The New Grade 10 Mathematics Curriculum

John Heuver

The new Grade 10 mathematics curriculum was introduced in the 1989-90 school year, adding fresh problems to those that existed in the former program of studies. Students entering Grade 10 have virtually no knowledge of algebra. In the past, it was possible to review briefly with the abler students the elementary algebraic operations and continue with a more in-depth exposition of the old material before expanding on it because they had been exposed to algebra in junior high school. This is no longer the case.

Important drawbacks exist in introducing algebra to students as late as Grade 10. It takes a considerable amount of time before a student becomes familiar with the elementary manipulations of algebra and develops an understanding of such things as why letters are used instead of numbers. As a teacher this year, I had the feeling of being almost a whole year behind at the beginning of the new program. This might be slightly overstating the case but it took almost six weeks or 35 percent of the semester to familiarize students with algebraic skills. Meanwhile, weaker students had lower chances of surviving a course that was completely new to them because of the amount of material that had to be covered in a given time.

When the new Grade 10 course was field-tested, the old junior high curriculum was still in place, so some of these problems were not evident at that time. Beyond the math classroom, Grade 10 students who take sciences need mathematical skills unless they study science as an appreciation course and have no need for calculations. Science teachers will find themselves in the unenviable position of having to teach a lot of remedial mathematics, especially in the physics program. The new science program will have to take into account the mathematical weaknesses of students.

For the less academically inclined students, the problems have become even more difficult. The number of high school credits in academic subjects has been increased to the point where it is almost impossible for these students to take courses in vocational subjects. Such students are unmotivated to study a subject like mathematics if there is not some clear reason why they should do so, and are not moved by the argument that they might need mathematics in the distant future for a training program they might wish to take. The vocational program was supported and funded in the past chiefly by the Federal Government, and Alberta Education has never had its heart in it. This is no doubt one reason why the current curriculum review of vocational programs in high school has been so poorly done.

Some key problems in course content seem related to the review process itself. Courses were planned in a fragmented way. Committees were struck and decided what topics should be covered in a specific course. This may look superficially to be a clever strategy. However, when it comes to selecting a textbook, it is virtually impossible to find a unifying thread that gives coherence to the text from a mathematical as well as a pedagogical viewpoint because the content has been predetermined along other lines. A committee that is bent on designing its own course content is in trouble from the start. From the publishers' perspective, the method works well because, to satisfy the needs of the different provinces, they just have to paste an extra chapter in the textbook and make a few small additions here and there. This makes economic sense to a certain extent. On the other hand, it means students and teachers have to carry textbooks that weigh like bricks—many of their pages are irrelevant—and are unnecessarily expensive. As well, they are poorly organized, with units that are in the prescribed curriculum scattered

throughout the text. Even the curriculum guides are written like manuals for a badly-designed computer program and are hard to obtain because of the cost.

A number of topics have been overlooked in the fragmented approach to building the curriculum. For example, simple equations like $4x = 12$ are simply omitted in the Mathematics 10 and 13 courses. This must be ascribed to the advent of curriculum development. A coherent textbook would not have missed this. Geometry (except for analytic geometry) has been omitted. In *The College Mathematical Journal* (March 1991), Reuben Hersch says, "Acquaintance with Euclid is indispensable in the understanding of mathematical philosophy of centuries earlier than our own." This omission might be less crucial to the Mathematics 13 student than it is to the more academically inclined student because the latter needs a broader understanding of our cultural heritage. At the level of international competition, our students are going to be no match for students of other nationalities.

The new program has been introduced with the motto *problem solving*. The problem-solving approach to the curriculum can only work if more Alberta teachers contribute to problem sections of mathematical journals. This is the only place where one can learn the art of problem solving in the mathematical sense because it is impossible to teach a technique with which one is unfamiliar. Any form of innovation in teaching mathematics must come from the practicing teachers themselves. Only teachers can make a curriculum work!