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The International Commission on Mathematical Instruction

ICMI

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The International Commission on Mathematical Instruction

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Legend: IMU stands for *The International Mathematical Union*.

Report on ICMI activities in 1996

1. Organisation

The General Assembly of ICMI held its quadriennial session in conjunction with the 8th International Congress on Mathematical Education, ICME-8, held at Reina Mercedes campus of the Universidad de Sevilla, Spain, in July 1996. The General Assembly was held on 17th July 1996. The minutes of the Assembly are published in the ICMI Bulletin No. 41, December 1996, pp 3-9.

The Executive Committee had its second meeting at ICME-8 as well. The EC meeting was divided into three sessions, held on the 13th, 14th, and 19th July. Beside in meetings, the work in the EC is conducted by correspondence and electronic communication under the direction of the President and the Secretary.

In recent years, applications from a number of countries to be co-opted as non-IMU member states of ICMI have been received by the EC. At the end of 1996 ICMI decided, with the endorsement of the International Mathematical Union, to co-opt Thailand as a non-IMU member of ICMI. The Adhering Organisation is the Mathematical Association of Thailand under the Patronage of His Majesty the King. Other applications were considered by the EC in 1996. Decisions are likely to be made in 1997.

It is part of ICMI's general policy to encourage member states to establish National Sub-Commissions of ICMI. In 1996 the EC was not informed of the establishment of new National Sub-Commissions.

2. ICMEs

The latest of the quadriennial International Congress on Mathematical Education, *ICME-8*, was held at Universidad de Sevilla, Reina Mercedes campus, 14-21 July. The congress had an attendance of about 3500 delegates from almost a hundred different countries. The programme was very rich and intensive. Proceedings of the Congress are in preparation. A novel feature in the ICME series was instigated at ICME-8. A 10% solidarity tax was imposed on all registration fees in order to provide (partial) financial support of the attendance of about 250 delegates from about 55 different non-affluent countries. The amount thus generated was distributed by a specially appointed Grants Committee which worked *incognito* in order to minimise potential problems of pressure. The Grants Committee will publish a separate report of its work.

The next congress, *ICME-9*, will be held in Makuhari, Chiba, Japan, in 2000. Preliminary dates are 31 July to 7 August. An International Programme Committee was appointed in 1996. It is chaired by Professor Hiroshi Fujita, Meiji University, Tokyo, Japan. The IPC is expected to begin its work early in 1997.

3. ICMI Studies

The mounting and conducting of so-called ICMI studies on crucial themes and issues in

mathematics education was continued in 1996. The ICMI studies are published by Kluwer Academic Publishers, Dordrecht, the Netherlands, under the general editorship of the President and the Secretary of ICMI.

The study on *What is Research in Mathematics Education, and What Are Its Results?*, the corresponding conference of which was held at the University of Maryland in College Park, USA, May 1994, is edited by Jeremy Kilpatrick and Anna Sierpinska. The volume is expected to appear in the beginning of 1997.

The study on *Perspectives on the Teaching of Geometry for the 21st Century*, the corresponding study conference of which was held at Università di Catania, Italy, September-October 1995, is edited by Vinicio Villani and Carmelo Mammana. The volume is expected to appear in the course of 1997.

Reports on the these studies, and on one a previously completed, *Gender and Mathematics Education*, were given at special ICMI study sessions at ICME-8, in Sevilla, July 1996.

The next study in the series is devoted to the theme *The Role of the History of Mathematics in the Teaching and Learning of mathematics*. An International Programme Committee was appointed in 1996, with John Fauvel, the Open University, UK, and Jan van Maanen, the University of Groningen, the Netherlands as co-chairs. The study conference will be held in France, most probably at CIRM Luminy (Marseille) in April 1998, with Jean-Luc Dorier, Grenoble, France, in charge of the Local Organisation.

The ICMI EC has also decided to mount a study on the *Teaching and Learning of Mathematics at Tertiary level*. The IPC is expected to be appointed in beginning of 1997. The site of the corresponding study conference is under negotiation.

4. Regional Conferences

In 1996, 3-7 June, *SEACME-7* (The 7th South East Asian Conference on Mathematical Education) was held in Hanoi (Vietnam) with 135 participants from 17 countries. A brief report of the conference, which was sponsored by ICMI as an ICMI Regional Meeting, was published in the ICMI Bulletin, No. 41, December 1996.

5. Affiliated Study Groups

ICMI continues to have four affiliated study groups, *HPM* (The International Study Group for the Relations Between the History and Pedagogy of Mathematics), *IOWME* (The International Organisation of Women and Mathematics Education), *PME* (The International Group for the Psychology of Learning Mathematics), and *WFNMC* (The World Federation of National Mathematical Competitions). Separate reports of their activities were published in the ICMI Bulletin Nos. 40 (HPM, PME, and WFNMC) and 41 (IOWME), 1996.

6. The Solidarity Programme

In 1992 ICMI established a Solidarity Programme to help the development of mathematics education in countries in which there is a need for it that justifies international assistance. The first stage in this programme was the mounting of a *Solidarity Fund* based on private contributions by individuals, associations, etc. The Fund

is to be activated to support concrete initiatives and activities that may foster solidarity in mathematics education between well-defined quarters in developed and less developed countries. The Solidarity Fund has received donations from various organisations and individuals in mathematics education for which it is most grateful. In 1996 no projects were supported by the Solidarity Fund. Although the total funds are not excessive, the ICMI EC would welcome applications concerning projects which are worthy of support in line with the general aims of the Fund.

7. ICMI Bulletins

In 1996, ICMI Bulletin Nos. 40 and 41 were published under the editorship of the Secretary of ICMI. Furthermore, the ICMI Bulletin is available in the following electronic forms: In ASCII-format on direct request to the editor. On the World Wide Web, where it can be found under the following coordinates on the IMU-server, through URL:

[http://elib./zib-berlin.de/imu.icmi.bull.\[no.\]](http://elib./zib-berlin.de/imu.icmi.bull.[no.])

8. ICMI on WWW

Since the end of 1995, information concerning ICMI can be found on the ICMI-pages of the IMU-server on the World Wide Web. The pages are located through URL:

<http://elib./zib-berlin.de/imu.icmi>

Mogens Niss, Secretary, 3 February 1997
Roskilde University, Roskilde, Denmark

ICMI Accounts 1996:

1 January - 31 December

Swiss Francs Account:

Income:

| | |
|---|-------------------|
| balance 1995 | 118.685,25 |
| IMU (Schedule A: Administration) | 11.000,00 |
| IMU (Schedule B: Scientific Activities) | 22.000,00 |
| IMU Contribution to ICME-8 | 12.000,00 |
| interest | 61,51 |
| total | <u>163.746,76</u> |

Expenditure:

| | |
|--------------------------|-------------------|
| transfer charges | 19,22 |
| transfer to US\$ Account | 10.000,00 |
| ICMI balance 1996 | <u>153.727,54</u> |
| total | <u>163.746,76</u> |

Den Danske Bank exchange rate, ult. 1996: 1 CHF = 0,74 US\$

Danish Kroner Account:

Income:

| | |
|---|------------------|
| ICMI balance 1995 | 23.860,34 |
| 2. payment (US\$ 1.000) of UNESCO grant to ICMI Study on Geometry ¹⁾ | 5.825,60 |
| total | <u>29.685,94</u> |

Expenditure:

| | |
|---|-----------|
| ICME-8, Secretary's expenses | 11.069,84 |
| EC meeting in Sevilla, at ICME-8 | 5.513,56 |
| ICMI Study on Geometry, IPC/Editorial board meeting, Secretary's expenses | 5.614,00 |
| typing of Bulletin 40 & 41 | 2047,50 |
| credit card charge | 150,00 |

| | |
|--------------------------|------------------|
| transfer charges | 30,00 |
| ICMI Balance 1996 | 5.261,04 |
| total | <u>29.685,94</u> |

