Calculators Are Here to Stay

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The winds of change are blowing in education, sweeping away time-honored practices and replacing them with new and puzzling developments. One of these changes is still on the horizon, and its impact is still to be felt. The hand-held calculator, a novelty only two or three years ago, will soon be making inroads into the mathematics curriculum. It is now the subject of frequent articles in the daily newspapers. National news magazines and professional reviews are also following the adoption of this tool by our society and are reporting these developments to their readers.

Conditions now exist that seem to virtually assure the introduction of the calculator in the schools. First of all, the price of these machines is coming down because of mass production. Only three or four years ago, the price of a basic model was about two hundred dollars; similar models now retail for thirty or forty dollars. Some models are available for approximately twenty dollars, and rumors have it that ten-dollar units will be on the market in two or three years. Calculators will be no more expensive than good dictionaries, thus bringing them into almost universal distribution. The use of calculators is also becoming widespread in industry, and more importantly for students, in the home.

What implication does this have upon the teaching of mathematics at the junior and senior high levels? Many teachers are justifiably concerned with the prospect of seeing their students using calculators at school. They fear that the computational skills acquired at the elementary level will be forgotten, and that the students will develop a dependency on these machines, and will gradually be unable to function in mathematics without them. Indeed, putting calculators into the hands of students who have an incomplete mastery of the fundamentals of arithmetic would bring on disastrous consequences.

In spite of these reservations, the use of these machines by students will become fairly commonplace in a very short period of time. Their widespread use outside the school will almost necessitate their being accepted in the classroom. Their advent will necessitate certain changes in the mathematics curriculum. There will have to be some shift of emphasis in both subject matter and skill development to accommodate calculators. These changes will probably involve the following areas:

(1) Computational skills will still be taught, as these are absolutely essential. There will be less need, however, for the tedium of repetitious drill. Less emphasis will be placed on algorithmic computation.

(2) The basic facts of arithmetic, such as the multiplication tables, will still have to be known in order to permit the students to be able to estimate the results of the calculations done with the calculator.

(3) The students will have to master thoroughly the skills of rounding off and of finding significant digits. They will also have to know how to use these rounded figures in their calculations.

(4) A firm grasp of the concept of place value will be essential if students are to understand and make sense of the answers they will obtain from a calculator.

(5) Fractions will have a somewhat decreased importance in the curriculum, as these will be changed into their decimal equivalents for use in the calculator. Decimal numerals will also be more in use with the gradual introduction of the metric system.

(6) Teachers can anticipate some changes in the textbooks as authors and publishers will soon be taking into consideration the impact that calculators are having on the teaching of mathematics. It is to be hoped that they will get away from the artificial or "made-up" problems all too prevalent in textbooks today, where all divisions come out even and where all fractions cancel out nicely.

(7) Creative teachers will soon see the opportunity for students to solve mathematics problems using calculators in subject areas other than mathematics, thus enriching the entire curriculum. The use of calculators will permit this without loading down the students with the drudgery of endless calculations.

The introduction of calculators in the classroom will not constitute a "revolution" in mathematics education. The novelty will soon wear off, and students will soon see it as just another learning tool, much like the cassette recorder or the typewriter. However, they will have at their disposal a machine that will permit them to perform complex calculations at a great speed and with a minimum of inaccuracies. The students will soon become aware of these benefits.

The calculator will never be a panacea for all of the ills of mathematics education. Indeed, it could only add to those ills if it is used unwisely. To begin with, it has no place at the elementary school level, where students should be acquiring a solid background in the basic mathematics skills. Also, it should never be placed in the hands of a student who doesn't have a firm grip of the basic concepts and processes of mathematics. This would be detrimental to learning. However, it will liberate good students from the tedium of repetitious computations and will permit them to focus on the real importance of problem solving.

Rightly or wrongly, change in education often occurs very slowly and schools find themselves all too often behind the times. The acceptance by teachers of such a commonplace article as the ballpoint pen is a case in point. They permitted its use in schools only after it had overwhelmingly replaced the fountain pen and the quill in our society. Similarly, the calculator is not a passing fad; it is here to stay. Its use will very soon be widespread in all sectors of society. It will soon find its way in schools. Teachers will have to cope with this new development.

Provincial departments of education will have to come to the aid of these teachers. Research will have to be done to determine the impact of calculators on the mathematics curriculum. Recommendations concerning the implementation, the use, and the evaluation of the use of calculators will have to be formulated. The precautions to take while using calculators will have to be clearly stated. Teacher education programs will have to be organized. It is to be hoped that this will be available to teachers when the need is felt.

References

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Who Gives a Gram About Scruples?

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The following article by Dr. Forrest Coltharp illustrates a problem that has been effectively solved in much of Canada. However, some of us are still in need of defending the metric conversion in our communities where resistance is continuing despite government directives requiring the change. This study may give you new ideas for overcoming resistance, or it may provide interesting reading. In any case, I include it as an item that has value to each reader within the limits of his imaginative application of the ideas and reasonings presented.

What does the United States of America have in common with the following countries?

Barbados	Oman
Burma	Nauru
Gambia	Sierra Leone
Ghana	South Yemen
Jamaica	Tonga
Liberia	Trinidad
Muscat	

You will find that all other countries in the world, except those listed above and the United States, have already adopted the Metric System of weights and measures, or have committed themselves to a change in the near future. Japan converted to the Metric System between 1951 and 1962. Great Britain adopted a ten year plan of implementation in 1965. South Africa will complete her switch to the Metric System during 1975. New Zealand began an eight year plan of conversion in 1969, and both Australia and Canada announced commitments to change in 1970.

Is it any wonder that if we are to compete in the world trade market, we must convert to the Metric System of weights and measures? Many of our multinational corporations are already in the process of converting, such as IBM, General