

IF I HAD MY WAY

Mathematics Tug-of-War

by H. CROSLY

IT is almost ten years since a Sub-Committee of the Transvaal Teachers' Association held a series of meetings to draw up syllabuses in Mathematics to bridge the gap between High School and Higher Mathematics. Professor Hyslop, then Professor of Mathematics at the University of the Witwatersrand, presented the universities' viewpoint, Mr. Ettershank, Deputy-Director of the Witwatersrand Technical College, presented the technical and Mr. Greig-Gass, Vice-Principal of Jeppe Boys' High School, and I, the High School viewpoint. The memorandum was submitted to the Transvaal Education Department and almost everything that the Sub-Committee had recommended, including the introduction of an "A Stream" and a "B Stream" course was embodied in the syllabuses prescribed for the Transvaal University Entrance Certificate and the Transvaal Secondary School Certificate courses and introduced in 1960 in Transvaal High Schools. It is understandable therefore that I should consider the present syllabuses for Mathematics in Standards IX and X to be good. Let us not however make the mistake of sitting back complacently and supposing that these are the syllabuses that will be best suited to conditions in the future — if a change becomes necessary then let it be brought into effect as quickly as possible, remembering that any change in either of the two syllabuses mentioned can be introduced for pupils entering Standard IX in the following year and thereafter only; it takes three years for these pupils to reach a university.

However, it is futile to deny that in bridging the gap between High School and Higher Mathematics, the gap between Standards VIII and IX has widened and, in fact, there is barely a bridge-head on the Standard IX "bank" at present. The result is that many pupils who have gained pro-

motion from Standard VIII to IX soon find the work in the new standard beyond them. It is imperative that the content of each of the syllabuses for the T.U.E.C. and the T.S.S.C. courses in Standard VIII be increased — how, will be obvious to a committee of specialists. There is at present insufficient content to keep the pupils interested until the year-end and it is already the practice in some schools to carry on into the Standard IX syllabus during the fourth term of the Standard VIII year thus establishing a strong bridge-head before the commencement of the new year. It follows however, that the requirements for promotion from Standard VIII to IX must include the ability to cope with this additional content for we are finding now that the pupil who copes with Standard VIII comfortably, flounders very soon in Standard IX and those who are in the T.U.E.C. course become discouraged and agitate to be transferred to the T.S.S.C. course. This of course, is seriously hampering correct streaming as far too many pupils are changing from the T.U.E.C. to the T.S.S.C. course mid-way through Standard IX after having coped reasonably well for three years in the High School. Due to organisational difficulties this change usually means that the pupil is compelled to change courses in the remaining subjects as well when he may have been coping perfectly well in these subjects.

To quote a new phrase recently coined in the United States, the "Potential Intelligence Quotient (P.I.Q.)" has not been realised with respect to Mathematics, by the end of the Standard VIII year and it takes a further six months at least before the pupil has learnt to apply his intelligence adequately. Many pupils and their parents are overcoming the difficulty by requesting a repeat of the course in the Standard IX year, whether the pupil succeeds at the first attempt or not. I wonder how the "five-year-olds" will cope on reaching Standard IX.

Much that is accomplished in Mathematics can be ascribed to "habit" and this "habit" is estab-

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lished as the result of frequent practice. With the present syllabuses in Standards VII and VIII, the habits needed for success in Standard IX Mathematics are not sufficiently developed by the end of the Standard VIII year and I feel that certain amendments to the syllabuses in Standards VI, VII and VIII would bring about the desired result. Brief reference may be made here to the hypothesis that the human brain consists of the Mind and a part which could be referred to as the Servo-Mechanism, the latter being similar in function to an electronic computer. It is in this servo-mechanism that habits are established and thereafter the mind "feeds in" the new information regarding the problem to be solved and the servo-mechanism attempts to solve it. It is for this reason of course, that any servo-mechanism, human or otherwise, can operate only if it has a mind to feed it and that therefore no man-made device will ever supplant the God-made human mind.

I believe that the first three years of High School tuition are geared at present to the last two years of Primary School while the last two years of High School, in the T.U.E.C. courses at least, are geared to the first year of University. It is obvious that both links must remain but the strain at present on the link between Standards VIII and IX must be removed. I have already suggested part of the remedy i.e. the revision of the syllabuses for Standards VI, VII and VIII, particularly for the T.U.E.C. course in Mathematics, but the remainder of the remedy is the improvement of the standard of Arithmetic in the last two years of our Primary Schools. The following quotation from "Secondary Modern Discipline" by R. Farley, is pertinent: "Modern education, especially in the Primary School, has concentrated more on activity and presentation than on content. Some backward children in the Modern School are lazy and have been encouraged to be so; they can make a Stone Age axe or tell you how an Eskimo family lives, but they cannot write their own language properly, or even say their tables. The result is that many pupils are indisposed towards work and are not so dim as supposed".

Just as many teachers are incapable of teaching Mathematics with any degree of efficiency in the High School, due to qualifications other than in Mathematics, so are many teachers incapable of teaching Arithmetic in the Primary School. W. D. Wall writes in his book, "Education and Men-

tal Health"; "The full understanding of abstract terms such as kindness, justice, charity and the like does not come until the mental age of 14 has been attained". If this is true, how then one may ask, can ten and eleven year-olds be expected to cope with Arithmetic when it is taught as an abstract subject instead of as a practical aid to living? It is not impossible that the methods laid down for the teaching of Arithmetic in the Primary Schools is at fault, but whatever is responsible for the lack of logical reasoning power in our present High School generation, the problem must be tackled immediately. One hears reports of the "Cuisenaire Method" which makes use of rods of differing lengths and colours and it is held that "the rods provide a clear insight into arithmetical concepts and processes, so that the knowledge gained by the child is gained meaningfully: a very definite aid to remembering facts and also to applying them in new situations". Sounds like an advert to me, but if the method helps to rid us of the present attitude towards Mathematics then for goodness sake let us try it. To be successful, any method must inculcate in the pupil the habit of reasoning for himself and carrying out the various steps in a problem because they are logical rather than "because Miss says so".

I wonder if the time has not arrived in this Atomic Age of ours to have specialist teachers for Arithmetic in the Primary Schools. I am aware of the fact that it has been the practice for many years in some Primary Schools for Miss A to take the English lessons in Standards VA and VB while Mr. B takes the Arithmetic. This procedure has probably helped the English as well and I think it is necessary today, more than ever, that arrangements such as these should be made whenever possible; it must be remembered that, just as there is a shortage of efficient Mathematics teachers in our schools, so there is bound to be a shortage of efficient teachers of Arithmetic. The solution to the shortage is obvious — produce more teachers of Arithmetic and Mathematics; the reasons for this shortage, much as I would care to state them, are outside the scope of this article.

I conclude therefore by quoting from the Papers of Field-Marshal Rommel: "One is forced again and again to re-learn the fact that standards set by precedent are based on something less than average performance and, for that reason, one should not submit to them".