Reflections on ICMEs

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Note to the reader: What follows is very much a personal, subjective view that in parts relies on an ageing memory. Forgiveness is asked, then, if some facts are incorrect and also if the reader believes that I have stamped on some toes too heavily.

ICME-10

It is to be expected that the form of ICMEs will change over the years. Certainly I cannot expect anyone wishing a future ICME to copy ICME-1, with its mornings occupied by twenty-one plenary talks on primary and secondary school education in Europe and North America, and the afternoons given over to fifteen-minute presentations by whoever wished to give them. Since then there have been many changes, but have we arrived at a suitable form and balance, better than anything that has gone before?

At the ICME-10 congress in Copenhagen (July 2004), I met a group of those attending their first ICME. Afterwards I asked them for their reactions to it. Only two responded at any length. The first was a young researcher from Asia who found it profitable "to learn from the experts". The second was a teacher who had taught for thirty years in secondary school and also had some experience of teacher education. She found ICME-10 an experience she did not wish to repeat. "When I registered for the ICME congress [and for the Group on *The relationship between research and practice in mathematics education*], I naively thought that mathematics education had to do with mathematics, teaching mathematics and schools, but by the third day I was convinced that I must have misunderstood the purpose of the congress." She became increasingly irritated by those researchers who seemed to lack her knowledge of mathematics and whose approach to teachers was condescending and insensitive. Should one dismiss such a complaint as a one-off? Unfortunately, I think not, for this was a reaction I heard from other teachers and curriculum developers who attended ICME-10.

My impression, too, was that ICME-10 was far too preoccupied with research in mathematics education and with trying, in what was essentially an internal fashion, to give it credence and status. This is not to decry the importance of research or, in particular, to diminish respect for the achievements of the two medallists, Guy Brousseau and Celia Hoyles, both of whom I have been pleased to know, admired and counted as colleagues for over twenty years. Yet, when listening to the plenary entitled *There is nothing more practical than a good research*, I was forced to think back forty years to Freudenthal's criticism of those university mathematicians who spelled out what form the school curriculum should take, as offering, in his words, "theorems without proof". What were we now being offered: a theorem, but, if so, we were given no examples; an axiom, but then it was in the sense of Hilbert, i.e., a statement on which arguments would be built, rather than Euclid's "commonly accepted notion"; a tautology, but surely there is good research (e.g. on historical topics) which does not aim primarily to be practical; or was it to be treated simply as an advertising slogan? At the *L'Enseignement Mathématique* / ICMI meeting held in Geneva in 2000, I told of how a 1960s textbook series written by an outstanding researcher and supervisor of researchers had failed dismally,

simply because he could not translate research into classroom practice. Teachers who still had day-to-day contact with students and understood their needs and interests, and textbook writers, utilising their skills, knowledge and experience, had an essential role to play in that translation process. Even where research has been closely tied in with classroom practices, as at the Freudenthal Institute, there will still be a need for in-service training, continuing professional development – call it what you will – if innovations and reforms are to reach classrooms in an ungarbled form. Good research, in itself, has seldom been practical: it has offered a rich source of guidance for practice, but has relied upon others to take it into the classroom. In fact, one can quote numerous examples of "good research" that have failed to be absorbed into textbooks and/or classroom practice. More emphasis on tackling this problem of translation into practice would appear to be needed rather than turning out yet more research students and papers. Or to take a more specific example: which was the more practical, the research that Celia Hoyles has carried out and for which she was honoured, or that highly successful (and, alas, unique) peak-time TV series that she hosted in the 1980s, watched weekly by eight or nine million viewers and devoted to the popularisation of mathematics? And how is the practical value of each to be evaluated?

This is not to say that no attention was given to the immediate concerns of teachers, curriculum developers and others at Copenhagen, but these appeared to be overshadowed by the attention given to educational research. Major problems, such as the diminishing autonomy of teachers in those countries in which they traditionally held it were neglected – clearly there are administrative decisions (mainly claiming to be based on "research") that mathematics educators cannot reverse, but surely we could discuss how to ameliorate their effects and to inform those from other countries of the dangers that might lie ahead. Again, the discussion of the enormous influence on the teaching and learning of mathematics – for good or ill – of increased national testing and of such international studies as TIMSS and PISA was despatched in a perfunctory and unsatisfactory manner. What, too, of noteworthy and recent mathematical and/or educational innovations to be found in classrooms and lecture theatres? And what of mathematics in those countries that cannot afford the luxury of researchers? Is it not important for all to learn of the situation in, and problems of, for example, some of those African countries in which the hopes and ambitions I encountered in them in the 1960s have apparently been crushed by time and events?

