



The ICMEs, of which the first was held in Lyon, France, in 1969, are held under the auspices of the International Commission on Mathematical Instruction, ICMI, founded in 1908.



In formal terms, ICMI is a commission under the International Mathematical Union, which appoints the Executive Committee of ICMI. In addition, the Commission consists of the National Representatives, one from each of the around seventy member states of ICMI.

The quadrennial General Assembly of ICMI is held during each ICME.

At ICME-10 the recently established ICMI Awards, the **Klein Award** and the **Freudenthal Award**, will be presented for the very first time; this will take place at the opening ceremony. For 2004, the Klein Award will go to *Guy Brousseau*, France, and the Freudenthal Award will be awarded to *Celia Hoyles*, United Kingdom.

The history of ICMEs:

ICME-1: Lyon (France), 1969

ICME-2: Exeter (United Kingdom), 1972

ICME-3: Karlsruhe (Germany), 1976

ICME-4: Berkeley, CA (USA), 1980

ICME-5: Adelaide, SA (Australia), 1984

ICME-6: Budapest (Hungary), 1988

ICME-7: Québec City, Québec (Canada), 1992

ICME-8: Sevilla (Spain), 1996

ICME-9: Tokyo (Japan), 2000;

ICME-10: Copenhagen (Denmark), 2004

ICME-11: Monterrey (probably) (Mexico), 2008

Table of contents

Welcome to ICME-10	3
Organising Committees	4
General information	5
Programme structure and time table for ICME-10	8
DTU overview and Venue	9-10
Opening and closing sessions	11
P – Plenary sessions	12
R – Regular lectures	14
TSG – Topic Study Groups	22
DG – Discussion Groups	70
TA – Thematic Afternoon	99
NP – National Presentations	108
SGA – Workshops	118
SGA – Sharing Experiences Groups	134
Poster exhibition and Round Table sessions	140
ASG – ICMI Affiliated Study Groups	141
ICMI-studies	145
ICMI General Assembly	146
Newcomers	147
Special meetings and events	148
Mathematical Circus	151
Why Math?	154
Non-commercial exhibitors	156
Exhibitions	158
Exhibitions by location	160
Commercial exhibitors	162
Sponsor symposia and workshops	165
Sponsors	166
Social programme and excursions	168

Welcome to ICME-10

The International Programme Committee, The Local Organising Committee, and the Nordic Contact Committee have the greatest pleasure and honour to extend our warmest welcome to all participants in the 10th International Congress on Mathematical Education, ICME-10. We have worked hard to establish a Congress with a rich, challenging and rewarding scientific programme and with an open and inviting platform for contact and friendship, social interaction, and exchange of cultural experiences.

We would also like to take this opportunity to express our sincere gratitude to all those who made this Congress possible: The members of the International Programme Committee, of the Local Organising Committee, and of the Nordic Contact Committee; our Professional Congress Organiser, Congress Consultants; the hundreds of contributors to various aspects of the scientific programme, in particular all the Organising Teams, and those who have established National Presentations; all the volunteers who have worked behind the stage in various capacities; and last but certainly not least: the sponsors of the Congress.

Above all, however, we want to thank you, the individual participant, who have decided to spend a week in Copenhagen in order to contribute to the furthering, at an international level, of the practice, development and research in mathematics education.

It is our hope that you will appreciate and enjoy the outcomes of all these efforts. We wish all participants a rewarding and enjoyable Congress.



Mogens Niss
Chair,
International Programme
Committee



Morten Blomhøj
Chair,
Local Organising Committee



Gerd Brandell
Chair,
Nordic Contact Committee



The 10th International Congress on Mathematical Education is endorsed by Her Majesty Queen Margrethe the 2nd of Denmark

Organising Committees

ICMI Executive Committee (2003-2006)

President

Hyman Bass, USA

Vice-Presidents

Jill Adler, South Africa

Michèle Artigue, France

Secretary-General

Bernard R. Hodgson, Canada

Members at large

Carmen Batanero, Spain

Maria Falk de Losada, Colombia

Nikolai Dolbilin, Russia

Peter Lawrence Galbraith, Australia

Petar Stoyanov Kenderov, Bulgaria

Frederick K.S. Leung, Hong Kong, S.A.R., China

Ex officio members (IMU)

John M. Ball (President), United Kingdom

Phillip Griffiths (Secretary), USA

IPC

International Programme Committee

The International Programme Committee is responsible for the planning of the official scientific programme.

