Trends

Mathematics

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Reflections on the Sixth International Congress

Approximately 2,300 people from 79 countries attended the Sixth International Congress on Mathematics Education held in Budapest, Hungary, from July 26 through August 3, 1988. Almost half the participants were from Hungary, Japan, or the United States (those three countries were about equally represented), about 10 percent were from Great Britain, and the rest were distributed among the other 75 countries.

The meeting brought out interesting differences among the countries represented, as well as consensus on many topics. For example, while many countries (including the U.S.) reported severe shortages of mathematics teachers, others complained of an excess. There was a clear connection between factors such as conditions in the schools (including discipline), societal support for education, teachers' salaries, and teacher prestige, and whether there was a shortage or an excess of mathematics teachers.

On many issues there was substantial agreement among the participants. There was wide support for the need to derive mathematics from the learner's reality and to pay attention to the learner's understanding (and misunderstanding). Technological innovations (notably calculators and computers) were believed to presage radical changes in the way we ought to learn (and therefore teach) mathematics. Problem solving was widely touted as the real goal of learning mathematics, and everybody agreed we need to do a better job of teaching it.

So much agreement among educators from such disparate backgrounds surprised and bothered me. I have long espoused the points in the previous paragraph as well as many others that drew well-nigh unanimous approval; but whenever I'm in the overwhelming majority, I begin to wonder whether we all understand each other. For example, I believe we should derive mathematics from the learner's reality; but we must remember that the power of mathematics comes from its abstractness, which allows us to apply the same mathematics to drastically different situations. If we stay too long with one model when developing mathematics, we lose the essence and the power of that mathematics. Further, the model from which we derive mathematics need not be a physical model; for example, abstract arithmetic can be the learner's reality from which we derive algebra.

Second, technological innovations *should* change the way we teach, but that doesn't mean we should stop teaching such things as the number facts or even the multi-digit computational procedures. To use technological innovations intelligently requires that we do more thinking, problem formulating, mental arithmetic, and communicating about mathematics. They also require that we understand that humans are the thinkers and planners and that machines do what some human has told them to do and should generally not be thought of as authorities or masters. Thus, we must be very careful about using machines to teach. They are useful tools, not teachers, and we should not obscure that fact.

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Certainly, problem solving is the goal of mathematics teaching. The vapid "problems" in most mathematics courses, however, seem designed to convince children that mathematics is a pathological process produced by adults to keep children unpleasantly and unproductively occupied when they would prefer to be doing something interesting or useful. Children should learn that mathematics can be used to solve interesting problems that would be harder or impossible to solve without the mathematics.

As I talked with my colleagues in Budapest, I was pleased with how much we all sounded alike, but worried, as we said the fashionable words, that we might be thinking very different things. And, even if we all agreed on the meaning of what we were saying, there seemed to be little evidence that what we were saying is affecting what happens in classrooms around the world sufficiently to provide the mathematically literate population the world will need to solve the problems of the first century of the next millenium.□

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