal Commission on Technical Education in Canada, and is taken to show that India is not the only country in which this phenomenon is met with, and it has nothing to do with the caste system as we are often told. Nor is "running after Government Service" a peculiar weakness of the Indian. George Kerschensteiner in comparing the education system of Germany and America says "But since in Germany the Government service, because of the lifelong tenure of office means an absolute secure livelihood once a position is obtained, more students throng into the higher institutions than are needed for Government work and these persons are lost to commercial and industrial vocations. Thus Germany suffers more and more from an intellectual proletariat a misfortune entirely unknown in the United States. Especially with the widespread development of the manual

training high schools, with their careful fostering of technical education, it seems to me that this danger has been put off indefinitely, as far as the U. S. A. are concerned." This opinion of an eminent German educationalist is specially valuable in showing the connection between "Distaste for manual labour" and "Seeking after Government service," and the antidote for both. The remedy really speaking is a continuation of the problem of providing for grownup boys motor activities suited to their age.

Impressions must be measurable

59. In the earlier years, it was the qualitative side which appealed to the emotions, that had to be better attended to. Now it is time to give greater importance to the quantitative side, to cultivate the intellect and will. Every impression must be followed by action, something by which the impression will be gauged and measured, tested and chastened. If the action is measured, the intellect is more pronounced and intense, and consequently the mental culture greater. It introduces the element of comparison, and develops judgment. The energy put forth in covering a given distance, or in forming a mental image of a measured

object becomes a yard-stick with which to measure other distances or objects. For this purpose it has to be constantly judged by working out—mostly through the hand; and the hand has to be taught to carry out the **exact** purpose of the brain, and that is the object of manual training.

Hand-writing

60. The most common form in which manual training was given in the olden days was hand-writing. Before the printing art was known, all literature in the world—in which India has no mean share—could only be transmitted from generation to generation, orally or in hand-written manuscripts, and penmanship was looked upon as a great distinguishing mark of an educated man. Even ordinary people had to cultivate a good hand if only for the simple reason that they could not hope to travel with their letters, to read them out to their correspondents at the other end. With the advent of printing, type-writers and easy means of travelling, a good hand-writing is perhaps not as necessary to-day as it was in those days. We therefore pay no attention to it, with the result that we have to go the absurd length of insisting, on all writing in Marathi, being done in Balbodh characters, which corresponds to the

Roman print-type in English, instead of *Modi*, the *Italic* script. We do not realise that a man has to gain a great control over his hand before he can transcribe well-proportioned, and beautiful lines on paper, uniform from one end of the book to the other, as a Maratha poet puts it; and in not attending to it, especially in the earlier years, it seems to me that we are losing an important educative factor.

Drawing must be exact—not leaves

61. Drawing comes next and is taught to a certain extent, in all schools in India. But as in many, many other things we begin at the wrong end, by asking our boys to copy flowers and leaves. To be able to draw a leaf exactly like the one supplied is a very difficult thing, and all that the boys can do is to draw something which looks like that. There is no measurement possible, no exactness, no comparison, and no judgment. Model drawing is better than leaf drawing, but what we want is geometrical drawing. Hand-writing should have given sufficient free-hand facility, in the primary stage, and later on there is no harm—nay it is very useful to give the boys a foot-rule and a square, with which to measure all lengths and angles, and to rule straight lines. From simple rectilinear

symmetrical figures, he should pass on to more complicated ones with the help of a compass, and then learn to sketch by measurement simple solid objects from different points of view. Propositions in geometry are not to be committed to memory, as we do at present, but are to be drawn to scale, and a finished beautiful figure will give the boy a joy which mere imitating of leaves cannot give, and in turn affect his intellect and judgment. These things are so much lost sight of in the present system of education that students who enter an Engineering college cannot often sketch a wood-screw and the college has to grind them in these elements with very indifferent results, for the simple reason that the boy is too old to feel any interest in such a form of motor activity. The object of teaching drawing in schools is not to create painters, as some imagine. Provision must no doubt be made in colleges for the study of painting and allied arts, but we must bear in mind that the school-stage drawing is only meant to do for the muscles of the hand, what singing did for the vocal apparatus.

Slojd—work with hands and simple tools

62. Next to drawing come activities connected with material objects—commonly known

as manual work or Slojd—a Swedish word which means “work with hands and with simple tools.” Here the child learns to act on the things in the outer world, and obviously the material to be selected should be plastic in the earlier stages and grow harder and harder as he grows. Thus the most suitable activities under this head are paper-folding, clay-work, wood-work and iron-work. These do not require the sensitiveness, necessary in singing or penmanship, but they add to the training in accuracy, carefulness and complexity of activity, the element of personal effort and strength. Working in three dimensions—with objects having length, breadth and depth—requires greater clearness of ideas, and a greater command over the muscles. But it must be borne in mind that such activities in the higher stage are only a logical development of geometrical drawing, and must be preceded or accompanied by the same, before they are of any real use.

Paper-folding and clay-modelling

63. Paper-folding is already a very common activity with all boys, and all that we need do in this connection, is to encourage it, and guide it on to better and more delighting patterns. This is something which every village

teacher ought to be able to do, if we did not frighten him by calling it "Paper slojd," insisting on his taking special training under a "Slojd expert," asking him to indent on the said slojd expert for all slojd material, including paper and a pair of scissors. Every Deputy Educational Inspector or Administrative Officer could learn a score of patterns in one day, and teach them to the village teachers as he goes round, and thus bring joy to hundreds of boys, for, who does not remember the delight all of us felt, when we floated our first paper boat, on the stagnant pool of rain water in front of our house? Next we pass on to work in clay, and which child does not like to play with mud balls *i.e.* if it is not prevented from doing so? That is one of the forms in which motor activity of children tends to express itself. Working with dirt is no doubt dirty but in trying to suppress it, only because it means some labour in washing, we are doing great harm to the growing child. Once discouraged it will not put its hands to any work in later years, and the constant prohibition from his mother may even breed in his mind a repugnance to all work, which dirties the hand, and lay the foundation of his "distaste for manual labour." Any attempt to smother such activity is a crime and

all we ought to do is to guide it, and make it as clean as we can. Instead of clay and mud, in Europe and America they use plasticine, which does not dirty the hands, and has the further advantage of being had in different colours. But this stuff is expensive, and its use is moreover likely to start another superstition that "clay-modelling cannot be done without plasticine," and then a "plasticine expert" will mean the end of all clay-work. Every village has a clay-potter, and Ganapati-maker, and they ought to be able to prepare sufficiently good "plasticine" for the village school. Instead of the boys having to go out in the mud, such prepared clay can be brought into the school. The boys would take to it very easily, and the operation will be cleaner. In place of the mud-balls they make and throw at each other, they can be taught to make clay-bananas clay-chulas and clay-images of various deities, with a touch of colour to make them more realistic, culminating in the annual mud-fort at the time of the Divali, in which all their hand-work can be exhibited, to the whole village.

The use of a knife

64. As a boy grows, he himself does not like to play in mud, and his interest passes on

to other work. He begins to wield his knife, and there commences his wood-work, *i.e.*, if his parents will allow him to use his knife. Generally we associate a knife with blood, and the Arms Act with both. So we mistake the boy's hunger for a knife as a symptom of blood-thirstiness, and immediately rush to snatch it out of his hand; and we even take the trouble of mending his pencils for him. A boy can get hold of a knife early only if he steals it from his father's box, or later when the father solemnly hands it over to him when he is sufficiently grown up, which means, when the fear of a knife is sufficiently impressed upon his mind. The result is that by that time all desire to use the knife is gone out of the boy. The boy who steals the knife continues his manual training for some time in carving his name on the school desks, until the teacher notices it and confiscates the stolen property, with perhaps a good whacking in addition. Thus ends the chapter of manual training in wood-work in India.

65. A knife is not merely for mending pencils, but is the simplest and most easily available tool, with which a man can do wonders, and it is good that a boy should realise its possibilities as soon as he can. So when a boy asks for a knife, we should give him one at once. We can

rest assured that before he does so he must have borrowed one from his friends and used it many times, and his coming to you only means that he has been refused a loan. A knife no doubt implies the possibility of cutting a finger, and in handing over the new knife, it should be but right to impress on the boy the necessity of being careful, and explain to him, how he might quickly stop the flow of blood if he should happen to cut himself, and why a drop of iodine, or similar antiseptic should be applied to the wound at once. In most cases no harm whatever will come to the boy through the knife, and small cuts he will know how to deal with. As soon as he gets sufficiently skilled to mend his pencil without danger, it is time to lead him on to something more interesting—such as a peg or a wooden spoon, heads of different animals on sticks, or handles for scythes and the like. Later on a small axe such as he can easily wield would be a very valuable addition, with which he can tackle bigger jobs.

Wood-work and Iron-work

66. By this time he should have got familiar with the use of the straight edge and the square in his drawing and may now be given a chisel and hammer, a saw and plane, and do

some joinery rather than carpentry. But in choosing the task set, we must bear in mind that they must be such as will arouse and hold the interest of the pupil. Of course correct methods of handling tools should be taught, but the objective should as far as possible be a complete article, which can be put to practical use in life, or serve as an embellishment in his home. A photo-frame or a small book-case is far better than mere mortice and tenon joints which are of no earthly use, and a well-made doll's bedstead will be much more interesting. *Motor activities bring pleasure only when they are finished and their result is visible.* Some turning on lathes should be given after this. They should be taught to turn wooden pegs, tool handles, or small boxes, which can be made more interesting still by colouring them with a little lacquer. One or two exercises in fret work, and little wood carving would help him in developing his sense of beauty, and complete necessary instruction in wood-work. To this should be added some smithy. Needless to say the articles to be made should be small useful articles like a spanner, a pair of callipers, a hasp and staple and the like. Iron is too hard a material to work cold except by filing which is a tedious process. Working with red-hot iron

demands greater caution and deftness of hand, and that is why a few exercises in iron-work are a very good rounding off to the manual training course.

Present State of Manual Training

67. The only place where such carpentry and smithy are taught is an Engineering college, but here again the results are not as good as they might be because, the average age of students entering this college is 18 to 19, and by that time their muscles have lost the requisite suppleness, and their natural interest in such motor activities is more or less effectively killed out. Except the so-called industrial school (which are dealt with later) carpentry is taught in schools in very rare cases. There as usual, we begin with the "slojd expert" and very expensive equipment beyond the reach of small schools, and then slojd methods are declared a failure in India, and slojd halls and equipment offered for sale. The programme detailed above may appear too big, but is really not so. At Wenersburg in Sweden such instruction has been compulsory in common schools since 1872, and in India we are actually doing it all—in a manner—in the engineering colleges in two years, and I cannot see why we cannot go

through it in four years of high school life. As for expense, I have always laid great stress on the necessity of obtaining only such tools and materials, as are locally available, and given a shed in which to work, the equipment of a school should not cost more than one thousand rupees, for a school with 300 boys. It is neither the equipment nor the programme, but the spirit underlying the manual work, that we lack, and this spirit cannot come until we all realise that without training the motor activities of our children into healthy channels, instead of trying to suppress them as we do at present, we shall continue to be a nation—or rather a collection,—of talkers.

Manual training meant to make better lawyers and doctors

68. I should like to make it clear here that all the carpentry and smithy described is not meant to make carpenters or blacksmiths, but to make good lawyers, good bankers and good teachers. This manual training in schools will not solve our bread problem as some imagine, at least directly, but if we insist on every boy and girl with suitable modification being educated in this manner, it will have a lasting impression on our character. That Indians have

brains, no one in the world has seriously questioned, but the brain now grinds itself with ill-directed thought. That energy will be released in well-controlled action, to which the child will get accustomed as he grows, and then shall we do more and talk less, be able to give blow for blow if necessary, rather than sulk as we do at present, and learn to laugh at our own follies, and sing in the midst of difficulties. Like everything else in this world, man is three-fold—Head, Heart and Hands; and only when all the three act in harmony, do we live a complete life. In India our hearts are aglow, heads also work; all we need do is to bring up our hands.

VIII. TECHNICAL EDUCATION

(i)

Present State in Bombay

69. It has already been explained how the present system of fifth caste education now does not enable us to earn our bread, and it is the common belief that we must have more technical education. It is therefore very necessary to understand as to what technical education is, what it can do for us and what it cannot do, so that we may not feel disappointed at the results afterwards. Our present provision for technical education in the Bombay Presidency, consists of two Engineering Colleges, one Technical Institute, and a number of Industrial Schools, where mostly carpentry and similar subjects are taught. It has already been pointed out that the local carpenter can teach his son equally well at his shop, and teaching of carpentry alone can make a very few men into carpenters. If such schools keep themselves conversant with up-to-date methods of work—which they seldom do—they can and do influence the quality of the local carpenter's work, and to

that extent they will be useful to society, but they will never solve the bread problem for the educated man. The technical institute provides a better education, and after passing through it some people do get into jobs, but the education imparted there is of an order which fits men only for the subordinate posts, and only a few of these men with very exceptional ability can, with luck, rise to higher positions. The teaching imparted at the Engineering College is of a higher order, and time after time efforts have been made to improve it. A civil Engineering course now takes five years after matriculation, and admission being restricted only to selected boys the standard is as high as could possibly be expected under the circumstances; and still the fact remains that in the employment market, a third class Edinburgh B.Sc., one often a failure from the local colleges, is considered to have received a better education. Whoever can afford to go to Edinburgh, now does so and we have a number of such people on the market, and the civil Engineering course has now ceased to be a sure road to employment that it once was. A few students are trained in Mechanical Engineering at Poona, and after a five years' College course Government give five of them,

at Dapuri workshops "a two years' training, wages Re. 1 per day with an increment of 8 annas for the second year." They knock at the doors of the Railways as the biggest employers of mechanical engineers and find that they have their own ideas of how education in mechanical engineering ought to be imparted, and these boys after seventeen years of education (10 years before matriculation and seven afterwards) find that no one wants them. The committee on Technical Education appointed by the Government of Bombay in 1920, proposed amongst other things that a new technological college be started in Bombay, and the University have now pressed the scheme on Government. On account of the financial difficulties of Government there is no imminent danger of this scheme materialising,* but as soon as it does, it is expected that it will "produce" many more graduates in Mechanical Engineering, and textiles and allied subjects, and thus solve the problem of their un-employment.

* This was written in 1927. By 1933 Government of Bombay have succeeded in shifting this responsibility on to the shoulders of the University of Bombay, who have July (1934) started a Department of Chemical Technology.

Cottage Industries

70. There are other people who think that the salvation of India will come by teaching "cottage industries." As commonly understood "cottage industries" are small industries which require no organisation, no machinery, and very little technical skill; but if we think of it for a bit, we shall see that it is not so. The common instance given is that of hand-spinning, which succeeded so well some years ago. Was there no organisation behind it? Was it not that hand-spinning was first made popular by extensive propaganda? Were not charkhas made by hundreds and freely distributed? Was not cotton—often made up into rolls—supplied to those who consented to spin? Was not the yarn collected for sale, and was not payment assured to them in their homes? All these things, and more were done, and the spinning boom lasted just so long as the organisation behind it continued to work efficiently. Even now the All-India-Spinners Association are doing wonders. But considered as a whole the spinning campaign was raised on the unselfish efforts of a small band of men, whose hearts had been stirred to their depths. Very soon the head began to assert itself as is inevitable in a thinking being,

and the enthusiasm waned, in spite of the constant efforts made to rouse it—and here began the decline of this new cottage industry, presumably because the idea contained other fallacies and fetters fatal to growth.

Use of Power has to be learnt

71. The foremost of these is the insistence on the use of human power. No one will question that man is the weakest of creatures, and yet to-day he is the strongest of all. His intelligence, enabled him to discern that there are other sources of power in nature, which he can use for his purpose and hence his mastery over the world. Instead of killing and eating other creatures round about him he found it better to train them to plough his land and to carry his burden. The bullock and the camel represent man's intelligence plus brute strength. The use of the horse was man's dim sensing that time had value for himself and his concerns. The elephant was the limit of brute power available from other living creatures, and man had to turn his attention to other forces in nature. He saw in the breezes of the heavens, a mighty power wastefully playing about him. He captured it with a sail, and wind carried for him heavier boats, swifter

than he could do. In steam he discovered another source of power. A steam engine put on wheels became his locomotive, with which he can drag burdens which would have required hundreds of elephants. Placed on a boat, it can move floating cities. Installed in a mill or a factory, it arms the feeble hand of man with a force to which there is hardly any limit. The internal combustion engine has made power mobile, and with electricity he can now spread his tentacles of power over vaster areas, and incidently it enables him to make better use of water. Not content with all this, man is already planning to get at the tremendous power which is locked up in a drop of water. We are living in a power age all over the world. In India too we do not insist upon every man dragging his own plough, or turning his own persian wheel. We use oxen and horses. We too have sailing boats. We travel by steam railways, and ride in motor cars. We even use water power, and electricity, and have traditions in the land of great Rishis, before whom quailed the mighty warriors, because a drop of water in their hands meant instantaneous annihilation of the warrior's might. The achievement of our ancients is now the world's goal and ought to be ours too.

72. That man has often misused power must be admitted ; but as Henry Ford says : we are only at the beginning of the power age. Only a few hundred years ago man still used most primitive means and with steam and electricity, he has, as it were, grown from an ant into a giant, at a leap. He stands dazzled and bewildered at the spectacle of the tremendous forces he is now gathering into his hands. Like a starving man suddenly coming into an immense fortune he does not know what to do. He is slashing about a bit with his new axe like Washington. A few men have got hold of the sources of power and are trying to lock them up within their pockets, and whole nations are trying to do the same. Man has in a great measure failed to make proper use of his newly won command over nature, and the very forces he has mishandled have turned against him. Thus we have our industrial slums and our horrible wars ; and on the whole many thinking men question whether all these things have at all added to our happiness. Hence their aversion to " power " ; but it seems to me they here confound the power with its misuse. It is not the power but its misuse that is responsible for the misery. That man's morals have failed to keep pace with his knowledge is the only con-

clusion we can draw from it, and this would be a powerful plea for efforts in that direction. But bottling up these powers, the knowledge of which has spread over the whole world is an impossible task. The Kali Yuga—the democratic age, which means every individual is to be equally powerful—has begun, and Shakti—the world mother has already begun her dance. The mightiest of human beings cannot stay her. Neither does it seem necessary. We speak of God as Omnipotent and if we are all His children, why need we be afraid of growing into His likeness, helped by our Great Mother. If the Rishis of India were mountains of compassion, they were giants in strength as well; and if Maharishi Vashishtha did not take his revenge on king Vishwamitra, it was not because he was impotent to do so, (his cow was a match for the army); but because he had the light of Wisdom shining on him as well—because he knew that he could change Vishwamitra quicker by forgiving him. Who knows it may not be India's mission to teach the world how to make better use of "Power," and how can we ever do it, if we shrink from it?

