

New Mathematics Course Sparks Joy Of Discovery

BY MARGARET McLEAN

The auditorium of Lillian McConaghy school was completely filled for last week's meeting of the parent teachers auxiliary when three local teachers discussed and demonstrated the new mathematics being taught in the public and secondary schools.

E. E. Totten, master mathematics teacher with York Central District High School Board opened the meeting with a brief outline of how and why the new course had developed. There had been many complaints that mathematics was not being taught properly, he said. Children didn't appear to enjoy it and many teachers were not enthusiastic about it. Employers complained that the young people they hired could add and subtract "but they didn't get the right answers."

After a conference organized by the Ontario Teachers' Federation which included representatives of universities, and secondary and elementary school teachers, a committee was set up, of which Mr. Totten was a member. The committee spent a year developing "Mathematics 9" the new grade 9 textbook which was authorized for use last year, after having been tried out for three years in various places in Ontario.

Throughout the trial period, Mr. Totten stressed that their main criteria was whether or not teachers wanted to go back to the old way of teaching mathematics after using the new system. Few of them did.

In its emphasis on having the child know the joy of discovery and learning by himself, much arithmetic in primary grades is now done with the use of concrete materials.

This was amply demonstrated by Mrs. John Routledge who teaches grade 1 at Pleasantville Public School. Said to know more about the new mathematics than anyone between Toronto and Sudbury, Mrs. Routledge has made a study of it in all grades from 1 to 13 and last summer even took a course in calculus at the University of Toronto, the only primary teacher in the class.

In grade 1 Mrs. Routledge begins discussions with the children on "sets" or groups and their numerosness, such as the stars in the sky, the cars in a parking lot, etc.

A small set is illustrated by the moon in the sky, or the number of cars on the supermarket parking lot on a Monday morning when there are just a few of them. The children are helped to notice however that this few, if parked in their own driveway would be many.

Following this type of discussion the children begin manipulating objects in sets. Each child has an "arithmetic box" containing disks, cardboard cutouts, blocks or beads and they learn their arithmetic with these and are not distracted by fumbling fingers having to print numbers. Printing the numbers is saved for a printing lesson and is not mixed up with arithmetic.

For some months the children work only with sets of one, two, three or four objects because they can see these sets without counting. They discover that four is greater than three, that three is less than four and so on.

A set of seven objects is noticed as being made up of sub-sets of four and three, or five and two. Five is seen as made up of a sub-set of three and two.

A handful of jacks may be thrown on the floor. The children see how they land and discover their "number stories" in a concrete situation, instead of memorizing a lot of words which may or may not have any real meaning for the individual child.

Subsequently the children are shown that our number system is based on 10. Each child has bundles of ten straws, pipe cleaners, or what have you, and learns for instance that 36 is made up of three bundles of tens and six more.

Children may be led to see the need for accurate units of measurement by the old bean bag game. When measuring their throws the teacher may use different measures to record various children's throws. When they find the one who made the shorter throw comes up with a higher score they immediately see the need of a

the basic geometrical principle that a line is a series of points.

Thus, stress in the course is on the structure and relationship of numbers and the children are helped to learn the meaning of number facts. "We want to stretch their minds to think" stated Mrs. Routledge.

Any parents having trouble stretching their minds in this way were reminded that the York Central High School Board has thoughtfully arranged a night school course for parents which is being held at Bayview Secondary School on Tuesday and Thursday evenings.

Announcement was also made of an "Open House" to be held November 2. Parents will be given a general view of the school system with a detailed explanation of the curriculum. They will be able to visit classrooms, compare the children's work which will be on display, and follow the work through each grade and see its continuity. Teachers may also be interviewed but on general subjects, not relating to any particular child.

Interim reports will be issued on October 30 assessing each child's progress and giving the parents an opportunity to arrange an interview if desired.

Members of the McConaghy PTA were also invited to attend the January 19 meeting of the Pleasantville Home & School Association when Noel B. Alder, co-ordinator of Oral French in the public schools for the Ontario Department of Education will conduct a demonstration lesson in Oral French.

standard measuring stick—and also become quite careful about how carefully the measuring is done!

Basic principles of algebra and geometry are inculcated in grade 1 when the children handle three dimensional objects, such as cylinders, cones, etc., and name them. They also study open and closed curves and their properties as well as perimeter, area and volume.

In all of this, the stress is on discovery with the teacher asking artful questions to spark the child. "You can see by the look on their faces when they discover something for themselves" said Mrs. Routledge.

Matt Kinnari, who is teaching the new math to five grade 7 and 8 classes at McConaghy school demonstrated some of his methods.

Mr. Kinnari showed how the "number line" is used to illustrate addition, subtraction and multiplication. His number line was merely a strip of white paper about three inches wide by about six feet long. On this he could tack strips of paper of different length and different colours. The green strip was one unit, the blue one, twice as long as the green, was two units, the yellow strip was three units and the brown one four. Thus it could be shown graphically that four plus one is five, etc.

The number line can be used to illustrate subtraction and multiplication as well. By using yellow strips of three units each, it could be demonstrated that 2×3 plus 3×3 equals 5×3 .

Going on in this way, the child is helped to see that in, for instance, multiplying 45 by 26, he is really multiplying 20×45 and adding 6×45 . This is in contrast to the old system where the child was taught to multiply first by six and then by two, always remembering to "move the second line over one" before he added the two to get his final answer, but not necessarily knowing why this was done.

Fractions also become much easier to grasp by means of the number line. When the line is divided in half at one point, it is easily shown that the whole consists of two halves; then it is further divided into quarters, the half is seen to consist of two quarters and the whole of four quarters. By continuing in this fashion, dividing the line into smaller and smaller sections, the children can see for instance that one half and one third equal not only five sixths but also two fifths.

Use of the number line also helps children to grasp easily

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