BUREAU OF EDUCATION

INDIA

Pamphlet No. 1

DRAWING AND MANUAL TRAINING IN PUNJAB SCHOOLS

By J. Y. BUCHANAN

Inspector of Drawing and Educational Handwork, Punjab.

CALCUTTA
SUPERINTENDENT GOVERNMENT PRINTING, INDIA
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29

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PREFACE.

THIS is the first of a series of pamphlets which it is hoped to publish from the Bureau of Education, India, from time to time. It was decided at the Conference of Directors held in February 1917 that such a series would serve a useful purpose. These pamphlets will differ from the Occasional Reports in being of a less formal and elaborate nature. They will deal, in a few pages, with any subject which appears to deserve treatment, with any recent development with which it appears desirable that educationists throughout India should be acquainted. These subjects, as in the case of similar series published in other countries, are likely to be of a varied kind. Where a particular method of instruction or an institution is described, it will be for the reader to consider which of its characteristics are worthy of imitation or possible of introduction among the circumstances which prevail elsewhere. It is not pretended that what is described represents a counsel of perfection or will be universally applicable. The views expressed will be those of the writer in each case.

The present pamphlet deals with drawing and manual instruction. Some of the principles which should underlie the teaching of drawing as a work of instruction were discussed in the fourth Occasional Report. Here the actual working of a definite system is described. Whatever the particular method pursued in a school, the general aim will be the same. 'It is now beginning to be understood,' says Mr. Buchanan, 'that the purpose of drawing is not merely to obtain certain mechanical results on paper, nor to produce artists, but to give to the pupils a new power of expression serviceable for the ordinary needs of life.' The use of incidental drawing and delineation in ordinary class lessons is also a valuable aid to the acquisition of knowledge and the expansion of the faculties. 'The ideal state of the teaching of drawing in schools would be to have every class master able to teach drawing to his class.'

The importance of manual training has been recognised by the Government of India in the Education Resolution of 1913 and elsewhere. The difficulties of its wide introduction in India are undeniable. The account here given of the centre at Lahore

shows how these can be at least partially overcome in towns. An inspection of this centre forcibly reminded me of similar centres which I have seen doing successful work in the cities of America and other countries.

One of the principal difficulties connected with manual instruction is the provision of capable teachers. A few facts have accordingly been collected which may be of assistance to those who contemplate the introduction of such instruction into their schools. In the Punjab itself no special facilities are offered for the production of such teachers, though a few undergo a short course at the Lahore centre. Teaching experience and a knowledge of drawing are regarded as essential, and practically all the men selected thus far are certificated drawing masters whose hereditary craft is carpentry. In the United Provinces arrangements exist at the training colleges of Allahabad and Lucknow, the qualification for admission as manual instructors being the intermediate examination at the former place and the school leaving certificate at the latter. In Madras two special instructors in manual training have been appointed. One of these is attached to the Teachers' College, Saidapet, where his principal function is to instruct teachers, ordinarily of the secondary grade, for employment in secondary schools and colleges. The course of training extends over two years. All students of the secondary grade, too, are allowed to undergo training, with a view to enabling them to become either general teachers or manual instructors. Twenty students are reported to have joined the class in the present year. Twenty teachers have undergone instruction in Bombay. The Inspector General of Education in Mysore has favoured me with a description of the operations in that State. Graduate teachers are trained in wood sloyd at Bangalore and Mysore, and receive Rs. 15 a month in addition to the pay of ordinary teachers. The total expenditure on the teaching of this subject in the schools is Rs. 10,000 a year.

As to the cost of teachers, the stipend given during the short course at Lahore is Rs. 30 a month. No regular scale of salary

has been fixed for the instructors; but appointments have been made on Rs. 50. In the United Provinces, the monthly stipend during training is Rs. 15 and the pay of instructors in Government high schools ranges from Rs. 40 to Rs. 70, and in training colleges from Rs. 60 to Rs. 100. In Madras too the stipend is Rs. 15; the pay ordinarily secured by passed students is from Rs. 25 to Rs. 35 a month in privately managed schools.

H. SHARP.

Delhi, 1918.

DRAWING.

In preparing this note the writer has endeavoured not only to present an account of what has already been done in the schools and training institutions of the Punjab, but also to state the general principles and aims which underlie the courses of instruction. Outlines of the courses followed in drawing and manual training are given, in the hope that they will be of practical value to inspectors, headmasters and teachers.

History.

The introduction of drawing into Punjab Schools is of comparatively recent date. In 1897 drawing became a compulsory part of the Lahore Training College course, where the subject was taught mainly from a professional stand-point. Student teachers were required to show that they possessed a serviceable power of diagrammatic representation, and that they could use it in the form of blackboard drawing, for the illustration of lessons. The class teacher's certificate examination included a test in blackboard drawing. It was recognised, however, that in the absence of any previous training it would be impossible in the very short college course to give sufficient time to drawing to ensure that class teachers would be able to teach it as a class subject.

Training institutions.

Special teachers had to be trained; and the Punjab education authorities determined to introduce a special course for drawing masters in their School of Arts at Lahore. Accordingly in 1899 a course was established in the Mayo School of Arts, Lahore, and a certificate, called the drawing master's certificate, was awarded to successful candidates by the Education Department. External students were allowed to enter for the examination; since 1915 this privilege has been withdrawn, and the course now covers a period of three years.

Drawing master's certificate.

In 1901 Mr. H. T. Knowlton, Principal of the Government Central Training College, Lahore—to whose efforts the progress already made is largely due—prepared a course in drawing and educational handwork for the normal schools, and in 1903 he published a course for primary schools. In 1903 drawing became an optional subject of study in the middle and high schools of the Province.

Drawing introduced into middle and high schools.

Difficulties.

The efforts to introduce drawing were greatly handicapped by the difficulty experienced in obtaining trained teachers, and also by the attitude of parents, school managers, and even District Inspectors, many of whom regarded the subject as an accomplishment, useful no doubt to some, but of little practical value to the average pupil. This attitude is fortunately slowly changing to one of appreciation.

Changes in drawing master's certificate course.

As regards the drawing masters, not only were they few in number, but the men obtainable, although frequently good draftsmen, were deficient in general education, and they had had no training in the methods and practice of teaching. During the year 1914-15 two important changes were made in the drawing master's certificate course. In the first place, a standard of general education was fixed for all candidates, *viz.* that they must have passed the vernacular middle examination, and *secondly* lectures on the methods and practice of teaching were added to the course. It is hoped that these changes will result in providing a better type of teacher.

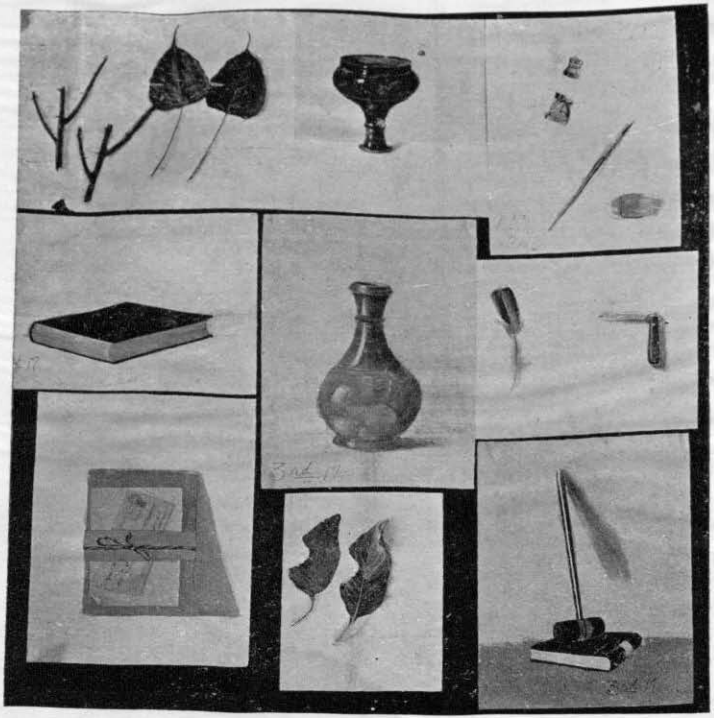
Appointment of a specialist.