Machine makes power possible

73. The machine is a necessary concomitant of power, for by its use alone can we use these great powers. With bare hands a man can work only with clay, but is powerless to shape any harder material like wood or iron. With a hammer and chisel, which are machines he can cut anything. The hammer enables him to deal a much stronger blow than his bare fists, and this without any injury to his hands, which is now transferred to the hammer. With a steam hammer he can give a far harder blow, only by pulling a lever, which requires very little effort on his part. He can, as it were, go on lifting an elephant and drop him on his work, every second for hours together. With a lathe, and shaping or milling and drilling machines he can work the hardest steel into any shape, as if it were butter, and even make automatic machines which will, once properly set, go on turning out finished articles for him by the hundred. In these machines man has created new animals with brute strength greater than that of an elephant, and what is more, these leviathans will go on performing the one or two operations they are meant to do, with unerring precision. The hundreds of parts which

make up a motor car could never be fitted together if they were not accurately made. They demand an exactitude greater than human hands are capable of, and the machine alone will make them— and make them by the thousand, the whole day and day after day. The machine thus enables man to direct the mighty powers of nature into useful channels.

Machines improve human skill

74. It is a common notion that by the use of machines, man is getting less skilful in the use of his hands. Here is Henry Ford's experience. "An interesting side-development of putting the work on the machines instead of on the men is the increased necessity for skilled workmen to repair the machinery, and to make new machines. Many people thought machines would destroy craftsmanship. Exactly the reverse has come about. We now need more expert machinists than ever we needed—we can always use more tool-makers." Others do not like machines because they are said to be ugly. A little thought will show us that there is nothing in nature which is inherently ugly. We judge things from the sense impressions they produce on us, and set up a standard based upon our own personal ideas, and thus it is that

a great Chinese beauty may not be considered as such in England and vice versa. It does not necessarily follow that either is ugly. Now in the matter of machines and motor-cars which are after all the latest additions to God's creation, the standard of beauty—as Ford says—has yet to be set. It is not right to call a motor car ugly because it does not resemble a horse. It is not ugly because most of them make horrible screeching noise; the remedy is to insist on more musical horns. Those who object to motor cars as making God's creation dusty, forget that dust is also of God's creation; and if we do not like it, we must have dustless roads.

Machines do not necessarily mean slums

75. Using power through the agency of machines does not necessarily mean industrial slums. Instead of the workmen coming to the slums, electricity now enables us to take the power and the machine to the workman; and this is what Ford has demonstrated to the world. He speaks of a small village plant of his where only 300 men are employed. "All men live within a few miles of the plant and come to work in their own motor cars. Many of them own farms or homes. We have not drawn men from the farms—we have added in-

dustry to farming. One worker operates a farm which requires him to have two trucks, a tractor and small closed car. Another man, with the aid of his wife, clears more than five hundred dollars a season on flowers. We give any man leave of absence to work on his farm, but with the aid of machinery these farmers are out of the shops a surprisingly short while—they spend no time at all sitting around waiting for crops to come up. They have the industrial idea and are not content to be setting hens." The fullest use is made of power, without creating slums—which are the result of human greed. The remedy is not to scrap the machine, but to make greed impossible or unnecessary as Ford has shown, by earning an income beyond the wildest dreams of a greedy imagination.

Man without the machine—a slave

76. Nor have machines made a slave of man, but quite the reverse. When he employed a bullock to plough his land, instead of harnessing his brother man to it, did he become a greater slave, or liberate himself? Did the sail make more galley slaves? Is an hour's ride in a tram or car easier or harder than a solid day's trudging along a dirty road?

Which mode of travel leaves the pilgrim fresh at the other end? Which leaves him more time to cultivate his mind? The fact is that the whole creation consists of beings at different stages of development, and evolution for each consists in his shaping his course to the highest, that he can conceive, which necessitates passing on the work of lower *i.e.*, more material nature to those on the lower rung of the ladder. Thus man rises by entrusting his heavier work to the beast, in return of which he feeds him. The beast himself rises by serving man to the best of his ability and both rise together better in co-operation, than when they are hunting each other. It is only when a greedy man takes the beast's service and fails to take care of him, that he falls. The emancipation of the beasts cannot be achieved by sending them back to the forests—where they will only rend each other to pieces, but by transferring on, their heavier work to less evolved beings, our machines with which man, the image of God that he is, is trying to imitate his Great Father. The function of the machine is thus to liberate man and beast from brute labour and to release their energies to the building of intellectual and spiritual powers. As Henry Ford puts it, "The way to liberty, the way to equality of opportunity,

the way from empty phrases to actualities, lies through power : the machine is only an incident." Every right step in that direction means not bondage but liberty. As the Sufi poet says, "I died a mineral and became (*a machine, I died a machine and became*) a plant ; I died a plant and became an animal ; I died an animal and was born a man. When did I grow less ?

Technical education—spirit of the machine

77. Inculcating this spirit into our young men (of course along with the knowledge from our scriptures to ensure its proper use) is what I understand by Technical Education; and before we discuss it any further, it seems to me that we have to choose between the charkha, as understood by me, and this ideal of which it is the antithesis. As an emblem of simplicity, the West needs a charkha far more than we do. Our poverty necessarily makes us very simple, and we need make no virtue of it. If our three hundred millions were really prepared to embrace poverty, India would not be seething with discontent, that it is. Even in days of yore only a few advanced souls embraced poverty. It has never been, and can never be the goal of a whole nation. And if we want to be rich, we

can do so in these days only with the help of a machine. How can we get the machine its rightful place in our society, if we are always condemning it, and insisting upon using only our hands? The charkha is not enough manual training because it is too mild and monotonous to suit the boy bursting with activity, who would rather break stones with greater relish. For the grown up, it is a punishment; that is why every one loudly advocates it, but very few use it. Even assuming that hand-spinning is the solution of all our ills will the world let us do it in peace? God girt half of India with a deep ocean, and built a compound wall miles high round the other half, and still we are in the din and clash of the whole world. In fact this Suvarna Bhumi "Land of gold" has been the rallying ground for the whole world for the last two thousand years. If the British—the latest arrivals—among them hold sway in India to-day, is it not because we are one and all dazzled by their steam engine? While we have done nothing but spinning during the period, the world has gone on, and we are already being dragged along, willy-nilly. Is it not time to stop spinning and look round to see whither we are bound; and if we feel, as so many of us rightly do, that the ship of the

world is bound for disaster, shall we not help in directing it properly? A touch of the rudder will work wonders, and there is Henry Ford already at the helm. Stopping the ship is impossible and cannot be done, because it is run by the intellect and emotions of millions of human beings, so many of whom are yet children. It is as futile as insisting on every child keeping quiet, because Patanjali prescribes it for the aspirant after yoga. When the child grows to that stage it will no longer feel any pleasure in this material world and then will leave it by itself. For the present we can only direct its activities for which machines are necessary. Having thus learnt to respect the machine, we proceed to make friends with it. That is the purpose of technical education.

IX. TECHNICAL EDUCATION

(ii)

Making friends with the machine

78. If we accept that the purpose of technical education is to make friends with the machine the natural procedure would be to get familiar with the habits of our new help-mate. The first thing to remember is that the machine is a very active worker, and refuses to fraternise with idle talkers, and so before we approach it, we must have learned the use of our hands, and generally cultivated active habits in our younger days as previously described. Trying to build a great technological institute at Bombay, without reforming our school is erecting an edifice without any foundations, and is foredoomed to failure. We can not "produce" technical experts from boys whose sole education at school consists in attempting to learn the spellings of a few hundred English words, whose acquaintance with science is through Townsend and Mercer's catalogue, and who outside the school are hearing nothing but only the charkha. We must put an Aero-

plane on our national flag, restore to the child its happiness, by never asking him to "keep still," allow it to cultivate active habits, teach him to be precise, and to take a joy in creating things, and then the machine will welcome him, and the new leviathans will be his willing slaves.

Modern Tools

79. In a technical college, the boy should proceed to learn the use of modern tools. He should work on a lathe and see how easily with its help he can give the hardest material any round shape or a flat side, or make screws with which he can multiply his power a hundred-fold. A shaping machine in which a tool slides along or a planing machine where the work is moved will file off for him large chunks of metal and give him an even surface. A milling machine with rotating cutters will cut steel with the alacrity of a rat burrowing a hole in earth; and he can clamp on a boring mill, huge castings, and turn them round or riddle them with holes by the touch of a lever. A punching machine will do the same for thin plates with greater ease, and with a shearing machine he can cut plates as he cuts paper with a pair of scissors. In a stamping press he will see with his eyes how he can twist a flat plate into sur-

prisingly useful shapes. All these machines need not be very large, because it is the process that the student has to understand and the size of work does not matter. Nor is it necessary to have too many of each as the students will be working at all of them in rotation. It may also be added that the college machine shop is not the place for single purpose machine used in actual industries. That is like forming sentences. Here the object is only to teach him the alphabet. And in teaching this alphabet smithy and foundry which are the vowels of the alphabet on a small scale should not be forgotten. If all these things are borne in mind, a good machine shop should not be very expensive.

Selection of exercises

80. In selecting exercises for the boy on all these machines moreover, the remarks we made under manual training, must be kept in mind, and all work should be in the nature of complete useful articles, and not mere fancy cuts. That will give the boys something in which "they will not fail," and give them the joy of creative activity and hence more zest in their work. Making sectional models from old machines is a very interesting and useful form

of activity. At a later stage all the boys should co-operate in making some complicated and large object, of which different parts should be allotted to different students. Every boy should first draw out on paper, what he is going to do, so as to get exactness in his ideas, and then in making the article he should be made to accurately stick to these dimensions. This is also the time for the boy to learn various methods of projection so that he may be able to make sectional drawings, so as to get a solid idea of various simple and complex pieces of machinery.

Mechanics

81. While he is thus getting familiar with the idiosyncrasies of the machine, he should also study the science of the machine—mechanics. He will have to study special mathematical methods like calculus, but it should be constantly kept in mind that they are only a means to the understanding of mechanics, and all examples as far as possible should be chosen from life. Let there be no “assume that” as far as possible ; and if they neglect friction from examples to make them simpler, they should immediately proceed to see what difference it would make. Students should always be

taught to look at the nature of the change that any variable may make in the whole; and whether they remember the exact expression or not they should always be able to say whether a curve connecting any two variables is a straight line, or a convex or concave curve. Special attention is to be paid to methods for getting equations for such curves, from a set of experimental observations, and the maxima and minima points. A knowledge of the properties and strength of materials is indispensable at this stage, and this should as far as possible be verified in a materials-testing laboratory, in equipping which variety rather than size should be kept in view.

Prime movers

82. After a student gets familiar with machine tools, he should go on to machines for the production of power. Steam engines came here first, and although the tendency in modern days is to go to internal combustion engines, steam is likely to remain in use for a long time and it is also easier to grasp. Once the boy gets a correct idea of the piston and the valve, he can understand other uses of the same. Steam turbines should not be omitted. Oil and gas engines, and the motor car engine should

come next; and he should have a very clear idea as to how these run. A knowledge of electricity, its generation and use, is indispensable in these days. Along with the knowledge of power generation will come, methods of power transmission, shafting and belting, compressed air and water transmission and electricity again. It is the custom for manufacturers of machinery and tools in civilized countries to present small models to technical colleges, but in India they only come to sell, and the day has yet to come when we could equip educational institutions in this way. With our slender resources, it is variety rather than size, which we ought to aim at in making our purchases.

Variety of courses

83. It is needless to add that before any boy can benefit from such a technical course he should already be familiar with the scientific method, and the science of living in general. It should now be his aim to specialise in branches in which he proposes to use his technical ability, for the technical ability is only a means to an end. A man who has learnt only mechanical engineering, can only serve some one else. He cannot start any thing of his own. Before he can begin independently—on how-

ever small a scale he likes—he must learn something more; and the evil resulting from divorcing these two aspects has already been pointed out. A man whose aim is to manufacture drugs, must study the machine—perhaps not as thoroughly as the man, who wants to start motor car manufacture—and the materia medica as well, together with some specialised chemistry of distillation and purification. One who wants to develop the mineral resources of the country, will add Geology to his mechanical Engineering; and the modern agriculturist, Botany and Organic Chemistry to the same. It is imperative that facilities for learning all these subjects should be available in one place, and some freedom should be allowed to the student in choosing whatever group suits him best. Some knowledge of economics of the Ford type, and modern efficiency and business methods, along with ideas of salesmanship are absolutely essential in these days before any man can hope to start independently. The last but not the least, would come religion which deals with the purpose of life; and without which we shall only go the way the West has, and be sorry that we ever left our role of talkers and got in to do things.

No industrial experts

84. It will be noticed that in these two chapters, the word "industrial" education has not been used anywhere ; because what has been described is not that, by any means, and the two should not be confounded. A man may be able to learn something of an industry, without its technique, but such men can only serve others. Before he can be expected to organise and direct any industry he must have a sound scientific and technical education. In fact industrial education is often too great a handicap on such a man. In learning the details of our industry as it is being carried on at present, he brings with him an indelible impression of all its points good and bad. He sees a particular type of machine being talked of as "wonderful," in the particular factory he happens to work in, and so begins to feel that it cannot possibly be improved. Nay he even gets into a superstition that the piece of work can be done by the aid of that specific machine and by that only. He knows all about his machine thoroughly and feels certain that everything else is "impossible." It is then that we call him an "expert"; and a glance at the world will show us that it is these experts, in whichever walk of

life we find them, who are the greatest blocks to progress. Their very thoroughness narrows their vision, and such men alone will never regenerate anything. They are however very good servants, and that is why Henry Ford calls them in whenever their aid seems necessary, but as he says "No operation is ever directed by a technician, for always he knows far too many things that cannot be done. Our invariable reply to "It cannot be done" is "Go, do it." Ford gives an instance "It seemed to us that we ought to be able to manufacture plate glass continuously in a big ribbon, and with no hand-work at all. The glass experts of the world said all this had been tried, and that it could not be done. We gave the task of doing it to men who had never been in a glass plant. They started experimenting at Hyland Park. They ran up against every trouble that had been predicted, and a number that had not been, but eventually they achieved their result." To enable men of this type to discover themselves is the goal of technical education. This may or may not lead to industrial development of the country, but is a necessary preliminary to it.

X. INDUSTRIAL EDUCATION

Self-sufficiency not the goal

85. Before any nation can fulfil its purpose of putting forth the particular aspect of God's Life that is allotted to it, it must be free to grow in its own way; and that is why even the tiniest nations aspire for that freedom. But a little thought will show that this political independence is at best only an aid to economic independence. Although slavery is now abolished by statute, every man is the slave of his hundred desires, and will daily sell himself into bondage for their sake. Suppression of these desires is an impossible task. We can gradually transmute them but while they last, all that we can do is to make the very bodies which desire, labour for fulfilling these desires. Thus economic independence begins with each man providing his own wants, not necessarily with his own hands, by sewing up his own boots, but with the fullest aid of machines, beasts and fellow-men in a spirit of mutual helpfulness, in ever-widening circles, from the family to the village, village to district, province, country and the whole world. Self-sufficiency is not the goal of human

existence, but as individuals we can only begin with our individual self; and try to reach out as wide a sphere as we can. The wrong lies in jumping to more distant parts, neglecting portions of humanity nearer home; or in the distant parts thrusting the products on us, at their price. These two evils are so intimately connected together that it is not possible to think of one without the other.

Industries required for food

86. We want to grow our industries, not because we do not want to soil our hands with foreign made goods, but only because by their aid alone, we can get enough food for the starving millions round about us. How to do that is the main problem before us. Agricultural and industrial training are only one aspect of the problem; and will never succeed until the other aspects are equally attended to. We cannot produce something out of nothing, and the first thing to look after is our raw material, which we use directly or indirectly. In agriculture it is the air, water, and land with its plant-food. Of these we have at least plenty of air everywhere, water in some places, and at times, and a large area of land, more or less suited to growing of crops. The deficiencies of

water must be made good with irrigation. Land must be studied with reference to its contents of plant food, to see what it can produce, and what it cannot produce, the shortage made good by proper fertilisers. To get all these factors together labour is necessary, and as this is often of a very heavy nature beasts and machines must be used. Before a man can efficiently make use of all these, he must have the necessary knowledge. A sound knowledge of the growth of plants, and management of beasts and machines, suited to each stage in life, would come under agricultural education, and must be made available for every farmer in the land. This can be supplemented by special training in growing particular crops, and specialised products. That would be the function of agricultural institutes and experimental stations, but none of these will ever make a mark on the agriculture of India, until the farmer is educated first, in some manner, as detailed in an earlier chapter.

Power in agriculture

87. Sound agriculture will mean more food and more produce, than what the farmer needs for himself, his beast and machine and then he will have to study the questions of trans-

portation to other places, where he can "market" it in exchange for other articles he desires to have, but cannot produce himself. This problem of transportation is again linked up with power, and getting acquainted with modern power is an indispensable part of the modern farmers' education. What the village school needs is not only a charkha but a motor car. Quite apart from its usefulness, as Ford says, "a motor car makes the people familiar with developed power—teaches them what power is, and gets them about and out of the shells in which they have been living. Many of us feel that agriculture cannot progress without tractors, but tractors will never succeed until the farmer gets familiar with an internal combustion engine of a motor car." Russia is another country in the world which has famines in spite of immense areas of land, because its agrarian population cannot with primitive methods produce a sufficient surplus over and above their own requirements to feed the cities; and when the Soviet Government went to Henry Ford to buy tractors, he told them, "No, you first ought to buy automobiles, and get your people used to machinery and power and to moving about with some freedom." They followed the advice. In India the process has already begun in the

cities and all we have to do is to cease to bewail its advent and spread it to the farmer as quickly as we can.

Agriculture—a part time occupation

88. We all know that agricultural operations alone cannot keep a farmer busy the whole year. A month's hard work at sowing time and another month at harvest is all that he is required to put in, and he spends the rest of the year at best in tending a few head of cattle, or sitting at a spinning wheel. We imagine that this is a peculiarity of poverty-stricken India; but this is exactly what a typical old type farmer is all over the world, down to the charkha. Here is what Ford speaks of an American farmer of to-day. "The old farm and the old plantation were nearly self-contained....The question of getting enough to eat and having a place to sleep stood out above everything else. A farmer did not expect to make money. He lived." Now "the spinning wheel and the hand-loom are no longer on the farm. The farm people buy their clothing. The farm is no longer isolated—the motor car, telephone and wireless have attended to that. The farmer has moved out of his little individual self-contained world into the great world which is a world of

industry, which has money enough to regard, as common necessities, what the farmer formerly regarded as extreme luxuries. The farmer wants as much money for his work as the industrialist gets for his work. The former claims that he works harder than the industrialist, and probably he does; but the world does not pay for sweat. It pays for results." Precisely the same changes are happening in India. The fact is that a farmer does not manufacture his goods; Nature does it for him. All that he has to do is to set the stage for Nature in the beginning, and after Nature has finished her work to fruition, he goes in to gather the harvest. This cannot keep him engaged throughout the year; and a man who works for two months of the year cannot expect to earn as much as another who works the whole year.

