



Information and Announcements

International Seminar in Mathematics Education

The Institute of Advanced Studies in Princeton (USA) is well known for its high-powered research; much less well known is its strong interest in education. A few years ago it started an institute called the Park City Mathematics Institute, located in Park City (Utah, USA) — a location better known for its association with the Winter Olympics! The institute runs on a transient basis during the month of July each year. Its mission is to offer “comprehensive professional development for mathematicians and teachers of mathematics, as well as programs for students aspiring to a career in mathematics.” Quality programs are offered for middle school, high school and college teachers, based on the three components of professional development: Learn and do mathematics; Analyze practice; Become a resource to colleagues and the profession.

Programs for undergraduate students, graduate students and research mathematicians are also offered, based on an annual mathematical theme of current importance.

Since 2001 there has been, in addition, an International Seminar on Mathematics Education that seeks to explore the interplay between theory and practice in this field; specifically, to explore the underpinnings of policy in the area of mathematics education, and to ascertain how things actually work in the ‘field’. The participating group has been intentionally kept small: only eight countries (Japan, India, Sweden, France, Kenya, Egypt, Brazil, USA), and only two individuals from each country, one from a ‘policy’ or research background, and one from a school-teaching background. In 2001 Curriculum Planning was the

theme taken up, with questions such as the following being discussed at depth: *What considerations decide how national curricula in mathematics are set? How does the balance between depth and breadth get decided? How are the competing demands of accessibility and excellence met?*

This year the theme taken up was Teacher Preparation, and the questions discussed included the following: *What kind of subject matter and pedagogical preparation do prospective mathematics teachers need? What kind of ‘clinical teaching’ best equips prospective teachers for classroom practice? What strategies have been used to improve and sustain the quality of pre-service teacher education? What are the characteristics of high-quality alternative certification programs?*

In India, teacher training remains a rather ad hoc affair. Typically it is of a ‘pre-service’ kind; there is little or no ‘in-service’ training. Additionally, the material to which the prospective teachers are exposed is quite dated. Thus, mathematics teachers get little exposure to items such as: (a) transformation geometry and Felix Klein’s Erlanger program; (b) historical aspects of the subject: a knowledge of what mathematicians such as Aryabhata, Brahmagupta, Bhaskara, Madhava, Archimedes, Fibonacci, did; (c) an understanding of the constructivist approach in the teaching of mathematics; (d) an understanding of the place of investigations and discovery-oriented teaching in the teaching of the mathematics (our school curricula at present tend to be highly result- and formula-oriented, with no place for investigations or for reading beyond the syllabus). Exposure to computer algebra systems (DERIVE, MATHE-

MATICA and MAPLE) and dynamic geometry packages (GEOMETRIC SKETCHPAD) is non-existent. There is no systematic development of approaches to tackle the needs of slow learners and of gifted students. All in all, mathematics teaching in India is an area where much reform is required, not to mention the research that must form the underpinnings of reform.

These were some of the items that came up for discussion during the Seminar. My colleague, Dr. Sudhakar Agarkar from the Homi Bhabha Center for Science Education (TIFR, Mumbai) has worked in the field of mathematics and science education for many years and in particular has the experience of working with school children and teachers from disadvantaged sectors. I have taught for many years at the school level, and have conducted in-service workshops for teachers. We shared our experiences with the rest, as did all the others. It was interesting to learn about the approaches being tried out in different countries. In France, for instance, teacher training is a highly structured and centralized program; prospective school teachers must pass a competitive examination in which both pedagogy and subject matter are tested. They must also write and defend a paper in some area of pedagogy. The level of rigor of the program in France is clearly worthy of careful study. However, there does not seem to be anything comparable for in-service programs. In Brazil, many semi-formal working groups of teachers appear to have formed, to support one another and to discuss matters of pedagogy; the system supports them in this enterprise. However the dominant areas of concern in this country relate to social problems (street violence, drugs) rather than teaching pedagogy; any attempt at reform must necessarily address such concerns too. In Egypt, videotaping of practice lessons of the teacher trainees has been tried, with some success. (This was the case for

some other countries too.) In Japan, in-service training is a yearlong affair, with programs of short duration going on almost all the time. In addition, there are programs for teachers after five years of teaching, after fifteen years of teaching, etc., devoted to themes such as classroom management, student guidance, dealing with problems of growing-up such as bullying, and so on. In USA, there is a wide multiplicity of programs, with each state offering its own certification process. Districts require in-service training of teachers, and some states require them to take 'continuing education' courses for renewal of their teaching certificates. There are many professional organizations (e.g., the National Council of Teachers of Mathematics) that host workshops for practising teachers, at least once each year. Additionally, many of the better universities hold in-service programs on their own initiative. In Sweden, prospective teachers must write a paper (as in France), and career teachers are obliged to (and have the right to) go through in-service training.

What will be the outcome of such a Seminar is not very clear at the start; but clearly more such international meetings are required, where educators from different countries meet to get an understanding of how things function elsewhere, and see what models might be emulated, in areas such as curriculum planning, teacher preparation, dealing with slow learners and gifted children, etc. The study initiated at the Seminar is planned to be a continuing one; it is hoped that the outcome will have some impact on policy at the appropriate level.

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