In 1913 the writer was sent out to the Punjab as a specialist in drawing and educational handwork *in order to organise and* develop the teaching of these subjects. After a year's experience of Punjab conditions he was asked by the Director of Public Instruction to revise the school drawing courses, and to bring them into line with modern practice. That this was necessary is not surprising in view of the great and universal changes that have taken place in the teaching of drawing during the last decade.

Courses in training institutions.

Accordingly in 1914 new schemes of work were prepared and introduced; they will be described later. In 1915 the courses prescribed for class teachers in the training institutions were changed and brought into line, and the class teacher's certificate examination now includes a test in object and nature drawing, as well as that in blackboard illustration. Students who have had instruction in drawing during their school course are now entering the training institutions, and we hope shortly to be able to provide class teachers able to teach drawing as a class subject.

1. Examples of primary school Drawing.



(2). Examples of middle school Drawing.

Special classes for teachers.

In 1914 special classes were formed for the further training of teachers. These were held in the headquarters of each district, and all special teachers of drawing, as well as selected class teachers attended. The duration of the classes was usually a fortnight, during which period a series of lectures on drawing was given, and the teachers worked through a course of school drawing. The classes met daily from 10 A.M. till 3 P.M. The lectures dealt with the theory and practice of teaching drawing, and practical demonstrations in class teaching were given. The classes are being followed up by visits of inspection, when practical difficulties are dealt with. At the close of each class the work was exhibited, and the exhibitions were attended by many parents, teachers and pupils; the practical value of the subject was recognised, and much interest was aroused.

Aim and purpose of drawing.

It is now beginning to be understood that the purpose of drawing is not merely to obtain certain mechanical results on paper, nor to produce artists, but to give to the pupils a new power of expression serviceable for the ordinary needs of life. During the course of the lectures it was shown that drawing is the primary means of expression in the constructive and decorative arts; that it promotes the close observation, muscular control, and skill of hand, which are necessary in the practice of every craft, and are the ground of intelligent appreciation and good taste; that the study of drawing opens to the mind the wealth of human treasure that exists in the form of architecture, sculpture, painting, and leads to a keener appreciation of the beauties of nature, thus greatly increasing the pleasure and significance of life.

Class teachers.

While the main object of special classes was the further training of those already engaged as special teachers, it was thought desirable to include a number of vernacular class teachers, in the hope that through their agency, drawing might be introduced into the vernacular, middle and primary schools, whose budget does not permit them to afford special teachers. Subsequent visits have shown that many of these teachers have been able to introduce drawing into their schools, and their pupils are doing good work. Such teachers have the great advantages of knowing how to teach, as well as a personal knowledge of their pupils, advantages which the special drawing teacher finds it difficult to gain. The ideal

state of the teaching of drawing in schools would be to have every class master able to teach drawing to his class.

New courses in drawing.

In the new school drawing course introduced in 1914, the subjects to be studied and represented are classed generally under two heads—nature forms and manufactured objects, a judicious balance being maintained between them. The examples selected are graded to suit the different classes, and are arranged so as to follow each other in a progressive course. Throughout the course the proper manipulation of the pencil, brush and pastel are carefully taught with the view not only of giving technical skill, but of the formation of habits of thoughtful and accurate observation. Drawing with coloured pastels and water-colours forms an essential part of the new course.

Drawing models.

In choosing examples for the school drawing work two important considerations have been kept in mind, first, that as far as possible the objects and natural forms to be drawn should be such as may be found in every village, and secondly, that the additional expenditure involved should be kept as low as possible. In the latter connection it should be remembered that the waste material of the school and the home, jars, empty tins, bottles, cooking and drinking vessels, cardboard, wood and tin boxes of different forms and colours, the workshop, the laboratory, the school museum and the fittings of the classroom will all provide excellent studies. The pupils too, in the writer's experience, have proved most willing to help as far as lies in their power, and if each object mentioned in the following lists suggests only one other of a similar kind, there will be no lack of material. Throughout the course the endeavour is to make the pupils feel that they are searching for the truth and recording it as they see it. The photographs (Figures 1, 2 and 3) illustrate typical primary, middle, and high class work in object and nature study. The following directions and schemes of work were issued by the Punjab Education Department as a memorandum on school drawing.

Extracts from the Memorandum on Art Drawing for Punjab Schools.

Drawing with instruments.

Use of instruments.

The pupils of all the classes should have practice in the use of rulers, compasses, and set squares, in measuring, in setting out

figures and in drawing to scale, etc. This should be taken rather as a development of arithmetic in the younger classes, and as a branch of mathematics in the elder, than as a part of the instruction in art drawing.

Cardboard modelling and wood-work.

The use of these instruments will also come in connection with several of the manual occupations, chiefly in cardboard modelling and in woodwork, for both of which drawing with instruments is a matter of first importance. Drawing to scale in plan and elevation, the development of surfaces, and exercises in solid geometry, should always form an important part of the syllabus for these subjects. All such occupations, which depend upon drawing with instruments for their basis, should be established and developed as branches of applied geometry.

Drawing to scale.

Drawing to scale should invariably be done from actual measurements made by the pupils themselves. As the measurements are taken, they should be noted on rough sketches previously drawn by the pupils. The most convenient scale to adopt should be determined by the pupils from their own calculations, and not selected for them by their teacher. Each pupil should construct his own scale, on the edge of a straight strip of paper, so that it can be applied directly to the drawing for measurement and setting off sizes. These strips should be kept by the pupils for use in future exercises.

Projection.

Two or three views of the object should, as a rule, be made—usually the front and side elevations, and a plan—and these should always be placed in proper relation to each other on the paper, and showing the system of projection. Scale drawing can thus be made to lead up to, and include the elements of solid geometry. The educational value of this work is very great, and every endeavour should be made to develop it to the full.

Solid geometry.

Art Drawing.

Free drawing on blackboard.

The children in the infant and lower primary department should spend a considerable part of their time in drawing from simple forms and objects connected with nature study and object lessons. They should be provided with pieces of stout mill-board 17″ × 12″, which can be readily obtained in the bazar at a cost of one anna each; these should be treated with Indian ink so that

the drawings may be clearly seen, and they should be secured to the desks in an upright position at about arm's length; where there are no desks, the walls of class rooms may be painted black at a suitable height. On these the children should be taught to draw boldly with chalk many of the simple forms, natural and manufactured, mentioned in the scheme. This free drawing is to be carried on in addition to formal drawing on tinted and white paper. The mill-boards may also be used by the children as flat surfaces on which to rest their paper when engaged in crayon or pencil drawing.

Mass-drawing. As a preparation for formal drawing the young children of the first two primary classes should also be practised in mass-drawing, by which is meant the rubbing on of chalk, or crayon in masses. When beginning this work, round and elliptical forms are best, as the motion required to produce them is the easiest for children, being not unlike a child's natural scribbles, except that they are brought under control. These should be combined with simple lessons on the primary and secondary colours. The teacher should frequently vary the mass-drawing lesson by one on outline. Having provided each child with a leaf he should explain the method of drawing it, by means of the blackboard. He should be careful to rub out his illustration before allowing the children to begin. At this stage the children should be encouraged to represent all they can see both in form and in colour; each child having his own box of crayons should select the colours required.*

Teacher's sketches on blackboard.

Schemes of work.