Power makes it worse—Industries alone will supplement both

89. The use of power on the farm we advocate will not mend matters here. Power will enable a man to cultivate a larger area and to earn more but there will be the cost of the tractor and machinery to off-set these. The number of days on which he will be required to work will not increase and on the whole he will if

anything be more idle than the present farmer, without even his bullocks to occupy his time. I have heard an expert warn young men that scientific farming on modern lines did not necessarily mean more money, and he was right because a more idle man cannot expect to be more prosperous. But that is only half the truth. The real problem for the agriculturist—more pressing in the case of the power farmer—is to find for him something profitable to do, during ten months of enforced idleness, to enable him to live. To ask him to go back to charkha is as profitless as providing work for him by asking him to drag his own plough. The bullocks can do the ploughing far better than he can, and the power-horse will do his spinning much cheaper. He does need an industry that goes to his cottage, not the cottage industry as we understand it, but organised power industry, decentralised to his farm. Those who talk of Japan's cottage industries forget that they are wise enough to distribute cheap electric power to the farms, and if our capitalists who are aping the West do not care to do so, the remedy is to create a public opinion which will compel them to do so.

School Museums for raw materials

90. We have seen how very intimately agriculture is connected with industries, and all talk of modernising one without the other is futile; and both must be considered together. If in agriculture we secure the co-operation of the vegetable kingdom, in industries we seek to make use of our minerals in addition to the vegetable products. So the first preliminary of industrial development is the taking stock of our universal wealth—our chief raw material. I do not mean only our gold and silver deposits, but the very black cotton soil, of which we must learn to make something, before we can talk of an industrial India. Collection of data and samples of all the raw material all over the country is a very useful step; but the very vastness of the collection makes it bewildering, and that is why our museums become the cemeteries of the samples. In addition to the central collection we must have small museums for each district, each town, each village. These should best be located in the local schools, and should contain samples of all things round about the boys. Some people cannot see the use of putting up in a bottle what the boy sees every day round about him; but the bottle and the nice cupboard

are meant to impress on the tender mind how valuable are the things on which he daily treads, and how all his wealth is to come out of that dirt. Mere collection of samples to please the Educational Inspector is worthless; along with the museum must be cultivated the spirit of asking "What can I do with this?" That is why we laid so much stress on manual training. Museums go only with work, and would be the boy's first touch with industrial education.

Sources of Power

91. Along with the consideration of our raw materials attention must be paid to the sources of power available in India. Coal is now in fair use in India, although we have yet to learn its economical use. We get coal at pit mouth at four or five rupees a ton, and spend twenty rupees a ton in transporting thousands of tons of it, hundreds of miles. We have mountains of coal dust, which we have to leave at the pit mouth, and the success of a coal merchant often depends upon the percentage of this dirt he can safely palm off on his customers. We must look upon coal not as a commodity, but as so much power locked up in the black casket, and then we shall see that even the dust has

value for us. Only that it must be converted into another variety of power which can be transported more cheaply. In India we also have heard that electricity is one such power and we even have our electric railways; only we bring Bengal coal a thousand miles to Bombay and then convert it into electricity, in preference to local Hydro-electric power, which presumably we shall next send on to Bengal. We have to revise some of these notions before we can think of industrial development. We have plenty of sources of hydro-electric power and we have even made a survey of many of these. But here again a superstition has already grown that we must have a thousand feet fall, before we can have hydro-electric power. Here too we have something to learn from Ford. River Rouge is only a little stream,—scarcely more than a small creek. The power of the stream had simply been allowed to go to waste, and all the villages were dwindling. Ford put on it a turbine which gives him forty-seven horse-power. “The turbine, as in all our new hydraulic plants is in a glass case, outside the factory, just to exhibit to the public what water power can do.” Lower down with 21 feet head he develops a hundred horse-power. Next with a 15½ feet drop he gets 26 horse-power, and in all

he has nine sites on that river for little power plants. We have to teach our young men to look at water-power in that way and they will find the whole country bristling with possibilities. Leaving tides and the winds, which are common to the whole world, we have in India our special blessing of Sunlight, in which shape God pours on us millions of horse-power if we have eyes to see. If England had as much sunlight, they would not have allowed it to waste, as we do. Here is something yet left for us to discover. Not a dead survey of hydro-electric sites, to be buried in a blue-book but getting the young man familiar with all these sources of power in which he is steeped is the next step in industrial education.

Industries first or Industrial Education first

92. "Industries first or Industrial education first" is another bogey, we have to lay before we proceed. That problem is as old as the other one as to whether the hen or the egg came first; and each person can answer it in the way which suits the circumstances. When Europe was engaged in the Napoleonic Wars "the machine" was born in England, and gave a great fillip to the industries in that country.

By heavily taxing hand-made cloth from India and prohibiting the export of machinery at first and then laying large export duties on them, England built up her industries before the other European nations could raise their heads after the disastrous wars; so that when France and Germany awoke out of that nightmare, they found themselves confronted with a full-grown industrial system, before which they were powerless. England could make everything better and cheaper, and the economic position in France and Germany looked as hopeless as ours. Only they adopted a remedy we could not or at least did not. They raised a tariff-wall round their shores, resorted to a process of hot-house cultivation by a thorough system of technical and industrial education, watered the new plant with plentiful bounties, and in time succeeded so well, that even England began to feel their competition in the open markets of the world. Later Japan entered the lists in exactly the same way. It is true that the English industries developed without any special attempt at education and flourished later under free-trade conditions; but as a result of the changed circumstances even England had to go back to protection and has now organised a suitable system of technical education. The

hen was first caught in England. Germany and France stole an egg and raised nice poultry inside their enclosure, so that even England had to pay attention to her eggs. We ought to benefit by the lesson and begin where it suits our present condition.

Use of tariffs

93. What tariffs and technical and industrial education have achieved in other countries they can do in India; and there should be no hesitation in adopting that course. About tariffs it is however necessary to remember that they are at best like a fence put round young trees meant to give the trees a chance in the world where everyone is ahead of us, and should not be considered a permanent feature of our industrial financing. We resort to tariffs and bounties only to quickly get above the necessity of having them; and while they last, we ought to make the best use of them. Thus if India wishes that foreign experts should not be entrusted with the task of running an industry, while hundreds of Indian youths are starving, or if the better mind of India is convinced that the housing-conditions of the workmen in the present industries are very bad, then India

should refuse to grant any aid to concerns which are not willing to fall in with these ideas. Tariffs and bounties are thus a very potent means of directing the activities of selfish money-grabbing capitalists, and thus ought to be taken the fullest advantage of. In this connection we often hear it discussed whether bounties should be given to industries run with foreign capital, because we take money as so much commodity. If we learn to look upon it as power to employ so much labour, we shall see that it matters little to whom that power belongs. The vital question is what labour is employed, is it inside the country or outside the country? If railways in India do not lead to our economic prosperity, it is only because the crores of rupees we spend on them are spent outside India, barring the earth work, which, thank God, is purely Indian. Railways thus at once come down from the category of industries to mere transport facilities, often worked to the detriment of local industries. All these factors have to be taken along with industrial education before it can be as useful to us as it has proved in other countries.

Markets for Industries

94. Industries require an assured market. Our life has now become so complex already that there should be no dearth of market, for good and serviceable articles, but it is futile to expect anyone to pay for them more money, only because they are "made in India." Civic pride has no doubt helped industries, but it is only a stimulant, and not food; and like other stimulants it is often followed by depression. A pin-maker will be allowed to make pins only as long as he makes good pins and sells them cheaper than others; and his goal should always be to put better pins on the market, at a reduced price. As long as he does this he need not be afraid of starvation. Individual men who are prepared to work in that spirit are no doubt essential, but a coordinate study of the possibilities is equally necessary. The latter is part of industrial education; and one of the first duties of the Industrial Institute or Department must be to attend to this. They must have special men on the staff whose business is to study the exports and imports of the country, and to analyse how the raw material gets more and more valuable as labour is spent on it. Take the instance of castor seed which we export in

large quantities and import castor-oil. This transaction can be shown as something like this:—

| | |
|--------------------------|----------------------|
| 1 lb. of castor seeds .. | Rs. 0-2-0 |
| Freight to Europe .. | „ 0-0-3 |
| Packing bottle .. | „ 0-1-0 |
| Return freight .. | „ 0-0-3 |
| | <hr/> |
| | „ 0-3-6 |
| Labour and profit .. | „ 0-4-6 |
| | <hr/> |
| | a total of Rs. 0-8-0 |

which we pay in India for a 6 oz. bottle. All articles of local consumption, considered as necessaries of life must be investigated and correct information as shown above under all the heads must be collected and published broadcast. If matters are put to the people in this manner, they will begin to think about it, and a demand for more information on the subject will arise. Of course we assume that the people have been taught active habits, and trained to take a living interest in their local raw material and power possibilities.

Methods of manufacture

95. It should be the duty of a second section of the staff to keep themselves fully posted

up as regards the latest methods of manufacture, and they must be able to give advice. They must not content themselves with simply referring to a certain company for oil-exPELLERS; but must understand and have the plant necessary to work out the fundamental processes involved—decortication, extraction of oil, purification, etc., and to try to find out if the same process cannot be carried out in some manner, better suited to Indian conditions. Even if a foreign machine is considered more suitable, it does not necessarily follow that we must buy hundreds of these at their price. The patents of so many of these have expired long ago; and if the demand for such machines is likely to be great, that will be one more fact for the first department to advertise.

Help in making machines

96. The Institute must have a third department which will give all help in making new machines. It should have arrangements for analysing and testing every variety of raw material used in machines, for melting and alloying them and making castings. It should have a machine shop equipped with the finest modern tools, with which to make the machines required in other industries. It has already

been pointed out that even in these days, when the tendency is to do everything by machines, the machines themselves have to be made by skilled workmen, by hand, and the tool-rooms where this is done are the nurseries of modern industries. We may and will have to import our machines from outside for years to come, but we must remember that as long as we entirely depend upon foreign-made machines, our industries cannot be said to be on a sure basis, if only for the fact that these "single purpose" machines may not have been built for our conditions. Human requirements are very difficult to describe on paper, as has recently been proved in the Bombay reclamation works, where a misunderstanding of the words "Soft clay" in ordering a dredger, cost us a huge sum of money. If we do not wish to have similar disasters, there must be a living touch between the person who manufactures the machine, and one who is to use it. Moreover when we buy these always, we are apt to look upon them with reverence—as I have seen many do—so that we are afraid even to touch them, let alone making suitable alterations. This does not conduce to efficiency. It is needless to add that it is not the function of the industrial department to take up the manufacture of machine but only

to give help in the initial stages until a suitable one is designed and then the duplication of these ought to be turned over to other indigenous manufacturers.

Deputation to foreign countries

97. Another important point is the sending out of our students to study industries in foreign countries. Scores of young men go out now-a-days, but what is the result? The Mangaldas Nathubhai Technical Scholarship was instituted at the Bombay University so many years ago, and it will be interesting to know how many of those sent out are running an industry. I believe very few. Is it not probable that this is due to the fact that we send out young men, who have no idea at all of practical conditions in India before they go out, and however clever they may be, they are thus unable to assimilate any knowledge? At best they can copy the shop they might have worked in. It is not unlikely that a man who goes out with the intention of studying soap-making, actually learns glassmaking, and on his return becomes an Accountant-General. That is not the fault of that young man but of those who sent him. Men of average ability who have already launched into some industry with such knowledge

as they can get here, and who have some experience of the practical difficulties met with, will learn at a glance much more than than the very clever youngster, because they are already seeking for the solution of some problem, while the other has no problem to solve. Technical knowledge cannot be imbibed as a sponge imbibes water. That is the application of Science to practical life, and unless the life is real, there can be no application—no knowledge.

Industrial education only a part of the problem

98. It will thus be seen that Industrial Education forms only a part of the vaster problem of the regeneration of the Nation's industries; but it is a very essential part. A technological institute or department manned by competent persons with a vision, and who have a clear idea of the goal to be reached by our industrial system, who study practical conditions and create a demand, assisted by a second set of vigilant toilers who keep themselves in touch with the very fast progress the world is making, who can lay their fingers on things which will be practical, aided by a third set of dexterous men, who have the most up-to-date tools for manufacturing machines and who have confidence in their ability to turn out work as good as any

foreign maker can do—such an institute reared on a broad foundation of general practical education, and in the hands of men fired by a common ideal, and all working inside a judicious Tariff-wall will alone save us from economic ruin. And if in our new system we should succeed in reducing human misery—now considered inevitable in the West—then alone we shall have justified our vaunted claim to be called the Mother-land of the Aryan civilization.

XI. RELIGION IN EDUCATION

Our moral calibre

We have seen how the present system of education takes no account of life. Our education to-day is essentially the same as it was fifty years ago, although the world has changed so much. This system was sound enough when only English knowing clerks were required, but is not now good enough for legislators or ministers. It is far from Technical, not even Liberal. The cultural influence of Science is hardly noticeable, and we are not yet in a position to appreciate the culture in English literature. Universities began as job-procuring machines, and even that they cannot do to-day. If some educated men succeed in life, or are cultured it is not the fault of the educational system; and in the case of the average man, education neither gives him bread nor makes him a better citizen. Nor is the educated man noted for his very superior moral calibre. The common goal of society to-day can be summed up in the phrase "Get rich quick, honestly if you can," and if this tide of materialism now sweeps over the whole world, the educated man in India, who

often leads the way or at best helplessly allows himself to be carried off his feet, cannot escape his share of the responsibility—and a lion's share too.

Education the only way out

100. It is quite true that "schools and colleges" where a boy or girl spends a few hours, are not the only places where education is imparted. The "home influence" is a paramount factor in their education, and the street cannot be left out of account. The home influence depends in its turn upon the education of the mother, and the responsibility comes back to the school. Because people are not properly educated, the general environment is not what it should be, and because that is not so, proper education becomes difficult. We thus move in a vicious circle, but the only place where we can break the circle is in our educational system. Any improvements we introduce there are bound to permeate the whole society in a few years' time. Education is the only organised way known in which we can affect the general environment. It is like the brain of the nation and although other agencies share in the work, the brain cannot shake off its responsibility in the matter.

Educated men leaders of society

101. We are often told that the number of educated people is so small that they hardly count in the general scheme. Is it really so? It has already been pointed out that a very large majority of mankind are willing to take ready-made opinions and rules of conduct, and people can get accustomed to anything if they talk of it and do it often enough. As Bernard Shaw says: "It is this dangerous power of custom that makes it so difficult to convince the common sense of mankind, that any established practice is wrong. Let a routine once spring up and you will presently find thousands of routiners following it passionately for a livelihood. To say that every man who beats his children is a conscious debauchee is absurd: thousands of dull, conscientious people beat their children conscientiously because they were beaten themselves, and think children ought to be beaten.... A respectable man will flog his son for telling a lie, because it is customary to do so. He will also flog him for not telling a lie if the boy tells inconvenient or disrespectful truths, because it is customary to do so.... Let anything once become customary and it will be practised by people, to whom it is not at all

natural, but whose rule of life is simply to do only what everybody else does, and who would lose their employment and starve if they indulged in any peculiarity." It is only men at the top of the ladder who can afford to go against an established custom good or bad, and inasmuch as these places of vantage are occupied by the educated few, come in their value and responsibility as setters of fashion, as teachers of the nation.

The "Godless" educated

102. Far from being powerless to stem the tide of world-forces, a little thought will show us that it is the frankly materialistic outlook of these "educated handful" which is mainly responsible for bringing into India, this great evil from the West. We have already seen how materialism in the West is only the giddiness they feel after a joy-ride on the power-horse, and our educated men have got the giddiness without the ride. They have adopted the gospel of materialism from the West, and now out-west the Westerners themselves, with the proverbial zeal of converts. In spite of all their materialism in the West, they do not look down upon those who talk of God and even from the highest down to school boys, quite a large

number attend church and are not despised for it. It is in spiritual India alone that an educated person if he goes to a temple, is considered "old fashioned," as some one who has yet to be reclaimed from "superstition, to rationalism," or at best taken as a hypocrite by his brother-degree-holders, whereas the uneducated look upon him as a phenomenon. Not that I attach any great importance to going to a temple by itself, but I mention it as a token of the materialistic outlook, which a century's Godless education has brought into the land. Centuries of heredity cry out against materialism from every nook and corner of India, and if we want to meet comparatively contented people, who have no desire to get rich quick, and who are willing to share half a loaf, with a traveller from the street, we have to look for them in the recesses where the light of modern education has not penetrated; and if the educated man himself is not as daring a materialist or a rationalist as he chooses to call himself—as he likes, it is because of his "uneducated mother." This is not a plea for the abolition of education, only a reply to those who say that "the reform must come from within," and that education cannot achieve everything. If education has made us materialistic, education can turn us away from the same.

Consequences of Materialism

103. Before educated India can be expected to take this step, we have to feel convinced that a great many of the social evils described are due to this outlook. Leaving aside numerous facts in nature that materialism cannot explain, if we assume for a moment that nothing, that does not report itself to at least one of our five senses, really exists in this world, we would find no valid reason for denying ourselves any pleasures at all. If money is the only means, with which we can buy pleasures, for our senses, why should not everyone try to "get rich quick," and why should anyone at all do anything which does not bring in money? The share-bazar and racing, which combine the least quantity of work with the quickest possibility of getting rich, are but further steps. Charvaka's advice "Borrow and drink ghee" is perfect wisdom, only we might substitute champagne for ghee. Any reduction in the facilities for drinking is an infringement of personal liberty. Temperance is desirable only because that alone will enable a man to drink the greatest quantity of wine in a life-time; but prohibition would be a crime. If a man derives great pleasure from the company of women,

why should he not have as many of them as he can buy, as long as he does not make too much noise about it, by calling the dancing girls to his own house? Do we not see these views reflected in our daily conduct?