Den Danske Bank exchange rate, ult. 1996: 1 DKR = 0,16 US\$

Sterling Account:

Income:

| | |
|---------------------------|------------------|
| balance 1995 | 16.279,88 |
| CUP royalties for studies | 31,96 |
| interest | 560,20 |
| total | <u>16.872,04</u> |

Expenditure:

| | |
|---|------------------|
| ICMI Study on Geometry, IPC/Editorial board meeting, Trento | 514,08 |
| transfer charges | 6,66 |
| ICMI balance 1996 | 16.352,30 |
| total | <u>16.872,04</u> |

Den Danske Bank exchange rate, ult. 1996: 1 GBP = 1,61 US\$

US Dollars Account:

Income:

| | |
|---|------------------|
| ICMI balance ²⁾ 1995 | 541,17 |
| Solidarity Fund balance ²⁾ 1995 | 32.761,69 |
| ICMI interest, 29% of total (corresponding to 1996 balance share) | 348,32 |
| Solidarity Fund interest, 71% of total (corresponding to 1996 balance share) | 853,15 |
| transfer from Swiss Franc Account (10.000) | 8.306,34 |
| reimbursement of loan to ICME-8, given in 1994 | 10.000,00 |
| Individual contribution to the Solidarity Fund | 41,00 |
| total | <u>52.851,67</u> |

| | |
|---|----------------------|
| Expenditure: | |
| ICME-8, including EC meeting | 2.885,04 |
| Contribution to the publication "The History of the Inter-American Committee on Mathematics Education" | 2.500,00 |
| transfer charges | 63,55 |
| Solidarity Fund balance 1996 | 33.655,84 |
| ICMI balance 1996 | 13.747,24 |
| (account balance) | 47.403,08) |
| total | <u>52.851,67</u> |

Notes:

1. The UNESCO/ROSTE office generously contributed a grant of US\$ 3.000 to the ICMI Study Conference on *Perspectives of the Teaching of Geometry for the 21st Century*, held in Catania, Sicily (Italy), 28 September - 2 October 1995. The second installment of the payment, which was initially divided into two parts - US\$ 2.000 and 1.000, respectively - was made in 1996.

2. As a consequence of the ICMI General Assembly and Executive Committee meetings held in Québec, August 1992, it was decided to establish an ICMI Solidarity Fund based on private contributions. The **Solidarity Fund** is mounted to assist mathematics education and mathematics educators in less affluent countries. Its money can only be spent (by a committee chaired by Professor Jean-Pierre Kahane) to serve such purposes and is therefore **not** part of ICMI's general resources. However, the appearance of the Solidarity Fund on the ICMI accounts for 1996 is due to the wish to keep ICMI's number of different bank accounts low. The accounts exhibit the ICMI balances and the Solidarity Fund balances separately. In 1996 the Solidarity Fund balances were all concentrated in the US Dollar Account.

3. In addition to the amounts displayed directly in the accounts, considerable extra sums should appear but do not and cannot. In 1995 Roskilde University (the Secretary's home institution) has contributed a substantial support to ICMI's work (e.g. telephone and -fax, e-mail facilities, postage, all the printing and distribution costs of the Bulletin, plus secretarial help of various sorts). It is estimated that the total contribution of Roskilde University is equivalent about US\$ 5.000. The ICMI Executive Committee expresses its gratitude for this generous support.

The Executive Committee's thanks also go to the institutions of its other members. These institutions, too, have given invisible support to ICMI's work in a variety of ways. For instance, in many cases these institutions have paid travel and other expenses related to participation in EC meetings and so forth.

Mogens Niss
5 February 1997

**ICMI Study on
The role of the history of mathematics
in the teaching and learning of mathematics:
Discussion Document**

Introduction

In recent years there has been growing interest in the role of history of mathematics in improving the teaching and learning of mathematics. Educators throughout the world have been formulating and conducting research on the use of history of mathematics in mathematics education. Some of the results of this research have been communicated at meetings of interested organisations, and through papers in various journals.

A research programme is beginning to emerge, with contributions from many places over the globe. Such a programme involves a consolidated critical bibliography of work that has been done, and a programme for developing a deeper understanding of the factors involved in the relations between history and pedagogy of mathematics, in different areas of mathematics, and with pupils and students at different stages and with different environments and backgrounds. It also involves the identification and spreading of information and good practice in learning and teaching situations.

ICMI, the International Commission on Mathematics Instruction, has set up a Study on this topic, to report back in time to form part of the agenda at the next International Congress in Mathematics Education (ICME) in Japan in the year 2000. The present document sketches out some of the concerns to be addressed in the ICMI Study, in the hope that many people across the world will wish to contribute to the international discussions and the growing understandings reached in and about this area.

It is hoped that this discussion document will lead to a number of responses and intimations of interest in contributing to the Study. It will be followed by an invited conference (to be held in France in April 1998), from which a publication will be prepared to appear by 2000. The next section of the present document surveys the questions to be addressed. Your views are solicited both on the questions and on how to take the issues forward as implied in the commentary.

Some research questions

The overall intention is to study the role of history of mathematics, in its many dimensions, at all the levels of the educational system: in its relations to the teaching and the learning of mathematics as well as with regard to teacher training and in educational research. History of mathematics as a component of the teaching of mathematics is, as any educational project, directed towards more or less explicit expectations in terms of (better) learning of some mathematics.

Research on the use of history of mathematics in teaching is thus an important part of research in mathematical education. To study such a large and multi-faceted theme we propose to analyse it in a number of (inter-related) questions which together will give insight into the whole process. The order in which the questions are put down here carries no implication about their relative importance or significance.

1. How does the educational level of the learner bear upon the role of history of mathematics?

The way history of mathematics can be used, and the rationale for its use, may vary according to the educational level of the class: children at elementary school and students at university (for example) do have different needs and possibilities. Questions arise about the ways in which history can address these differences. This may, again, be reflected in different training needs for teachers at these levels. (To speak about the “use” of the history of mathematics may seem to presuppose that history of mathematics is something external to mathematics. This assumption would not be universally agreed, however.

2. At what level does history of mathematics as a taught subject become relevant?

In analysing the role of history of mathematics, it is important to distinguish issues around using history of mathematics in a situation whose immediate purpose is the teaching of mathematics, and teaching the history of mathematics as such, in a course or a shorter session. It could be that courses in the history of mathematics, and its classroom use, should be included in a teacher training curriculum (see question 3). There is also a third area, related but separate, namely the history of mathematics education, which is a rather different kind of history.

3. What are the particular functions of a history of mathematics course or component for teachers?

History of mathematics may play an especially important role in the training of future teachers, and also teachers undergoing in-service training. There are a number of reasons for including a historical component in such training, including the promotion of enthusiasm for mathematics, enabling trainees to see pupils differently, to see mathematics differently, and to develop skills of reading, library use and expository writing which can be neglected in mathematics courses. It may be useful here to distinguish the training needs for primary, secondary and higher levels (see question 1).

A related issue is what kinds of history of mathematics is appropriate in teacher training and why: for example, it could be that the history of the foundations of mathematics and ideas of rigour and proof are especially important for future secondary and tertiary teachers. (This issue is also relevant for other categories than future teachers, and is picked up again in question 5.)

4. What is the relation between historians of mathematics and those whose main concern is in using history of mathematics in mathematics education?

This question focuses on the professional base from which practitioners emerge, and relates to the social fabric of today's mathematics education community as well as to issues about the nature of history. There are, gratifyingly, a number of leading historians of mathematics with an interest in educational issues, as there are leading mathematicians and mathematics educators with an interest in history. But as well as minor misapprehensions of the nature of the others' activities, there may be deeper tensions and conflicting aims which it is important to bring to the surface. For example, historians may underestimate the difficulty of transmuting the historical knowledge of the teacher into a productive classroom activity for the learner. It is important that historians and mathematics educators work co-operatively, since historical learning and classroom experience at the appropriate level do not always co-exist in the same person.