First and Second Primary Classes.

Infants and 1st primary class. To draw to a large scale on blackboards, mill-boards, or *takhtis*, with chalk, and to a small scale with coloured crayons on tinted or white paper, from objects of simple form and attractive colour, such as discs of red, blue, and yellow colour, not less than 12″ in diameter, coins, biscuits, envelopes with stamps, book covers, flags, playing-cards, kites, hoop, beads, flag and staff, etc.

*Note.—The results at this stage from an adult's point of view may be poor indeed; the teacher should not be discouraged however, but by careful instruction and correction he will lead the children to a more correct rendering of form and colour.

Luggage label, blotter, book with coloured binding, punkha, Chinese lantern, toy mallet, kites, school room scrolls, walking stick, toy rattle, etc. In these classes flat objects have as far as possible been chosen, in order to avoid the difficulties of perspective representation. 2nd primary class—objects.

Leaves of simple form, such as *ber*, *pipal*, etc., and simple fruits. Natural forms.

The above list is suggestive, but not by any means exhaustive. Some of the large examples such as kites, punkhas, flags, etc., will serve as class exercises for demonstrating methods and principles, while of the smaller objects such as biscuits, envelopes, etc., there should be one specimen for every child. Along with this systematic drawing, where proper supervision can be secured, the children should be encouraged to illustrate in their own way the stories told to them by their teachers. Such work, though it may not be correct "drawing," is of great value as a means of expression and should have a place in the drawing scheme. Recreative drawing.

Third Primary Class.

In this class formal drawing, that is, drawing with pencil in outline, will begin, and while continuing to practise the free drawing with chalk of natural forms and objects on mill-boards, exercises must now be given in space judging and practice in drawing lines, combinations of lines, curves, simple and compound. These may be taught in an interesting and intelligent fashion by arranging stout string on the blackboard in the forms required. A reference to the drawings illustrated for this class will show how advantage is taken of space judging to introduce the use of the brush and water colour.* Primary colours should be used at this stage and at the beginning of the session may be prepared by the teacher; towards the end of the session secondary colours may be introduced, and the children allowed to prepare their own colours. The teacher will demonstrate how to hold and use the brush. The greater part of the time should now be spent on pencil drawing and painting, and there will not be time for more than one or two crayon studies. Formal drawing. Water colour washes.

To draw to a large scale on blackboards or mill-boards, with chalk, and to a small scale with pencil, brush, and coloured crayons on tinted and white paper.

* See "Art Drawing for Indian Schools." Publishers, Macmillan & Co., Bombay.

Space judging. Simple exercises in space judging combined with practice in drawing lines, horizontal, vertical, and oblique, combinations of lines, angles, triangles, square, rectangle, simple and compound curves.

Objects. The school bell, a piece of coloured paper with a corner turned down, tennis racquet, a whip, bow and arrow, *takhti*, sword, cane stick with red head, envelopes, set squares, etc.

Natural forms. Leaves—*lasure, angur, bar, ber,* etc. Fruits—coconut, grapes, cherries, etc.

Fourth and Fifth Primary Classes.

Circle in perspective. While continuing the work done in the previous class, using objects of greater difficulty, in these classes it is necessary to introduce the circle in perspective and to draw from objects based thereon. Preliminary practice should be given in drawing a hoop or hoops suspended at various levels, until the pupils can judge fairly well the ellipses required to represent the circle in perspective.

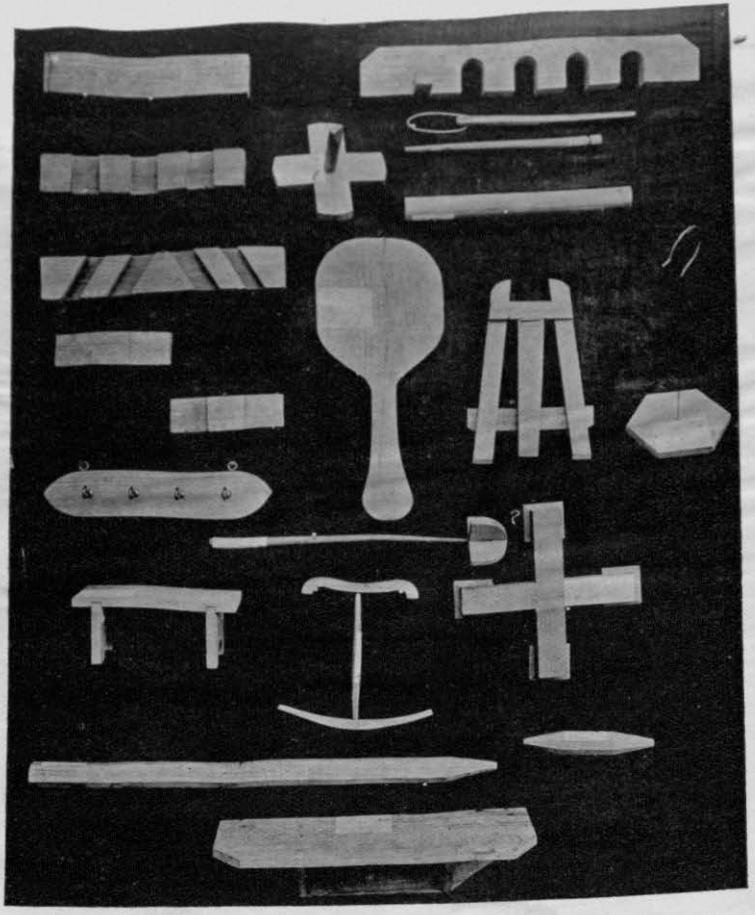
Illustration of principles. Several objects from the scheme should then be selected and put before the class at the same time, and the teacher should show by demonstration that the root principle underlying the representation of any or all of them is exactly the same. For example objects such as *chattu* and a *chakla* may be used as examples of a class of objects whose abstract form is the cylinder, a *kif* or a drinking glass may be used to illustrate the cone. These objects can then be drawn in turn at subsequent lessons. There is no need for the whole class to be drawing the same object; generally at least two objects will be necessary, unless the specimen is very large.

Two objects necessary.

Backgrounds. The objects should be correctly drawn in outline and much importance placed on correct proportion. Suitable backgrounds of paper or cloth of primary and secondary colours should invariably be used. Early in the session, further lessons on primary and secondary colours should be given, and the pupils taught how to mix and lay on washes of the same as illustrated in the scheme. Towards the end of the session the pupils may be encouraged to attempt to render the simple effects of light and shade on common objects with pencil.

Colour lessons.

3. Examples of high school drawing.



The meaning of light and shade should be carefully explained. A sheet of paper displayed in a good light, first as a flat surface, and then bent to a cylindrical form will be found useful for this purpose. The object to be drawn should be placed on a flat surface such as a drawing board and in a good light with a sheet of white paper placed vertically behind it so that it may be more clearly seen, and also to give a standard of comparison. The positions of objects relative to the eye-level should be varied from time to time. Objects such as a hanging lantern or an electric light pendant should be represented in their natural position above the eye-level. Light and shade. Position relative to eye-level.

In connection with nature study, leaves, twigs, fruits, etc., the children should be encouraged to represent all they can see both in form and colour. No attempt should be made to press the leaves. Small pieces of clay or plasticine will be found useful for supporting leaves, shells, etc., in the desired position in front of the pupils. Nature study.

Fourth Primary Class.

To draw with pencil, brush and coloured crayon on tinted and white paper.

Punkha, drinking glass, *chakla*, *mohali*, *kif*, *thali*, *mungli*, horseshoe, *guddi*, brush, football, hockey stick, etc. Objects.

Leaves—*chanane*, *moti*, *loqat*, *nakh*, twigs, buds, fruits of simple form, eggs, feathers, etc. Natural forms.