Its logical conclusions not acceptable

104. The Criminal Procedure Code would be the only practical limit for a genuine materialist, and if we are at all logical, even that limit would be seen to be a curtailment of one's freedom. If a few rupees are quite moral at bridge, why not a few hundreds at poker? Why should not lotteries be allowed especially in a "Worthy cause"? We might even go a step further. If some women find it easier to live by selling their body, why should they not do so? If the senses alone matter, why should not the muscles of the man, which are the nearest partners of the senses, be allowed to help the senses in procuring happiness? If the survival of the fittest *body* is the law, because we recognise nothing beyond it, why should not a strong man take whatever he likes from one weaker than himself? Why should an individual care for the good of the many, and even assuming that he should do so only, because by combining with others he can get more material pleasures, why should not

robbers form co-operative societies, or a strong nation enslave the whole world if they are strong enough? If matter is the only reality, that would be the most logical conclusion, and yet, when Bernhardi boldly proposed that course, the whole world rose up against him. We are all of us on Bernhardi's road, but there is something, inside us, which cries halt at every step, and we are trying our best to smother that inner voice. This is the philosophy of life that guides the nations of the West, and leaving aside the wisdom of centuries, we in India are also humbly following them on their road to ruin. The last war has given them a rude shock, but we have escaped from it, and to-day they have perhaps a greater suspicion of the cause than we have. If we only open our eyes in India and try to get back, we will do so far quicker, for we shall then be working with the strong under-current of spirituality, that already exists in the land, and perchance repay to the West the great debt we owe them, for waking us up from our slumbers. In the earlier chapters, I have laid great stress on the necessity of cultivating the activity aspect in our education, but it were folly to do so without attending to the wisdom aspect also. "Be strong," "Be active," must be combined with "What for,"

before we come to "be happy." Only religion will do this.

Materialised Religion

105. While the educated men of India are trying to persuade themselves that there is no God and religion, the masses left without their guidance are drifting into positively wrong notions of God and religion, which are more consistent with the gospel of materialism than spiritual life. Religions are being rewritten to suit materialistic tendencies let loose in the land, and people of all religions have come to a point when they take out of their own sacred scriptures only as much as suits their material interests, and use it for their material benefit, with the name of God on their lips. It is this materialising of religion that is responsible for the enormous amount of intolerance in the land, and consequent communal troubles. This spirit is not necessarily confined to the masses, but by a curious irony of fate reacts upon the educated few themselves and that is why we have some degree-holders amongst the greatest bigots and fanatics in the country. They tried to sow materialism and are reaping a "materialised religion." Even in the West this same phenomenon is noticed, but in India, owing to

the very cosmopolitan nature of the population, the evil has now reached such proportions that we can no longer shut our eyes to it, just as we have the rock of materialism on one side, we have another terrible rock of materialised religion on the other. The ship of the world is moving on with tremendous energy, and any attempts to stop it, in order to avoid the second rock are as futile as they are in the case of the first rock. What we need is a touch of the helm, and only the educated man whose privilege it is to be at the helm of nations, can do it.

Universal idea of God as now materialised

106. To see what a restoration of religion will achieve, let us take one idea which all the religions of the world have preached from times immemorial that creation has sprung from one source. In the unmanifested condition the Hindus describe it as "It," because no better description is possible; but in this manifested world, which according to all religions is not "a fortuitous concourse of atoms" as the materialist would like to believe, He exists and guides the Universe with Divine justice and mercy. In this aspect the Hindus call him "Ishvara," Moslems "Allah," Christians "The Father in Heaven," and to the Buddhist

He is perfect LAW incarnate. As the whole world is sprung from Him, obviously all are His children, and it would be inconsistent with His Divine wisdom to attribute to Him a partiality for one child in preference to another. This one fact if correctly grasped will change the face of the world. But with our brains intoxicated with materialism we look at this great truth from below. That the belief in God is universal, none can deny, but because our five senses do not report His presence in this world, we conclude it is only an idea we have, hence the materialists search not for God but the origin of the Idea of God. Some allege that this idea has grown on the soil of human ignorance, tilled by imagination, and watered by the fear of the unknown, and that all religions have been gradually elaborated from crude forms of animism and fetichism. Their likenesses are referred to universally observed natural phenomena, imperfectly observed, and fancifully explained, solar and star worship being the universal key for one school, phallic worship the key for another, because that is the only other possibility known to the materialist. All scriptures are the babblings of "child humanity" the child's Father being only an idea, or at best a monkey. Thus speak to-day's "wise men" and the poor

ignorant millions are silenced. Even if they are not convinced, their faith is rudely shaken at any rate they too begin to believe that "man made God in his image," instead of the reverse, and then, attributing to God all the human weakness...is only natural.

God in India of to-day

107. Thus to-day an average Hindu certainly believes that there was a God, and that Great Holy Rishis did tread His land of old, but whether all of them exist **to-day**, he does not feel so sure. At least he thinks they must, like himself, be too sleepy to attend to their business, or if awake, great tyrants who have already chalked out his future in the lines on his forehead. He entirely ignores the other half of the law that if he is what he has made himself in the past, his future is clay in his own hands, and so religion to-day makes an average Hindu a helpless meek individual, instead of just the reverse. The average Mahomedan has greater faith in the existence of God. He is not ashamed to spread his carpet on the station platform, when prayer time comes, and therein lies the virility of his religion. An average Christian believes in the Father in Heaven at least on Sundays; but both the Moslem and the

Christian have unfortunately persuaded themselves they alone are His favourite children, and there is only chastisement in store for others, who do not go to God, through their door. A little thought will show that this is only attributing to the Great One our own human weaknesses. Like the different languages in the world, the different religions instead of being only the means of approaching the One who is the Father of the whole creation, have become an end in themselves—an end as seen through the strongly coloured glasses of materialism, which now dominates the world's thought.

Understanding God will change History

108. Let us see what a restoration of the belief to its pristine purity will do. If there **is But One God** in the world He is obviously the Father of all, irrespective of colour, caste, creed or religion. He must be looking upon all His children with the same love, but it does not follow that all the children are of the same age. All different religions are presumably teachings, He has given to different groups of His children to suit their age. There is His Divine Power behind every little thing that happened, is happening to-day, and will happen in

future, in this world. He directs all our actions only to one end—which every good human father has also in view—the good of all His children—that they may quickly grow into His likeness. Looked at from this point of view—our present materialistic History will have to be rewritten. We would no longer talk of the invasions of India during the last two thousand years, but the throwing open of India's gates by God to other races. We would no longer speak of hordes of Tartars coming in to loot India, but of their being brought into India for a Divine purpose. We would no longer consider lust of gold as the only motive, which animated the Dutch, the Portuguese, the French and the English, in their attempts to take possession of India, but would look upon the happenings of the seventeenth and eighteenth centuries in India as a sort of friendly international tournament, that the Wise Father had arranged to find out which of His children from the West were the fittest persons to reconsolidate this ancient land. The gold was only the prize and the sovereignty of India only the challenge shield, which the English have fairly won, for waking us up. If we learn to look at all our problems from this point of view, our whole attitude towards them will change.

Communal troubles

109. Hindus and Moslems instead of trying to break each other's heads in the name of religion will sit down and try to find out why their One Father has brought them together, and then each will perceive a great many good qualities in the other worth following. Instead of calling a Mahomedan a fanatic, the Hindu would feel less ashamed of visiting his own temple, while the Moslem would imbibe more of the Hindu's tolerance. The Hindu would better his society by comparing the position of a widow in a joint Hindu family, with the legal independence enjoyed by a Moslem woman, where no marriage is complete until the bridegroom makes some provision for his wife, which no one can touch. The Moslem in his turn may like to copy the Hindu's ideas of the great sanctity of the marriage tie. Amongst the Hindus themselves, the Brahmins of to-day, instead of merely claiming the privileges their forefathers undoubtedly enjoyed would try to make sure that they are worthy of them, and the non-Brahmin, instead of attributing all his ills to the Brahmin, and trying to pull him down, would try to raise himself into the high position the Brahmin of to-day has vacated. Both the

Hindus and Moslems would ask themselves if they have imbibed the active habits of their western friends, or even learned the value of the machine they have brought them, while the westerners in thier turn might see some good in pausing a bit and dreaming sometimes of things beyond. Every one will of course continue to do what he considers best for himself, but will cease to thrust even good things on his neighbours, and thus will grow toleration, which is so sorely needed in India.

Moral Progress impossible without religion

110. Although I do believe that, for the description of God I have set forth above, I have enough authority in scriptures all over the world, I do not for a moment assume that that view will necessarily commend itself to every one. I describe it in detail only to show how even one idea common to all religions will revolutionise our whole life and make us happier. A correct understanding of Divine justice will similarly cut at the root of all corruption, gambling and other money-problems. We agree with Mayhew when he says "Moral progress depends ultimately on the religious attitude of individual and community, that is, on the prevalent conceptions of the mutual relations of

God and man. Though actual conduct is determined partly by conditions that have no apparent connection with religion, and seems sometimes on a higher plane when entirely dissociated from religion, the ideals which ensure progress and demand something more than mere adaptation to environment, depend for their driving force on religious sanction, and are an integral part of man's attempt to achieve peace and happiness, through his relations to the Supreme Power of the universe. Consistent with this standpoint is the conviction that an educational system which is to be, in the full sense, morally effective must rest on a religious foundation." We have yet to recognise this great truth in our educational system.

Religious Neutrality is a meaningless phrase

111. In describing the indigenous system of education in India, when "every large village possessed a school of its own, and the foundation of a system of national education was laid by the spontaneous efforts of Hindu and Muhammadan Society," the Education Commission of 1884, pointed out how large a place religious teaching occupied in the course of instruction, both high and low and how from the essentially secular bazar school in some parts of India, re-

ligion was not excluded. In the early British days religion was looked on by some as a mere mass of superstitions not worth preserving in days enlightened by the rays of western science, while others who fully realised the sway it has over human minds, had no desire to risk the possible consequences of dabbling in it. Religion was thus strictly kept out of our educational system, as either putrid or dangerous. We have already seen how a century of such education has only added to our stock, the terrible superstition of materialism, and this has enhanced its power for mischief. In spite of our strict "neutrality," religious explosions are the order of the day. Intolerance is writ on every man's face. The oft-abused third class railway compartment has done more to breed tolerance in us than all our Universities and Colleges; but the crowded compartment can only level down. It is powerless to up-lift. Correct understanding of religion will alone do that. "Religious neutrality" was perhaps inevitable for a foreign government, but are our own men also to continue the same traditions? I quite admit, it is a difficult problem, but it is a problem of momentous importance, and it is no use shrinking from it. If it has to be squarely faced someday, why not to-day?

Religious atmosphere—not religious education

112. In maintaining with Mayhew that an educational system which is to be, in the full sense, morally effective, must rest on a religious foundation, I quite agree with him that this does not mean merely or primarily that there must be religious instruction, but that...the atmosphere of school and college life, in and outside the class-room, must be saturated with religious thought and feeling. Mere moral instruction as some imagine is no substitute. A mere catalogue of virtues has never convinced any one of the necessity of being virtuous, not carrying with it the "categorical imperative" that God provides. Even a modern psychologist like Parsons, to whom God is only an "idea," admits that "man's ideas of a supernatural Agency, God or gods, have a profound effect upon his behaviour; and as such must be assigned their appropriate—very great—value as influencing conduct." In early childhood religion in our education will take the form of stories, narrating to them in a spirit of admiration, how godly men and women in the past lived and achieved—the versified Puranic legends, which the 1884 Education Commission mentions was a great feature of pre-British

education, and is still the most important part of the education we get in our childhood from our "un-educated" grand-mother. In later years it will be an understanding of the purpose of God in creation, and how we can best co-operate with it and be as Happy as He is. Young men educated in this manner, will not be ashamed of referring to God in Senate Halls or Legislative Assemblies, and that spirit will filter down to the masses, just as their materialism has spread, and much faster than that, and then shall we get into a frame of mind, where each one will not try to "get rich quick" at the expense of others, but in order that he may share the happiness that riches may give with all his fellow-beings, and when in his search for God, he finds happiness far greater than all that money can give, will come his time to retire to a forest if need be, and attain to God Himself. That is of course the ultimate Goal of life or lives, and an education which serves a preparation for that life, is the most practical of all educations. We have tried to trace a few land-marks on the way, and if we feel in our heart of hearts that the road will lead us to happiness, we must take courage in both hands, and march on, starting from where we are. The solving of India's problem in this respect will lead on the world to greater Happiness.

XII THE TEACHER

God's Ambassador

113. The teacher has been described as God's Ambassador to the personality, and he has to realise this first. All educational reform can only begin with him, rather than with curricula. The teachers themselves are but the product of the older education. If they are unwilling to try new experiments, it is but natural. But it will be to their greater glory, if they boldly come out to lead the coming generation into pathways not known to their tender feet, but which they themselves have perhaps trodden in some previous existence. Where shall we get such people, I do not know, and all I can do is to ask every reader of this little book—**ARE YOU THAT PERSON?**

APPENDIX A

HOW TO STUDY

No study without memory

STUDY is principally a function of the intellect which we train by study. In this training memory plays a great part. Reading is to the intellect what food is to the physical body and memorising is eating the food. Stuffing our brains with facts and figures without understanding their relationship is cramming, and this is of no real use. But this does not mean that memorising is no use. Just as properly digested food is no burden on the system but adds to our power, properly digested memory far from being a "burden" as some people imagine, becomes a faculty. In fact "memory" is the foundation of all intellectual development—which we label study. It is therefore necessary to understand what memory is.

What is Memory ?

2. Quite apart from the feelings of pleasure and pain that sensations arouse in us, inside us there is a Recording Angel, who registers every impression that comes in and files it for future reference. He obviously has a staff of very efficient shorthand writers who can take down the messages as they pour in through the five senses. All notes are written in indelible ink, and not even the faintest flicker is forgotten, although at the time we may not be conscious of it. Births and deaths, marriages and

funerals, Logic and Physics are all the same to the Stenographers. Their business is to write. They go on scribbling the news as it comes from the North, East, West and South.

Ambition ensures attention

3. Apart from the fact the incoming messages are affected by our emotions and our "will to believe," there is a remarkable difference in the loudness of the signals received according to the Attention we can bestow on the subject, and this very greatly depends upon the motive—the Inner Urge which prompts us to study. Where this is lacking, as in the case of sons of rich men, no amount of outward study will produce results. Poverty and the will to get rid of it, often supplies this urge. Ambition works the same way and so the first duty of every teacher is to raise this ambition, by all legitimate means. Ambition ensures attention, which means loud signals, which the stenographers in our head can easily follow and record.

Association of ideas

4. All the stenographer's notes are at once transferred to the record room. We can understand the filing system followed in this department best by observing the beginning of the process in a child. After birth the child is hardly self-conscious for some time, but soon its telephones get into working order. The food it takes in is used up in the body and the first urgent message that the brain gets is that of hunger—a painful sensation. The response is "crying." In a minute the eyes of the baby report the arrival of another person, who takes it up gently (so says the skin) and puts it to her breast. The

child sucks milk, and is soon satisfied. It now notes the source of the food more carefully—the mother's form and her face, and being in a happy mood, *i.e.*, with strong life currents, they make a deep impression on it. The only messages received loudly are "Hunger-mother-satisfaction"; and these are all filed together. We have seen how the record-keeper takes delight in reading aloud his files, and so the next time the word "hunger" is whispered, he reminds the exchange of the mother; and what is curious, when the eyes announce the mother a few minutes afterwards, it reads out the chapter on hunger, and the child begins to cry. "Hunger-pain-mother-pleasure" are so mixed up in the child's memory that any one brings up the other. *The ideas are associated.*

5. Another very interesting study is the memory of a horse. Suppose we beat a horse very severely somewhere on the road. It is very dimly conscious of our existence, but it vividly sees the curiously shaped tree in front of it, and the record-keeper in its brain records "that tree—intense pain in the back." Next time we go there the image of the tree reminds the horse of the whipping, and its reaction is to stop. A foolish driver whips it once again, and that only confirms the idea in the horse's brain. Every lash adds to the supposed connection between the tree and the pain, and the creature will naturally refuse to budge an inch, until that association is broken. A wise coachman will therefore get down and pat the horse on the neck. The brain record now runs—tree, pain, patting, pleasure; and the animal begins to wonder what is really correct. It will walk a couple of steps and stop again. Another caress confirms the second impression, the new association gets stronger,

and the horse will go on without any further trouble. That is why, every wise owner of a horse offers the horse some choice morsels, with his or her own hands, the circus trainer always feeds the tigers, and kings grant knight-hoods and titles themselves.

Memory—a network of channels

6. Memory appears to be like plastic clay, on which every impression makes a small rut through which life-currents flow, and the passage being continuous, these channels are all interconnected. Our second experience does not necessarily follow the same sequence, but it might touch the first in some points. All these grooves therefore cross, and recross each other, and our whole brain is, as it were, covered by innumerable furrows, forming a very intricate network. When the waters of Life pour into any one of these trenches it naturally tends to overflow into all connected galleries. There is no rhyme or reason in the linking together of ideas, and anyone can verify this for himself by watchig the sequence of his thoughts for a few minutes.

7. The following is nothing extraordinary.

“I see a cat—oh, yes. It has come for milk—ten seers my cow gives—quite. I must arrange for grass—it is so costly—why not get some grazing. Yes, how beautiful was the grass-land at Lonavala, wonderful, but it was there I had the accident and broke my arm. Yes—the bandage and the dirty iodoform—I can almost smell it now—no better than a bad privy. Oh, the wretched closet in our house and the wretch of a landlord! He wont improve it—these capitalists, and they want such high rents

—of course rent act must be passed—legislature again—but what bad acoustics has the council hall got—our College theatre is very much better—Did not I build it?” and so on. If we recall our dreams, we shall find some most astounding association of ideas. All we can say is that generally speaking a time sequence can be observed between two succeeding lines of thought and that our thoughts mostly centre round ourselves, all wanderings tending to come back to ME and MINE. Such is memory, a very intricate network of channels made by previous experiences. That is the function of *chitta*—that which collects—the filing department.

Making a deep rut—Observation

8. Not all the furrows made in our brain are always of the same size. First of all the depth of a rut depends upon attention—the interest we take in it—the intensity of the Life current. We have already seen how this is affected by pleasure or pain. That is why educational toys make the children happy, and all orators begin by praising their audience and putting them in a pleasant mood, thus securing their attention. A student's mind may wander through his studies for hours, and yet the impressions in his brain will be very faint. If he cannot attend, the reading of books is worthless, and he might as well go out and have some vigorous physical exercise, when his blood will circulate faster and the brain may work better. If we want the memory to retain anything we must make a deeper groove and for this we must secure attention—observe accurately—making the fullest use of all our senses. There is a great deal to observe in the smallest match-box and see how it differs from another.

Looking at motor cars to observe how their shape, and contour varies is very interesting study; and it is not impossible to distinguish between cars of different makes at a glance from a distance. Even the so-called illiterate villagers can by training their observation find out their sheep or camel out of hundreds of similar animals which look all alike, and instances are not unknown of "puggys" who can follow the faintest foot-prints for miles. It is only by very careful observation that an artist can see not one but a multitude of noses, as he wanders along the market place; and it is by developing the same faculty, that an engineer can visualise beforehand the buildings he is going to construct. Such concrete memory is seldom associated with pleasure or pain, and so is the most difficult. But that is the real beginning of all intellectual training—attention, observation, visualisation—making a deep channel in the brain. It is useful to remember that in childhood the brain is more plastic and the impressions made then go down deeper and last longer.