5. Should different parts of the curriculum involve history of mathematics in a different way?

Already research is taking place to investigate the particularities of the role of history in the teaching of algebra, compared with the role of history in the teaching of geometry. Different parts of the syllabus make reference, of course, to different aspects of the history of mathematics, and it may be that different modes of use are relevant. Looking at the curriculum in a broad way, we may note that the histories of computing, of statistics, of core "pure" mathematics and of the interactions between mathematics and the world are all rather different pursuits.

Even for the design of the curriculum historical knowledge may be valuable. A survey of recent trends in research, for example (bearing in mind that history extends into the future) could lead to suggestions for new topics to be taught.

6. Does the experience of learning and teaching mathematics in different parts of the world, or cultural groups in local contexts, make different demands on the history of mathematics?

A historical dimension to mathematics learning helps bring out two contrary perceptions in a dialectical way. One is that mathematical developments take place within cultural contexts and it is valid to speak of Islamic mathematics, Greek mathematics and so on, as developments whose style is characteristic of the generating culture. The antithesis to this is the realisation that all human cultures have given rise to mathematical developments which are now the heritage of everyone; this therefore acts against a narrow ethnocentric view within the educational system.

The Study should explore the benefit to learners of realising both that they have a local heritage from their direct ancestors --in the way in which Moslem children in

countries where they are in a minority are known to derive pride and strength from learning about Islamic mathematical achievements-- but also that every culture in the world has contributed to the knowledge and experience base made available to today's learners.

There are many detailed studies of the interplay between history of mathematics and culture in educational contexts throughout the world, notably in Brazil, the Maghreb, Mozambique, China, Portugal etc, which should be drawn upon in analysing and responding to this question.

7. What role can history of mathematics play in supporting special educational needs?

The experience of teachers with responsibility for a wide variety of special educational needs is that history of mathematics can empower the students and valuably support the learning process. Among such areas are experiences with mature students, with students attending numeracy classes, with students in particular apprenticeship situations, with hitherto low-attaining students, with gifted students, and with students whose special needs arise from handicaps. Here the many different experiences need to be researched, their particular features drawn out, and an account provided in an overall framework of analysis and understanding.

8. What are the relations between the role or roles we attribute to history and the ways of introducing or using it in education?

This question has been the focus of considerable attention over recent decades. Every time someone reports on a classroom experience of using history and what it achieved they have been offering a response to this question. So a search of the literature is a fundamental part of researching the response to this question.

The question also involves also a listing of ways of introducing or incorporating a historical dimension: for example anecdotal, broad outline, content, dramatic etc. Then one would draw attention to the range of educational aims served by each mode of incorporation: the way that historical anecdotes are intended to change the image of mathematics and humanize it, for example. Or again, the way that mathematics is not, historically, a relentless surge of progress but can be a study in twists, turns, false paths and dead-ends both humanizes the subject and helps learners towards a more realistic appreciation of their own endeavours.

There are rich issues for discussion and research in, for example, the use of primary sources in mathematics classrooms at appropriate levels.

This question is a very broad one that could involve a large number of people: it may be wise to distinguish the taxonomic question --the range of different classroom aims and modes of activity-- from the further exploration of each issue.

9. What are the consequences for classroom organisation and practice?

The consequences of integrating history are far-reaching. In particular, there are wider opportunities for modes of assessment. Assessment can be broadened to develop different skills (such as writing and project activity), and consequences for students' interest and enjoyment have been noted. Teachers may well need practical guidance and support both in fresh areas of assessment, and in aspects of classroom organisation. This in turn may have consequences for teacher training as well as curriculum design.

10. How can history of mathematics be useful for the mathematics education researcher?

This question provides an opportunity for an exploration of the relations between the subject of this study and researchers in the mathematical education community (whose aims are, in turn, to provide insights into the processes of learning and teaching). One example is the use of history of mathematics to help both teacher and learner understand and overcome epistemological breaks in the development of mathematical understanding. A constructive critical analysis of the view that 'ontogeny recapitulates phylogeny' --that the development of an individual's mathematical understanding follows the historical development of mathematical ideas-- may be appropriate. Another example is of research on the development of mathematical concepts. In this case the researcher applies history as possible 'looking glasses' on the mechanisms that put mathematical thought into motion. Such combinations of historical and psychological perspectives deserve serious attention.

These issues could be studied in teaching experiments in which the above questions are addressed, and also questions like: What is good for the learner? How do you know it is good for the learner? and so on. Even if a teaching experiment does not use history of mathematics explicitly, the elaboration of the teaching project may have made use of the results of history of mathematics. For instance, such a question as 'is it good for the learner?' may be better understood in the light of the history of mathematics. So the question here is: how can research in mathematics education profit from historical knowledge? The answer to this question might deal with themes such as the historical genesis of a concept and an epistemological analysis of the interplay between history and the teaching of a subject. Moreover, history of mathematics helps to understand the distance between the way in which concepts function in the mathematics community and the way they function in the school.

There are also fundamental questions about the style and evaluation of research in this area. Different styles which have been used in the past range from the anecdotal (in effect) to quasi-scientific surveys with questionnaires and statistical apparatus. A process of such considerable complexity evidently calls for a research methodology of some sophistication. Fortunately the wider mathematics education community has been studying this problem for some time: it is indeed the subject of an earlier ICMI Study (What is research in mathematics education and what are its results?). So a group could be encouraged to draw upon the wider community experience and consider its application to our area of concern.

11. What are the national experiences of incorporating history of mathematics in national curriculum documents and central political guidance?

This is not so much a question for discussion as a fairly straightforward empirical question, needing input from knowledgeable people in as many countries and states as possible. But of course it has policy implications too, and could lead to a sharing of experience among members of the community about how they have reached the policy-making level in their countries to influence the content or rhetoric of public documents. Perhaps this study could be carried on in parallel with the more discursive questions, organised by a small group who could put the results (in the sense of public documents or quotations from them as well as brief historical accounts of national curriculum change) on the WorldWideWeb as they are collected.

In some parts of the world a different relationship between history and mathematics may have been developed. For example, in Denmark and Sweden history of mathematics is regarded as an intrinsic part of the subject itself. There are also differences in styles of examination and assessment. If everyone with access to examples of such different approaches, from different countries and states, could pool their experience it would be a most valuable input to the Study.

12. What work has been done on the area of this Study in the past?

The answer is: quite a lot. But it is all over the place and needs to be gathered together and referenced analytically. A major annotated critical bibliographical study of the field, which might well take up a sizable proportion of the final publication, would be an enormously valuable contribution that the ICMI Study could make. It should include a brief abstract of each paper or piece of work included, and indications of the categories to which the work relates in an analytical index.

The organisation of this sub-project will need to be different from that of the rest of the Study. It will need to be even more pro-active to achieve a useful result. A small group should perhaps take this in hand and work out how it can be achieved collaboratively. Some progress on such a bibliography is already in hand in various places, notably by Fred Rickey in the US, John Fauvel in the UK. This seems another place where work in progress could be available on the WorldWideWeb.

Bibliography

Here are, as a small selection to start with, some of the places in which work on the above topics has appeared in recent years.

