

The 8th International Congress on Mathematical Education, July 1996

Impressions of ICME 8

JOEL HILLEL

ICME was held in Sevilla the capital city of Andalucía, Spain, a city whose rich history is still apparent in its beautiful buildings, parks, and old quarters

I was asked to write from a Canadian perspective about ICME 8, though I am not sure exactly what that means. To start, I will simply imitate the Canadian reporters of the 1996 Summer Olympics and mention the events involving Canadian participants (without assigning medals). I will, though, quickly abandon the Canadian coverage of ICME 8 and slip into more personal impressions.

The Canadian participants

ICME 7 in Quebec City in 1992 was a Canadian show and, as usual for the host country, Canadian participation was substantial. In comparison, in Sevilla we would almost qualify as an under-represented country, with less than 40 participants. But "small is beautiful" and though we were few, our presence in the scientific programme of ICME was quite evident: one need not go further than mention the opening plenary talk, given by my colleague Anna Sierpiska (more on that later). Among the 60 Regular Lectures, Carolyn Kieran talked about the "Changing face of school algebra" and Claude Gaulin on "Difficulties and challenges in the implementation of "problem solving" in school mathematics curricula". Chief Organizers of Working Groups included Eric Muller (Mathematics as a service subject at the tertiary level), and David Robitaille (Evaluation of teaching centres, and systems), and of Topic Groups, Louis Charbonneau (History of mathematics and the teaching of mathematics) and myself (University mathematics). Other contributors to Working Groups and Topic Groups included Sandy Dawson, John Eggsgard, Gila Hanna, Richard Pallascio, Susan Pirie, Luis Radford, and David Reid. Several other Canadians were involved on Advisory Boards but were unable to attend the Congress. Last, but not least, Bernard Hodgson was a member of the International Program Committee.

The opening plenary

Anna Sierpiska's opening plenary to an overflowing crowd in the Palacio de Congresos had the intriguing title, "Whither mathematics education?" In her talk she pondered whether the domain of research in mathematics education has really changed much since the New Math movement. She pointed out that "New Math", like "Problem Solving", "Constructivism", "Math through Applications", or "Theory of Situations" was, in her terms, a "program". Each such program is characterized by a certain ideology, by theory building, and by didactic actions. Relying on her vast knowledge of the field of mathematics education research, she examined several programs and their underlying ideologies and theories. She then gave examples of how tensions arising between ideals, reality, and theory within a given

program are resolved, pointing out that, quite often, proponents of a particular program change their theoretical explanations, or even try to bend reality to the ideal, rather than give up on the ideology. She indicated her preference for "interactionism" as a research program because it puts less emphasis on ideology and more on attempts to describe what is variously possible under different didactical practices and with different classroom formats. She illustrated these ideas from some of her research work in Montreal, of students learning linear algebra under different formats of tutor-student interaction. She concluded by suggesting that researchers in mathematics education might be overly concerned with the foundations of the field and too preoccupied with debates about theories and methodologies, thereby failing to produce sufficient concrete results in the design of didactical actions.

Working Groups and Topic Groups

ICME 8 kept the format of 6-hour Working Groups running in parallel, similarly with the 3-hour Topic Groups. The number of such groups continues to increase and there were 26 groups of each type in Sevilla. Those of us who are members of the Canadian Mathematics Education Study Group have our own notion of what a Working Group means: namely, a relatively small group of about 15 participants who meet together to discuss, exchange views, and grapple with a particular issue in mathematics education. Working Groups in ICME are quite different. I attended a very well-run Working Group (WG15): The impact of technology on the mathematics curriculum, organized by Michal Yerushalmy which had nearly 150 participants (though it was split up, on some occasions, into several subgroups). Most of the time was taken up by talks, software presentations, and a panel discussion at the end. The time for questions was limited and, often, the same individuals asked all the questions. I think such Working Groups would be more appropriately called "Mini-conferences".

On the subject of technology, one significant change to be noted in this Congress was that, while enthusiasm for the use of technology and interesting implementations still abounds, the general mood has become a lot more sober. This sobriety has to do with being more realistic about the extent that a particular technology requires changes in the current classroom culture. Patrick Thompson, in the opening talk to WG15, grouped technological innovations into different powers-of-ten in terms of the changes they entail in the present system. He saw technology as just one component of a "system of means" for fostering the learning of some concepts.

It is not clear to me how Topic Groups are meant to differ from Working Groups. My impression is that they conform to the simple equation $TG = 1/2(WG)$; that certainly held for TG3 (University mathematics) for which I was the organizer. Speakers in TG3 described various ways in which they, individually, or their departments have tried

to undo the shackles of Bourbaki through changes in emphasis, content, course offerings, styles of teaching, and assessment. It was evident that the problem of under-prepared entering students, which one tended to believe was specific to North America, is in fact quite widespread and that universities are trying to deal with this through various "transition courses". A caveat must be made concerning the identification of trends in university mathematics based on generalization of contributions to the Topic Group: most of us who attend ICMEs are likely not typical members of university mathematics departments and it is not always obvious that our concerns are shared by our colleagues.

