

## CURRICULUM CHANGES IN ELEMENTARY MATHEMATICS

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I appreciate the opportunity of reporting to the Mathematics Council of The Alberta Teachers' Association recent developments in elementary mathematics curriculum in this province. While it is probably correct to assume that the majority of representatives here are directly concerned with secondary school mathematics I offer no apology for discussing with you recent activities and future plans relative to mathematics programs in Grades I-VI. Any changes anticipated in mathematics in the elementary grades should be known and understood by teachers of the junior and senior high school grades if we are to develop a well articulated and continuous program for all children in Alberta.

It may be of interest to this specialist council to know why a revision of the elementary arithmetic program was undertaken within the last four years. During the past ten years there has been a steadily growing interest in mathematics on this continent and elsewhere. While it is true that the majority of mathematics experimental groups began their work at the college and university level, many of them subsequently showed an increasing interest in secondary school mathematics and still later an interest in elementary school arithmetic. I am sure the work of the School Mathematics Study Group, as well as the work of such people as Dr. M. Bieberman of Illinois, Dr. F. Weaver of Boston, and many others is well known to most of you. In addition to this influence for change in elementary arithmetic curriculum coming from outside the province, there were a number of factors of a purely local nature which also contributed to the revisions which we are considering today. The two series of arithmetics, Making Sure of Arithmetic in Grades I-II, and Study Arithmetic in Grades III-VI, which have been in use in Alberta schools for some time seem to have created problems of articulation between

Grades II and III. There has also been dissatisfaction with the success children achieved in their ability to solve problems and to work with the number system. The present texts in Grades III-VI were authorized in 1947, which makes them out of date with respect to the data used in problems. Although the revision had actually been undertaken previously, the report of the Royal Commission on Education in Alberta, which was presented to the Legislature late in 1959, recommended a special study of modern mathematics and its gradual introduction into the school system.

After a careful consideration of the developments in experimental mathematics programs elsewhere and the conditions which existed in this province, the Elementary Curriculum Committee appointed an Elementary Arithmetic Subcommittee late in 1957 to study the present program, to become acquainted with the professional literature in the field and to evaluate textbooks which were available. The membership of this subcommittee included three classroom teachers, two supervisors, one Faculty of Education representative, one school superintendent and a member of the Department of Education.

The subcommittee spent considerable time becoming familiar with recent developments in elementary arithmetic. Because arithmetic has been traditionally a textbook course in this province, the committee saw the selection of new textbook materials as one of its chief responsibilities. Three criteria were established which textbooks had to meet before they would be considered by the committee for careful evaluation. The three criteria were:

1. the series had to have been published since 1956,
2. it had to be complete from Grades I-VI, and
3. it had to have teacher guidebooks.

The publication date of 1956 was chosen to insure that the new authorizations would not be more than five or six years old before they were introduced into the classrooms. The committee insisted on a complete series from Grades I-VI in an attempt to overcome the problem of articulation which had been evident in the present program. Teacher guidebooks were required because of the beneficial effect which similar publications had exerted on the reading program in elementary school. The following six series



of arithmetic texts met the criteria and were selected by the subcommittee for careful evaluation and teacher reaction:

Exploring Arithmetic--Osborne et al  
Understanding Arithmetic--McSwain et al  
Arithmetic in my World--Stokes et al  
New Winston's Arithmetic--Deverell et al  
Arithmetic we Need--Buswell et al  
Seeing Through Arithmetic--Hartung et al

Evaluation of the six series took the form of a three-pronged program. Fourteen study groups, each consisting of 6-18 teachers, evaluated one or more series through all the grades in order to obtain a picture of the total program of teaching the number system, fundamentals, problem-solving and measurement. About 70 other teachers experimented with one series in their own classrooms. Books for pupils and teachers were supplied in sufficient quantities to equip both the study groups and the experimental classrooms for the school year 1959-60. An open-ended type of questionnaire-study guide, developed by the subcommittee, was supplied to study group teachers and experimental classroom teachers. At the end of the year these questionnaires were returned to the subcommittee for compilation and analysis. In addition to the evaluations by study groups and experimental classrooms, a testing program was administered. All pupils in the experimental program were tested in September and again in May of the 1959-60 school year, as were an equal number of pupils still using the Study Arithmetic Series. While the subcommittee fully realized the many weaknesses which exist in such a testing program, it was felt that some useful information could be obtained in this way. In view of the lack of familiarity of experimental teachers with the new materials and the presence of many uncontrolled factors, the committee agreed that any information obtained could not be considered as research evidence but rather the findings of action research which would demand cautious and reserved interpretation.

Following a careful study of the reactions of teachers in both study groups and experimental classrooms and an evaluation of test results, the subcommittee eliminated four series of textbooks from further consideration and recommended that two series:



Seeing Through Arithmetic, W. J. Gage, Ltd., and  
Arithmetic We Need, Ginn and Company,

be authorized for use in Grades I-VI in Alberta schools. In June 1961, the Minister of Education gave his approval to this recommendation for dual authorization. The Seeing Through Arithmetic Series is the newest and most up-to-date set of elementary arithmetic texts now available. The series employs a somewhat new and different approach to the teaching of the number system, the fundamental processes, problem-solving and measurement. The Arithmetic We Need Series, while more traditional in its approach, places a greater emphasis on understanding of the number system than does the present series, Study Arithmetic. The main difference in content covered in the two series results from the ratio approach to percentage in the Seeing Through Arithmetic Series which means that the study of this topic is pretty well completed in Grade VI.

The new approach to teaching arithmetic in elementary school, which is sometimes referred to as modern mathematics, could possibly be said to have the following characteristics:

1. a shift of emphasis from mechanics to understanding,
2. an emphasis on helping pupils see mathematical patterns, relationships and principles,
3. an emphasis on a systematic approach to the solution of problems employing the use of equations and ratio,
4. a shift in emphasis from the stimulus-response psychology of learning to the Gestalt,
5. an increased emphasis on preciseness of mathematics language and mathematical processes.

The anticipated changes in elementary arithmetic in 1962 are not sufficiently different to cause any great concern. They do, however, involve certain changes in both method and content with which teachers will need to become familiar. In view of these changes at the elementary level in the immediate future and the probability of changes at the secondary level in the not too distant future, this Mathematics Council has come into existence at a most favorable time. Here is an opportunity for your organization to render an extremely valuable professional service to mathematics teachers in this province as well as an important educational service to the children.