

taught ; but methods of practice are left almost entirely to be learned in actual work. With the main exceptions of surveying and draughting, in which the school has a very thorough course in both theory and practice, there is very little of actual office or field work attempted. This is only as it must be.

Before we learn methods of practice, we ought to learn methods of reasoning; if we have our methods of reasoning, the methods of practice follow easily and quickly.

We can divide the engineer's field of study into three divisions: (1) Methods of nature, including facts which may hardly be said to be methods, *e.g.*, the three angles of a triangle are equal to two right angles. Under this heading I would include all the laws of Chemistry, Optics, Hydrostatics, Dynamics, and Mechanics, etc., and nature's methods as shown in Mineralogy, Geology, etc., and also the facts of geometry, and those facts connected with the peculiarities of substances—such as, iron can sustain a tension of so many pounds to the inch.

(2) Methods of reasoning, both in connection with the methods of nature, as in the theory of internal stress; also methods of reasoning, pure and simple, which in themselves are of no ultimate value beyond mental training, but which form foundations and steps for further reasoning, as in algebra.

(3) Methods of practical dealing with the methods of nature, methods of practice in turning the methods of nature to our use, *e.g.*, turning the energy of the combustion of coal into a form convenient for use, as in the steam engine or gas engine; the application in the construction of a bridge of the power of iron to resist stress, and of the facts of geometry, and the theory of mechanics, together with a consideration of all the circumstances surrounding both the present construction and the future life of the bridge.

The school training of an engineering student consists chiefly in Nos. 1 and 2, and in preparing him to pursue his studies in No. 3.

We have the difference between the so-called "theoretical man" and "practical man." The man who is only practical and sneers at the theoretical man is only in No. 3, and knows very little of Nos. 1 and 2. But it is self-evident how extremely more practical the theoretically trained man can be when he has his methods of practice.

The engineering student's chief work should be in the training of his mind; the training of the mind in methods of reasoning, thought, and observation. Consequently do not fret because you will not be able to build a "Forth" bridge on graduating, but devote yourself to this training of your minds.

The main thing, I believe, consists in the training of the mind; quick-

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