Fifth Primary Class.

Further exercises should be given in this class in drawing circular forms. The objects after being carefully drawn in good proportion should be rendered in light and shade as truthfully as possible, care being taken to have the high lights left white, and to show reflected lights and shadows correctly. High light and shadows.

Leaves, feathers, fruits, vegetables, grasses, etc., will enable the pupils to keep up their practice with the brush and water colour. These provide excellent material for colour study and should be painted as like the actual colours as possible. Natural forms. Water colour studies.

Ghara, *martaban*, cricket-bat and ball, reel of cotton, drinking glass, shields (various), mallet, chisel, stick of chalk, pencils, matches, pins, cardboard knives, hooks, keys, toys, etc. Objects.

Natural forms.

Leaves—*kaner, pipal, khatte,* feathers, vegetables, pumpkin, *gobi,* etc., grasses and grains of various kinds.

At this stage the pupils should show a greater appreciation of form and colour.

First, Second and Third Middle Classes.

Perspective.

The properties of the circle in perspective must again be clearly explained and demonstrated, carefully drawn outline and good proportion insisted on, and in these classes the study of practical perspective as applied to all rectilinear forms such as boxes, books, parcels, etc., should be begun and continually practised. In order to secure the full advantage of the training in accuracy of observation and rendering to be gained from the study of rectilinear objects, the methods of representation should be as simple and direct as possible. All elaborate systems of construction lines should be avoided and the pupils taught to estimate relative distances and levels, and to compare one mass with another.

Simple methods of representation.

The principles of perspective should be learnt from observation rather than by rule. Great care should be taken to secure the correct rendering of details such as handles, spouts, etc.

Nature of representation in colour.

As a rule the common object studies will be in black and white, but in the third middle class promising students should be allowed to attempt a simple group in water-colour. In connection with nature study, many of the specimens used in the lower classes will again be used, a more perfect rendering of form and colour being insisted on.*

Memory Drawing.

Importance of memory drawing.

In order that the knowledge of form obtained by careful drawing from objects and natural forms may be impressed upon the pupils' minds, memory drawing should be included in the scheme: it affords splendid exercise for the memory and for training the eye to quick and intelligent observation. It is in fact a kind of drill, having a similar relation to drawing as mental arithmetic has to ordinary arithmetic, and should occasionally be practised in all the classes.

* *Note.*—The successful representation of leaves and sprays of leaves depends mainly upon drawing accurately the radiation of a number of lines from the main stalk, and the pupils' attention should be frequently directed to the form of the junction of the leaf and stem.

Method of teaching.

The subject may be taught thus:—an object or natural form may be exhibited for a few minutes and, if considered necessary, passed round the class for examination, then put away; the pupils should proceed to draw it without help or comment by the teacher, or the lesson may be based on the memory of a previous drawing of an object or natural form. The fact that they may be required to reproduce a drawing from memory compels the pupils to concentrate their attention on such things as proportion and the relation of parts to each other. At the close of the lesson the object may be shown, the drawing compared with it and special attention drawn to common errors.

Recreative Drawing.

Supplementary work.

In some schools the giving out of drawing books to the scholars of the primary classes for home and recreative drawings, to be inspected by the teacher periodically, has had encouraging results; not only does it afford a pleasing recreation, but it is a useful supplement to the school lessons, the children being allowed to draw from memory or to select any subject they please.

First Middle Class.

To draw with pencil, brush, or coloured crayons on tinted and white paper.

Objects.

Objects consisting of circles at the top and bottom, joined by vertical, oblique, or curved lines, such as *piyala, dol, gumla, tambiya,* black bottle with label, *mohla,* beaker, *ukhli, chhuri,* ink-bottle, leyden jar, tea box, cigar box, large book, etc.

Individual work.

In addition to the foregoing a large number of interesting examples similar to those given in the junior classes. can be obtained. Being small, they will serve mainly for individual work —such as knives with open blades, wrenches, padlocks, buckles, hinges, scissors, etc., and apt pupils may be encouraged to represent these in water-colour.

Natural forms.

Leaves, *tut, kale, angur, shahtut,* simple sprays of two or three leaves, budding twigs, feathers, tomato, orange, etc.; these provide excellent material for colour studies.

Second Middle Class.

Objects. *Chapni, dawat,* fire bucket, *martaban,* book, tableknife, box, Indian club, barrel with hoops, *hukka,* cup and saucer, mortar and pestle, paint-pot and brush, tools from the workshop, shavings, etc.

Natural forms. Leaves and simple sprays, *jaman, amrud, sukhchain, shisham,* spray of rose leaves, reeds, grasses, broken cocoanut, apple, plum, etc.

Note.—Outlines preparatory to painting or shading should be very lightly drawn.

Third Middle Class.

Objects. Rectilinear forms such as chalk-box, large books, parcel tied with string, barrel, *lota, diva, chatti, topis, parat,* Chinese umbrella, and groups of two simple objects, such as tumbler and lemon, axe and block of wood, ink-bottle and chalk-box, brick and trowel, etc.

Individual studies. Small objects for individual studies, such as a shoe, tools from the workshop, screw-driver, pincers, chisel, and toys of all kinds.

Natural forms. Leaves and sprays of leaves, *tun, am, thore,* seed-pods, shells, feathers, fruits, etc.

Fourth and Fifth High Classes.

Study of colour The pupils in these classes should have acquired the power of representing almost any object, or simple natural form, in light and shade. Further instruction will now be necessary in colour-mixing and in colour matching, and many of the objects should be rendered in water-colour. Groups consisting of two or three objects which have already been drawn may now be given, and as a rule,

Groups. these groups should consist of an object based on the circle, one based on the cube, and one of an irregular form such as a fruit or vegetable, etc., or two rectangular forms may be placed one above the other; these afford excellent practice in the study of practical perspective. Occasionally the objects should be suspended above the eye level.

Progressive nature study. Nature study should be continued from leaves, sprays and buds, twigs, fruits, etc. Studies of twigs and buds should be made at various stages of development.

The question of composition and space-filling should form part of the drawing instruction. The pupils should be accustomed to regard every drawing on a sheet of paper as an exercise in composition and space-filling. The drawing should be so placed on the page as to fill it in a satisfactory manner being neither too big nor too small, and suitable margins should always be left. Composition. Space-filling.

Fourth High Class.

To draw with pencil, brush, and coloured crayons, on tinted and white paper.

Objects and simple groups of objects, *surahi*, tripod and beaker, ink-bottle and quill, *handi*, *khopi*, large box with divisions, *kulah*, *dauri*, books, pair of shoes, turban, *chimta*, travelling trunk, orange or apple in a plate, flag hung in folds, loaf of bread on a plate, etc. Objects.

Leaves and sprays, *nim*, *dharek*, *arand*, buds, rose bud and spray of leaves, shells, melon with part cut out, vegetables, fruits, etc. Natural forms.

Fifth High Class.

Objects and groups of objects, umbrella, *hal*, *gangasagar* and glass, fan, *tarazu* and weights, large book and roll of paper, *hukka* and open book, ink-bottle and chalk box, etc. Objects.

Simple sprays, buds, twigs, flowers, fruits arranged on plate, pea pods, feathers, moths, butterflies, birds, etc. Natural forms.

Materials.

Approximate cost.

	Rs.	A.	P.	
Mill-boards 17" × 12"	0	1	0	each.
Crayons	0	2	0	per box.
White paper	10	0	0	„ ream.
Drawing books	0	2	0	and Re. 0-4-0.
Brushes	0	4	0	each.

Colour pigments can be bought in the bazar at a very small sum and are suitable for the primary classes. These pigments should be mixed with water and boiled before being used.

In the middle and high classes each pupil should have Reeves' three-colour box of water-colours costing ten annas.