Jill Adler, South Africa

Abraham Arcavi, Israel

Michèle Artigue, France

Mariolina Bartolini Bussi, Italy

Bill Barton, New Zealand

Hyman Bass, USA

(Ex officio, President, ICMI)

Christer Bergsten, Sweden

Ole Björkqvist, Finland

Morten Blomhøj, Denmark

Marcelo de Carvalho Borba, Brazil

Nikolai P. Dolbilin, Russia

Elin Emborg, Denmark

(Administrative secretary)

Joan Ferrini-Mundy, USA

Hiroshi Fujita, Japan

Gunnar Gjone, Norway

Bernard R. Hodgson, Canada

(Ex officio, Secretary-General, ICMI)

Lim-Teo, Suat Khoh, Singapore

Mogens Niss, Denmark (Chair)

Kyungmee Park, R.O. Korea

Teresa Rojano, Mexico

Wilfried Schmid, USA

Zheng, Yuxin, P.R. China

LOC

Local Organising Committee

The Local Organising Committee is in charge of the practical planning of the Congress. The committee represents all levels and branches of the Danish educational system and the Nordic Contact Committee.

Leif Andersen

Michael Wahl Andersen

Morten Blomhøj (Chair)

Gerd Brandell, Sweden

Torben Christoffersen

Lisser Rye Ejersbo

Elin Emborg

(Administrative secretary)

Barbro Grevholm, Sweden

Ebbe Hansen

H. C. Hansen

Vagn Lundsgaard Hansen

Carsten V. Jørgensen

Leif Kragh

Kjeld Bagger Laursen

Bent Lindhardt

Claus Michelsen

Arne Mogensen

Mogens Niss

Anne Winther Pedersen

Tine Wedege

Carl Winsløw

NCC

Nordic Contact Committee

The hosting of ICME-10 in Copenhagen, Denmark, is based on an invitation from the Nordic countries, namely Denmark, Finland, Iceland, Norway and Sweden. To ensure and develop the Nordic cooperation in relation to the Congress, a special Nordic Contact Committee was formed. In terms of the traditional organisational structure of an ICME, the Nordic Contact Committee may be seen as playing the role of a National Committee.

Denmark

Morten Blomhøj

Carl Winsløw

Finland

Juha Oikkonen

Erkki Pehkonen

Iceland

Anna Kristjansdóttir

Norway

Otto B. Bekken

Ingvill Merete Stedøy

Sweden

Gerd Brandell (Chair)

Barbro Grevholm

Kerstin Pettersson (Secretary)

Roland Munther (Secretary)

Important addresses

Congress Venue

DTU

(Technical University of Denmark)

Anker Engelundsvej 1

DK-2800 Kgs. Lyngby

Denmark

Congress Secretariat

Congress Consultants

Martensens Allé 8

DK-1828 Frederiksberg C

Denmark

Tel: +45 70 20 03 05

Fax: +45 70 20 03 15

icme@congress-consult.com

During the Congress the Secretariat can be contacted in the registration area, building 101.