Changes in ICMEs over the years

The programme Freudenthal devised for ICME-1 (1969) followed a similar pattern, with its emphasis on plenary lectures, to that for the typical International Congress of Mathematicians. The speakers, however, were all drawn from Europe and North America and they spoke only about primary and secondary education. (Significantly, four were women – not a high proportion, but a breakthrough in ICMI terms and actually higher than the proportions at the next few ICMEs.) Yet almost without exception they spoke of what was being done in the classroom; of the work that they or their projects were engaged in. This was, of course, the time of great excitement and optimism: of "modern math", and also of much less ambitious but more long-lasting work. Also memorable was the contribution of members of the UK Association of Teachers of Mathematics, who, disappointed by the official programme, brought a class of schoolchildren to Lyon and gave demonstration lessons before leading discussions on their aims and philosophy. Whatever its drawbacks, any schoolteacher would have found much of interest at this ICME.

ICME-2 (Exeter, 1972) sought to build on Lyon and to remedy some of the more obvious defects. The number of plenary lectures was drastically reduced – to seven; working groups (38) were instituted; and, in an attempt to build on the ATM initiative, countries were invited to mount national presentations and 17 did so. Significantly, some of the plenary lecturers came from outside the world

of mathematics and mathematics education, which has rarely been the case at later ICMEs. Another innovation, now ruled out by the sheer size of the congresses (and also the pressures to "get into print"), was that those who submitted papers to their working groups could ask for them to be considered for publication in the *Proceedings* alongside the plenary addresses. An international panel selected eight such papers for publication. Looking again at the list of leaders and secretaries of working groups, I was surprised at how well the programme committee had identified young talent, such as Alan Bishop, Margaret Brown and Celia Hoyles, and encouraged their growth and involvement. One old and regular ICME attender told me at Copenhagen that he still counted Exeter as the most enjoyable and rewarding ICME. It was, however, greatly favoured by the still relatively small membership, 1384, the air of optimism that still pervaded mathematics education, an attractive campus site, and good, but not over hot (thoughts of Budapest and Seville) weather.

Yet, in some ways ICME-3 (Karlsruhe, 1976) was to surpass Exeter. It had some outstanding plenary lectures, but was most notable for the care that had gone into its preparation. The programme was effectively built around thirteen discussion groups whose outcomes would form a volume in the UNESCO *New Trends in Mathematics Teaching* series. So as to facilitate planning, the thirteen group leaders, together with their German secretaries and members of the programme committee, spent a week together in the preceding December discussing plans and content for their groups. And all was paid for by UNESCO. The drawback was that the tight planning cast too great a feeling of rigidity over the meeting and there were complaints that ordinary members were allowed too little time to contribute. Moreover, optimism was beginning to wane as the difficulties of implementing successful curriculum development came to be more clearly recognised and criticism of the more outlandish schemes continued to mount.

Berkeley (ICME-4, 1980) attempted to meet some of the complaints made of Karlsruhe and did so in a way that set the pattern for future ICMEs. First, it had to cope with a much larger membership. This it did partly through the introduction of sub-plenary lectures (but not in the numbers encountered in Copenhagen). For what was really the first time, the programme for an ICME had to be constructed around the number and size of lecture rooms available. What Berkeley did uniquely offer were short, sub-plenary lecture series on aspects of newly developed branches of mathematics. These proved popular and it is a pity that no other ICME has, so far as I can recall, followed this path: a single plenary given on some aspect of mathematics has been the standard offering at succeeding ICMEs (although Paul Erdös gave an un-programmed and highly popular sub-plenary lecture at ICME-6 in Budapest).

The gradual process of democratisation, with more members being allowed to contribute, was carried even further at ICME-5 (Adelaide, 1984). This ICME was distinguished by being the last ICME whose programme was planned by a national team (with a few members whom they chose to invite from elsewhere to assist them). Future ICMEs were planned by programme committees appointed by ICMI. This has brought advantages in that an international congress was planned by a truly international committee and a degree of continuity has been established, but in retrospect one does sometimes long for signs of originality of the type that some of the earlier programme committees demonstrated. Traditions have been established, but, as Gustav Mahler wrote of music-making in Vienna, *Tradition ist Schlamperei* (sloppiness, an unwillingness to think anew).

Not everyone was happy with the form ICMEs were now taking and I recall what was to be my last conversation with Freudenthal, which took place at ICME-6 (Budapest, 1988). He had missed ICME-5 and so the programme for ICME-6 came as a shock. His criticism was as trenchant and as beautifully worded as ever: "I conceived Lyon as a showcase for all that was best in mathematics education. Now ICMEs have turned into bazaars for mathematics education bric-a-brac." In some ways this was a remark that reflected bygone attitudes and ways (e.g., when grants to attend

conferences were based on what applicants would gain from attending rather than what they would "contribute"), but in others it is still one that demands our constant attention.

Later ICMEs, Québec (1992), Seville (1996) and Tokyo (2000 – the first I missed), have followed roughly similar paths to that at Budapest.

