

TEACHING OF MATHEMATICS IN GERMANY.¹

IN previous issues we have referred to papers on English education in mathematics which were laid before the 1912 International Conference on Mathematical Teaching. We have now before us, in five volumes, the German contribution to that conference. They give an account of mathematics at the primary and secondary schools, at the universities, in technical education, and in training colleges for teachers. They deal mainly with Prussia, but include also the non-Prussian parts of the German Empire, with an occasional reference to Austria.

Germany also has its reform movement in mathematics, and most of the changes that have been made lie to the credit of a body which bears the euphonious name of "der Damnu," into which its full title "Deutscher Ausschuss für den Mathematischen und Naturwissenschaftlichen Unterricht" has for the sake of brevity been telescoped. This body was formed in 1907, by the united action of a number of voluntary scientific associations, and is playing much the same part that the British Association committee has played in this country.

The aims and the present position of the movement are well illustrated by a scheme of teaching proposed by Dr. Schimmack for the Oberrealschule. The scheme covers the nine school years between the ages of nine and eighteen.

In geometry the scheme begins in the manner to which we are now accustomed in England, with measuring, drawing, practice with instruments, and work which familiarises geometrical concepts.

It is noticeable that there is two years' work in geometry before algebra is begun. This procedure, so excellent because of the more abstract and difficult nature of algebra, is not the result of the reform movement, but has long been the practice in Germany. It is a promising sign that the report of the curriculum committee of the Headmasters' Conference advocates this procedure, and gives us leave to hope that in this matter England will follow Germany's lead.

Algebra, then, is begun in the fourth school year, geometry having been begun in the second. It leads off well, with signless quantities, and it is rather a pity that the subject is not carried on for a year or so with such quantities before the distinction between positive and negative quantities is introduced.

The trigonometry of right-angled triangles is to be introduced in the sixth year, as is also "projective geometry" (or cross-ratio geometry). The former proposal would find much support in this country; the value of the second item is not so clear.

In the seventh year the calculus is begun, differential and integral at the same time, a proposal which many in England will approve. Not so many will, however, approve of Dr. Schimmack's relegation of arithmetical and geometrical series to their proper place beside the calculus.

The scheme closes with "discussion of the foundations of geometry," too metaphysical perhaps for most boys; but we must remember that the scheme is intended for the Oberrealschule, and that less ambitious schemes would be appropriate to the Gymnasium and Realgymnasium.

An important note is appended to the scheme to say that throughout the course geometrical figures are to be thought of as variable and not rigid, and

¹ "Abhandlungen über den mathematischen Unterricht in Deutschland-
veranlasst durch die Internationale Mathematische Unterrichtskommis-
sion." In twenty-five parts. Herausgegeben von F. Klein. (Leipzig and
Berlin: B. G. Teubner, 1909-12.)

"Berichte und Mitteilungen veranlasst durch die Internationale Mathe-
matische Unterrichtskommision." In four parts. (Leipzig and Berlin: B. G.
Teubner, 1910-12.)

that attention is to be directed to the interdependence of the parts as the form of the figure changes.

The consideration of this scheme goes to justify our English reformers in their view that they are not sacrificing thoroughness to the desire to cover ground. It is much that the Germans, with their love of beginning from the very foundations, should declare for "functional thinking" from the start, for the introduction of trigonometry at fourteen or fifteen, and of the calculus at fifteen or sixteen, and should feel it possible to prune the course sufficiently to allow that.

The language of these volumes is at times curiously heavy. One happens on long, long sentences the meaning of which cannot be extracted by ordinary reading; they have to be logically dissected. And such sentences are frequent. Is the accusation true that command of language is spoilt by a mathematical training? Or have the Germans spoilt their language by the replacement of foreign words by sesquipedalian words of home manufacture? Whatever the cause, these volumes contain also the germs of better things. "Der Damnu" has been referred to. "Die IMUK" is a portmanteau word for die Internationale Mathematische Unterrichtskommision, and "Der DATSCH" for der Deutsche Ausschuss für Technische Schulen. Some extension of this idea will quickly reduce the most unwieldy sentence to manageable size.

THE ASSOCIATION OF TEACHERS IN TECHNICAL INSTITUTIONS.

THE annual conference of the above association was held at Bradford during Whitsuntide. The address of the president of the association (Mr. P. Coleman, Northern Polytechnic, London) dealt mainly with the organisation of technical education, the value of "internal" examinations for technical students as compared with "external" examinations, and the London University Commission report in its bearing upon polytechnic work. He remarked in reference to this:—

"The report and the recommendations based thereon unfortunately show a bias that can only be due to a complete misconception of the work and standing of the London polytechnics. . . . The reasons given in the report appear to be based on insufficient evidence, and at variance with the facts as known to those who have a close acquaintance with the polytechnics."

Mr. Coleman urged the development of "non-vocational courses in the technical schools, partly because in many towns these schools are the only suitable institutions in which to hold such courses for adult students (whether technical students or not), and also in order to bring home to students whose main interest is necessarily the study of science or technology that "the work associated with their future occupation should not lead them to forget every other means of culture." As a practical measure in this direction, he suggested that the technical institutions "should definitely associate with themselves the University Extension Lectures of the locality, or such work as that of the Workers' Educational Association."

Papers were read to the conference upon vocational education, by Mr. Arthur C. Coffin, director of education, Bradford; co-ordination within a county area, by Mr. F. W. Cook, chief officer for technical education for the West Riding of Yorkshire; and the corporate life of technical institutions, by Mr. W. Hibbert, Regent Street Polytechnic, London. A number of sectional meetings were held, attended by teachers of special subjects, at which questions such as the qualifications for the registration of teachers, the syllabuses