Chair,

Local Organising Committee

Morten Blomhøj

IMFUFA, Roskilde University

P.O. Box 260

DK-4000 Roskilde

Denmark

Tel: +45 46 74 22 85

ICME10-LOC@ruc.dk

Chair,

International Programme Committee

Mogens Niss

IMFUFA, Roskilde University

P.O. Box 260

DK-4000 Roskilde

Denmark

Tel: +45 46 74 22 66

ICME10-IPC@ruc.dk

Chair,

Nordic Contact Committee

Gerd Brandell

Centre for Mathematical Sciences

Lund University

P.O. Box 118

SE-221 00 Lund

Sweden

Tel: +46 (0) 46 222 0538

Gerd.Brandell@math.lth.se

General information



I C M E
1 0
2 0 0 4

Posters

Posters are on display throughout the Congress and can be put up from Monday July 5 at 8.00 to Tuesday 6 at 14.30.

Posters are on display the following places:

Poster 1-101: Building 208

Poster 102-160: Building 116

Poster 161-220: Building 101

Non-reviewed posters: Building 306

The number given to each reviewed poster can be found in the poster abstract book. In each poster exhibition area there is a board showing the position of each poster according to poster number. Please observe the directions as to the position of the poster.

Non-reviewed posters are numbered on a list placed in the poster area of building 306.

Please consult the list for information on the position of your poster.

Assistants will guide you and supply you with pins and tape.

Please take down your poster at the end of the Congress.

Presentation, Speakers

All speakers whose sessions are to be transmitted are requested to consult the technicians in the Speaker's Preparation Area in building 210, 1 hour before your session at the latest.

Your presentation can be delivered on a CD-Rom, a 3½ disk, an USB memory stick or it can be downloadable from an online site. Your own laptop can be connected to the data projector if available in the lecture room.

All services in the Speakers' Preparation Area are also available for all other speakers.



I C M E
1 0
2 0 0 4

Communication

There will be easily accessible Internet access at the venue: in the DTV library in the west hallway of building 101 and in the computer rooms in buildings 208 and 210.

An open W. LAN (wireless) Internet connection covers most of campus.

For telephone calls, there are pay phones (coins and phone-cards) in building 101.

Hearing aid device

A hearing aid device has been installed in room A81, building 116, to which the plenary sessions will be transmitted.

Smoking

Please observe that the venue is a strictly no smoking area. Smoking is only allowed outside.

Quiet area

Part of the first floor of building 210 has been reserved as a quiet area. The area contains a number of small, partly secluded rooms with table and chairs. The ground floor of building 210 contains the Speaker's Preparation Area.

Badge

All participants, accompanying persons and exhibitors are kindly asked to wear the Congress badge in a visible place at all times throughout the Congress.

Emergencies and medical assistance

Dial 112 for ambulance, rescue service, fire department, and police. It is free to call this number from all phones, also cell phones.

As the campus area is fairly extensive it is necessary to be very specific about the building in which the service is needed.

If you experience medical problems, please contact the registration desk.

As participant of the congress you are considered a business traveller and must therefore be insured accordingly.

Lunch and shopping

Packed lunches will be served in the canteen area of building 101 and in building 302 (between buildings 303 and 306). Lunch tickets can be bought for 40 DKK/day. Please buy lunch tickets before lunch to avoid queues.

Alternatively, the Canteen and the *Faculty Club* in building 101 offer a variety of hot and cold lunches. The Faculty Club, on the 1st floor, is suited for lunch meetings. Please buy a minimum of 8 Faculty Club lunch tickets.

Fast food can be bought in the Fast food bar in building 101 and in the Pizzeria on *Kollegjebakken*, see map.

The coffee shop in the *S-huset* (part of building 101) is open until after happy hours. The bar in the *S-huset* basement is open after happy hours.

There is a kiosk in the canteen area of building 101 and a convenience store on campus in *Kollegjebakken*. The canteen is open until 20.30 and the Faculty Club until 18.00.

The DTU bookstore is open throughout the Congress, allowing you to purchase books and stationery.

Banks

At the venue there is an ATM machine and a bank. Banks are generally open on weekdays between 10.00 and 16.00. The banks at the Airport and at the Central Station have extended opening hours from 06.00 to 22.00 and from 07.00 to 21.00 respectively. They are also open during weekends. In Copenhagen there are several exchange offices.