Drawing materials kept by teacher.

In many secondary schools in England a charge of about Rs. 2 per head per annum covers the cost of colour, pencils, rubber, brushes, paper, etc., and this arrangement works well in Punjab schools.

The materials remain with the teacher and are always ready for use, thus saving time and trouble.

Note.—For further details and illustrations of those schemes in drawing, see "Art Drawing for Indian Schools" published in English and in Urdu. Publishers Macmillan and Company, Limited, Bombay and Calcutta.

5. A Manual Training Room.

MANUAL TRAINING.

Begun in 1906.

Manual Training was begun at the Central Training College, Lahore, in 1906 in connection with the science classes. For lack of room the work was carried on for some time in a closed-in verandah; in 1912 a special room was built and equipped at a cost of about Rs. 5,000. This subject is now taught to all senior Anglo-Vernacular students of the college, and since 1914, it has been an optional subject for B.A. students, about 50 per cent. of whom take it.

An optional subject.

Manual Training is an optional subject in Punjab schools, and has within recent years been introduced into several Government and aided schools. Grants are made towards the cost of tools and equipment.

Manual training in English schools.

Modern secondary schools in England have as a rule a well equipped manual room attached to the school building; such an arrangement is ideal. In the case of older schools, however, it was found impossible on account of the expense involved to provide manual training rooms for every school, and this gave rise to what is known as the "Centre" system, which has been widely adopted by city school authorities.

The "Centre" system.

When in 1915 manual training was begun at Lahore, it was decided to adopt the "Centre" system experimentally in connection with three city high schools. It seems desirable first to explain what the "Centre" system is, and then indicate the scope and aims of manual training, before giving details regarding the Lahore "Centre."

The "Centre" is a room or rooms situated in a central school or building, to which the boys of three or four neighbouring schools go for training. As a rule centres are built to accommodate from twenty to forty boys at a time, and from four to six hundred boys may receive instruction weekly, in each. This system, although convenient for city schools, is not suitable for country districts, because of the greater distances between the schools.

Aims.

The aims in manual training are two-fold, first that the pupils shall acquire manual skill which shall increase their usefulness

and adaptability in whatever occupations they may afterwards engage. That this is important will not be disputed, for manual dexterity not only plays an important part in the life of a craftsman, but is necessary also in the majority of professions, *e.g.*, in surgery, science, sculpture, painting, dentistry and engineering. The second object in manual training, is the mental and moral discipline resulting from such exercises. The educational results are incontestible; one of these is that manual training has exercised a beneficial reaction on other school studies, and boys, discouraged through failure in literary subjects, have not only "found" themselves in the practical work of the manual training classes, but have taken fresh heart and made better progress in their ordinary school work.

Mental and moral results.

The moral results have been no less valuable; for practical work develops among other things, precision, honesty, and self-reliance. *Precision,* because in making the objects absolute accuracy is insisted on; *honesty,* because in constructive work it is impossible to dissimulate, and conceal ignorance by ambiguity; while *self-reliance* is developed and increased by the acquisition of the power to do things.

In constructive work boys learn to think for themselves about the work in hand, and to form and trust their own judgment.

The Lahore Centre.

The work in Lahore was begun in a hired building, conveniently situated for the schools concerned: it was fitted with ten dual wood-working benches and tools. The building, although it was the best obtainable, was small and badly lighted; at the end of the first year the head-master of one of the schools offered to give a large well lighted room on certain conditions which were agreed to, and since June 1916 the work has been going on under favourable circumstances. Originally equipped to accommodate twenty boys, the centre has recently been enlarged, and now 40 pupils are taken at a time The following particulars are given for the guidance of those who may have to design a manual training room. The room should be rectangular, well lighted and ventilated, its size will be determined by the number of pupils and the lighting should be obtained from the north side of the room. The benches should be placed in rows along the room having their ends turned towards the windows to ensure good light to

The manual room.

the workers. Assuming that the room is arranged in this manner, and that each bench is approximately 4′ 6″ long × 2′ 6″ wide, the width of the room required will be 23 ft.; this allows for a central passage 6 ft. wide, and passages at each side of the room 4 ft. wide. The length of the room will be determined by the number of benches; the space between them should be 3 ft. There should be a clear space of 10 ft. in front of the class; on this, the teacher's demonstration bench, almirah, etc., may be placed. Another 10 ft. will be taken by the teacher's room and store. This will make the length of the building about 50 ft. (See figure 6.)

Fittings.

Benches.—The benches should be strongly and soundly constructed, and fitted with cast steel, instantaneous grip vices. Wood screw vices are cheap, but inefficient. A suitable size for a dual bench is 4′ 6″ by 2′ 6″ and the height should range from 2′ 4″ to 2′ 7″ to suit the boys; it is an advantage to have them fitted with drawers in which drawings and unfinished work may be kept. A drawing of an inexpensive bench is given. (See figure 8)

Tools and tool racks.—Tool racks are shown on the top of the bench; they should be constructed to hold the bench tools of two boys. A list of tools is appended; when lack of funds makes the provision of a full outfit impossible, the tools marked by an asterisk need not be purchased.

Almirahs.—Three almirahs should be provided, one of which should have a glass front in which specimens of finished work may be exhibited; one should be fitted for the storing of special tools, and one pigeonholed for unfinished work.

Accidents.

Ambulance outfit.—A simple ambulance outfit, consisting of a roll of 2″ cotton bandage and a bottle each of carbolic oil and 'new skin,' should be kept in every Manual room, so that in case of accident simple remedies may be at hand.

A collection of specimens of the different kinds of timber used in the district should be made. After having been properly labelled and classified, these may be used in connection with the lessons on the growth and structure of timber.

Store room.

A store room in which to keep timber and materials is necessary. Along two adjacent walls of the store room iron bars

should be inserted at distances of two feet apart to support the timber, which may be placed on end, or horizontally, as desired. Shelving should be fitted round the remaining walls for storing nails, glue, metal and sundries.

Teacher's room.

A small room, simply furnished, should be provided for the teacher's use, it should contain an almirah for stationery, etc.

Methods of instruction.

In every class, boys vary greatly in manual skill, ingenuity, and resourcefulness, and their instruction should be varied accordingly. The work should be based on an ordinary sequence of tool operations. As a rule, a new piece of work should involve some one new difficulty; for example, the use of a new tool or the use of a familiar tool in a new way. Definite instructions in the use of new tools, and of new materials are always necessary, and practical demonstrations should be given of every difficult bench operation.

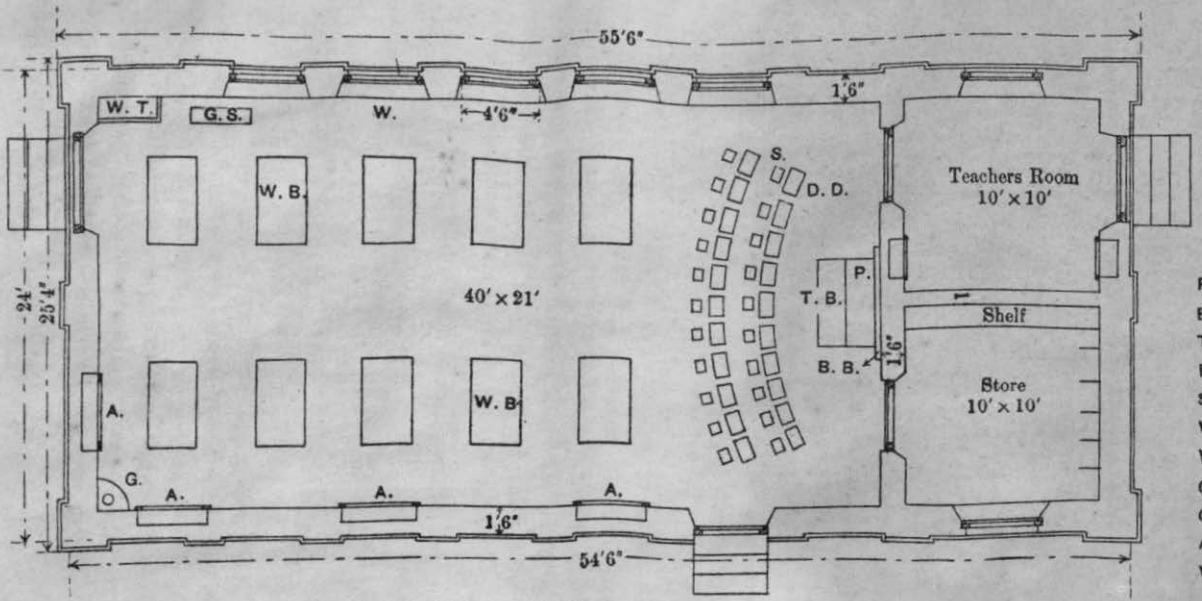
Scheme of work.