General Impressions

ICME is at least two conferences in terms of participants: there is a large group of practicing teachers, particularly from the host country, and another group of those involved in mathematics education as researchers and teacher-trainers. The latter group contains a subgroup which one might describe as "veterans of the circuit". Not surprisingly, one gets very different responses from individuals asked about their impression of a particular presentation or of the Congress in general. Sevilla was my third ICME while ICME 3 in Karlsruhe in 1976 was my first. How did they compare? ICME 3 was not as big either in terms of the number of participants or the scope of its scientific program. Mathematics education seemed simpler in those days, without the present proliferation of research programs and points of view: Freudenthal, Piaget, and Polya just about took care of everything. But Karlsruhe was also my first conference in mathematics education; everything I heard was new to me, and just about every person I met was a new acquaintance. Now is twenty years further on, and in the interim I have gone to mathematics education conferences whose acronyms cover every possible combination of 3-, 4- and 5-letters of the alphabet. Thus I belong to the group often heard complaining that they found very little new in ICME 8. But then, how could there be anything new when most of the talks I attended were given by colleagues I have heard speak at one or more conferences in the very recent past? My note-taking this time dwindled to just a few pages, a far cry from my first ICME where I took lengthy notes of every talk I attended.

But it is important to be reminded, conversing with today's newcomers, that for many participants an ICME is still something special: the excitement expressed by a recent Ph.D. about hearing and meeting those who were until then just names appearing in research articles; a mathematician telling me that some of the sessions she attended will have a profound influence on her professional life; a colleague pleased to meet a community of people who, like him, are interested in cultural aspects of mathematics education.

And I wouldn't want to end without mentioning that some of the talks I attended were excellent, even if their content was not completely new to me. I think particularly of Gérard Vergnaud's presentation which was so nicely paced and so clearly presented, utilizing lots of examples to illustrate his thesis that thinking is both systematic and opportunistic, and ending with a theoretical framework of "schemes" which extends his previous notion of "conceptual fields". It

was a talk that managed to strike the right balance of interest, appealing to practitioners and researchers alike. Michèle Artigue also gave an excellent summary of research into student's learning of elementary analysis (I seem to have been tempted into distributing medals after all!)

Organizational problems

The 1996 Summer Olympics in Atlanta were plagued by transportation problems and reporters complained that these problems distracted people's attention from the events on the field. ICME 8 also had its Achilles' heel. The agency handling the infrastructure was simply not up to the task. This caused many needless aggravations, frustrations, and disappointments. Requests for accommodation were never acknowledged (I sent 4-5 e-mail messages that went unheeded, and, as it turned out, I had no reserved accommodation when I arrived). Instead of the excursion tickets being included in the registration package (after all, we had already designated our preferences) we had to line up again to obtain tickets, and those who waited until the commotion subsided ended up not getting what they had requested. Shuttle buses didn't arrive on time and were sometimes full when they did arrive. In fact, for the first three days of the conference, the prevailing image was one of horrendous lineups everywhere. There were quite a number of visibly upset people either ready to pack up and leave or, unfortunately, taking out their frustration on the wrong parties.

Another major problem was the sound system in the Congress hall. Many in the audience, particularly those who sat in the centre of the hall, couldn't hear Anna Sierpiska's plenary talk at all. In this relatively modern complex with its multiple video screens no one seemed to be in charge of making sure the sound system worked properly (the problem might have been easily fixed by changing the placement of the microphones). Minor problems had to do with rooms still being locked when an event was due to start. The "green people", the Spanish mathematics students recruited to assist at the conference, were very eager to help but were at a loss to know what to do when a serious problem arose.

I have two more comments, more general in nature. I often feel it is a pity that at the start of a Congress, when everyone is fresh and excited, the first hour (at least) is devoted to welcoming speeches. I am aware of the political reasons for starting this way but I feel sure the system is not indispensable. It seems to start off a scientific conference on the wrong foot. (Unless my memory is playing tricks with me, the International Congress of Mathematicians in Kyoto in 1990 had a brief opening ceremony and immediately started with the business of the scientific program.) The other comment is that we need to develop a "conference etiquette", something akin to what happens at concerts and performances where late-comers cannot simply barge in but have to wait for an appropriate interval. We seem to feel that we are entitled to walk into a lecture at any time. In some cases this can be done discreetly, but when the entrance is in the front of a room and there are hordes of people milling about in the corridors, every opening of a door creates a total distraction. I attended several talks which were in rooms just near the main conference hall and it was very difficult to stay focused. (Alas, I can offer no solution to what to do with people who want to leave a lecture in the middle.)

