

But mining schools exist primarily for the training of mining engineers, and this objective is ever present in the mind of the governing bodies of the American and German mining schools. The defects of the Otago course have been removed, this having been effected by the system of practical work inaugurated by the late Director, and the revision of the curriculum adopted in 1901, which have brought the graduate course abreast of that of the leading American mining schools. The results have amply justified the more stringent and practical course now prescribed and enforced.

The mining school is not able to turn out trained mining engineers, but it prepares the graduates by a system of careful specialisation to be competent to occupy positions as assistant geologists, assistant mine-managers, mine-surveyors, mill assayers, and foremen of cyanide-works. It is in these occupations that the shrewd student accumulates the practical experience and knowledge of detail which afterwards form the foundation of his successful professional career.

A union of theory and practice has often, and rightly, been emphasized by many writers on technical mining education. A judicious union of the two is admitted to be necessary for a proper and intelligent understanding of any professional subject, but it should be borne in mind that theory and practice, although co-ordinate, are not necessarily equal.

In some subjects the theory dominates the practice; in others the practice dominates the theory. For example, in the extraction and recovery of gold from its matrix by solutions of potassic cyanide, a proper understanding of the theory is more important than the practice, which is largely mechanical and easily acquired. Conversely in assaying the theory is simple; but the practice—that is, the skill and precision necessary for the performance of assays that could form the basis of commercial valuations—can only be acquired by long and diligent practice in the laboratory.

Again, in the case of geology the theory and practice are alike simple and easy to acquire; but not every geological student, not even the brilliant student, is a potential geologist. To theory and practice must be added the geological faculty—a mental attitude or function not easily defined—which experience has shown to be rare, but, to some extent, capable of cultivation.

The relative value of theory and practice must be considered in each case, and the instruction so regulated that the one shall be the complement of the other.

It is believed that the success of American mining education is principally due (a) to specialisation and (b) to the employment of experienced professional men as teachers in the different departments of mining and metallurgy. It has long been recognised in the United States that the brilliant student without experience is of no value as a teacher in such professional subjects as mining engineering and geology.

The pre-eminence of German graduates in all departments of metallurgy is held to be due to three principal causes—namely, (a) judicious specialisation; (b) thoroughness of instruction in chemistry; and (c) the opportunities which students possess of obtaining practical experience in almost every class of metallurgical operation.

So far as New Zealand is concerned, mining students have no opportunity to engage in or even see the metallurgical operations connected with the production of iron, steel, copper, zinc, lead, silver, antimony, &c. And since information concerning these, imparted by lectures and textbooks, must necessarily be unsatisfactory and to some extent superficial, special attention is devoted to the production of gold, which is the dominant mining industry of New Zealand, the Commonwealth of Australia, and South Africa, and the occupation in which the majority of the Otago graduates find employment.

GERMAN MINING SCHOOL EXAMINATIONS.

For a number of years it has been agreed that a written examination paper of some six or eight questions, in a technological subject covering a course of study extending over six months, is an unsatisfactory and inadequate means of ascertaining the knowledge and proficiency of a student in that subject. The Germans, with a view of increasing the efficiency of mining education, have lately introduced in their leading mining schools some radical changes in the conduct of the examinations for mining engineers.

Written examinations have now been relegated to a subordinate place. In view of the great extension of mining technology, it has been deemed advisable to divide the examination into two parts—namely, preliminary and final, the former being held at the end of the student's second year, and the final at the end of the fourth year.

Preparatory to the preliminary examination, the student, among other requirements, must submit two drawings and two freehand sketches of mining machinery or other appliances not too simple in character, and two simple essays or theses on appliances or methods with which the candidate has become acquainted in the course of his prescribed year of practical work. If these requirements are satisfactorily performed the candidate is put through a *vivâ voce* examination in the following subjects: Higher mathematics, physics, inorganic chemistry, mechanics relating to mining, and mineralogy. Failure in any one subject in the *vivâ voce* examination debars the candidate from passing, but he may present himself for re-examination in that subject at the end of three months. If a candidate fails in more than one subject all the subjects of examination must be taken again.

Candidates for the final examination must accompany their applications with satisfactory certificates of class attendance and practical work, and the following theses, attested by a declaration that they are the work of the candidate himself—namely, a geognostic description of some mining district or mineral deposit; a description of mining machinery, or of an electro-technical installation; a geodetic or surveying paper recording work actually performed by the candidate, with calculations, profiles, and full explanations; and a drawing of some complicated mining machinery or appliances, or a short description, sketch, and calculations of similar machinery of the candidate's own design.