

The Manchester Technical School formulates a very complete course of study in this section. Under the heading of "Decoration" are the following: (1) Plain gilding; (2) lining and outlining; (3) preparation of cutting of stencil; (4) advanced stencilling; (5) painting of flat ornament in colours and gold; (6) painting ornament in light and shade; (7) preparation of working drawings, pounces, &c.; (8) enlarging, reducing, and adapting ornament to technical requirements; (9) the use of gold and other metals, and the mode of application; (10) the decoration of relief-ornament in colours and metals.

Under "Drawing" come: Freehand drawing of ornament, elementary freehand brush-work, elementary plane and solid geometry, elementary principles of design, distinguishing features of style in ornament, drawing to scale from actual measurement.

Under "Measurement" come: Measuring for preparation of drawings, measurements for estimating and quantities, preparation of a specification.

The following text-books will be found useful: "Painting and Decorating," W. T. Pearce; "Manual of Home Painting," Ellis Davidson. Reference works are: "Colour," A. H. Church; "Chemistry of Paints and Painting," Church; "Painters' Colours, Oils, and Varnishes," C. H. Hurst; "Grammar of Ornament," Owen Jones; "Art of Graining," Sutherland; Lewis F. Day's "Text-books on Ornament and Design"; Frank Jackson's "Lessons on Design"; "The Journal of Decorative Art"; "Building World"; "Plumber and Decorator."

Each student in the Manchester School takes up and carries through a definite piece of practical work from start to finish. Prizes are offered in many centres by the painters' societies and unions, and by private firms.

*Plumbing.*—Large classes are in operation in every centre visited, one class of the Regent Street Polytechnic having as many as 150 students. In some institutions students are admitted free to drawing classes, and to classes in physics and chemistry of plumbing.

In all cases models and diagrams of the latest and best appliances are available for the use of the students. The course of instruction generally embraces the following sections: Workshop arithmetic; geometry and drawing; elementary physics for plumbers; workshop appliances, and the principles of their action; the methods of obtaining measurements from plans; simple examples of estimating the cost of work; simple examples of obtaining plans and sections.

In practical work: The various tools required, and the method of using them; straightening sheet-lead and tin, lead pipes, &c.; preparation of seams for soldering sheet-lead and tin; methods of soldering sheet-lead with fine tinman's and plumbing solder; preparation of solder, soil, &c.; preparation of joints for soldering with iron, blowpipe, and metal; joint-making; calking joints with lead and rust cement; joints of earthenware, &c.; hot- and cold-water arrangements; bending, bossing, and lead-working in various forms.

The text-books generally in use were: T. W. Clarke's "Plumbing Practice"; S. S. Hellyer's "Lectures on Sanitary Plumbing"; Dr. Willoughby's "Hygiene"; Davies's "Plumbing." Reference works: T. Wright Clarke's "Plumbing Practice"; Rivington's "Building Construction"; Hood's "Warming and Ventilation of Buildings"; Latham's "Sanitary Engineering"; "Domestic Sanitary Drainage," by Maguire; Parry's "Water: its Collection and Distribution," &c.

In Manchester sanitary lectures are arranged for women, and for women sanitary workshop inspectors.

In London the course of lead-work for plumbers is amplified at the Arts and Crafts Institution in Regent Street by what is usually described as "external plumbing," including sheet-lead casting, simple casting in sand with open moulds, and generally the art of moulding in sand, samples of which were turned out by the students during my presence; pattern-making, especially the use of lead for patterns; pierced-lead work; incising, stamping, punching, and inlaying lead; tinning used ornamentally on lead, &c. Some of the objects to which the above processes are applicable, and in the design and making of which practice is given, are: Ridges and finials; gutters, pipe-leads, and cisterns; crestings, valances, tablets for inscriptions, flower-boxes, &c.

Considerable discussion is at present going on in England in relation to the certificating of plumbers. From inquiries made I strongly advise the City and Guilds of London Institute's examinations as being the best for our plumbers.

Regarding the examination in honours, there has been no practical examination up to the present, but Sir Philip Magnus informs me that such an examination will probably be held in 1899.

I would urge the adoption of a recognised certificate in the theory and practice of plumbing, the same to be required from all plumbers before a license shall be granted to carry on the trade of a plumber.

The recommendations of master plumbers in relation to subjects of instruction are fully covered by the various syllabuses of instruction. A suggestion is made under the heading of "Departmental assistance," to the effect that capitation upon practical classes should be increased to such an extent as to require no fee for the use of materials being charged, as has in some cases been done.

*Building Construction and Drawing* is one of the most important of all subjects connected with the building trades. The importance of a knowledge of drawing cannot be overestimated, for, although it is not always necessary for the workman to make a drawing, it is absolutely necessary that he should be able to read one. Large classes are held in every centre in Britain, and in every case ample illustration is provided by models and diagrams, and by specimens of all the different kinds of timber. Brick-work is illustrated by models, and in almost every school visited the lantern is freely used for the illustration of lectures continuously given.

The course of work generally includes the execution of working drawings such as are required by builders or architects, the setting-out of masons', carpenters', plumbers' iron- and brick-work.