Calinger, Ronald (ed), *Vita mathematica: historical research and integration with teaching*, Mathematical Association of America 1996

Fauvel, John (ed), *History in the Mathematics Classroom*. The IREM

Papers, The Mathematical Association 1990 (translation from the French of papers by the Committee Inter-IREM, combined with classroom resources)

Fauvel, John (ed), *For the learning of mathematics 11 no 2* (June 1991; *special issue* on using history of mathematics in the mathematics classroom)

Fuehrer, Lutz (ed), *mathematik lehren 19* (December 1986; *special issue* entitled 'Geschichte -- Geschichten')

IREM de Franche-Comte (coll.ed), *Contribution à une approche historique de l'enseignement des mathématiques*, Besançon 1996 (proceedings of the 6th Summer University, Besançon July 1995)

IREM de Montpellier (coll.ed), *Histoire et épistémologie dans l'éducation mathématique*, Montpellier 1995 (proceedings of the first European Summer University, Montpellier August 1993)

McKinnon, Nick (ed), *The mathematical gazette 76 no 475* (March 1992; *special issue* on using history of mathematics in the teaching of mathematics)

Nobre, Sergio (ed), *Meeting of The International Study Group on Relations Between History and Pedagogy of Mathematics*. Blumenau/ Brazil 25--27 July 1994, UNESP 1994

Schoenebeck, Juergen (ed.), *mathematik lehren 47* (August 1991; *special issue* about 'Historische Quellen fuer den Mathematikunterricht')

Swetz, Frank, et al (ed), '*Learn from the Masters!*', Mathematical Association of America 1995

Veloso, Eduardo (ed), *Historia e Educação Matemática*. proceedings/actes/actas, Braga/Lisbon 1996

Call for contributions

The ICMI Study on *The role of the history of mathematics in the teaching and learning of mathematics* will investigate the above questions over the next two years. The Study has three components: an invited study conference, related research activities, and a publication to appear in the ICMI Study series that will be based on contributions to and outcomes of the conference and related research activities. The conference will be held in April 1998 in France. The major outcomes of the study will be published as an ICMI Study in 1999 and presented at the International Congress of Mathematics Education in Japan in 2000.

The International Programme Committee (IPC) for the study invites members of the educational and historical communities to propose or submit contributions on specific questions, problems or issues stimulated by this discussion document no later than 1

October 1997 (but earlier if possible). Contributions, in the form of research papers, discussion papers or shorter responses, may address questions raised above or questions that arise in response, or further issues relating to the content of the study. Contributions should be sent to the co-chairs (addresses below). Proposals for research that is on its way, or still to be carried out, are also welcome; questions should be carefully stated and a sketch of the outcome --actual or hoped-for-- should be presented, if possible with reference to earlier and related studies. All such contributions will be regarded as input to the planning of the study conference.

The members of the International Programme Committee are

Abraham Arcavi (Israel),
Evelyne Barbin (France),
Jean-Luc Dorier (France),
Florence Fasanelli (USA),
John Fauvel (UK, co-chair),
Alejandro Garciadiego (Mexico),
Ewa Łakoma (Poland),
Jan van Maanen (Netherlands, co-chair),
Mogens Niss (Denmark, ex officio)
Man-Keung Siu (Hong Kong).

This document was prepared by John Fauvel and Jan van Maanen with the help of Abraham Arcavi, Evelyne Barbin, Alphonse Buccino, Ron Calinger, Jean-Luc Dorier, Florence Fasanelli, Alejandro Garciadiego, Torkil Heiede, Victor Katz, Manfred Kronfellner, Reinhard Laubenbacher, David Robertson, Anna Sfard, and Daniele Struppa.

Contributions should be sent to the co-chairs at the following addresses:

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This document is also available on the World Wide Web at

<http://www.math.rug.nl/indvHPs/Maanen.html#dd>

The International Programme Committee for ICME-9

The International Programme Committee (IPC) for ICME-9, The Ninth International Congress on Mathematical Education, to be held in Makuhari, Chiba, near Tokyo, Japan, in July/August 2000 has now been appointed by the Executive Committee of ICMI. The members are as follows

Professor Hiroshi Fujita, Tokyo, Japan, *Chair*
Professor Claudi Alsina, Barcelona, Spain
Professor Jerry Becker, Carbondale, Illinois, USA
Professor Tania Campos, São Paulo, Brazil
Professor Gila Hanna, Toronto, Ontario, Canada
Professor Cyril Julie, Belville, South Africa
Professor Gilah Leder, Bundoora, Victoria, Australia, *representative of ICMI*
Professor Lee, Peng Yee, Singapore, *liaison officer between the IPC and the Congress Organisers*
Dr. Stephen Lerman, London, United Kingdom
Professor Tadao Nakahara, Hiroshima, Japan
Professor Nabuhiko Nohda, Tsukuba, Japan
Professor Toshio Sawada, Tokyo, Japan
Professor Heinz Steinbring, Dortmund, Germany
Professor Julianna Szendrei, Budapest, Hungary
Professor Wang, Chang-Pei, Beijing, China
Professor Miguel de Guzmán, Madrid, Spain, *ex officio, President of ICMI*
Professor Mogens Niss, Roskilde, Denmark, *ex officio, Secretary of ICMI*

The IPC can be contacted through its Chair:

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ICMI Study on University Mathematics

The Executive Committee of ICMI has decided to mount an *ICMI Study on the Teaching and Learning of Mathematics at University Level*. The Study is directed by an International Programme Committee (IPC) which is composed as follows:

Professor Derek Holton, Dunedin, New Zealand, *Chair*
Professor Nestor Aguilera, Santa Fé, Argentina
Professor Michèle Artigue, Paris, France
Dr. Frank Barrington, Melbourne, Victoria, Australia
Professor Mohamed El Tom, Doha, Qatar
Dr. Joel Hillel, Montréal, Québec, Canada
Professor Urs Kirchgraber, Zürich, Switzerland
Professor Lee, Peng Yee, Singapore
Professor Alan Schoenfeld, Berkeley, California, USA
Professor Hans Wallin, Umeå, Sweden
Professor Ye, Qi-xiao, Beijing, China
Professor Mogens Niss, Roskilde, Denmark *ex officio, Secretary of ICMI*

The first task of the IPC is to produce a so-called Discussion Document for world-wide circulation. This Discussion Document will be published in the next (December 1997) issue of this Bulletin, and elsewhere. The next task is to organise an international Study Conference which is to be held 8-12 December 1998 in Singapore.

Contacts with the IPC can be made through its chair

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ICMI WMY 2000 Committee

In order to consider, plan and prepare the main aspects of ICMI's involvement in the World Mathematical Year 2000, *The ICMI WMY 2000 Committee* has been formed. The Committee will work under the chairmanship of ICMI's President, Professor Miguel de Guzmán. The Committee has the following members:

Professor Miguel de Guzmán, Madrid, Spain, *Chair*
Professor Bernard Hodgson, Québec City, Québec, Canada

Professor Jean-Pierre Kahane, Orsay, France
Professor Hikosaburo Komatsu, Tokyo, Japan
Professor Lee, Peng Yee, Singapore
Professor Eduardo Luna, Miami Shores, Florida, USA
Professor Michael Neubrand, Flensburg, Germany
Professor Kaye Stacey, Melbourne, Victoria, Australia

The Committee may be contacted through its chair, Professor de Guzmán, at the address given at the beginning of this Bulletin, or by e-mail: <mdeguzman@bit-mailer.net>

French Donation for ICMI's Solidarity Fund

The French National Sub-Commission of ICMI, C.F.E.M, has decided to make a contribution to ICMI's Solidarity Fund and Programme (established 1992) of French Francs 5.000. The Executive Committee of ICMI is very grateful for this generous donation towards the furtherance of mathematics education research and development through projects and activities in places in which there is a need for it.

Mathematics Education in Germany

The German Sub-Commission of ICMI offers information about 'Mathematics Education in Germany', for all who are interested, and especially for participants in The International Congress of Mathematics, to be held in Berlin, Germany, in 1998. The information is available on the WWW at the following address

<http://www.mathematik.uni-wuerzburg.de/History/mathed.html>

A Tribute to David Wheeler

The publication this summer of the 50th issue of *For the Learning of Mathematics* (FLM) will herald the end of David Wheeler's editorship of this well-known and respected mathematics education journal, a journal he founded close to two decades ago and which he has produced almost single-handedly by himself ever since then. Moreover, this year marks the 50th anniversary of the beginning of David's remarkable career as a mathematics teacher. David retired from Concordia University (Montréal) in 1990, and has recently relinquished his position as the Canadian national representative to ICMI. Thus it was felt by many to be an excellent occasion to pay tribute to David's manifold achievements and contributions to mathematics education.