Some teachers adopt a rigid scheme of work consisting of "exercises" and "models" carefully graded in difficulty. This plan has its advantages; at the end of the course pupils have learnt how to use certain tools and to perform certain operations; all the pupils have made the same things, and healthy competition has been aroused.

The weakness of such a scheme lies in the small demand made on the inventive powers of the pupils. Many teachers have adopted another plan, allowing their pupils to suggest the objects or to modify their size or shape. In Lahore we have tried to combine both the methods described, and it has been found possible to retain a satisfactory gradation of difficulty, and at the same time encourage originality. It should be remembered, however, that until a boy has acquired a working knowledge of the ordinary tools and some skill in their use, he cannot be thrown on his own resources. At every stage a boy's own suggestions should be welcomed.

Skill and accuracy.

Importance should be attached, not only to principles and methods, but also to craftsmanship. A degree of accuracy suitable to the material and to the development of the pupil should always be demanded. Accuracy should increase with experience. Too great a degree of accuracy should not be looked for in the earlier stages.

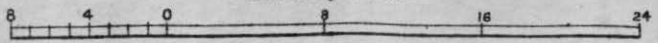


REFERENCES.

P.	Platform
B. B.	Black Board
T. B.	Teachers Bench
D. D.	Drawing Desk
S.	Stool
W. B.	Work Benches
W. T.	Water Tub
G. S.	Grinding Stone
G.	Glue Pot
A.	Almirah
W.	Windows

6.—PLAN OF MANUAL TRAINING ROOM FOR A HIGH SCHOOL.

Scale of Feet.



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The course should include the construction and use of the simple joints employed by carpenters. This work (though subordinate in character, since it is only a means to an end) needs to be carefully taught. The type of models made will naturally vary with the locality. In agricultural districts, the objects may properly be taken from the farm; the more advanced boys might, for instance, make an egg box, a pigeon box, a hencoop, models of farm implements as a plough, etc.; in iron work, a hasp, a bolt, different kinds of hooks, hinges, etc., may be included. Courses of instruction.

In practical life much of the work done with tools at home is connected with mending and repairs; a good course will include such work.

In the earlier stages rectilinear work of different kinds should predominate, and curved work should be introduced gradually; the course should be associated with the special interests of the boys in practical life, and will include the construction of simple apparatus and working models. Boys who show a special bent should be encouraged, and given every opportunity for carrying out original ideas.

It is often an excellent thing to arrange for the co-operation of more advanced boys in doing a larger piece of work. Such objects as a set of book-shelves for the school library, or a cabinet for the museum, etc., may be made in this way. The value of this work is increased where the control is taken by the boys themselves, the teacher acting only in a consultative capacity.

Where it is thought desirable to make metal the medium of instruction rather than wood, special metal work benches fitted with smiths' vices will be necessary. For forge work, an annexe with a fire proof floor is desirable. The work may begin with bent iron and flat sheet metal work. After soldering has been taught, it will be possible to introduce the construction in sheet metal of many simple objects, such as are made by zinc-workers and tin-smiths. Later the boys may go on to screw cutting with stocks and dies; drilling and rivetting are important operations, and can be taken comparatively early. Simple forging operations, for instance, "drawing down," "upsetting," "scarfing," "tempering" and simple "welding" are useful and interesting, and within the capacity of boys of 15 years of age. Metal work.

Care of tools.

The course should invariably include instruction in the care of tools. Boys at wood-work should learn how to set and sharpen their tools. They may begin by learning to sharpen a chisel on the oil stone, and as they grow stronger, go on to learn the use of the grindstone.

Drawing.

Drawing should be associated with wood and metal work. Boys should be taught to make scale drawings and dimensioned sketches, and to work from them. In the earlier stages the pupils should use the ruler and set squares only. Drawing boards and T-squares should be introduced as soon as the boys have learnt how to use the ruler and set squares.

The drawing may frequently be made from a completed model the dimensions being taken by the boys themselves directly from the object. Isometric projections may occasionally be made.

The ability to read drawings is essential, and to gain this, much practice is required.

Drawing desks.

The drawing desks should have hinged lids so that drawing boards, T and set squares may be kept in them; stools should be provided. The desks should be about 2′ 10″ high and the tops should have a slope of about fifteen degrees. A good sized blackboard should be provided and a platform on which the teacher's demonstration bench may be placed.

Correlation with other subjects.

Manual training should not be regarded as an isolated subject, but should be associated with science, geography, art, etc. The manual training room should be looked upon as a place not only where formal lessons are given, but also as a place where a boy may carry out his constructive ideas and experiments.

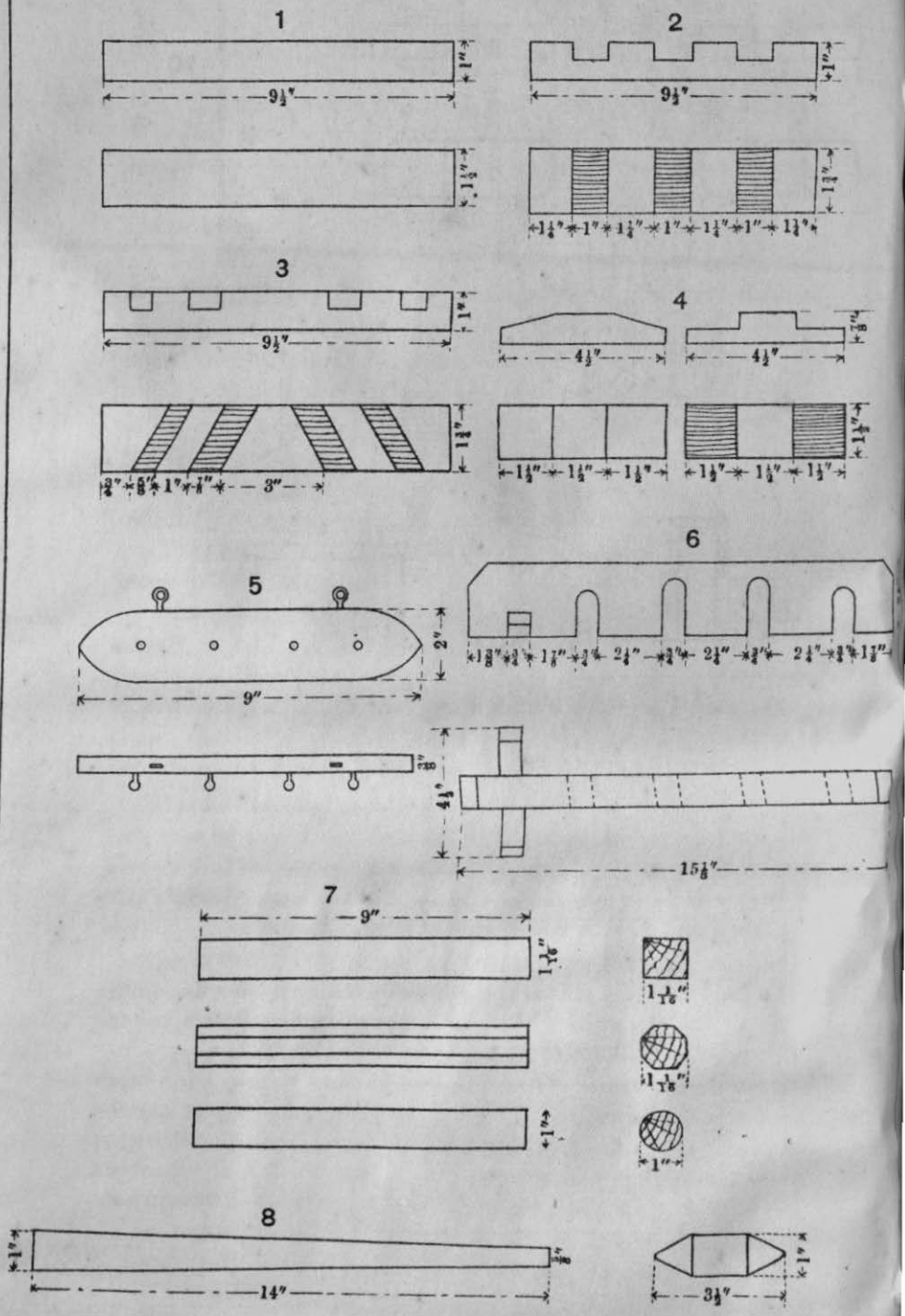
The ordinary boy is full of constructive curiosity which if wisely directed may have far-reaching results, important alike for the individual and the community.