Please note that the Congress Secretariat does not offer bank services, although payments related to registration can be made with most international credit cards.

Transportation

All participants and accompanying persons receive a travel card as part of their registration entitlements. This travel card allows unlimited travel with all public transport in the greater Copenhagen area from July 5 to 11.

Trains depart from Copenhagen Central Station and other city stations for Lyngby every 5 minutes during rush hours. All Holte and Hillerød trains stop at Lyngby station. The trains leave from platforms 9 and 10 at the Central Station.

The regular bus service from Lyngby station to DTU runs:

Bus 190:

Monday to Friday from 6.17 to 18.17 with 30 minutes interval, thereafter once every hour, 36 minutes past the hour, until 23.36.

Saturday from 7.47 to 14.47 with 30 minutes intervals, thereafter once every hour, 36 minutes past the hour, until 23.36.

Sunday from 8.36 to 23.36 once every hour.

Bus 300S:

Monday to Friday from 6.30 to 8.16 and 13.36 to 19.13 with 10 minutes intervals. 8.16 to 13.36 and 19.13 to 0.00 with 20 minutes intervals.

Saturday from 6.45 to 0.00 with 20 minutes intervals.

Sunday from 7.00 to 0.00 with 20 minutes intervals.

From DTU to Lyngby station:

Bus 190:

Monday to Friday from 6.31 to 18.31 with 30 minutes interval, thereafter once every hour, 24 minutes past the hour, until 23.24.

Saturday from 7.31 to 14.31, thereafter once every hour, 24 minutes past the hour, until 23.24.

Sunday from 8.24 til 23.24 once every hour.

Bus 330S:

Monday to Friday 6.28 to 8.45 and 13.24 to 17.44 with 10 minutes intervals. From 8.45 to 13.24 and 17.44 to 0.17 with 20 minutes intervals.

Saturday 6.25 to 0.17 with 20 minutes intervals.

Sunday 6.37 to 0.29 with 20 minutes intervals.

Apart from the regular bus service between Lyngby station and DTU, the Congress will provide shuttle buses between Lyngby station and DTU mornings and afternoons.

From Lyngby Station:

Continuous service from 07.30 to 08.45

From DTU:

Buses will leave at 18.30, 19.30 and 20.30.

Between DTU and Lyngby City Centre there will be shuttle buses Monday, Tuesday, Wednesday and Friday 13.45-17.00.

Please refer to the map in the Congress bag for walking directions between DTU and Lyngby station. The distance from Lyngby station to DTU is approx. 4 kilometres.

Programme structure and time table for ICME-10

The scientific programme for ICME-10 includes the following elements:

- eight Plenary sessions (P),
- eighty Regular lectures (R) running in parallel in five time slots,
- 29 Topic Study Groups (TSG) with four time slots each,
- 24 Discussion Groups (DG) working in three time slots,
- a Thematic Afternoon (TA) with five parallel mini-conferences,
- five National Presentations (NP),
- the Small Group Activities (SGA) consisting of 46 Workshops, and
- 12 Sharing Experiences Groups,
- a Poster Exhibition with more than 220 posters,
- meetings in ICMI-Affiliated Study Groups (ASG) and presentations of ICMI-Studies.

All programme elements are described in the following chapters.

To achieve as much clarity as possible in presenting such a complex and multifaceted programme, each day in the time table has been formatted in a similar way.

In the Congress bag you will find a cardboard sheet with the time table printed on the one side and an “empty” time table on the other side. The empty time table can be used to plan your own itinerary for the Congress to ensure you attend those activities and lectures that most interest you.

Legend to Time Table:

The hour gives the starting time of the following activity. Roman numerals refer to session slots with parallel activities.

P: Plenary activity

R: Regular lecture

TSG: Topic Study Group session

DG: Discussion Group session

SGA: Common term for Small Group Activities, i.e. Sharing Experiences Groups and Workshops

ASG: Affiliated Study Group meetings

Poster/Round Table (RT):

Poster presentation and Round Table discussion

GA: ICMI General Assembly

MS: Meeting Slot after happy hours available for meetings in different groupings within the mathematics education community.