We would like to thank all the authors below who kindly agreed to collaborate with us in the preparation of this tribute. The personal perspectives they provide in their testimony will undoubtedly help the reader gain a sense of the variety and the depth of David's involvement in mathematics education over half-a-century. We would also like to thank Mogens Niss, editor of this Bulletin, for providing a publication outlet through which this tribute to David Wheeler could be shared broadly with the mathematics education community.

Bravo and thank you, dear friend David!

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Some notes on David Wheeler's years as a mathematics educator in Britain

I first met David Wheeler in the late fifties at a local branch meeting of ATAM (the Association for Teaching Aids in Mathematics, later to become ATM, the Association of Teachers of Mathematics). When the meeting broke up into small discussion groups I found myself in one chaired by this amazingly impressive man with a generous laugh, a warm and inviting manner yet with a sharp eye for fraud or insincerity. Not for the last time, I found myself simultaneously encouraged and challenged by his presence in the group. Such personal influence has been the experience of many teachers who were fortunate enough to work with him in some way during his professional life in England.

David was already a key figure in the Association which had been founded by Caleb

Gattegno in 1952. He became an increasingly important influence in mathematics education in Britain over the next two decades. He was tirelessly active in a number of fields: after many years teaching mathematics in London schools, he moved into post-graduate teacher education at Leicester University, where he soon became involved in the setting up of a study group with colleagues from other universities (some readers will know the sort of influence he had in this study group which was not unlike the one he initiated many years later in Canada).

He continued to be involved in the work of ATM: he wrote regularly for the journal of the association, "Mathematics teaching", contributed to various books and edited a number of these (notably "Notes on mathematics for children", Cambridge University Press, 1977). He served on the committee of the association for many years, including a particularly fertile spell as Secretary, and he was a regular seminar leader at conferences. He became an outstanding editor of the journal whose magisterial editorials still get re-printed from time to time; his own wide interests and contacts ensured that the journal moved from being something more like a local house magazine into an authoritative and internationally respected journal.

Apart from all that, and apart from his normal university teaching and administrative responsibilities, he was often running courses for teachers outside his immediate local area, serving on national committees, attending international conferences, giving radio talks on the teaching of mathematics, writing articles in other educational journals, commissioning and editing a series of textbooks, preparing courses for the Open University - this latter yielding a remarkable book, "R is for Real" (Open University Press, 1974) which deserves to be more widely known.

Lists of achievements like the above are formal pieties which do not convey the very special nature of the legacy that David left to his many friends and colleagues in Britain. Perhaps this can be best captured in some of his own words. For many years I would ask groups of prospective teachers to read his article on the Role of the Teacher ("Mathematics Teaching", no. 50, 1970, p23) . Discussion of this article was always fruitful. For students who were on the edge of their first experience of teaching, it was exhilarating and very helpful to read his pungent reversal of the usual traditional advice that a teacher faced with a new class needs first to establish relationship. (A typically shrewd aside noted that "teacher-trainers have one sort of language for this: experienced teachers another!") For, "if the teacher takes the initiative in establishing relationships before there are any tasks, the children will know that the tasks do not have first priority; they are being thoroughly logical in subsequently working on the relationships instead of the tasks."

The article opened with the following paragraph: "If we know that ineffective teaching of mathematics is not due to the difficulty of the subject matter, and if we know that changing the classroom environment does not contain within itself the possibility of acting directly on the awarenesses of children, and if we then do not re-examine in the most fundamental way how as teachers we should act, we are guilty of a total failure of seriousness, for we have stopped our progress towards a better education for children just short of the point at which we can make a contribution to it."

David himself never stopped short of making a contribution, one that was serious, challenging but sympathetic, and always tinged with humour. In the words of the title of one of his ATM conference lectures, he helped "humanise mathematical education". During the sixties, he had been a central figure in the ATM research and development group. He had not himself been a student of Gattegno's like many other members of the group, but he was certainly the one who had the most understanding in theory and practice of what Gattegno was eventually to call the science of education.

It is perhaps typical of his own research in mathematics education that at the height of a professional career in England he chose to leave a tenured post and familiar ways to work with new challenges in New York.

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Reminiscences of David Wheeler in New York

I don't have a clear recollection of my first meeting with David Wheeler, although it was certainly in the early 1970's at Caleb Gattegno's Educational Solutions. I started working for Educational Solutions in various public schools in 1970 and Wheeler's name was often mentioned (somewhat reverently) around the office. ATM (Association of Teachers of Mathematics), MT (Mathematics Teaching), David's connection to Gattegno and David, himself, were unknown to me. These were all to change in the next couple of years.

I didn't see much of David when he first arrived. He mostly worked in the downtown 5th Avenue office of Education Solutions and I in the uptown 5th district of the New York City Public Schools. I don't know how we came to know each other better, but it was undoubtedly through some combination of seminars at Educational Solutions, the many lunches at Brew Burger, and concerts at Carnegie Hall.

I appreciated David's wit and humor from our first meetings, but a true respect for his mathematical insights came a short bit later. The occurrence was a weekend workshop that he conducted using the black and white Nicolet geometry films. He guided the participants through a careful study of several of the films, revealing insight after insight. What a tour de force! And I still have my notes.

There were occasions in New York when I was leading a workshop that he was able, at a critical moment, to focus an uncertain discussion. Then, and in many working groups of CMESG/GCEDM (Canadian Mathematics Education Study Group / Groupe canadien d'étude en didactique des mathématiques) that we participated in since, I have come to value his uncanny ability to contribute when he is not the leader, not by adding more layers of detail to an existing viewpoint, but by illuminating it through the suggestion of complementary and countervailing viewpoints.

David and I used to trade what seemed to us to be interesting math problems. There must have been some discussion about their usefulness in school settings, but the memory of the joy of solving them is more prominent. After leaving New York he continued to send me problems and I have maintained them in a file which I still utilize. Recently, a discussion among members of my department on an equivalent of Wythoff's Nim sent me back to that file. There it was, clearly presented with follow-up suggestions from twenty years ago that the current discussion had yet to consider.

There was one question that I used to frequently ask David to which he did not have (or chose not to have) an unequivocal answer: "What do you do in that office?" It was asked partly out of curiosity and partly from the knowledge that I would have found it very difficult to work in such close physical proximity to Gattegno.

In retrospect I think a partial answer to the question comes from viewing his short stay in New York as a bridge spanning his significant accomplishments with ATM and MT in the UK and with FLM (For the Learning of Mathematics) and CMESG/GCEDM in Canada. The office allowed him to cross that bridge at an ideal pace; contemplating the past, learning in the present and preparing for the future. I feel fortunate to have accompanied him for even a small part of that crossing.

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Some aspects of David Wheeler's career in Canada

David Wheeler came to Canada in 1976 as professor of mathematics at Concordia University in Montréal. From that date until the time of his retirement and relocation to Vancouver a decade and a half later, he played a major role in a number of international organizations and activities. In the Canadian context he was instrumental in the formation and growth of two significant initiatives: the development of Concordia as a centre for teaching and research in mathematics education, and the creation of the Canadian Mathematics Education Study Group / Groupe canadien d'étude en didactique des mathématiques (CMESG/GCEDM).

When David Wheeler came to Concordia, the Mathematics Department's main commitment to education was through the Master's in the Teaching of Mathematics programme (M.T.M.). At the time, the M.T.M. consisted essentially of content courses in mathematics and did not provide a broader based vision of mathematics education. Wheeler brought a wider perspective to the programme by weaving in the pedagogical, psychological, historical and philosophical connection to mathematics education. He introduced faculty and students alike to Piaget's work in developmental psychology, to Polya's classical writing on heuristics and problem solving, to Lakatos' perceptive insights of the process of mathematization and proof. He brought the international mathematics education community to Concordia by attracting visiting scholars and lecturers. By co-directing the first FCAR (Fonds pour la formation de

chercheurs et l'aide à la recherche du Québec) three year research project on problem-solving, he helped launch the research aspect of the mathematics education group. Within five very short years, the group has achieved an international reputation, with a very high research profile and an active role in many national and international organizations.