Keeping the groove—Recapitulation

9. Our mind seems to be formed of matter like pitch, so that a furrow made in it tends to close up with time. Even a ghastly wound will heal after days, and time brings forgetfulness to cover up our greatest sorrows. The impressions then made gradually get filled up; although they never are fully obliterated. Whenever we go over the same in thought, the waters of life flow through them, and they get deepened again, and so by brooding over our misery we greatly intensify it. Worry kills. That is a wrong use of repetition; but that is the Law. It is only by constant revision that we can keep the

rut, and make it wider. If we read for five minutes and then try to recapitulate what we have read for ten, we can remember it much better. In mental repetition the whole energy is derived from inside and so we cannot be inattentive. We try to carry our thought again and again along the groove made by the author in our brain. In hearing a lecture it is possible to be 80 per cent absent-minded; in reading slowly we have to fix it perforce to a greater extent, but we cannot run over the ideas mentally with a distracted mind. Hence the great value of mental repetition—recapitulation.

Make some well-worn paths

10. Now in all these impressions we always notice some sort of sequence in time or space, and events always seem to follow in that succession. So certain associations like George Washington and his axe or the Gandhi cap and the lathi soon establish themselves in our brain deeper than others, and it is wise to take as much advantage of this as possible. If we are asked to remember the following fifteen words: "Noise, hand, terror, ink, colonel, thunder, black, ghost, pen, lightning, army, head, cannon, light, skull," we find it almost hopeless. But if we rearrange them like this: "Colonel, army, cannon, noise, thunder, lightning, light, black, ink, pen, hand, head, skull, ghost, terror," it is not hopeless to commit them to memory. If we have to make a number of purchases, try to rearrange them according to the geographical position of the different shops, and mentally go along the various streets, so that we can do all errands in one round. We find the task becomes much easier. In remembering the specifications for say a masonry wall—we cannot make a

mistake if we take them in the order in which the work is done—quarrying the stone, bringing it to site, dressing it, fitting it in place, etc.: We then introduce in the jumble some logical, rational sequence and link the ideas in a manner, in which they always follow, to lead thought along well-worn paths.

Value of metaphors and Similies

11. Hence the value of all metaphors, and similies. In the Marathi alphabet there are three letters for "S", and the child is taught to think of one with a tuft of hair on the head, the second with a pierced fat belly and the third that it gets in sugarcane. Thus is the unfamiliar linked with the familiar in the boy's brain making it much easier to grasp things. A very interesting simile is the one in the Kathopanishad, in which the body is likened to a carriage, the emotions to the horses, the intellect to the driver and the Jiva to the owner of the carriage. Many abstruse subjects can thus be made easy in this way, and every teacher ought to take the greatest advantage of this fact. It must however be always borne in mind that all these are aids to understanding, and the similie ceases to be similar beyond a limit. It must not be stretched to absurd lengths.

Use of Stories and Parables

12. The profoundest truths have similarly been conveyed in the form of parables and stories, which makes them very easy to grasp. The Hitopadesha is a fine treatise on worldly wisdom couched in very simple form, which catches the attention of even children. Æsop's fables are famous. Ancient mythologies are all very inte-

resting reading, in which the laws of life have been very beautifully illustrated, by applying them to human problems. Whether these stories are actual history or not is a minor point. Even in the Hindu literature they are only known as "Puranas"—old things; and they ought to be taken as such at least for the great good they can do. They are all stories with a purpose—meant to teach some great lesson, in an entertaining form, and are certainly more useful than many modern works of fiction, which only take us along the gutters of Paris and New York. These only vividly describe to us the seamy side of life, and appeal to our sensations, without touching the intellect. The others also lead the horses along well-worn paths, and teach the driver at the same time, by arresting his attention and making a deeper impression on his brain.

Rhythm and poetry help very greatly

13. Rhythm seems to help memory enormously, hence the value of prosody, and versification. Like all rivers, the waters of life also do not seem to flow in a constant steady current, but in rhythmical gusts. When a child first learns to read, it is very difficult to take out the sing-song tone. Why attempt it? Give it poetry and it can follow it quite easily. That is why religious teachings are put in chants. The oft-abused Brahmin has kept up in his head for centuries millions of words of ancient wisdom, all put in verse. To make things doubly sure he strung together every third syllable, the first words of different paragraphs and so on, all again in poetry and that is how he has been able to perform this wonderful feat of memory. Jingling sounds, even if completely devoid of any meaning seem to stick to the brain, and hence the

Karikas. I learnt years ago that something happens to a set of verbs "shaklu, pacha, mucha, richa etc." What that "something" is, has clean escaped my memory, but I can run out the string of a hundred verbs or so, without a single mistake, partly because of the reverbations whereas I have forgotten all prose rules in Bhandarkar's books. In Sanskrit, they versified even the dictionary and all knowledge worth remembering was put in sutras, "strung" together in a thread.

Reasoning

14. We have seen how our recording angel works, how impressions are made, how they can be deepened, and how we can rearrange them to a certain extent, making the useful ones more pronounced and wiping out those we do not want. A study of these laws—unfortunately not studied in our schools and colleges—is very useful in teaching us "how to study." At the same time it is necessary to consider the why of things. Which furrows should we retain and which should be obliterated and why? That is the business of a second department in the brain. We have observed a certain order in which impressions follow each other in time and space; but if we go a little deeper, we find that amidst all the jumble of innumerable experiences, different events come after each other in a definite and invariable sequence. Even the experience of our shy horse was like this: "Strange tree, memory of pain, (horse stops, driver gets irritated) whips horse, recurring pain." The animal only missed the two stages inside brackets. The links are always there, although we do not often notice them. Apples had always been falling, and the earth had always attracted them. It

was only the connection between the two that flashed in Newton. Our stenographers do not jot down every whisper and pile up record on record without a purpose. They do it to the end, that the second aspect of Intellect should perceive the thread that persistently runs through them. However distorted the vision may appear at first sight, if we look at it carefully, we shall see an Eternal verity behind it. It must be admitted that this is no easy task, and more often than not we do not succeed in our endeavour to see the hand of God or the existence of that Law, if we prefer to put it that way; but all our sages have told us from the house-tops that IT IS SO, and even with our undeveloped and limited intellect, we too cannot help seeing it to a certain extent.

The purpose of study

15. Grooves in our brain which correspond to the inalterable succession in nature are correct, logical and reasonable: all the others are wrong. To search for the former ought to be the aim of our Intellect, because they lead us to happiness. Other ideas bring us into conflict with God's or Nature's laws, and result in pain. We must therefore learn to keep a constant watch on all our experiences, try to wipe out of them those that do not harmonise with the Eternal Verities and deepen the others. That is the real goal of all intellectual education. Mere collecting and recording sensations in an aimless manner is cramming, whether it is poetry or chemical formulæ. Rearranging them and storing them in the correct order is not cramming, even if we read a thousand books. It is foolish to talk of burdening the brain with Eternal Truths. The stomach is oppressed only with undigested food. As

soon as it is assimilated it ceases to be a clog and becomes nourishment instead. So it is with the intellect. Aimless reading even if correctly memorised, brings no happiness. We must learn to pick and choose—to discriminate—to see the golden thread or GOD'S PLAN running through them. That is the function of Buddhi—Reason—the real goal of Intellect, the development of which is the purpose of our study.

Note: The following are very useful books on the subject:—

| | |
|----------------------------------|-----------|
| Concentration by Ernest Wood ... | Rs. 0-8-0 |
| Memory training | Rs. 0-8-0 |
| Character Building | Rs. 0-8-0 |

T. P. H. Adyar.

APPENDIX B

PHYSICAL EDUCATION

(Summary of points to be attended to)

- (1) Pre-natal and post-natal clinics are essential.

Age 1 to 5—At home

(2) From birth regularity of habits should be formed. The infant should be left to crawl about and surrounded by brightly coloured and shining objects.

Age 5 to 10—At home and then school

(3) Play—Age of toys—Kindergarten—Montessori—methods for training of senses.

(4) Suppressing physical activity of children in these years is a crime. Such suppression is not only injurious to bodily growth, but engenders a mental attitude of sullenness, which makes technical education very difficult later on. No child should be ordered to “keep quiet.” Physical activity is natural and should of course be guided, but never put down.

(5) Teaching periods should be short, and should include as much activity as possible, and recreational exercises with proper attention to breathing should be given between periods.

(6) Personal cleanliness should be insisted on, and a compulsory wash or bath in Schools in dirty localities is more important than drill. The great value and need of

fresh air and pure water should be impressed upon the child's mind, not by lectures, but by practically providing them in Schools.

(7) Mal-nutrition during these years has a permanent effect on the child, and it is the duty of a Nation to attend to this in the case of all children at this age. This is specially necessary in poverty-stricken India.

(8) Periodical Medical Inspection of School boys should be carried out and this must be followed by remedial measures. Medical attendance during sickness is also necessary.

(9) The creation of an atmosphere of joy in the school has, a very great effect on the growth of the physical body. It is like sunshine to plants. I know this is difficult to describe and more so to obtain, in an average school. But I do not consider it impossible, if we all make an effort to broaden our faces a bit.

(10) The introduction of Music—National songs and choruses, Bhupalis and Bhajans—will help a great deal towards the creation of this atmosphere. Instead of shouting at boys not to make noise, the teacher will say "let us sing," and the jarring noise will become rhythmic sound. I do not consider it impossible to get teachers to learn a few songs even in villages, and with the help of a gramophone, I do not consider that the difficulties would be insuperable.

(11) If we go one step further, it would be possible to insure all the three elements, joy, music, and physical exercise in our schools, by the introduction of Tipari, Lejeem and other folk-dances. These already exist even in our villages, but are at the present time relegated to the "uneducated." If once this superstition is broken, I

think, it will react very favourably on our younger generation. I would suggest a suitable officer being put on special duty to study the existing folk-dances in India and in other countries with a view to selecting such as would be suitable to our schools.

Age 10 to 15—in Secondary Schools

(12) This is the time for manual training, various vigorous games, and mass drill. The object should be to give hand and eye training, and to cultivate a team spirit, along with exercise and plenty of fresh air. Health and hardihood should be the aim rather than muscular strength.

Age 15 to 20 in Colleges

(13) All physical education should be rounded off by rigid and hard discipline under military conditions in the University Training Corps.

APPENDIX C

Art and Music in Schools

(Abstracted from a note by Mr. Ahmed G. Chagla,
Karachi)

I. PRIMARY SCHOOLS

(A) *Music*:—Two lessons of half an hour each per week, given in the following manner should suffice:—

(a) Divide the class into four groups.

(b) Choose the best four boys and make them heads of these groups.

(c) Select a song of five verses with a chorus.

(d) Let the four groups prepare only one verse each and sing in the serial order, the fifth verse being sung by all. In the beginning the leader of each group should sing alone and his group should repeat it after him. Other groups should follow in the same way and the fifth verse should be sung by the four leaders only at first and then all groups together.

(e) When all can sing this without a mistake, expression can then be added to the song by varying the strength of the tone, according to the emotion, each verse is supposed to express. If it conveys sorrow, it should be sung softly, if joy loudly and so on. Even one verse may begin softly and end in a loud peal.

N.B.—(1) The leaders will have to be trained separately for another half an hour in advance. Each class should be taught separately, songs and times being selec-

ted to suit the age and general emotional out-look of the children. But it is very useful to bring all the classes together once a month.

(2) In selecting scales (modes) at this stage it is advisable not to introduce dissonant intervals. "Sampurna" Ragas which make use of all the seven notes in serial order like Khamacha & Kafi are more suitable, and to these Bhairavi with soft tones can be added a little later. These help the pupil to get acquainted with all the degrees of the scales in their simplest melodies, progression and sequence. The Ragas should be thus selected, but too much standardisation in songs is not good. Different music teachers should be allowed to develop their initiative within the limits laid down, and several alternative schemes can be prepared by some competent person, out of which teachers may select what they like.

(3) In the higher primary classes Ragas which use only five or six notes like Bhupa, may be used to add variety.

(B) *Dramatisation*:—Simple stories should be put into such a set of verses (as described in I) and after the children have picked up the tune and can sing it with some expression, they should be allowed and encouraged to add gestures, facial expression and movements. It should be possible to see which boy is playing the part of a lion by his dignified movements and the ass by his foolish braying. Even very simple costumes may be added. Children at this age enjoy stories of animals and all dramatisation should preferably take such a form. Panchatantra and AEsop's fables provide splendid material.

II. SECONDARY SCHOOLS

(A) *Music*:—(a) Music should be similarly continued in Secondary Schools, but now greater attention should be paid to the selection and training of group leaders.

(b) The "Staff" notation can be very easily picked up at this stage, and should be taught in all schools—because it is the only written language of music recognised by almost all civilized Nations of the Earth.* There is a vast Musical literature published in this notation and so one who can read music is in the fortunate position of being able to acquaint himself with the Music, not only of every Nation in the west but also of Persia, China and Japan. The staff notation is thus a great and potent means of creating an international out-look in our children, and this one thing alone far out-weighs any disadvantages the system may have.

(c) In secondary schools, dissonant Ragas like Bhairavi and Hindol should be introduced for special songs for particular occasions.

(d) At this stage a greater variety can be introduced in the contents of the songs and the themes—which can now include.

- (i) Ordinary every day facts of nature like the description of a rainy day or a moonlit night expressed in verse.

* Turkish and Persian music is akin to Indian music being purely melodic in character. It is therefore of interest to note, that after years of patient investigation and experiment, both Turkish and Persian Educational authorities have "finally" adopted the "Staff" notation.

- (ii) Queer problems jovially expressed, and humorous anecdotes.
- (iii) Historical subjects like incidents in the lives of National heroes and saints.
- (iv) Stories of emotional appeal like *Cassabianca*.
- (v) Stories with mysterious and supernatural endings.

(B) *Dramatisation*:—Such music should lead on to dramatisation and for this a certain amount of scenery and costuming is very helpful. But these should all be designed by the boys, and be made of paper or few pieces of cloth. Lighting effects can be added at a later stage and then the school is ready for a school pageant, in which a very large number of boys can take part. But that is perhaps a far cry in our country at present.

APPENDIX D

THE TEACHING OF ELEMENTARY IDEAS OF AGRICULTURE IN RURAL SCHOOLS

The following is an outline of a scheme, meant to serve as a practical guide to teachers in giving elementary ideas of agriculture to boys in rural areas. It is modelled after the French practice. It is obviously no more than a general indication; but teachers will find that it contains essential directions, which should not be omitted in adopting them to the capabilities of their pupils and to the circumstances of the locality in which their schools are situated. As these instructions are meant to be used in Primary Schools, they will have to be translated into the various vernaculars, with suitable technical terms.

Directions to teachers

2. Instructions in elementary principles of agriculture, such as can be properly included in the programme of primary schools, ought to be addressed less to the memory than to the intelligence of the children. It should be based on observation of the every day facts of rural life, and on a system of simple experiments appropriate to the resources of the school, and calculated to bring out clearly the fundamental scientific principles underlying the most important agricultural operations; above all, the pupils of a rural school should be taught the reasons for these operations, and the explanation of the

phenomena which accompany them, but not the details of methods of execution, still less a resume of maxims, definitions of agricultural precepts. *To know the essential conditions of the growth of cultivated plants, to understand the reasons for the work of ordinary cultivation, and for the rules of health for man and domestic animals*—such are matters which should first be taught to every one who is to live by tilling the soil; and this can be done only by the experimental method.

3. The teacher whose teaching of agriculture consists only in making the pupils study and repeat an agricultural manual, is on the wrong path, however well designed the manual may be. It is necessary to rely on very simple experiments, and especially on observations.

4. As a matter of fact, it is only by putting before the children's eyes the phenomena to be observed, that they can be taught to observe, and that the principles which underlie the science of modern agriculture, can be instilled into their minds. It should be remembered that this can be done for the rural agriculturist only at the school, *where it will never be necessary to teach him the details which his father knows better than the teacher*, and which he will be certain to learn from his own practical experience.

5. The work of the elementary school should be confined to preparing the child for an intelligent apprenticeship to the trade by which he is to live, to giving him a taste for his future occupations. With this in view, the teacher should never forget that *the best way to make a workman like his work, is to make him understand it*.

6. To sum up: The aim of elementary instruction

in agriculture, is to give the bulk of our country children enough elementary knowledge to enable them to read a modern book on agriculture with profit, or to derive advantage from attending an agricultural conference; to inspire them with the love of country life, so that they may prefer it to that of towns and factories; and to convince them of the fact that agriculture, besides being the most independent of all means of livelihood, is also more remunerative than many other occupations, to those who practice it with industry, intelligence, and enlightenment.

OUTLINE OF COURSE

Primary stage

I. FIRST HALF YEAR

(A). *The three states of Matter.*

7. Some simple demonstrations are indispensable to induce observation and comparison of these three states. Plunge into water a wine glass or a funnel with the opening downwards; then let the air escape, when the bubbles will be seen or the pressure felt; or secure the air blown or breathed into a vessel of water; transfer it to another vessel, and measure it approximately. These are very necessary experiments, and they can be done anywhere without expense. The same may be said of the following:—Produce steam; condense it—in other words—distil water, and observe the change that take place; or prepare a little oxygen and produce combustion, increase the vigour of this by draught, identify the pro-

ducts; or demonstrate atmospheric pressure and the elasticity of air. Anything beyond this can be done later on.

(B) *Animals.*

8. The teacher should stimulate the curiosity of the children by conversing familiarly with them, and telling them about the animals that they see every day. He should select the most striking features in the history of each. The dog, the bullock and the horse will furnish matter for several explanatory and descriptive reading lessons, and for some little written exercises done, if necessary, with the help of pictures. The various species of the dog should be compared; varieties of bullocks and cows should be studied; the horse should be compared with the donkey, the cat with the lion and tiger, etc.: the habits of farm yard fowl, the periodic flight of the swallows and other migratory birds; the history of the metamorphoses of the frog; the silk-worm and the bee, and their products, etc.: all these should form a basis for most interesting reading lessons and conversations.

(C) *Man.*

9. A short description of the human body should follow these lessons on animals. This might be begun before the experimental lessons described above are finished, but it is only when these lessons are completed, that the functions of nourishment and respiration should be dealt with. Beyond this the instruction should not go, but some advice on matters of health might be added.

II. SECOND HALF YEAR

10. The pupils should be brought into contact with the actual objects required for the experiments or

demonstrations. Sometimes the children or the teacher can bring them into the class-room; some times both teacher and children can go out to observe the objects. In rural districts an object lesson on plants should in no case be given without having the object itself before the children's eyes.

(A). *Plants.*

11. It will naturally be well at first to draw the pupils' attention to an active phenomenon that of germination which is easy to produce and easy to follow in its different phases, especially in spring-time. A bean or a grain of corn or gram, put into damp moss or blotting paper or sand, is convenient. Or the seed can be supported by a cork floating on water—it will be quite easy to see the development of the little roots and of their essential organs, the root-cap and the absorbing hairs.