Models to be returned to pupils.

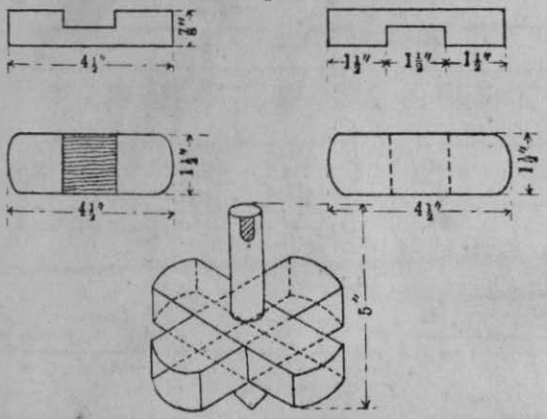
A point I should like to emphasise is that it is essential to the success of a manual training scheme that the objects made should become the property of the pupils. It will be found that boys very naturally desire to have possession of their work, and the knowledge that at the end of the year the models will be returned, adds greatly to the interest and diligence of the pupils.

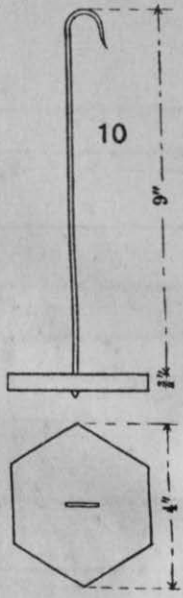
Cost of building and equipment.

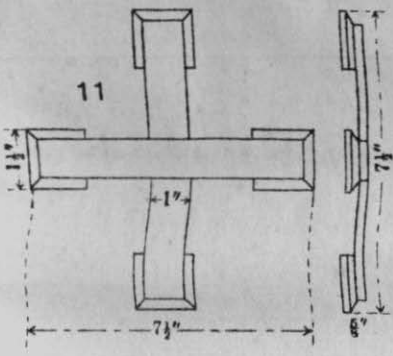
As regards the cost of a building and equipment it is difficult to speak with certainty, as prices for buildings vary in almost

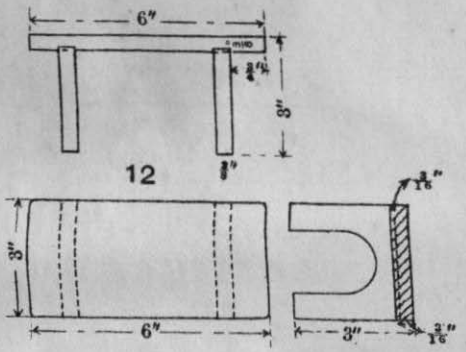


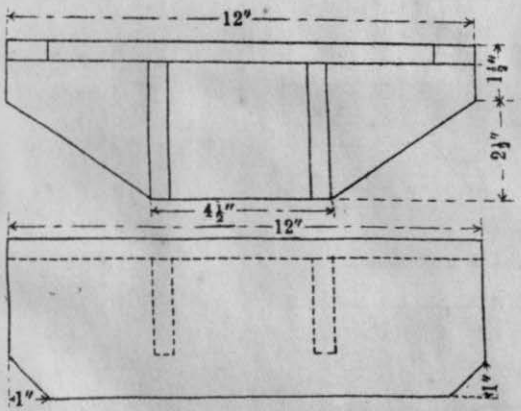
7.—A FIRST YEAR'S


9
4½"
1½"
1⅝"
1½"
1½"
4½"
1½"
4½"
5"


10
9"
4"


11
1½"
1"
7½"
7½"
6"


6"
3"
12
3"
6"
3"


12"
1½"
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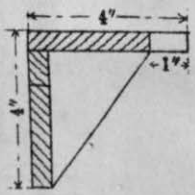
4½"
12"
1"
1"


4"
1"
4"
13

every district, and, owing to the present war, the prices of tools have increased, and are likely to go on increasing.

The following is an approximate minimum estimate for a room to accommodate twenty pupils :—

	Rs.
Brick building (see figure 6) having a wood block floor, with accommodation for 20 boys, a wood store, and teacher's room ; inside sizes 50′ × 23′	3,000
Benches, Tools, etc.	1,000
Total .	4,000
10½ wood work benches (see figure 8) at Rs. 25	262-8
21 instantaneous grip vices at Rs. 10 . .	210
21 sets of bench tools at Rs. 15 . . .	315
Special tools including grindstone . .	200
Freight, say .	12-8
	1,000

The amount of timber or metal, etc., required, will vary with the course followed ; an approximate estimate would be Rs. 2 per pupil per annum.

The following models are suitable for a first year's course ; dimensioned drawings, in plan and elevation, are given in the plate attached (Figure 7).

1. Sawing and planing exercise.
2. Cross notching.
3. Oblique „
4. Door fastener.
5. Key rack.
6. Marble board.
7. Round Ruler.
8. "Guli danda."
9. Spinning top.
10. Letter file.
11. Stand for flower-pot.
12. Science bridge.
13. Bracket.

The models shown in the photographs were made by Lahore boys.

TOOLS AND EQUIPMENT.