CMESG/GCEDM in the 1990's has become an active and influential group involving a high percentage of the population of Canadian mathematics educators and mathematicians with a strong interest in education, as well as a few regular, 'offshore', participants. In its early days, however, it was almost exclusively Wheeler's brainchild. In the evolution of CMESG/GCEDM we have a clear picture of Wheeler at work -- imaginative, sensitive, ambitious, disciplined, diligent and determined; it is a story worth recounting in some detail.

Shortly after his arrival in Montréal, David composed a letter in which he noted his perception of the lack of any national forum for the discussion of ideas about the teaching and learning of mathematics. He went on to ask a large number of mathematicians and mathematics educators in Canada whether this perception was correct, and if it was, whether there was merit in trying to create such a forum. The response to this request was largely negative. Of the individuals who responded, the majority either did not see such a venture as particularly important, or felt that their needs were already being met adequately by the National Council of Teachers of Mathematics (USA) and its allied interest groups. In the minority group of 'positive' respondents there was a small 'cluster point' in Kingston, Ontario where, independently, two individuals had expressed some interest in Wheeler's suggestion. One was John Coleman, the long-time head of the Department of Mathematics at Queen's University, and the second was William Higginson, recently appointed as an assistant professor in the Faculty of Education at the same university. [It would later be suggested, neither unkindly nor totally inaccurately, that CMESG/GCEDM was a function of Wheeler's imagination, Coleman's influence and Higginson's energy.] With this rather thin potential base for a national organization Wheeler moved quickly and decisively taking advantage of the fact that Coleman had recently completed a major study of the "Mathematical Sciences in Canada" (Science Council of Canada, 1976) and was able to support an invitational meeting at Queen's in the summer of 1977. The format established for that gathering [invited speakers -- in this case, John Coleman, Tom Kieren of the University of Alberta, and Claude Gaulin of Université Laval -- and working groups] has been one of the 'constants' of the organization which evolved out of that meeting. It was clear to many by the end of that first Kingston meeting [which was to be followed by three more at that location in the next three years, by which time a formally constituted organization -- whose elected president for the first ten years was David Wheeler -- had come into being] that the 'new boy' on the Canadian mathematics education block had much to offer to this previously very loosely organized community. Take, for instance, these observations from his contribution, "Reflections after the Conference" from the Conference Proceedings (pp. 56 - 61 in "Educating Teachers of Mathematics: The Universities' Responsibility", A. J. Coleman, W. C. Higginson and D. H. Wheeler, eds.; Ottawa: Science Council of Canada, 1978):

"...it would be premature to say that mathematics education is on the verge of a breakthrough comparable to that experienced by mathematics... Yet the real message of the implied parallelism is that there 'may' be a current flowing that could liberate education from its ideological constraints... It is always a possibility that those who enter with curiosity and sensitivity and persistence into a dialogue with the facts may, like Kepler or Faraday or Cantor, find themselves carried into a new world that others will inherit."

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David Wheeler's international legacy

David Wheeler's fifty years in mathematics education have left indelible marks on the international scene.

Evidence of these can be found in his exceptional contribution as writer and as editor of the internationally renowned British journal "Mathematics Teaching" as well as in his remarkable work as founder, editor, fund-raiser, administrator, and much more, of "For the Learning of Mathematics" (FLM), a journal with a well-established world-wide reputation. These are discussed by others in this Bulletin.

Other evidence is David's involvement in activities of the International Commission on Mathematical Instruction (ICMI) and International Congresses on Mathematical Education (ICMEs). Concerning ICMI, he was the first and the only Canadian official representative until his retirement from this post in 1996, and he actively participated in a number of ICMI study seminars, always providing deep insights and thoughtful reflections. On the other hand, David Wheeler has been a member of the International Programme Committees for ICME-5 (1984), ICME-6 (1988) and ICME-7 (1992). For the latter, he chaired the IPC and played other very important roles, being in the forefront organizing and developing the successful bid to host the congress in Québec City, and sitting on the Executive Committee and the Canadian National Committee. He contributed much to the success of ICME-7 and was an important member of the Editorial Panel for the two volumes of its Proceedings. As Chair of the IPC, he insisted that members reflect and question all parts of the programme: What was the role of Working Groups, Topic Groups, etc.? Was there a proper balance between these and the more traditional lecture presentations? How could the committee facilitate real participation by those who already had and those who were new to the ICME experience? etc. Undoubtedly David Wheeler has left his mark on the evolving spirit and organization of the ICMEs. Moreover, through many invited presentations he has made during ICMEs, PME and HPM conferences, ICMI study

seminars and other events around the globe, he has influenced mathematics educators from the elementary to the tertiary levels.

It is clear that David has been consistently recognised internationally not only for his thought provoking and rich articles and presentations, but perhaps even more for his brilliant, original and spontaneous interventions during meetings, often raising questions or putting in question what others assumed of no consequence or accepted without question. Always aspiring to improve knowledge and understanding, he eagerly and patiently encouraged the participation and development of others.

We take the liberty to personalize the aims which he had originally spelt out for FLM: David Wheeler... "aims to stimulate reflection on and study of the practices and theories of mathematics education at all levels; to generate productive discussion; to encourage enquiry and research; to promote criticism and evaluation of ideas and procedures current in the field." In his fifty years of activities in mathematics education, David has certainly achieved that and we are most grateful for it.

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David Wheeler and the FLM adventure

In July 1980, the first issue of "For the Learning of Mathematics" (FLM) appeared -- conceived, edited and financed (with some support from Concordia University in Montréal) by David Wheeler. By June 1997, the fiftieth issue will have appeared, David's final one as editor of his journal. Although the journal's synchronic appearance was on occasion aleatory, its diachronic presence is now an established regularity in the academic world (reflecting the most important factor when calling the June issue the June issue).

One of the many lasting impressions David has made in this realm has been produced through the pages of this journal, despite his almost never appearing as a named presence in the pages themselves. (He had a short editorial on page 1 together with a few briefly-worded questions and comments in his interview/discussion with Caleb Gattegno in issue number 1, and a second editorial to end things off in issue number 50. And that's it.) The incoming editor might be permitted a gleam in his eye about the pieces David might finally be inveigled into writing.

There are a number of orienting influences. One is that of the Association of Teachers of Mathematics (ATM), of whose journal David Wheeler was an early editor. In FLM issue 1, ATM is "represented" by Tahta, Trivett and Gattegno. The

very name of the journal is deliberately resonant of the collections of Caleb Gattegno's writings, entitled "For the Teaching of Mathematics".

The title also signals the journal editor's strong interest in learning mathematics, without necessarily delimiting this as the journal's sole or even primary focus. The editorial on page 1 of issue 1 claims: "I want to do something to serve the interests of those who have to learn mathematics." A wide range of things can be offered "for the learning of mathematics": the title signals one answer to the question of what the journal is for.

FLM, like its editor-creator, is strongly orientated toward the mathematical, including its history and philosophy, in order to offer illumination of some of the issues at work within mathematics classrooms at all levels. FLM takes mathematics seriously. This has little to do with the age of pupils or complexity of mathematical content. It is possible to take mathematics in infant schools very seriously, as authors such as Gattegno, Rotman, Tahta and Walkerdine have shown, illuminating the referential and symbolic complexity of early arithmetic.

Elsewhere, in particular regard to mathematics, David Wheeler has written: "Dewey said somewhere that subject matter is a prime source of pedagogical insights. Almost no educators really believe this, I think, except in the trivial sense of hoping that teachers, textbook writers, and curriculum designers "know their mathematics". Even many mathematicians, who ought to know better, have no interest in looking below the instrumental or formal surface of mathematics in order to get clues about how to present it more effectively."