NP: National Presentation

Time table for ICME-10

July	Sunday 4	Monday 5	Tuesday 6	Wednesday 7	Thursday 8	Friday 9	Saturday 10	Sunday 11	
08.00	Registration	Registration							08.00
09.00									09.00
09.30		Opening	P 3	P 4					
10.00			Coffee break	Coffee break					10.00
10.30			R I	R II					10.30
11.30		Short break	Short break	Short break					11.30
12.00		P 1	TSG I	TSG II					12.00
13.00		Lunch break	Lunch break	Lunch break					13.00
14.30		P 2 Panel	National Presentation	P 5 Interview					14.30
16.00		Coffee break	Coffee break	Coffee break					16.00
16.30	DG I	SGA I ASG I	NP cont. Poster RT	SGA II DG II	SGA III ASG II				
18.30	Welcome reception	Happy hour	Happy hour					18.30	
19.30	MS	MS	MS					19.30	

DTU overview

Registration
Congress Secretariat
Information

Coffee/tea

Lunch
Sale of lunch tickets

Exhibition

Happy Hour

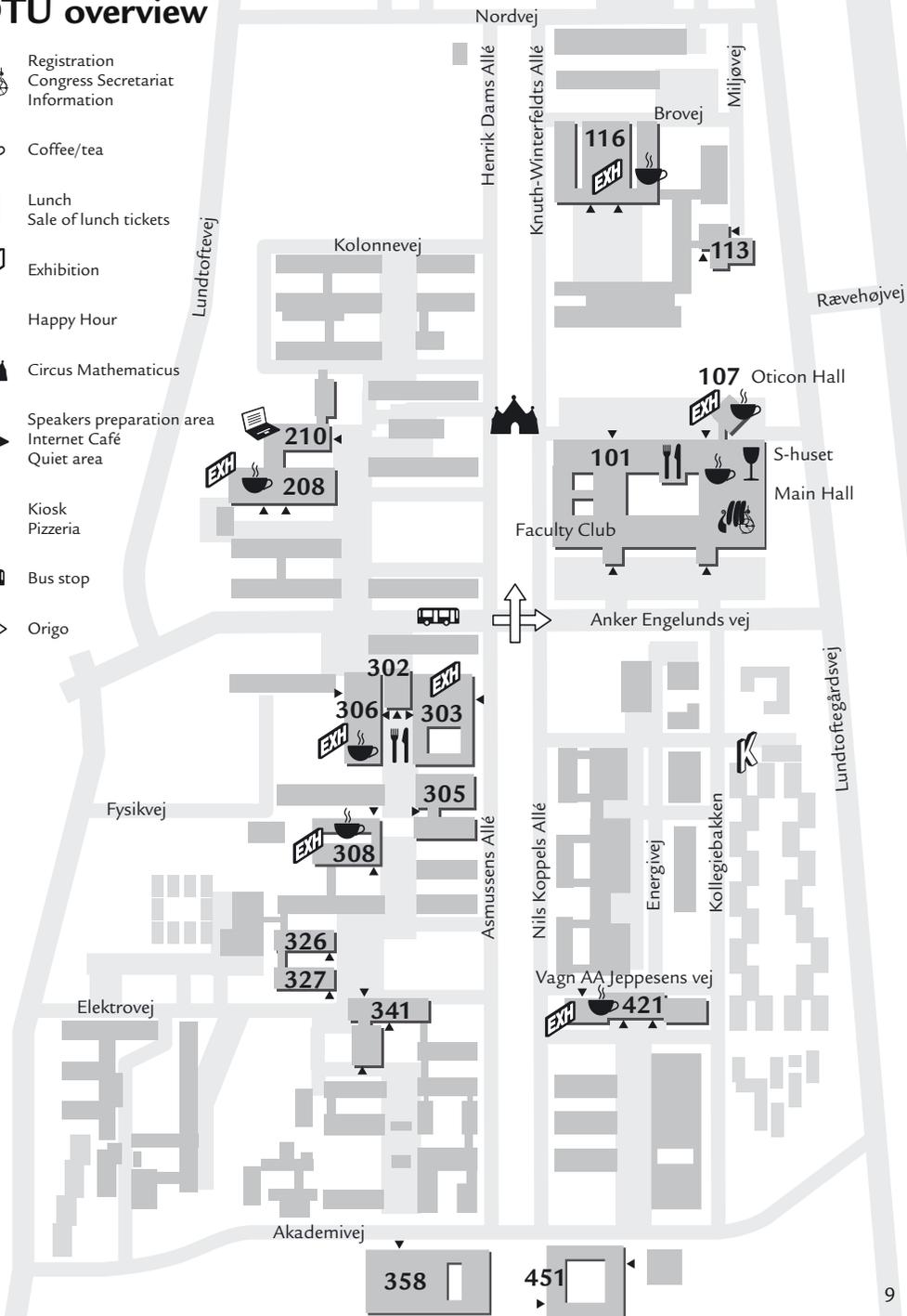
Circus Mathematicus

Speakers preparation area
Internet Café
Quiet area

Kiosk
Pizzeria

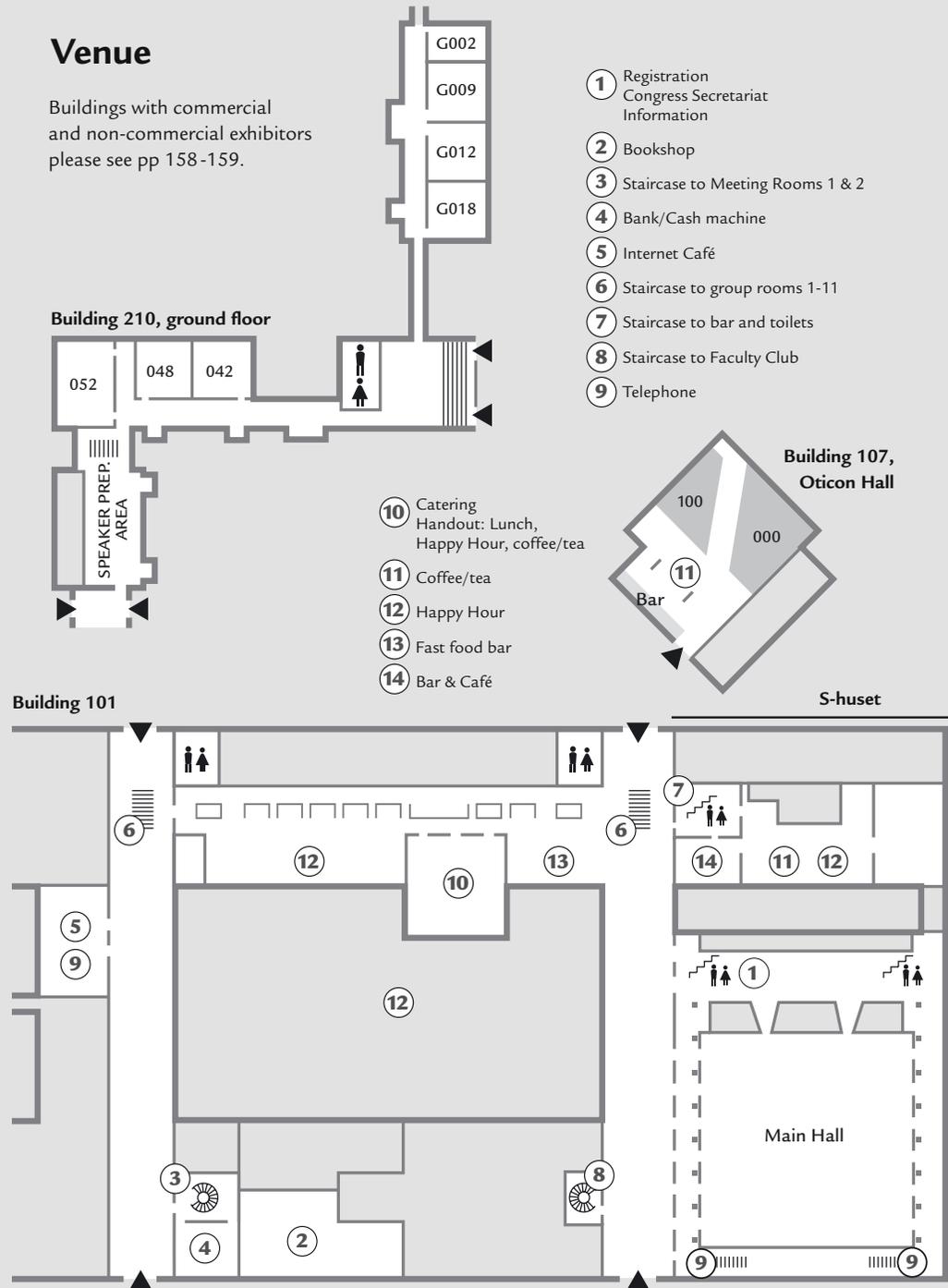
Bus stop

Origo



Venue

Buildings with commercial and non-commercial exhibitors please see pp 158-159.



Opening and closing sessions

The **opening session** will include a variety of elements.