12. It is from nature also that the branch, the leaf, and above all the flowers, should be studied. In the latter case, for instance, the first thing to do is to put a specimen of the flower chosen into the hands of each of the children; then under the general guidance of the teacher, each child should, either with a pen-knife or else an ordinary pin separate the flower into its parts—calyx, corolla, stamen and pistill.

13. A few well chosen examples will suffice to give an idea of the families of plants which are more particularly interesting on account of their good or bad qualities, *i.e.*, useful and noxious plants.

14. A good way of making these lessons interesting is to arrange the different portions of the flower

studied, on a sheet of paper to fix them with a little gum, and to add to this natural representation a written explanation, and if needful a diagram.

(B). *First Ideas of Agriculture.*

15. Such ideas, to be useful to children who have not yet reached ten years of age, must be very limited; they should aim at attracting the child, and serving him for a starting point, with a view to prepare him to use his faculties of observation, and to familiarize him with the phraseology that will be used in the "more systematic lessons" of the following year.

III. THIRD HALF YEAR

(A). *Elementary Ideas of Science.*

16. The study of combustion should be extended to that of carbonic acid gas, the presence of which in limestone should be demonstrated:—(Some chalk and a few drops of a mineral acid are all that is necessary for making the following experiments.) (i) The changing of chalk into quicklime (the school stove will provide sufficient heat) showing the loss of weight by comparing it with a piece of chalk similar to the one used. (ii) The action of water on quicklime. (iii) The properties of slaked lime, whitewash, lime-water. (iv) The production of carbonic acid gas. (v) Reformation of chalk. (vi) Soil is composed of clay, lime and Silica.

Proceed as follows:—

- (a) Wash a small quantity of soil with water, catching wash water in a glass.
- (b) Clay will wash away.
- (c) Sand and lime will stay behind.

- (d) Pour a little Hydrochloric acid on (c).
- (e) Lime will go into solution.
- (f) Silica will remain.

This simple experiment will show that soil is composed of clay, lime and silica.

(B). *Elementary Ideas of Agriculture.*

17. The teacher should devote himself to making the children observe that plants, as well as animals, require nourishment in order to live; and to prove this, some plants should be grown in pots and in some corner of the school garden. The following experiment will serve as a starting point. Sow some seeds of rapid growth, early beans for instance, in good soil with suitable manure added, some in sterile material, such as exhausted soil, sand, or gravel, or even glass broken into pieces about the size of gravel. The need for manure will thus be demonstrated; its composition will be dealt with later on. During school walks observe difference in soils, and collect samples. Sow the same seed in each and observe difference in growth. A few earthen pans are all that are required for these experiments.

18. Utilise the school walks for giving the students, elementary ideas relating to "ordinary, agricultural implements and operations".

The Higher Primary Stage

(19) Children of 12 or 13 should receive more advanced agricultural instruction than is comprised in the programme for the Primary course. Teachers should therefore add to the foregoing, for their older pupils, as

much as they can of the following programme. It will present no great difficulties, provided the pupils have been well grounded in fundamental scientific ideas, by means of simple experiments carried out in the class room, and provided they have been trained to observe from nature.

I. FIRST HALF YEAR

(A) *Animals.*

20. The principal distinctions by which animals are classified should be shown by examples taken as far as possible from the animals known in the country, preference being given to those which are either useful or the reverse. The domestic animals will naturally have the first place, and the teacher should seek to impress upon the children's minds the principles upon which are based the rules for the health and the feeding of stock.

21. The study of the principal organs may be facilitated by the direct observation of a dead animal. Some teachers are able to preserve the digestive organs of small animals, or even a skeleton, and thereby to enrich the school museum: the example they give deserve to be noticed.

(B) *Man.*

22. The instruction in anatomy given to children should be such as to convince them of the necessity of observing the rules of hygiene. It should deal with digestion, circulation, respiration, and with the relation of the senses to the nervous system. Exaggeration is to be avoided, as also all empirical prescriptions, which should

not be confounded with hygiene far less with the science of medicine.

(C) *Elementary Ideas of Physical Science.*

23. These are to be impressed on the children's minds by means of simple and inexpensive experiments. This part of the programme is to be carried out chiefly in towns and industrial centres. In the country, such instruction may be limited to demonstrations which bring out clearly the principal effects of heat, of light, of electricity and of gravitation. The all-important matter here is, to stimulate the children's curiosity, and to select the subjects of experiment and illustration from those phenomena that are most easy to produce or to observe. It is only when such subjects are exhausted that others should be introduced.

24. Some ideas of meteorology are necessary: the child should be made familiar not with the construction of the barometer and thermometer, but with the indications they furnish, and with the method of reading such indications. He should be enabled to read a meteorological chart.

(D) *Elementary Ideas of Chemistry.*

25. The experiments that can be made with extremely limited apparatus, are very numerous. A couple of glasses, some glass tubing and corks are all that are necessary, in an elementary school. They can be had anywhere, and they will serve to extract the alcohol from any fermented liquid, or ammonia from any mineral manure containing it, or even from liquid manure.

26. In selecting experiments those should be chosen which have a direct bearing on agriculture, the substances

which nourish plants being considered as the most important. From wood-ashes, potash can be extracted; a calcined bone can be changed into soluble phosphate by being treated with dilute hydrochloric acid; it can then be reconverted into insoluble phosphate either by neutralizing the acid used, by a base, or simply with carbonate of soda. Lime will detect the presence of ammonia in the compounds of ammonia, which are used as manures. The pupils will learn to distinguish the principal artificial manures of commerce, the nitrates from the compounds of ammonia and potash, the superphosphates from slag, etc. The really important thing is that the scientific terms which have become part of the current language of agriculture, should convey a clear and definite meaning to the children who are about to leave the rural school.

27. Knowledge of the principal manures will be much facilitated by the use made of them in the summer half-year, in the various experimental cultivations.

(E) Minerals.

28. Ideas regarding the soil, rocks, and kinds of land, should be given partly by means of object lessons, the objects being taken from the school museum, and in connection with some of the chemical experiments; and partly by means of school walks, the latter being the most important part of the instruction.

(F) Agriculture and Horticulture.

29. The actual school-room lessons should be begun before the spring time; they should bear upon matters essentially connected with local cultivation. Each lesson should deal as far as possible with the things which the

children have already seen and examined. The teacher must therefore begin by the subjects that have been entered upon in the primary course, and which have been explained during reading lessons, walks, etc.

30. He should then continue throughout the summer months, co-ordinating the lessons with practical exercises, school walks, etc. The subject matter of the lesson on agriculture or horticulture, properly so called, should be identical with the object of the last walk or of the next one, and with that of the practical exercise assigned for the same period.

II. SECOND HALF YEAR

(A) *Experimental Cultivations.*

31. Arrangements for this purpose should be planned and carried out in such a manner as to bring out clearly the following fundamental truths:—

(i) Air should penetrate easily into the soil, because roots cannot dispense with oxygen; they breathe as leaves do, they should always find suitable nourishment, that is to say manure should be thoroughly mixed with the soil wherever roots develop.

(ii) In all arable soil, four substances (1) *nitrogen* (2) *phosphoric acid* (3) *potash* and (4) *lime*, are sufficient to provide for the entire nourishment and full development of cultivated plants. These four are absolutely necessary and plants cannot grow without them. They have to be added in a suitable form, otherwise they might affect the physical properties of the soil.

(iii) Organic matter, far from being useless, keeps land in a state favourable to the aeration and development

of roots ; moreover, it operates advantageously on the nutritive substances which the soil contains. The most important manure therefore is cow-dung—which supplies the soil with the four substances in due proportion ; it may be supplemented by suitable chemical manures.

(iv) A manure is suitable to a soil if it supplies that substance which the particular soil lacks for the nourishment of the plants to be grown. Thus the composition of a good manure depends not only upon the kind of cultivation that is required, but also on the nature of the land. It is therefore not possible to make up a manure that will suit all soils even for the same species of plants. Formulae or receipts said to be infallible and universally applicable, are no more to be trusted than remedies to cure all diseases.

(v) To produce good harvests, the soil, after having been manured, must contain the four nutritive substances in a proportion that depends upon the species of the plant to be grown. Modern agriculturists should know that excess of one of the four substances is always useless and costly, and, moreover, that it may become injurious if any one of the other three is lacking in quantity. In other words, the excess of one of the substances is as injurious as its insufficiency, the development of the plant depending upon that element of which the smallest proportion is to be found in the soil.

32. The first experiments in, what we may call, these demonstrative cultivations, which are very elementary but fundamental, are to be made in pots, or, better still, in wooden boxes, the children themselves helping. The four substances dissolved in a jar of water, will suffice to bring a plant to maturity. If the air is prevented from reaching

the water in the jar, the oxygen which is necessary for the roots will fail, and the plant will die. Take some sterile soil like broken glass, and sprinkle on it only three of the substances. See how plants suffer for want of one, proving that even if one of the nourishing substances is not supplied vegetation suffers to a very appreciable extent.

33. This experiment is the starting point of the experimental plot; and although it is more complicated than the preceding one, it can also be carried out in pots or in boxes, or better still, in a corner of the garden if the soil be of good physical quality, but very deficient in the nourishing substances. It is a very important experiment inasmuch as it illustrates the fundamental principles given above; and shows especially the great difference that will appear in the yield of different parts even of the same field, according as the manure used corresponded or not to the composition of the soil and to the needs of the plant. It does not admit of a valuation of the return, being an experiment of quality and not of quantity, but it affords a remarkable proof that too much of one substance is as bad as too little.

34. The pots for this illustrative cultivation should be made of porous earthenware; this causes rapid evaporation and renders constant watering necessary. The pots should be placed in rather deep saucers. Into these saucers, water can be poured, and the supply thus given will probably be enough for several days, even in hot and dry weather. Or else holes to contain the pots may be dug in the yard or garden, thus avoiding the excessive heating often caused by radiation, particularly near walls, which rapidly withers the plants under experiment.

35. The top layer of the soil in the pots may be covered lightly with moss, chopped straw, or even sawdust, in order to prevent the hardening caused by constant watering.

In one pot put sterile or exhausted soil.

In the second for each pound of soil put in—

(a) 14 grains of nitrate of soda

(b) 21 grains of superphosphate of lime

(c) 7 grains of chloride of potash

In the third pot, put in only (a) and (c). This will give more straw.

In the fourth pot, put in only (b) and (c).

In the fifth pot, put in only (a) and (b). Observe the difference.

36. These experiments in cultivation, most of them so designed as to admit of being brought into the school-room at the time for lessons, should, in the case of some household vegetables, be repeated in a corner of the garden. These important experiments, where ground can be had, ought to be carried out on the following plan:

37. Transplant young cabbage or salad plants into three ridges close to each other. In the first ridge there should be no manure; the second should be thoroughly dressed with mineral manure well suited to the soil and to the plant; the third should be given either a manure which is deficient in the necessary substances, or else farm-yard manure only.

38. Of the elementary experiments that can be done in pots or boxes, special attention should be drawn to the fact that the liquid and gaseous substances contained in farm-yard manure have great fertilizing properties. An

experiment can be arranged to show this by growing the same seeds in three pots, one of which (A) should be given liquid manure like cattle urine, (B) only the gases, from fermentation of dung and urine in a jar, led on to the pot through a rubber tube; and (C) without any manure. It will be seen that even the gases alone will be of great value.

39. The value of the manures annually wasted in India is appalling, and a great boon would be conferred on agriculturists by convincing them that the first practical advance they can make, without the expenditure of capital, is by diminishing this enormous waste. The foregoing experiments will make this waste evident, and if they are completed by exact directions given on the spot, in view of some well or badly managed manure heap, there is a good chance of the lessons bearing fruit. Teachers could do a great deal towards clearing the streets of our villages of the streams of liquid manure that infect the atmosphere, and defile the waters of springs and wells, instead of being employed to bring fertility to the fields of those who neglect to use them, and yet who complain of the deficiency of their harvests.

40. The experiments indicated above are essential as a basis for all instruction in agriculture. It is most desirable that they should be carried out in all rural schools, each year, so that each child of more than eleven years of age, should have assisted at all of them. *These, or similar experiments, require but little care, and cost almost nothing; they are the natural and necessary introduction to those that will afterwards take place in the experimental plot.*

II. THE EXPERIMENTAL PLOT

41. It is impossible to attach too much importance to the necessity for prudence in the organization of experiments which are designed chiefly in order to show agriculturists how to set about obtaining from a given soil, a more remunerative yield than that which is got by the ordinary methods. It should here be remembered that there are no such things as universally applicable formulae, and that the best manure for the plant should include the nourishing substance in which the soil is deficient.

42. Knowledge of the soil, therefore, is necessary before deciding upon the fertilizing substances to be employed in experimental plots. Accordingly, teachers in carrying out these operations, would do wisely to follow the advice of a special professor, or of a practical expert. They should carefully avoid using excessive quantities of manure, and should take the ordinary custom of the district as the standard of comparison. Thus, even the simplest of experimental plots should always include the three following divisions:—

- (1) The standard (without manure)
- (2) Only farmyard manure in the quantity usually used in the district.
- (3) The same quantity of farmyard manure, with the addition of artificial manures in a proportion determined by the nature of the soil, and that of the plant under cultivation. This proportion should be determined by the professor of Agriculture.

In other plots, for gaining supplementary information, the nature of the manures applied to the third sec-

tion, might be varied by leaving out one or more of the constituent elements.

43. It is as an assistant of the Departmental Professor of Agriculture that the teacher works at the experimental plot; but it is in his own garden, that he should carry out the most convincing experiments, by devoting himself to the propagation of the best kinds of vegetables and fruit. It may here be particularly noted that the teacher can do a useful work as regards fruit and kitchen gardening, without exceeding his proper functions, and, at the same time, find therein a source of some personal profit.

The pupils should participate in the foregoing operations to an extent regulated by their age and their manual capabilities, as well as by their scientific knowledge. No hard and fast rule can be laid down in this matter. Sometimes most of the pupils will merely look on at the pruning, grafting, etc., of a fruit tree; sometimes the older pupils will themselves use the pruning-knife, sometimes again, all will be employed in watering or weeding a corner of the garden devoted to experiments. The work must be rational, requiring the exercise of the intellectual faculties as well as the labour of the hands.

III. SCHOOL WALKS

45. These should be both preparatory and complementary to the class-room lessons on minerals, on rocks, on the principal kinds of soil in the neighbourhood, on useful or injurious insects and plants, on the essential operations of cultivation and the manipulation of agricultural implements, on the distribution of manures, on sowing, on crops, etc.

46. The important thing in observing or investigating agricultural operations is to bring out the application of the scientific ideas that have been acquired, or are about to be acquired, by means of the ordinary lessons. For instance, it is not enough to show how ploughing makes the land lighter; it should be carefully explained that the breaking up of the soil assists the development of the roots, enables the manure to reach them, and that the aeration that it causes, ensures to the roots a sufficient supply of the oxygen which they need. The same course should be followed in explaining most of the other agricultural operations.

47. The following is an indication of the principal subjects for study, and of the nature of the observations to be made during school walks, and of the practical exercises common to both the Primary and Higher Primary courses:—

(a) *Ploughing.* How the different parts of the plough are placed; how the ridges are cut by the coulter and the plough-share and turned back by the mould board, which is shaped like part of the furrow; the distance from the point of the coulter to that of the plough-share, according to the stiffness of the soil. The method of lightening the soil, of aerating it, of manuring it, of utilizing the water of the sub-soil. How the depth of the ploughing is regulated. The season for ploughing and the number of times it should take place, in tilled and in fallow land.

(b) *Harrowing and Rolling.* How the teeth are placed in a harrow. The effects of the operation of the harrow and the roller on the soil-levelling and superficial pulverisation. The results as regards gravel or clay soil

if rain supervenes, hardness produced and aeration impeded. Action of the harrow on seed plots, on grass and the other noxious weeds. The crushing of clods of earth by the rollers; levelling with a view to facilitate mowing or reaping later on. The seasons for harrowing and rolling.

(c) *Use of Manure.* Management and spreading of farmyard manure. The different kinds of manures. Their use before and after tillage. Manures used as top-dressing in tillage, in meadows, and in gardens; effects of farmyard manure in hot-beds for early vegetables or fruit.

(d) *Sowing.* The conditions necessary for germination; effect of the depth of the seed plot, and influence of the season. The quantity of seed.

(e) *Pruning and Grafting.* Pruning and grafting of fruit trees, shrubs, and vines, etc.

(d) *Lighter Operations of Tillage.* Dressing the earth, development of adventitious roots; second tilling; destruction of weeds, aeration of the superficial roots; the danger of the second tilling being too deep in the case of some plants, vines, etc. weeding.

(g) *Cropping.* The succession of deep-rooted plants to those with superficial roots, nitrates found again in the subsoil; green manures; fallow lands.

(h) *Harvest.* Principal operations, management, preservation and valuation of the harvest reaped in the district.

(i) The manipulation of mechanical implements where available, such as the mowing machine, the reaper,

the sower, the thrashing machine, the sorter, the straw chopper, etc. will furnish, if occasion offers, subject matter for instructive explanation given by the teacher or by the man who uses these machines.

48. To sum up: Explanation of the work done by the agriculturist in his field or in his garden, in his granary or in his cellar, in his stable or in his farmyard, should be necessarily based on observations from nature; it should give rise to lessons in the class room, before or after the school walk, and to written summaries, and to comments made, as a rule, during suitable reading lessons. No doubt, the child, on leaving the elementary school, even after completing the normal period of school life, and having attended regularly, will have acquired no more than what, from the point of view of the science of agriculture, are merely elementary ideas; but if the study of it has been made attractive and interesting to him, he will continue it as far as he finds means to do so.

49. The introduction into popular libraries of well-chosen works on agriculture and of publications specially suited to the cultivation of the district, constitutes one of these means, but that will not be enough. It is necessary that the youth should not only retain, but should complete and extend, the knowledge he has gained as a child and this he will do with a facility increasing with his years, if interruptions in his subsequent education be avoided. Too much, therefore, cannot be done to support and encourage the zeal of those teachers who re-open school for their former pupils, at suitable times. Familiar chats, readings, well-selected practical exercises, an occasional meeting, with experiment done or planned—all this

serves to stimulate among young people an intellectual activity very profitable to the progress of the country.

50. As with all other instructions, so with that in agriculture, the work of schools must remain incomplete unless provision be made for its continuation and development.

APPENDIX E

INDUSTRIES IN URBAN SCHOOLS

By

H. N. PHERWANI, I. M. E.

Author of Efficiency Principles, etc.

I. COURSE OF TRAINING

1. The following course of studies and training should be sufficient to give the desired practical direction to thoughts and actions and so help our boys after matriculation considerably to look after themselves and in any case feel more confident about fighting the battle of life and go through the struggle for existence better than they can do without such knowledge.