Wheeler has published, indeed championed, some pioneering work in the use of history of mathematics in classrooms, as well as strongly underpinning by his support a continuing exploration of the notion of "ethnomathematics". There is actually something of an irony here, as this latter notion in its various manifestations has proved a source of ambivalence to him (not least in connection to his own work on the notion of mathematising). Yet, as psychoanalyst Adam Phillips has noted, "ambivalence makes us vulnerable, because we are always on the side of the enemy".

For the Learning of Mathematics has proved itself to be open to some unfamiliar and unexpected writing (not least on occasion unexpected by the editor himself, a consequence of engaging guest editors). The special issue on psychodynamic influences brought together a number of such pieces, though other writing drawing on similar elemental themes (such as by Early or Blanchard-Laville) had appeared in the journal prior to this collection. As David has often pointed out, he doesn't have to agree with his authors. Even the Radatz article on student errors in the first ever issue contained a citation by Freud.

David Wheeler's sense of the mathematical and the educational, of what is worthwhile attending to, is well represented in the pages of his journal. It reflects a disciplined eclecticism and an appreciation of a wide variety of writing, both in content and style, corralled by a clear and unflinching eye for material of value shining through a wide range of forms. The letters he wrote to authors, whether of acceptance or rejection

(producing occasional difficulty in recipients of the former in not construing them as the latter), were always motivated by a desire to make the journal the best he possibly could.

For the Learning of Mathematics will no longer be confluent with David Wheeler. But in handing its management over to the Canadian Mathematics Education Study Group / Groupe canadien d'étude en didactique des mathématiques (CMESG/GCEDM) and in taking part in the choosing of a subsequent editor, he has continued the link and underlined his continued involvement with and commitment to the journal. And it is we, its readers, who benefit and it is on behalf of the readers that I offer my appreciation.

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Announcement

The journal For the Learning of Mathematics (FLM) changes hands.

At this time, it is fitting to announce that David Wheeler, founder, editor, etc. of FLM, has generously agreed that his journal should continue under the auspices of the Canadian Mathematics Education Study group / Groupe canadien d'étude en didactique des mathématiques. Starting with issue 17(3) the new editor will be Dr David Pimm of the Open University, U.K. The Canadian home of FLM will be Queen's University in Kingston, Ontario.

FUTURE CONFERENCES

ATCM '97, June 1997

The Second Asian Technology Conference in Mathematics, focusing on computer technology in mathematical research and teaching, will be held 16- 20 June, 1997, in Penang, Malaysia, organised by School of Mathematical Sciences, Universiti Sains Malaysia.

The conference will provide an interdisciplinary forum where researchers in the fields of mathematics, education, computers and technology, together with teachers can present results and exchange ideas and information. The conference will cover a broad range of topics relevant to the use of technology in mathematics. These topics include: The potential use of technology in teaching and learning of mathematics; Development of user-friendly softwares; Computational mathematics. The programme will include plenary sessions, special sessions, short communications and exhibitions. Selected papers presented at the conference will be published in the proceedings.

For further information, please contact

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PME-1997, July 1997

The 1997 annual conference of the International Group for the Psychology of Mathematics Education, PME, will be held in Lahti, Finland, 14-19 July 1997.

The Richard Skemp Memorial Fund of PME has limited funds available to support both academics who find difficulties in attending PME conferences for racial, political, or philosophical reasons, and those from developing countries that are under-represented within the PME. Applications for an allowance from the Travel Fund containing relevant information may be sent to the Executive Secretary, Dr. Joop van Dormolen, Rehov Harofeh 48 Aleph, 34367 Haifa, ISRAEL, before 1 March 1997. Applicants are supposed to play an active part in a Working Group or Discussion Group, or otherwise). PME members may nominate recipients for support from this fund by writing to the Executive Secretary.

For further information about PME-1997, please contact

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CIEAEM 49: The interactions in the mathematics classroom, July 1997

La Commission Internationale pour l'Étude et l'Amélioration de l'Enseignement des Mathématiques (CIEAEM) organises its 49th conference on the above-mentioned theme, 24-30 July 1997, at the Escola Superior de Educação, Instituto Politécnico de Setúbal, Portugal. The sub-themes of the conference are 'The interactions among students', 'The teacher's role', 'Task, curriculum materials and problems', 'Images/-views of mathematics', 'The observation and analysis of classroom interactions'.

The International Programme Committee is chaired by

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from whom further information can be obtained.

International Symposium on DERIVE and the TI-92: Fun in Learning Mathematics, August 1997

The Austrian Centre for Didactics of Computer Algebra organises this conference in

Kungsbacka (near Gothenburg) in Sweden, 7-9 August 1997. For further information please contact the chair of the programme committee and local organiser

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Justification and Enrolment Problems in Education Involving Mathematics or Physics, August 1997

On the occasion of the 25th anniversary of Roskilde University (Denmark), IMFUFA (the Department of Mathematics and Physics and their Functions in Education, Research and Applications) is pleased to invite mathematics and physics educators; scholars and scientists working in areas to which mathematics or physics are essential; representatives of institutions, agencies and organisations of research, industry or commerce; educational administrators, planners, authorities, and politicians; and other interested parties to attend this international conference which is going to be held at IMFUFA, Roskilde University, 22-26 August 1997.

Mathematics and physics play objectively significant roles in a large number of educational subjects and study programmes in various areas, not only as subjects in their own right but even more, perhaps, as essential components in other subjects and fields of study. Yet, in many places pupils and students have considerable difficulty in finding mathematics and physics relevant, and in coming to grips with their study. Similarly, in many countries students, to a manifest extent, are opting away from tertiary studies in which mathematics or physics form a key component.

Although national and local conditions and circumstances are undoubtedly important in this context, the problems are clearly international and non-superficial. This implies that attempts to explain or counteract the problems have to rely on in-depth analyses of their scientific, socio-economic, cultural, didactical, philisophical, and pedagogical aspects. The main purpose of the international conference *Justification and enrolment problem in education involving mathematics or physics* is to elucidate and analyse the problems with respect to these aspects, and to do so from a variety of different perspectives, such as educational sector and level, geography and culture.

If you are interested in receiving further information about this conference please contact the organisers:

Jens Højgaard Jensen (physics)
e-mail: <jhj@mmf.ruc.dk>

or

Mogens Niss (mathematics)
e-mail: <mn@mmf.ruc.dk>

or the Conference Secretariat:

Ms. Karina Larsen,
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Fax: +45 46755065
e-mail: <kl@mmf.ruc.dk>

ICTMT-3, September-October 1997

The Third International Conference on Technology in Mathematics Teaching will take place 29 September - 2 October 1997 at the University of Koblenz, Germany. The conference will bring together classroom practitioners, curriculum developers and mathematics education researchers who share a desire to improve the quality of student learning. Main lectures by distinguished speakers will be complemented by a programme of specialist short talks and workshops. There will be an exhibition of books and IT materials. The conference languages are English and German.

Conference themes include: 'Impact of technology on teaching and learning'; 'Access to education through technology'; 'Technology and assessment'; 'Ways forward - future trends'. Deadline for the submission of abstracts is 30 June 1997. Abstracts should be submitted to Professor Wolfgang Fraunholz, Mathematisches Institut der Universität, Rheinau 1, D-56075 Koblenz, Germany.

For further information about this conference, please contact

Institut für Mediendidaktik
der Universität in Koblenz,
Rheinau 1, D-56075 Koblenz,
GERMANY
Tel: +49 261 9119651
Fax: +49 261 9119652

International Conference on Mathematical Education, October 1997

This conference, which is co-sponsored by Hangzhou Teachers College and California

State University at San Marcos, USA, is going to be held in Hangzhou, China, 3-5 days in the middle of October 1997. The exact dates have not yet been decided. The topics for discussion in the conference include: 'continuing education in mathematics', 'middle-school mathematics education', 'university mathematics education', 'modern technology and mathematics education', 'literacy in mathematics education'. The deadline for the submission of abstracts (not exceeding two pages) to the address below is 31 July.