The following tools and appliances are required for a class of 20 pupils:—

Planes—

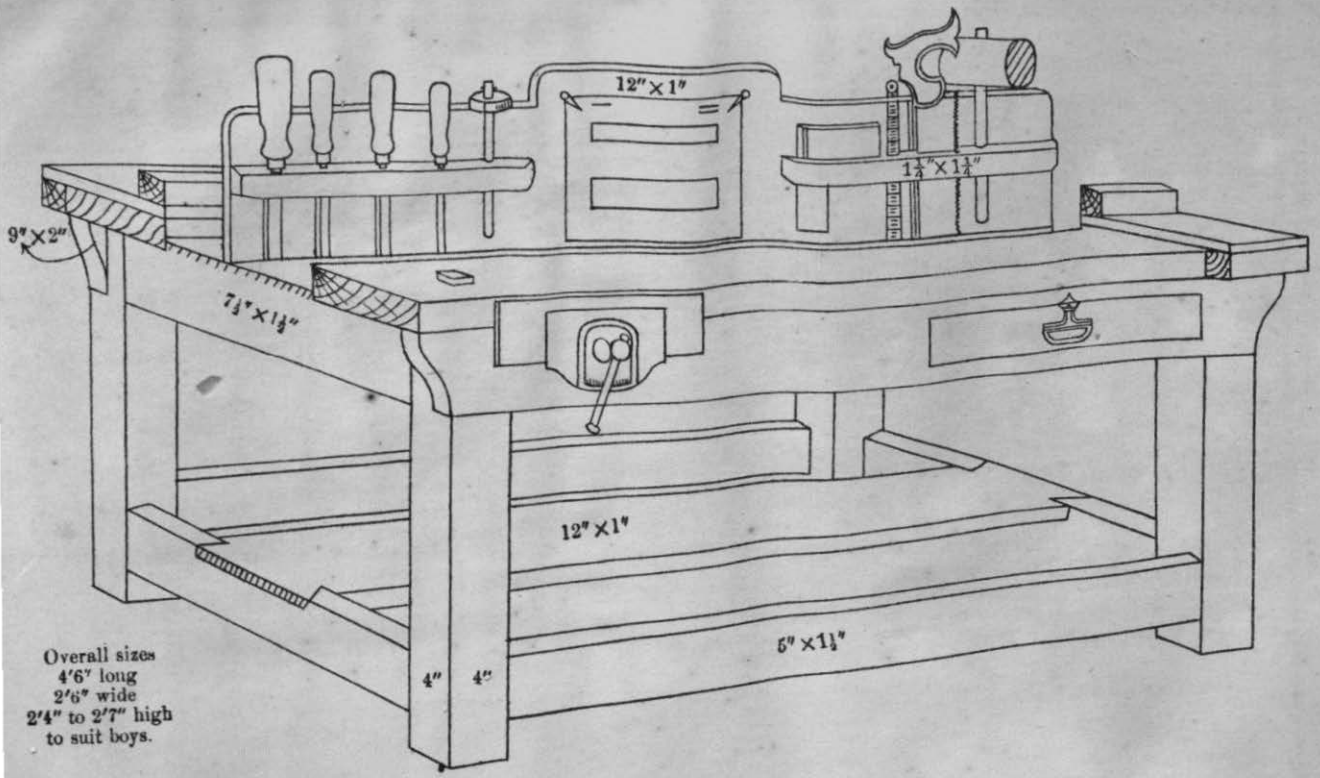
20 Jack 2″ iron; *may be of country pattern.*
* 2 Trying 2½″ iron.
6 Smoothing 2″.
1 Stanley iron smoothing 9″.
* 2 1¼″ Rebate (skew mouth).
* 1 Side fillister.
1 ¼″ Bead plane (boxwood slip).

Saws—

20 Tenon 10″ brass or iron back; *may be of country pattern.*
4 Panel 22″.
2 Rip 24″.
* 2 18″ Frame bow, three spare blades.
2 14″ „ „ „ „ „
1 Pad saw with ebony handle, 3 spare blades.

Chisels with handles—

20 Firmer chisels 1″.
20 „ „ ¾″.
20 „ „ ½″.
20 „ „ ¼″.
10 „ „ ⅛″.
6 American Socket ¼″.
6 „ „ ⅜″.
10 „ „ ¼″.
6 Gouges firmer 1″.
6 „ „ ¾″.
6 „ „ ½″.
6 „ scribing ¾″.
6 „ „ ½″.
20 Try squares 4½″.
1 Try square 12″.
20 Marking gauges (beech); *may be made locally.*



Overall sizes
4'6" long
2'6" wide
2'4" to 2'7" high
to suit boys.

8.—WOODWORK BENCH FOR TWO PUPILS.

No. 607-3-2000

TOOLS AND EQUIPMENT—*continued.*

2 Mortice gauges, thumb screw slide.
2 Pairs iron (wing) compasses 6″.
20 Steel 2′ 0″ rules having English and metric markings (Rabone & Sons, No. 1644).
10 Bench Brushes 10″ size.
3 Basolas.
2 Glue brushes.
1 Wire brush for cleaning files.
1 Pair blackboard compasses.
1 Blackboard ruler.
* 2 Cramps 30″ (steel).
12 Half round rasps 8″ medium.
* 4 Round files 6″ handled.
6 Saw files triangular section.
6 Claw hammers, American pattern.
20 Carpenter's mallets; *may be made locally.*
2 Washita oil stones.
6 Oilstone slips for gouges (assorted sizes).
2 Pair pincers 7″.
3 Pairs round nosed pliers 5″.
3 Pairs bell hanger's cutting pliers.
10 Screw drivers 9″.
3 Stanley iron spokeshaves 2″.
* 3 Iron spokeshaves round face 1½″.
5 9″ Bevels (rosewood).
2 Ratchet braces 8″ sweep.
2 Sets centre bits from ¼″ to ¾″ by $\frac{1}{16}$″.
2 Sets shell bits from ⅛″ to ⅜″ by $\frac{1}{32}$″.
1 Each wood countersink bits ⅜″ and ½″.
1 Each brass countersink bits ¾″ and ½″.
2 Country drills.
* 1 Set Jennings auger bits.
* 1 Expansion bit 3″.
*12 Assorted bradawls (handled).
1 Glue pot ¾ pint.
1 Grindstone 24″ by 3½″ fitted with iron stand and Isley's grinding attachment complete.

TOOLS AND EQUIPMENT—*concluded.*

2 Country turning lathes and tools.
2 Sawing trestles 2′ 6″ long.
12 Nail punches (assorted).
2 Oil cans bench small.
1 Oil stove with iron tray for glue.
1 60° black board set square 18″.
1 45° „ „ „ „ 18″.
20 Drawing boards.
20 Set squares 45°.
20 „ „ 60°.
20 T—squares.

Estimates for the supply of tools may be obtained from Bombay and Calcutta firms.

Materials for one session's work—

1 Quart sperm oil.
1 Quart linseed oil (raw).
4 lbs. Scotch or French glue.
3 Quires each glass paper *Nos.* 1, 1½ and 2.

Oval wire nails—

2 lbs. 1½″.
3 lbs. each 1″, and ¾″.
Brass escutcheon pins.
2 lbs. each 1″ and ¾″.

Screws—

1 Gross each, 1½″ No. 10, 1¼″ No. 10.
1 „ „ 1″ No. 8, ¾″ No. 6, ⅝″ No. 4, ½″ No. 4.
Brass screw (round heads).
2 Gross each, ¾″ No. 4, ⅝″ No. 3, ½″ No. 3.
2 Gross cup hooks ½″ brass or iron.
1 Gross drawing pins.
2 Reams drawing paper.
2 lbs. India rubber.
1 lbs vaseline.

The amount of wood or metal required will depend on the course followed.*

* *Manual Training for Indian Schools* (Oxford University Press, Bombay) by Mr. J. Y. Buchanan, may also be seen.

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No. 2. Vernacular Reading Books in the Bombay Presidency. By J. G. Covernton. (*Out of print.*)

No. 3. The Educational System of Japan. By W. H. Sharp. (*Out of print.*)

No. 4. Furlough Studies. By J. Nelson Fraser, H. Sharp and G. W. Küchler. Rs. 2.

No. 5. Training of Secondary Teachers. By H. R. James, H. Sharp and J. Nelson Fraser. As. 8.

No. 6. Educational Buildings in India. Rs. 5.

No. 7. Methods of School Inspection in England. As. 8. By H. G. Wyatt.

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Indian Education in 1914-15. Rs. 2.

Indian Education in 1915-16. As. 8.

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