2. The training is designed to take up about 800 hours, each subject being allotted an average of 60 hours.

3. It will be noted that this course of training and studies is suggested for morning and evening classes, for one year, the boys being asked to keep terms for actual employment during the day-time with any suitable employer or being helped if so required and fixed up with some commercial or industrial establishment in the city. In course of time, and even with a little exertion at the start, I feel quite confident that the public board of management of such schools should be able to secure the consent of at least a hundred employers, who would be quite willing to take up these boys as a part of a scheme of co-operative

practical educational efforts and agreeing to pay some little remuneration per month equal at least to the fees or more according to the merits and work of the boys, so employed.

4. I will now briefly give the details of each subject and a note as to why I have thought it proper to give education in that subject for boys so that they may more easily and reasonably acquire that direction of thought and action, in life which may give them the needed confidence in themselves and which may also inspire confidence in their employers in their usefulness and if any line of knowledge is further pursued to greater depth by them, may raise their values as men considerably higher than would be otherwise the case.

II. EQUIPMENT COSTS

5. For a class of 100 boys we would require the following equipment in addition to accommodation—which of course need not cost anything extra—since it would be obtained from the existing schools free of charge and free of investment.

| | Rs. |
|---|-----------|
| 25 Typewriters at Rs. 150 each | ... 3,750 |
| 100 Industrial Books Library Average price 5sh. Total 500sh. 25 pounds at Rs. 14 to the pound | ... 350 |
| One 10 B. H. P. Crude Oil Small Diesel Engine and generator | ... 2,500 |
| Necessary other machinery and tools for making use of same | ... 1,000 |
| Fixing etc. | ... 300 |
| One Electric Motor 5 H. P. | ... 350 |

*One sample each of 20 things for assembling
and dismantling practice*

| | | |
|--|-----------------|-------|
| 1. Bicycle | ... | 20 |
| 2. Sewing machine | ... | 20 |
| 3. Incandescent Lamp and Stove | ... | 10 |
| 4. Harmonium | ... | 20 |
| 5. Clock | ... | 10 |
| 6. Gramophone | ... | 40 |
| 7. Locks of sorts | ... | 10 |
| Tools, Vices, Hammer etc. | ... | 100 |
| 8. Electric Fans Assorted | ... | 50 |
| 9. Typewriter included in above estimate | | |
| 10. Water Pumps used in houses | ... | 50 |
| 11. Hand weaving loom | ... | 50 |
| 12. A Camera | ... | 50 |
| 13. Hand Operated Aerated Water Machine | ... | 100 |
| 14. Electric Refrigerator and Kerosene Refrigerator | ... | 400 |
| 15. A Cream Separator | ... | 100 |
| 16. Duplicators | ... | 100 |
| 17. Treadle Printing Machine | ... | 300 |
| 18. Air Compressor and Spray Painting Machine Hand and Power | ... | 300 |
| 19. A Motor Cycle and Car, Old ones will do | ... | 300 |
| 20. An Oil Engine and motor Already provided. | | |
| | | <hr/> |
| | Total about ... | 9,260 |
| | | <hr/> |

For twenty proved Formulae, Raw Material and Cost of Getting Same from qualified Chemist Rs. 200.

For One Easy Shorthand Course Rs. 100.

Library and Literature for higher English usually available in all schools.

III. SYLLABUSSES

Subject No. 1: Practical and Higher English.

6. The necessity of giving a liberal knowledge of the English language will be readily accepted when it is remembered that the main aim of my plan of education is to divert the boys from joining colleges and preventing waste of four years of useful life. In asking the boy or his parents to do so, we would not be acting fairly if we failed to give the boy the essentials of a literary education. Our boys must be accepted as persons of culture, and whenever an occasion should demand, be able to exercise power and influence in their community. This they will not be able to do, unless their literary tastes and knowledge have properly been developed and they have been given a course in speech culture. The advantages of being an engaging conversationalist, a charming correspondent, a lucid writer and an effective speaker can never be over estimated. Quite apart from making a man more fit for larger enterprise, leadership and general achievement, even in the commonest and most modest of occupations of a typist, or a shorthand-correspondent, a greater knowledge of English, a stronger grip and mastery of the English language, will be found to be of great advantage. Shorthand and typewriting training institutions, who neglect this essential teaching of the English language, are wasting a lot of human labour and talent, as merely a

mechanical knowledge of typing English words, without knowing their meaning, or taking down dictations which are unintelligible to the man who has to transcribe them afterwards, result in the rejection of the poor boys and in any case lowering of their wages.

7. For these reasons, I have put Practical English as the first subject to be taught and I recommend that this subject should be taught on the models of some of the well-known correspondence courses available from England and America. Two or three such courses will give the needed raw material in the hands of a competent teacher, who should of course be a man of mature age and possess a liberal and a thorough knowledge of the English language and be able to take pleasure in the work and competent in other respects.

Subject No. 2: Easy Shorthand.

8. Modern business, without shorthand, would lose enormously in speed and dispatch. Even in our private life, an acquisition of any knowledge which enables us to do two hours work in one—is bound to prove of advantage. If we appreciate fast trains, quick telegraphic service, air-mail etc., all because we value time, then we cannot logically neglect the learning of some method of easy shorthand, some system which may condense in simple alphabets and save unnecessary writing motions and fatigue for fingers.

9. That shorthand has not become a part of our general education, is probably due to two reasons. One is that shorthand as it exists today is written mostly in signs and symbols which have no resemblance to the words of the alphabet already learnt. Naturally the acquirement of

whether in acquiring knowledge for life or in acquiring a livelihood as a shorthand typist.

Subject No. 3: Typewriting.

13. The use of typewriters is fast becoming as universal as writing itself. Commerce uses the typewriter in preference to the pen. Our courts demand complaints and defences, applications and appeals to be typewritten. Editors want all literary contributions preferably in type. Pen-manship was considered a good accomplishment of a cultured man but since pen-manship is steadily giving way to typemanship, we must not neglect the modern writing machine. Anyone and everyone who has any writing to do—and all of us have always to do some kind and amount of writing—would do it better if trained early in life in the use of the typewriter. I therefore consider the training in typewriting as essential as the training in good handwriting. Not simply those who seek their livelihood through typewriting but all persons—whom we may claim to give practical and useful education, must therefore be taught the use of the typewriter, to understand not only to write on it fast but also to understand the mechanics of the machine, to keep it clean and make minor repairs without feeling helpless. The foundations for speed and facility in typing should be laid as early as possible and the teaching of typewriting should be as much a part of the curriculum as is penwriting in our Schools. Since however, our Schools even upto the Matric Standard neglect to give this very essential training. I have included same as a necessary subject for teaching in my course of prevocational and practical education.

Subject No. 4: Correspondence and filing.

14. Our schools, though they concern themselves with teaching of a few thousand English words, do not make any effort to give some training in the art and craft of letter writing and filing same. If we could get figures from the Post Office of the millions of letters and post cards it daily delivers, we would but dimly appreciate the importance of letter writing in every day practical life. With the increase of literacy and also due to our vastly improved means of communications, letter writing becomes a subject of vital and great practical importance whether in purely private life or in business life where our students may seek service. Every concern, except perhaps a very small establishment that does only a neighbourhood business, has to use letters when buying or selling, paying bills or collecting money, making contracts, and executing many kinds of transactions—all of which necessitate writing letters. Not only is it necessary to answer letters promptly, but the increasing volume and accumulation of correspondence must be preserved and filed in a manner that will permit of an easy reference on some future occasion, all of which again emphasises the clear necessity of acquiring a knowledge of letter writing as well as a training in some systematic methods in the art of filing. Whether on the field or in the factory, in the office or at home, a sound knowledge of letter writing will be immensely useful, and therefore its acquisition cannot be properly left to haphazard experiment and experience over a long period of years. I have therefore included this subject where-in much useful training in this important branch of human knowledge can be given.

Subject No. 5: General Introduction to a knowledge of Twenty Industries.

15. There is no need to repeat that the present education leaves a man wholly ignorant about even a superficial acquaintance with any kind of Industry. Worse than that, I have shown in the paper that I read before the Ninth All-India Educational Conference at Karachi that there is either an accidental or a deliberate absence of even simple words that may have any industrial bias in the present English Readers that are used as texts in our schools. Without any acquaintance or knowledge of Industry the education naturally leads a boy to one and one occupation only and that is one of clerkship. I hold that each man in the truest traditions of the monarchs of the past like Chandra Gupta, Aurangzeb or King Alfred the Great must know at least one handicraft and the present times demand even knowledge of more than one craft.

16. Therefore, it is that I give opportunity to every boy to fix in two or even three strings to his bow of occupation. I do not claim by such acquaintance and the introduction to Twenty Industries or Trades to give the boy all the knowledge necessary to start earning from it immediately. That work of training can only be carried out in a properly equipped Polytechnique Institution, which ought to be maintained by every Municipality having a population of 50,000 souls or more. Such efficiency of earning from a particular trade or industry can also be acquired in a regular commercial or industrial establishment.

17. But this I do claim that as a result of the acquaintance that I am planning to give, with the twenty

industries and trades taught, the vision of the boy could be appreciably widened and as a result, he or his parents would have more material for the choice of the future line of life's activity of their dear boy.

18. I am therefore giving below, by way of illustrations and suggestions a list of a few industries and trades. This list is by no means exhaustive nor do I require it to be followed absolutely. Lists may be made to suit local conditions. The list given is only meant as a model for guidance.

19. I suggest further that my list of 100 industries may be circulated in local schools and to parents and a request made to mark the twenty industries or trades most liked. Such of the twenty trades as get the greatest support, may then be taught for that year in the pre-vocational Schools.

20. I am therefore giving below names of one hundred trades and technical subjects, a fairly general and good knowledge of any twenty of which, I believe to be very desirable and possibly to every one in his life work in any city like Karachi or other similar port or commercial town of India.

21. I repeat again that I am giving this list for guidance only, my plan being to let the pupils or their parents choose the twenty most preferred and most likely to be immediately useful trades themselves.

Artificial Silk.

Airships and Airplanes.

Automobiles.

Accumulator Charging.

Acids, Alkalies and Salts.

Alcohol.

- Aluminium, its manufacture and marketing.
The Aerated Water Machinery.
Book binding and care of books.
Block Cutting and Print Making.
Boot and Shoe Making.
Bleaching, Dyeing, Printing and Finishing.
Bricks and Brick Making.
Building Houses.
Brewing and Malt Making.
Bread and Biscuit Making.
Brushes and Brush Making.
Butter and Cheese Industry.
Button Industry.
Compressed Air Power.
Cinema Talkie Machinery.
Carpets and Carpet Making.
Clays and Clay Products.
Clock and Watch Making and Repairing.
Coal and its uses.
Cocoa and Chocolate Making.
Cold Storage and Ice Making.
Cement and Concrete.
Copper and Its Uses.
The Cycle Industry.
Common Patent Medicines, What they cost and contain.
Dry Cleaning, Washing and Dyeing
Dyes and Colour Industry.
Embroidery and Handweaving in spare time.
Electric Motors and Dynamos.
Electric Welding.
Fuel Oil and its uses in Industry.
Furniture Making and Selling.

- Film Industry.
- General Agricultural Appliances.
- Gas Oil and Petrol Engines.
- Glass and Glass Manufacture.
- Gloves and the Glove Trade.
- Gums, and Resins, their nature and uses.
- Hosiery Manufacture.
- House Decoration and Repairs.
- Iron and Steel, their Manufacture and Use.
- Inks.
- Incandescent Kerosene Lamps.
- Ice Making.
- Jute, Its Spinning and Weaving.
- Jewellers Trade.
- Knitting and Knitted Fabrics.
- Locks and Lock Making.
- Leather and Leather Making.
- Loud Speakers.
- Manufacture of Cast Iron Products.
- Manufacture of Cement.
- Mechanism of Motor Cars and Motor Trucks.
- The Match Industry.
- The Meat Industry of Europe and America.
- The Motor Car Industry
- Nickel.
- Oil Pigments, Varnishes and Paints.
- Plywood, its manufacture and use.
- Pottery Handicrafts.
- Pharmaceutical and Drug Making, Selling and Dispensing Business.
- Photographers' Business.
- Printing.

- Paint and Varnishes.
Pottery Industry.
Paper Industry.
Perfumery Industry.
Rubber Industry.
Rice Industry.
Ropes and Rope Making.
Radio and Wireless.
X Ray and Its Uses.
Sign Board Painting.
Spray Painting and Cellulose Lacquers.
Strength of different materials.
Salt Industry.
Ship Building Industry.
Silk Industry.
Soap Industry.
Sponges.
Starch and Starch Products.
Stones and Stone Quarries.
Straw Hat Manufacture.
Sugar Industry.
Sulphur and the Sulphur Industry.
The Tea Industry.
Tin and the Tin Industry.
The Tobacco and Cigarette Industry.
Tailoring and Dress Designing.
Towels and Towel Making.
The Velvet Industry.
Wood Block Printing.
Wool and its Substitutes.
Wool and Woollen Yarn Making, etc., etc.
Zinc and Zinc Manufacture.
Etc. Etc. Etc.

SUGGESTED METHOD OF TEACHING

22. One of the most useful and desirable methods of imparting knowledge in any of the above listed subjects would be to give the boys a printed summary of ten to twelve pages of each of the twenty selected Industrial subjects, fixed for being taught during a particular year. These summaries would particularly give the most interesting facts regarding the special industry and a digest of the contents of at least two or three other good books with the name of the publishers and should give the fullest guidance as to all sources of further available information. It will be noted that my proposed Extension Classes in Schools will keep most of the books mentioned in the summaries, so that boys who get interest can loan out same and read at home, and acquire more knowledge of whatever industry they like in greater detail.

23. Regarding the actual teachers for these subjects, efforts should be made to obtain honorary or paid services of men for teaching particular industries who may be actually engaged in the city in such industry. It does not matter much if such persons are not well educated or even do not know much English. Failing to secure the co-operation of such men, the educational director of such extension classes should take up the class himself and such a director must necessarily be a man of mature age, widely read, well experienced and able to do justice to the subject himself.

24. Teaching in this subject should further be carried on in a conversational style and students encouraged to study the industries they are taught on their own initiative and make observation and survey of local conditions of the particular trades, industries or occupa-

tions, in their own town or city or district or province or the country or even foreign countries and be encouraged to submit written reports. The whole idea is to make them alert and wide awake on the subject and thus urge them to intenser efforts by themselves to acquire more and thorough knowledge later on and pursue one of the many trade and vocations or industries brought to their notice especially as they are afforded no such opportunity under the present system of education. Lastly the value of such teaching in making the people industrially and technically minded can never be questioned and will be of great National value in any case.

Subject No. 6: Practical Chemical Formulae.

25. I have in my Library a very interesting book entitled "**Secret Remedies**" "*What They Cost And What They Contain*" issued by the **National Medical Association, London**. A peep into its pages will surprise many people what they pay for their favourite patent medicines and how little those remedies actually cost.

26. There is probably no other field of knowledge which if put into practical use, offers greater possibilities for a progressive development from an investment of small capital and spare time and attention at the start than the field of Practical Chemistry, whether it is used for making secret remedies or for supplying such things of daily use as Soap, Polishes for boots, Metals, Furniture etc., or innumerable Medical preparations.

27. Apart from such a consideration Chemistry practically enters into almost every phase of our material existence. It is no exaggregation to say that all industry to-day is three fourths Chemical. In every branch of

manufacture, in agriculture, in our mills and laboratories, in electrical shops or industrial plant of all conceivable kinds, in the manufacture of drugs of all kinds. Chemistry will be found very useful.

28. Chemistry is consequently, one of the most practical and useful studies that every man whether young or old should be introduced to and in order to cultivate desirable sort of taste in this fascinating branch of human knowledge, I have included the subject in my Pre-vocational Course of Studies, a practical training and knowledge of Twenty proved Formulae with the chief object of rousing in the man a desire for a further, fuller and deeper study of Chemistry and by making it more interesting and thus fire the hearts of all those learning with an ambition to advance their knowledge. In the training given, an opportunity to make some particular chemical products is actually given, so that the student gets a taste and an urge and an irresistible desire within himself to work for a greater and deeper knowledge securing well paid occupations and independence in later life.

29. I may be permitted to explain that I do not claim to do any thing beyond rousing a practical interest in the subject and definitely make no exaggerated claims of turning out chemists in any way by my demonstrations by affording practical production of a few chemical products based on proved formulae and taught in a thoroughly practical manner by a competent and qualified chemist.

30. I may also further state that from my actual experience of teaching I have found that learning of such formulae on the part of the boy, does not require any other education than what every one leaving schools has already acquired, namely, the ability to read and write English upto the Seventh Standard.

31. I have actually taught boys making soaps, inks etc., with perfect ease. All my idea in pre-vocational education is to show a variety of possible occupations and to inspire confidence in work other than mere clerical employment and this whether under the Government or Private Service. I simply seek to create by my education at the proper age a thirst for investigation and develop a desire for experimentation and afford some practice in formulae and thus give the boy a taste and an opportunity to do this work himself.

" SUGGESTED LIST OF TWENTY FORMULAE THAT
MAY BE TAUGHT "

32. 1. Household and Toilet Soaps, 2. Inks for the office, 3. Leather Polishes, 4. Face Creams, 5. Scented Oils, 6. Plastic Leather, 7. Plastic Cement for flooring Tiles, 8. Beverages non-alcoholic, 9. Glues and Pastes, 10. Dry Cleaning and Bleaching, 11. Woodwork Polishes, 12. Paint Removers, 13. Metal Polishes, 14. Candles, Plain and Scented, 15. Smelling Salts, 16. Tooth Pastes and Preparations, 17. Depilatories, 18. Chalk Sticks, 19. Seidlitz Powders, 20. Rat Killing Compounds etc.

Subject No. 7: "Manual Dexterity and use of tools."

33. A normal man should love activity of his hands and feet, of body, brain and the eyes. Boys love hammers, saws and tools of all kinds and these will always intrigue them, arouse their interest and develop their natural urge, to build and create. This urge is born in everyone. One of the chief reasons against the present purely bookish education is that it gives no opportunity for such activity nor does it permit the boys to follow this

dominating natural impulse and it is therefore that I have stressed that every school boy should be made to purchase and possess a good set of tools and in any case a saw, a hammer, a plier, a spanner and a screw-driver etc.

34. I have consequently made the dismantling and assembling of some of the most common things, a regular part of my curriculum of Pre-vocational Education. I have actually done this work on a group of school boys from 10 years to 16 years of age and I can say from my own experience the learning has made them happier and keener minded. The many beneficial effects of an introduction of this kind of useful manual dexterity and confidence to use tools will give enthusiasm to the normal boy for project work and the new energy thus gained will spread to all of his other work and will make the whole of his other training all the more interesting and useful. Boys when they find they have the knowledge to dismantle repair and reassemble useful mechanical appliances feel themselves growing into big men, able to use tools and show sense and skill of mature men. The thrill of accomplishment, the pride of doing something useful will glow in their hearts when they see that what was useless before in the house is working alright now, due to their personal skill and knowledge. Incidentally, parents will also like this practical and useful direction of the energy of their boys.