What has changed significantly over the ten ICMEs would appear to be the constitution of the membership. In particular, the links with university teaching seem to have almost disappeared. Looking back at the Exeter (1972) *Proceedings*, I find that there were university-level working groups on mathematics for specialists, for social scientists/biologists, and for scientists/engineers, in addition to one on teaching methods in such institutions. These attracted many well-known mathematicians as well as their younger colleagues to the congress. The attractions for these have dwindled over the years and they are now poorly represented – is this to become the case for the classroom teacher? Meeting, discussing and comparing with teachers from other countries has always been a great attraction for many at ICMEs – and unless my memory serves me false, more time for such informal meetings was allowed in the programmes of the early ICMEs. We must ensure that there is always a place for teachers at ICMEs and that they are never made to feel that they are being treated as "the poor relations".

The range of membership is, I believe, a most important issue. Much of the learning and most of the pleasure one derives from an ICME comes from outside the official programme. One wants to enjoy plenary lectures and the work of the various groups, but it is the pleasure of meeting old friends again and of making new acquaintances from whom one can learn that makes many people return to ICMEs: that and the chance to discover new cities, cultures and countries. Any restriction on the range of membership, even if not intended, will mean that members have less chance of gaining knowledge of what is happening in other levels of education, in other facets of mathematics education, and in other countries. That is why it is important to keep the balance of ICME programmes closely in mind and to ensure that all kinds of mathematics education and all types of workers within our field can find both programme items that inform and help them in their work as well as those that enlarge their vision of mathematics education.

Yet I must end by stressing what has not changed. Experience with the planning of several ICMEs has given me some understanding of not only the burden borne by members of the Programme Committee, particularly its Chair, but, more particularly, by those who serve on the national and local committees. These last put in much work over three or four years to ensure that congress members are provided with good working facilities, accommodation, hospitality, excursions and an introduction to local culture, and everything else that they might need. And the morning after the closing ceremony there is, inevitably, the feeling "that was it". Everything is over and the congress itself has appeared to have passed one by in a flash. But they should be reassured that their work has not gone unnoticed and unappreciated. Although one might have some negative criticisms to make of the programmes of some ICMEs, one has nothing but admiration and gratitude for those who worked so hard to make them possible.

The status of research in mathematics education

This is a long-standing problem. Writing in 1974 (*Mathematics: Society and Curricula*, Cambridge, pp. 71 and 77), Brian Griffiths and I drew attention to the fact that in the 1960s the British Government had spent more money on research into the development of new glues than on research into education, and that a noted economist, John Vaizey, had answered this charge by writing that "at least, the former outlay led to an increase in the stickiness of glue, whereas research on education, so

far as he knew, did not lead to increases in the efficiency of education". The expected response of an ignorant businessman, you might claim. Yet Vaizey, later Lord Vaizey, was an outstanding academic, whom I had met when the two educational developmental projects on which we worked shared the same building, and who had actually been employed as a researcher at the London Institute of Education for two years. More recently, I was reminded in hard money terms that this attitude still persists. University departments in England receive a substantial part of their funding dependent upon the way in which the research output of their staff is judged. When Head of the mathematics department and eager to increase our income, I was persuaded by colleagues in education to register as a researcher with them. This would mean, they argued, that I was included amongst a higher ranking set of researchers than if I stayed with the pure mathematicians. Their argument was correct; what we had not realised, however, was that I should have attracted more money to the department as a low ranking pure mathematician (no worries about practicality here) than a higher ranking educator. Clearly, there is still a job to be done to win recognition of the worth of educational research and to raise the standard of such research so that status is accorded to it. The task at ICMEs would seem to me to be to discuss how this might be done, rather than to try to convince each other that this goal has already been achieved. Some years ago Ed Begle made many valuable suggestions on how this goal might be achieved, including ones relating to PhD study and the value for the subject of replicating important past research and by this steadily amassing knowledge, rather than insisting on "originality" and thus adding another speck of sand to a pile that would never provide the foundation for anything solid.

The eighth ICMI Study, *What is research in mathematics education, and what are its results?*, has been criticised on a number of grounds, including the choice of its title, but to me its major failing was that it did not result in a slim volume that could be read by those who doubt the value of such work. No doubter would be likely to read through a large and expensive volume that appeared to have been written with the converted in mind. Should ICMI, then, produce a slim booklet on "What research in mathematics education offers" which can be widely and freely distributed and which would not only explain what such research is, and what it is not, but how illustrated research findings have been put into practice and have actually led to educational improvements? In the not-too-distant past, educational improvements tended to stem from outstanding teachers who reflected upon, and reacted to, their classroom experiences. It is essential that we should neither lose such a source of inspiration nor neglect what research can offer in practical terms.

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