For further information, please contact

Yu, Xiuyuan, Conference Co-Chair
Hangzhou Teachers College,
91 Wenyi Road, Hangzhou 310012,
CHINA
Tel: +86 571 808 1082 or 808 7339
Fax : +86 571 808 1082

PME-NA XIX, October 1997

Illinois State University is proud to host the 1997 PME-NA (Psychology of Mathematics Education - North America) meeting at Chateau, Bloomington/Normal, Illinois, USA, 18-21 October 1997. A rich and stimulating program is in the planning stages. Tentative program planning features several plenary sessions with a focus on mathematics education research on learning and instruction. Suggestions for other plenary topics and/or speakers are invited.

At present the planned session formats include research paper sessions, symposia, discussion groups, short oral presentations, and poster sessions. As usual, decisions about acceptance will rely on peer review, which shortens the timeline for proposal submission. It is not too early to be thinking about your proposal, which will be due by 27 January, 1997.

Bloomington/Normal is located in Central Illinois, 125 miles south of Chicago. Weather in October will be moderate with trees and fields in fall harvest colors. Planned excursions may include an evening at the theatre or a barn dance. Accommodations will be available at Jumeris Chateau, a five-storey hotel offering the warmth and charm of a French country estate. A walking-jogging trail in back of Jumeris leads all the way to the University and can be particularly colorful in October. We look forward to your participation in the program and to your presence among us in 1997.

For further information about the 1997 PME-NA meeting, please contact:

Jane Swafford, 1997 PME-NA Annual Conference
Department of Mathematics
Campus Box 4520

Illinois State University
Normal, IL 61790-4520
USA
tel: +1 309 438-7797
fax: +1 309 438 5866
e-mail: swafford@math.ilstu.edu

IFIP Working Group 3.1. Working Conference, October 1997

Working Group 3.1 (Secondary Education) of the International Federation for Information Processing (IFIP) is organising a Working Conference on the topic *Secondary School Mathematics in the World of Communication Technology: Learning, Teaching and the Curriculum*. This Working Conference is a sequel to two previous ones organised by IFIP WG 3.1 on similar themes in Varna (Bulgaria) in 1977, and in Sofia (Bulgaria) in 1987. It was felt appropriate to look again, ten years later, at the rich relationships between mathematics and the new technologies of information and communication. The conference will take place in Villard de Lans, a mountain resort located in the Alps 35 km from Grenoble (France), from October 26 to 31, 1997.

The programme of the conference will be built around four themes:

- A. Curriculum:* curriculum evolution; relationships with informatics
- B. Teachers:* professional development; methodology and practice
- C. Learners:* tools and techniques; concept development; research and theory
- D. Human and social issues:* culture and policy; personal impact

Participation at the Working Conference is by invitation only and will be limited to 80-90 participants. Both the philosophy underlying such a working conference and the physical capacities of the venue impose this limitation on the number of participants.

For further information, please contact

Bernard R. Hodgson
Chair of the Programme Committee (Grenoble 1997)
Département de mathématiques et de statistique
Université Laval
Québec G1K 7P4,
Canada
e-mail: bhodgson@mat.ulaval.ca
Fax : +1 418 656 2817

If such is the case, you should briefly explain the reasons why you wish to take part in the Working Conference.

This Working Conference is being organised by IFIP WG 3.1, with the help of the IUFM (Institut Universitaire de Formation des Maîtres) of Grenoble and the Leibniz

Laboratory of IMAG (Institut d'informatique et de mathématiques appliquées de Grenoble).

Teaching in mathematics, July 1998

An International Conference of the title indicated above will take place 3-6 July 1998 in the island of Samos, Greece. The main objective of the conference is to examine new ways of teaching undergraduate mathematics. It will provide a unique and centralised forum and bring together faculty members from various countries who are committed to introducing and using innovative teaching methods. The conference will be of great interest to mathematics faculty as well as to anyone involved in the teaching and learning process of undergraduate mathematics. Conference themes include: Integration of computing technology; Innovative ways of teaching; Reform issues related to calculus and other math courses; Distance learning technologies; Assessment of student learning; The role of mathematics in other disciplines.

For further information, please contact the conference chair:

Ignatios Vakalis

Department of Math & Computer Science, Capital University

e-mail: <ivakalis@capital.edu>

or consult the World Wide Web at <http://icg.harvard.edu/~samos98>

Third International DERIVE and TI-92 Conference, July 1998

This conference will be held 14-17 July 1998, on the campus of Gettysburg College in Gettysburg, Pennsylvania, USA. Papers submitted for consideration by the Conference Committee should reach conference organiser Professor Carl Leinbach (see below) no later than 15 November 1997. For further information please contact either of the following conference organisers

Carl Leinbach,

Gettysburg College, Gettysburg, PA 17235,
USA

e-mail: <leinbach@gettysburg.edu>

or

Bert K. Waits,

Mathematics Department, The Ohio State University
231 W. 18th Avenue, Columbus, OH 43210

USA

e-mail: <waitsb@math.ohio-state.edu>

ICMI-EARCOME 1, August 1998

The First ICMI East Asia Regional Conference on Mathematics Education (ICMI-EARCOME 1) will be held 17-21 August 1998 at the Korea National University of Education, Chungbuk, Republic of Korea. See announcement elsewhere in this Bulletin.

International Congress of Mathematicians, ICM-98, August 1998

This congress will be held, under the auspices of the International Mathematical Union, 18-27 August 1998 in Berlin, Germany. The Board of Directors of the Organizing Committee consists of

President: M. Grötschel, Berlin
Vice-President: M. Aigner, Berlin
Honorary President: F. Hirzebruch, Bonn
Treasurer: J. Sprekels, Berlin
Secretary General: J. Winkler, Berlin

The International Programme Committee is chaired by Phil. J. Griffiths, Princeton, USA.

The current plans for the congress include the following sections: 1. Logic; 2. Algebra; 3. Number Theory and Arithmetic Algebraic Geometry; 4. Algebraic Geometry; 5. Differential Geometry and Global Analysis; 6. Symplectic Geometry and Hamiltonian Theory; 7. Topology; 8. Lie Groups and Lie Algebra; 9. Analysis; 10. Ordinary Differential Equations and Dynamical Systems; 11. Partial Differential Equations; 12. Mathematical Physics; 13. Probability and Statistics; 14. Combinatorics; 15. Mathematical Aspects of Computer Science; 16. Numerical Analysis and Scientific Computing; 17. Applications; 18. Control Theory and Optimization; 19. Teaching and Popularization of Mathematics; 20. History of Mathematics.

Further information about ICM-98 can be obtained through the World Wide Web, through URL:

<http://elib.zib-berlin.de/icm98>

Third European Congress of Mathematics, July 2000

The Third European Congress of Mathematics will be held in Barcelona, Spain, 10-14 July, 2000. Further information will be released in due course.

ICME-9, July-August 2000

The Ninth International Congress on Mathematical Education, ICME-9, is going to be held 31 July - 7 August 2000, at the Chiba Convention Centre, Makuhari, at the Tokyo Bay, near Narita Airport. Further information will be available in forthcoming issues of this Bulletin.

ICMI and the ICMI Bulletin on the World Wide Web and on E-mail

Information about ICMI, including the most recent issue of the ICMI Bulletin, is now available from the ICMI pages of the IMU server at the Konrad-Zuse-Zentrum für Informationstechnik Berlin, (Germany). These pages can be found through URL:

<http://elib.zib-berlin.de/imu.icmi>

Direct access to the ICMI Bulletin on the WWW, through the IMU-server, is obtained by the URL:

[http://elib.zib-berlin.de/imu.icmi.bull.\[no\]](http://elib.zib-berlin.de/imu.icmi.bull.[no])

The ICMI Bulletin is also stored as an ASCII file in the editor's (i.e. the ICMI Secretary's) electronic post system. If you want to receive a copy of this issue as an ASCII text through e-mail, please contact Mogens Niss at <mn@mmf.ruc.dk>.

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