35. I give below the twenty useful mechanical appliances, practice in dismantling, repairing and assembling of which will form a part of regular training in my scheme of Pre-vocational training.

1. Bicycle, 2. Sewing Machine, 3. Incandescent Lamp

and Stove, 4. Harmonium, 5. Clock and Gramophone, 6. Locks of sorts, 7. Electric Fan, 8. Typewriter, 9. Water pump, 10. Hand Weaving Looms, 11. Camera, 12. Hand Operated Aerated Water Machine, 13. Electric Refrigerator, 14. Kerosene Refrigerator, 15. Cream Separator, 16. Duplicator, 17. Treadle Printing Machine, 18. Air Compressor and Spray-painting Machine, 19. Motor Cycle and Car, 20. An Oil Engine.

Subject No. 8: Salesmanship for boys.

36. Shall we teach Salesmanship to our boys and will it help them in being more useful in getting jobs?

My emphatic answer is YES! and I feel bound to add still more emphatically that without some working knowledge of Salesmanship, all other knowledge may be practically useless.

It should not be supposed that because we may not have to sell goods therefore we do not need any knowledge of salesmanship. No man in the last analysis, will be successful, who is also not in a larger sense a good salesman. If a man is not selling goods, he is selling his brains his ability, his services. Every time a man is trying to get a new position, he is selling himself. Every time a man wants any kind of co-operation whether financial or otherwise from a friend or a banker or the public he is selling and in fact every time a man tries to make a deal of any kind with another fellow being, he is selling himself. Salesmanship in its true and proper sense, is a big practical human subject and needs studying from every angle. Every one needs to learn the art of persuasion and be posted on the best, easiest and quickest method to make other people want and accept what he has to give them on his own terms and at his own price and thus secure employment for himself.

38. As a subject for actual employment and money getting, salesmanship has hardly another equal for our boys. Our industries are worried about proper distribution of their products and here is a big job for all for our business firms big and small throughout India.

39. I wrote very lately in the press on the advantages of Co-operative Educational Colonies and the immense possibilities of utilizing organized educational labour of our school boys both in the production and distribution of goods. Taking advantage of this opportunity, I wish to add further that given a proper training and control, the organized education sales labour of our 921,128 boys who are now being educated in our 241 Colleges and 2944 High Schools, would give us a sales force that will stagger the mightiest foreign organization of any, Japanese or German, Eastern or Western firms in its wide and complete coverage of the Indian territory and its Indian customers or in its net average of orders booked or in the cheapness of its cost and the rapidity of its sales drive in most of the bazaar and popular lines of manufacture. Salesmanship offers a real big job, not only for all our boys, but also for the struggling industries of India, if only our educationists and the Government will accept this work and responsibility in the true spirit and let it be further realized that this work will also appreciably decrease unemployment of our educated youth on the one hand and their less educated industrial workers on the other and speed up prosperity throughout India. If the Government-controlled schools, require a lot of time in taking to this necessary work of training, why should not the Private Schools and Colleges both aided and unaided take up the work and do a great and good service to the

country? Is there anything to prevent them from doing so?

40. On sound practical grounds of usefulness in life I have therefore included salesmanship in my scheme of Pre-vocational Education for our boys as it will not merely develop in them the necessary confidence in their abilities but at the same time will greatly develop their faculties of taking interest in other human beings, in industrial things in general and also rid them of the undesirable weakness of feeling shy and thus help to make them more useful and go-ahead citizens all round. The training if properly acquired and practised will open up new, pleasant and paying field of employment in their future years and with the growing scarcity of government and general clerical jobs, this training should prove to be a great boon to them in their after-life.

Subject No. 9: Practical accounts.

41. Every man no matter what his occupation and education, must have a general idea of how to prepare budgets of his expense and income, and know the general principles of keeping accounts. Such a knowledge will help him immensely keeping a correct record of his financial transactions with a view to being able at all times to ascertain the exact position of his assets and liabilities and thus keep himself informed whether he is progressing or falling back financially.

42. Recognised principles of book-keeping and accounts may therefore very properly be taught, and once these are grasped, they can be applied by the student to the peculiar cases of any business or his own personal accounts in his later life.

43. It cannot be too strongly urged, that a training in general principles of accounts is very essential and some definite knowledge may very usefully be given of what a debit entry and what a credit entry means or what is a balance sheet or what is a man's worth and how much he has gained or lost or what a ledger is and how entries may be made therein. I hold that every one, whether in or out of business should be very early acquainted with a proper knowledge of personal economics and of the art of keeping accounts, of financial transactions and its simple technique and be able always to understand intelligently about bills, cheques, hundies, drafts, vouchers, accounts, balance-sheets and profit and loss and preparation of income tax statements. Such a knowledge when acquired will be found very useful in all vocations.

Subject No. 10: Practical knowledge of Law.

44. There is no branch of knowledge, so essential to the proper pursuit and enjoyment from labours of any vocation as an elementary knowledge of the Laws prevailing in any country, where a man has to live.

45. When the accumulations of a life time may be liable to be torn from their owner and even moneys of brothers and relations and the inherited fortunes of ancestors divested from the rightful heir by unscrupulous money lenders—sharppers and other fraudulent people, it is important that every one who wishes to enjoy or transmit the fruits of his own labour or peacefully to hold his inheritance, should acquire as early as possible, some working knowledge and familiarity with the fundamental laws of the land, as shall secure him and assure him the safe keeping and enjoying of what has been acquired by.

his own labours or transmitted to him through the loving care of others.

46. Every man is endowed with certain individual rights and he should know early and fully about these rights. A correct knowledge of one's own rights and rights of others, will prevent a lot of litigation very much in the same manner as people who keep their health by a working knowledge of how to take proper care as to food, exercise and rest, seldom find it necessary to go to doctors and pay their bills.

47. Serious mistakes, leading to much loss and suffering are made, all because of ignorance while the few who know derive great advantages. Our lawyers and the great army of the people who feed upon litigation, are literally supported by the ignorance of the mass of our people and as a consequence the loss of the individual and the society is very great.

48. I therefore feel that no scheme of pre-vocational education can be considered complete, which does not provide for a proper and necessary study of the important principles underlying the legal rules that regulate a man's actions when working for himself and enjoying his life and liberty, while restraining the license of others.

Subject No. 11: Character and Health Culture.

49. It is my firm belief that for continued employment and financial sufficiency as well as maintaining a reasonable degree of self respect and independence, the possession of a high character and robust health are absolutely essential.

50. When misfortunes hang heavy and an individual has lost everything good, character will keep him alive, and

ultimately also help him to thrive. A man of good and strong character cannot be beaten and finally broken in the game of life.

51. No education is worth the time and expense which fails to give clear and practical ideas on character culture which shall guide the individual right in his thoughts and action throughout his whole life and save him from many pitfalls of temptation and major vices that would otherwise lead him to a sure and ultimate destruction.

52. A conscious and scientific knowledge of the great qualities that must be learnt and cultivated to achieve great ends is bound to prove of incalculable benefit and such knowledge of character needs to be imparted as an essential part of all education. Therefore, all the knowledge and training acquired will be strengthened greatly from the teaching of a well planned course on character.

53. Not less important is a sound knowledge of Health Principles, for health is the very foundation of human existence and an immensely important factor for success in life. It has been truly said that health is the greatest wealth of a man, as the Persians put it "Yak Tandrusti-Hazar Niamat." The hurry and drive, the keen competition and the risks to which we are constantly exposed on the road, in the factory and everywhere demand of all of us a maximum of physical and mental energy. These strains in turn require great blood supplies. The speed of modern civilization is harmful and taxing and growing more harmful and heartless still, which brings on quickly feeling of tiredness that makes replenishing of physical energies, a matter of important study and attention by every one.

54. In all vocations, physique and personality count and to maintain these in good condition, health is essential. A sickly man can hardly do much work or impress others. The neglect of health unquestionably makes for much failure in life.

55. Consequently, I have considered it extremely important to coach the student under proper direction and through qualified teachers, the scientific importance of fresh air, exercise, diet and rest. An opportunity to study the human machine will be given and preparation and maintenance of personal health charts and records taught. Tables of average weight for different ages, value of different foods and charts of exercises will be some of the other items taught and the gaining of this knowledge and a taste for pursuing these studies further created and so a sound foundation of knowledge laid, the practice of which, will help to acquire and maintain good health and so increase many working days and save heavy bills of doctors. Naturally a qualified medical man will be in charge of this subject under the directions of the Principal.

Subject No. 12: Efficiency and Scientific Management.

56. Efficiency Principles and Efficiency Knowledge as a clear cut system of thought, exist only in the minds of the very few, so few indeed, that most people get no opportunity at all of knowing or learning from them. One big reason why so called educated people cannot advance, is mainly because they lack both the knowledge and the spirit of efficiency. An average European or a Japanese is far more efficient because he possesses both the scientific and the efficiency spirit and manifests this personally in his daily life.

57. Efficiency alone can show every individual how to increase his work and worth. A knowledge and practice of efficiency will help every man to do more work with actually less effort. A knowledge of efficiency principles can alone put in possession of our men—young and old—a power of accomplishing and a new method of living to which they are now strangers and will materially help to bring out their undeveloped possibilities.

58. It is not too much to state, that the want of knowledge and practice of efficiency, makes a real difference in the matter of wealth, poverty fame or obscurity, power or weakness, health or disease, growth or decay, hope or despair in any individual's or a nation's life. Unless we teach our men to marshall their thoughts under the banner of efficiency, we cannot help them very much to win the battles of life and come out successful in the strenuous struggle for existence.

59. The domination of the West over the East is largely due to the spirit of scientific management and efficiency, which prevails in the West and which is unfortunately absent in the East except for Japan. Drill-ing and discipline, regulations, rules and routine, time tables and schedules, budgets and plans, tests, time and motion studies etc., are but few of the many outward forms of application of efficiency principles and scientific management.

60. The haphazard manner in which the daily life of an average youth, after leaving school and college is carried on is very distressing and destuctive of all hopes of success. The cross purposes at which the young man, his wife or members of his family work, whether in the house or outside, result in enormous wastes of times, efforts

and materials. It would be a revelation to many people what a lot of time they daily waste in reading trash, in foolish wagging of their tongues, in superfluous movements while dressing and other daily routine things. A great deal of time of most men is lost in doing nothing in particular for long hours. If these very people by acquiring a knowledge of efficiency principles and practising same, could be got into a habit of running their day on a scientific schedule from the time they got up from their beds to the time they went back to sleep, their production, prosperity and pleasure would be immensely increased and through their surplus, the Indian nation would also benefit much.

61. Among our many calamities, our un-organized life is perhaps one of the greatest and therefore it is, that I have felt keenly the necessity of acquainting every one, who is being prepared for any vocation or any earning or any useful career with a working knowledge of efficiency principles and principles of scientific management and thus trained to pursue and practice it throughout his later life. The advantages of such knowledge in helping to improve one's life work by doing it on known facts of proper standards and plans, of acquiring a habit of writing up schedules or of making time and motion studies, of despatching and carrying out one's work as planned and finding out and maintaining as far as possible standardized conditions and learning and carrying out all work by standardized operations, cannot be questioned. An endeavour will be made, not only to teach this branch of knowledge in the most interesting and simple language but what is more, the students will be acquainted with original sources of knowledge so that they may continue

the study and practice of this fascinating and fruitful science throughout their later life to their own great advantage and to the greater advantage of the Indian nation in the long run.

APPENDIX F

INDIA'S TEN YEAR EDUCATIONAL PLAN

Primary Stage.

This will be compulsory for every citizen and will include:

- (a) Sound physical development
- (b) Formation of habits of cleanliness
- (c) Cultivation of an active temperament
- (d) The three R's
 - (i) Reading more of poetry, with special attention to rhythm
 - (ii) Writing a good hand, and
 - (iii) Arithmetic, as applied to problems of the child's every day life.

2. To give effect to this aim:

- (a) Physical education shall be given a definite place in our education
- (b) As in all civilised countries, Government and Local Bodies must recognise their moral responsibility with respect to medical inspection, medical attendance and proper nourishment of school children, and shall make a serious effort to meet this obligation.
- (c) The practical aspect of education shall be cultivated by getting the children:
 - (i) to trace the outlines of letters, figures of animals, birds etc. and to fill them in with proper colours

- (ii) to cut these out of paper with a pair of scissors
 - (iii) to make paper boats and boxes (without calling it paper sloyd)
 - (iv) to make clay models of mangoes and bananas and later of other complicated patterns
 - (v) to grow small gardens of their own, in villages, or wherever a little land can be made available
- (d) Music shall be introduced in all Schools in the form of devotional songs like those of Kabir and Mirabai, and the National songs of various countries sung as loud choruses. For this purpose every school shall have at least one gramophone, and be connected to a circulating library of suitable records.
- (e) The teaching of Legeem, Tipri and other indigenous varieties of rhythmic exercises shall be encouraged in all schools.
- (f) Story telling as an Art shall be taught in Training Colleges and encouraged in all Primary Schools.

Higher Primary Stage.

3. The objects to be attained during this stage of education shall be :

- (a) A good knowledge of the child's vernacular
- (b) Cultivating exactness, by good hand writing and geometrical drawing
- (c) Acquiring manual dexterity by some hand-work, like Carpentry
- (d) Physical training and games in which the team spirit shall be considered more important than the game itself. These shall form part of the regular time-table.

- (e) A beginning of the working knowledge of English, which shall not be compulsory for all. In Schools where English is not taught Hindi as the *lingua franca* of India shall take its place.

Secondary Stage.

4. The aim of education during this stage shall be :

- (a) A good working knowledge of English, which shall be compulsory only for those who wish to go up to the University.
- (b) A better acquaintance with the Vernacular as Literature.
- (c) A beginning of the appropriate classical language with more attention to ability to understand, rather than intricacies of grammar
- (d) A practical knowledge of Science with special reference to the pupil's own well-being *i.e.*, Hygiene and Science in everyday life, with some physical geography
- (e) Acquaintance with algebraical methods, and more geometry combined with accurate drawing.
- (d) Other special voluntary subjects—literary and vocational.

5. These aims shall be compulsory for all schools seeking State recognition or affiliation, but within these limits all schools (acting under their own administrative officers or governing bodies) shall have complete statutory freedom to attain the goal in any manner they think fit, as under :

- (a) The number of years a child should ordinarily spend in each stage and the detailed syllabuses issued by the State will be taken only as guides and not

enforced. The schools must not omit any of the subjects compulsorily required during each stage, but may add to them or re-arrange them as they like. Each school must send a copy of the syllabus it proposes to follow to the Director of Public Instruction for information, *not for previous sanction*. The Director's remarks, if any, shall be always welcome but not binding on the school.

- (b) Three years after any changes are introduced the Director shall have the right—if he thinks it necessary—to institute an enquiry into the effects of the change by a committee, on which the Department, the governing body, and the parents of the pupils will all be represented. The report of the Committee with the Director's remarks shall be sent to Government, and if after reading it, they come to the conclusion that any features of the experiment have proved unsuccessful or harmful, Government shall order necessary alterations.
- (c) All schools shall be free to use any text-books they like, subject to a veto by Government. If a school does not like to adopt the text-book recommended (*not laid down*) by the Department, it shall send on to the Director copies of any new texts it may have in view, not less than four months before commencing their use. On receipt of this, the Director shall invite public criticism of these, and if after taking that into consideration, he is of opinion that any contents of the book are repugnant to the morals of the pupils, or are

likely to give any offence to any section of the public, he shall move Government to veto their use permanently or until the offending passages are removed. If no such veto is exercised by Government within the four months, the use of the new text-books in all schools shall be considered lawful.

- (d) A school may divide their classes according to standards or subjects (horizontally or vertically) as may be feasible and the Headmaster of the school shall be free to impose any test he considers necessary for deciding on the promotion of pupils from one class to another *within* one or three definite stages laid down. The responsibility for promotions within the stage will rest on the Headmaster of the school, assisted by his teachers.
- (e) For the examinations at the end of each stage, common papers shall be set by a committee for each linguistic division, but the answer papers shall be marked and oral examinations where necessary shall be conducted by Board of four Headmasters of similar Schools, the school being examined being one of them, a fifth officer appointed by the Educational Department, and a sixth representative appointed by the Local Board, or governing body, the two latter not being lower in status than the Headmasters. This Board will grant to successful pupils a certificate for having passed the minimum requirements of that stage, and this certificate will be accepted by all schools recognised by Government.

- (f) Students would be well-advised to change a school only at the end of a stage, but if they have to leave it when they are half way through, their place in the school they wish to join will be decided *solely* by the Headmaster of that school, after imposing any test he considers necessary. The leaving certificate from the previous school will be considered only as a recommendation, and in no way binding on the school which the pupil wishes to join.

UNIVERSITY STAGE

Preparatory

6. All University Examinations should be shifted to the month of November but the Matriculation should continue to take place in the month of April and the results be announced by end of May, as at present.

7. The time between June and November for all fresh matriculates wishing to enter the College should be utilised, as follows:—

- (a) Students should register at the College they wish to join on 1st July, and should attend classes in the College only for two months—July and August.
- (b) During this time, they should undergo a thorough Medical Examination, and be given curative treatment wherever possible.
- (c) One hour per day should be devoted in the time-table to physical education and training.
- (d) One hour per day to be devoted by the students to some approved hobby.

(e) In addition to this, the student will be given:

- (i) a course of not less than 30 lectures on hygiene.
- (ii) a course of not less than 20 lectures on how to study.
- (iii) a course of not less than 20 lectures on how to read and what to read.
- (iv) a course of not less than 20 lectures on modern methods of indexing knowledge.

8. From 1st September to end of November all students will undergo compulsory military training in a suitable camp. The students will have to live all the time in camp and undergo training, as laid down by the military authorities; and they will be admitted to the College only if the military authorities are satisfied that during the three months they have tried to do their best.

9. No student will be admitted to any College affiliated to the University of Bombay unless he produces certificates of his having attended the preliminary course in July and August to the satisfaction of the Principal of his College and carried out the military training to the satisfaction of the military authorities.

10. At the University stage the aim of education will be:

(a) At the Bachelor Stage.

- (i) to impress upon the students the Eternal verities of Life taken both from Science and Religion.
- (ii) to teach them the methods of both thus showing them how to attack practical problems of life, in the light of these Truths.

(These Truths can be best impressed more by the living of these by the Professors and

students together in a place away from the temptations and struggles inevitable in our modern cities).

(b) At the Master's Stage.

By encouraging the student to search for a solution of the practical problems of daily life in our country (not the genealogy of hogsheads) under the guidance of the Professors, who ought to be doing similar work themselves.

ERRATA

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