The earlier exercises should include some such as the following:—

Sawing off across the grain of the wood, and sawing along the grain of the wood, blocks and strips of given dimensions taken from a drawing prepared by the boy himself from a model, and having marked on it the required dimensions. Many varieties of tenon and of halved joints can be made in the rough by the saw alone.

The use of the plane can be commenced by planing small surfaces about 9in. in width and then planing down strips to a given thickness. The planing of two surfaces at right angles to each other, the preparation of a right square prism and of a hexagonal prism, and the construction of a straight-edge with bevelled edges can follow.

The joints used by carpenters form a valuable series of exercises in which the use of the chisel may be learnt; such as the various forms of halving, of mortise and tenon, notching, dowelling, dovetailing, groove-and-tongueing, and scarfing with keys or wedges. The teacher should draw up a complete series of simple and graduated exercises for the early stages which all members of the class should execute in turn. No attempts should be made at first to construct small articles of furniture.

The proper use of nails and screws should be explained and practised till a fair measure of accuracy has been attained.

So far the instruction does not involve the use of curved surfaces. If the workshop is provided with a lathe, another graduated series of exercises might be arranged to include the simpler forms of turning, but this is not insisted on.

In iron the student should begin by chipping a plane surface, then completing it with a file; filing a cube till the sides are accurately plane and parallel to each other; making a hexagonal prism and a hexagonal bolt-head will be found good exercises for using the file. Drilling a circular hole in an iron plate, screw-cutting, and similar exercises will enable a lad to take part in the construction of some useful tool for the workshop. Instruction may subsequently be given in the methods of joining metal-work by welding, riveting, &c. The use of cold riveting may be shown even where there is no smith's hearth. A similar series of exercises might be introduced for brass in place of iron. Where facilities exist a lathe for metal-work and a blacksmith's forge will be found extremely useful.

There should be not less than 4ft. run of bench for each boy under instruction, and he should have a space of at least 2ft. in width in front of the bench. The room should be well lighted and ventilated. There should be a bench and set of tools for the use of each scholar when under instruction, with a proper place in which to keep them, each bench being provided with a wood or metal vice as the case may be. A teacher cannot properly direct the manual instruction of more than about twenty boys at one time.

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6. PROGRAMME OF THE CITY AND GUILDS OF LONDON INSTITUTE EXAMINATIONS FOR TEACHERS OF MANUAL TRAINING IN PUBLIC ELEMENTARY SCHOOLS.

Manual Training—Woodwork.

With the view of certifying to the efficiency of qualified teachers under the Education Department of Public Elementary Schools to give instruction in woodwork in accordance with the provisions of the Code (1890), the City and Guilds of London Institute is prepared to issue certificates to such teachers on the following conditions:—

1. The candidates will be required to give evidence of having regularly attended, during the session preceding each examination, a course of at least twenty practical wood-working lessons given on separate days in a school or class registered by, and under an instructor approved by, the Institute.

Each lesson should be of at least two hours' duration; and no two lessons may be given on the same day.

In order that a class may be registered, it must be under the direction of a committee of a School Board, or municipal council, or technical school, or other public body.

2. The candidates will further be required to pass two examinations, one at the end of each year's course, to be conducted by examiners appointed by the Institute, and to pay a fee of five shillings for each examination.

First Year's Examination.

The examination to be held at the end of the first year's course will consist of (1) drawing, (2) practical exercises in wood-working.

Provision for holding the examinations and arrangements for supervision must be made by the committee of each school. Either tools must be provided for the practical examinations, or the candidates must be required to bring them.

1. *Wood-working.*—Candidates will be provided with suitable sawn pieces of wood, and will be required to reduce them by the plane, saw, or chisel to any simple forms shown by dimensioned sketches. They will also be required to construct from such pieces of wood any of the simpler joints, or any very simple combination of such joints, to dimensioned sketches.

2. *Drawing.*—Candidates should have clear notions regarding the accurate representation of solids on a flat sheet of paper. The nature of the following kinds of projection should be understood:—

(*a.*) Orthographic projection (plan, elevation, section) in which the projectors are at right angles to the plane of projection.

(*b.*) Oblique projection, in which the projectors are parallel to each other, but oblique to the plane of projection.