Concluding remarks

My impressions of ICME are not detached from those of the host city and the social events, official and unofficial. On these counts we were very fortunate. On the first evening we were treated to a spectacular show at the Congress Centre by the beautiful dancers of the Andalusian Dance Company. There were several exhibitions in town related to the Congress, one with an interesting collection of old mathematics texts and calculating machines. Sevilla and its environs lived up to their reputation (including that of being hot — the temperature showed 51°C in the sun one afternoon). The Alcázar more than compensated those of us who did not manage the trip to the Alhambra — built in the same Mudejar style, the patterns made me recall the recent talk by M. Escher's son to the Canadian Mathematics Study Group, when he remarked how inspired his father was by his visits to the Alhambra; the Giralda and cathedral; the elegant gardens of María Luisa Park; Triana, the gypsy quarters on the banks of the Guadalquivir; and the celebrations of the Festival of St. Anne which started as the Congress was coming to an end. In Córdoba, there was the Mezquita with its spectacular white and red double arches and its mihrab; the old Jewish quarters of Córdoba and Sevilla; I could just go on. I must also mention the warmth of the Spanish participants who were so keen to show us around and initiate us into the Spanish tradition of sampling wines, sherries, and tapas at different bars. And while ICME seemed at times too big and overwhelming, there were occasions when I would find myself sitting with just a few old/new acquaintances, in some bar, exchanging views about the conference, about our work, about future plans, late into the night, and suddenly it was all worth it.

ICME 9 will be held outside Tokyo in four years time. Will I be there? Maybe.

Some reflections about reflection and ICME 8

BARBARA JAWORSKI

My working group (WG26) was probably the most significant part of my Congress. It was well-designed, well-organised, and well-chaired. Its theme was "Connections between research and practice in mathematics education". There was a balance between presentation of papers and group discussion, and between English and Spanish. The group leader, very sensitively, translated where necessary and possible, and there seemed to be an atmosphere of inclusion for members of the group. This is my story, however, as an English speaker and one of the people who presented a paper. I wonder if the Spanish speakers and the non-presenters also felt "included"? This seems an important issue for conference organisers and group leaders to address.

In our discussion about research and practice it became important to address the "who" question: *Whose* research and *whose* practice is it? Invariably this led to a questioning of what actually we mean by research.

Research might be seen as a process through which theory grows and knowledge is enhanced. In the case of educa-

tional knowledge and research, what can we say about its nature and purpose? Perhaps that nature includes the substance and processes of practice, and that purpose includes informing or enhancing practice. But, of course, practice is the everyday work of practitioners, so informing and enhancing practice must have something to do with the ways in which we operate in our work as learners, teachers, teacher-educators, researchers, or whatever.

It struck me that when we (a community of educators) talk about influencing practice in mathematics education, we are drawn to images of classrooms and teachers, and the enhancing of the learning experience for mathematical learners: i.e. seeking better teaching. So research slips into being about developing knowledge of processes of learning and teaching — to enable teachers to do a better job. Cynically, we recognise attitudes of, "If only teachers paid attention to the research which has been done ...". We are all aware of the amount of research which sits on shelves in libraries and has no connections at all with practice in classrooms. This research is manifestly not informing or enhancing practice. It might even be detrimental to its own aspirations as it gets a bad press with teachers who regard it as irrelevant to their practice and who thus become antipathetic to its messages if ever these penetrate school walls.

In practice, educational development often adopts a model of those-who-know doing something to those who don't. This has been shown mainly not to be successful and is partly responsible for research ending up on library shelves.

The mood of the Group seemed to support the importance of bringing research closer to practice; perhaps that teachers themselves should be involved in the research, an empowering process which raises issues which have a direct connection to classroom practice. This raised questions related to practitioner research: to what extent it might be classified as research; how it might be related to reflective practice; how teachers might be supported in doing research; whether such research would increase knowledge; where the theory resides in such research. In fact we recognised that the results of practitioner research are often regarded as unrigorous and ungeneralisable, therefore it is seen as not increasing theory or knowledge.

I played a strong part myself in some of this discussion, but afterwards stopped to question our presumption in discussing what might be best for (other) teachers. The people who make statements or decisions about this, and indeed who urge teachers to get involved in research and reflective practice, are often teacher-educators, or researchers, from higher education. As teachers ourselves, how do we feel about such presumption and do we practice what we seem to preach? One might ask how many of us do research on our own practice, or enhance practice through critical reflection. How questioning are we of the success of our delivery of academic courses in terms of the growth of knowledge and effective practice in teaching?

In reflecting on these discussions and developing my own thinking as a result, I was reminded of a number of recent events, or concerns, which seemed to have a bearing on