

Some Trends

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ever, the concept of mental arithmetic is not the same for all countries. Whatever it is, almost universally the use and stress on mental arithmetic begins in the second year of elementary school and continues, usually with daily (or at least periodic) drills, right through the age of 15 years. The one concept of mental arithmetic that is predominant is that of rapid calculation without the use of paper or pencil. Short cuts and tricks are learned (sometimes rationalized) but the purpose is to save time for later mathematics. Speed is of the essence and of course accuracy is demanded. The second concept extends beyond computation, to problem solving, allowing the use of the basic structure of the decimal system and its laws of operation, for the mental estimation, approximation, and exact solution of problems as well as for checking. Its emphasis is on thinking — reasoning, and understanding and not on speed. This concept offers power to the initiative and creativity of pupils learning, as well as interest and challenge in the subject, and it in no way deters from speed for those pupils who are capable.

SOME TRENDS.

All countries are engaged in studying their mathematics education. A few countries are engaged in systematic experiment, but most study is made by scattered efforts of a few leaders or interested persons. Whether by parental pressure, experiment, or changing cultural patterns, there has been a gradual shift from mere rote — manipulative teaching of arithmetic, through complicated computational exercises, to the teaching by rationalization of the fundamental concepts and laws underlying the operations on number, including the decimal system of notation. Such a shift can be looked upon only with favor by those interested in the mathematical knowledge of our future society.

The result is that the work of the first four or six years is no longer regarded as reckoning or arithmetic, but as mathematics and is being labelled as such in the schools. The one drawback to the rapid promotion of this 'rational' point of view is the lack of knowledge of the elementary school teacher

on the nature of the mathematical structure of arithmetic. It appears that to date no countries are making any determined effort to improve this state of affairs.

Along with this shift in emphasis, there has also been a decrease in the home work demands upon the pupils, and a relaxing of requirements by delaying the introduction of newer topics. Thus the operations with fractions is now a fifth or sixth year instruction topic in all but a few countries; and these fractions are frequently limited to simple denominators, having fairly easily discovered Least Common Multiples. The elementary school is being extended from the fourth to the sixth or higher grade and the trend is strong to have all children undertake the same mathematics study throughout a period of eight years. The *same study* seems to make sense, but if this implies the same amount, at the same rate of teaching, then it contradicts all that we know of the great individual difference in ability and in mental growth of children in all countries.

The following trends exhibited by a few individual countries are merely noted: (1) Delaying the more logical aspects of plane geometry and preparing for it, by introducing theorems and deductions in the initial study of algebra; (2) Re-introducing rigid motion into the study of geometry, i.e. the intuitive approach to the preservation of metric properties by rotation, translation, and reflections; (3) The unification of mathematics study by eliminating separate hours for the study of arithmetic, algebra, and geometry, and using these subjects indiscriminately to help each other, especially in early years of the secondary school; (4) The early introduction of algebra through the generalization of the laws of arithmetic; (5) The use of the mathematics books of the school library as resource and enrichment material as well as a necessary part of mathematics study; (6) An ever increasing use and construction of gadgets and models; (7) Stressing the metric system by making it the only one to be learned and used; (8) Introducing some concepts of modern mathematics so as to prepare for the study of Modern Algebra at the University level, and also to give clarity and unity to the elementary mathematics and (9) introducing aspects of descriptive statistics in both arithmetic and algebra.