The session will be opened with words of welcome and introduction by the chairs of the International Programme Committee, the Local Organising Committee and the Nordic Contact Committee, and by official representatives of the venue and of the Danish Ministry of Education, the Mayor of Lyngby-Taarbæk municipality and other official representatives. The president of ICMI will formally open the Congress, and the Secretary General of ICMI will present the new official logo of ICMI.

A key component in the opening programme is the presentation and motivation of the two new ICMI Awards, The Klein Award and the Freudenthal Award, to their very first recipients.

The session will also include a rich musical programme by The Royal Danish Brass band.

The programme of the **closing session** is in three parts. After words of farewell from the organisers, the Secretary General of ICMI will give his closing remarks, in which ICMI and its past, current and future activities will be outlined. The Secretary General will end his remarks by formally declaring the Congress closed. Finally, representatives of the host country of ICME-11, Mexico, will present the host country and invite the mathematics education community to Mexico in 2008.

The Closing Session, too, will include a rich musical programme by 'Den Unge Danske Strygekvarter' ('The Young Danish String Quartet').



I C M E
1 0
2 0 0 4

P – Plenary sessions

There are eight plenary sessions: six plenary lectures, one panel debate and one interview session.

P

Plenary sessions

All plenary sessions take place in the main hall in building 101. Depending on the number of participants the plenary sessions will be transmitted to auditoria in buildings 116, 303 and 306. Detailed information will be given at the Congress.

Abstracts for the Plenary sessions are to be found in the *Abstract book for Plenary and Regular lectures*.

In the Regular lecture slot following the six Plenary Lectures in the morning, it is possible to meet and discuss with the plenary speakers. These events are announced under the different Regular lecture slots.

P1 – Plenary lecture – Monday 5, 12.00-13.00

Hyman Bass, University of Michigan, Ann Arbor, USA

Mathematics, mathematicians, and mathematics education

P2 – Plenary panel debate – Monday 5, 14.40-16.00

Moderator: *Stephen Lerman*, London South Bank University, United Kingdom

Panel Members: *Richard Askey*, University of Wisconsin, USA

Susana Carreira, University of Algarve, Portugal

Yukihiko Namikawa, Nagoya University, Japan

Renuka Vithal, University of KwaZulu-Natal, Durban, South Africa

Mathematics education for whom and why? The balance between mathematics education for all and for high level mathematics performance

P3 – Plenary lecture – Tuesday 6, 09.00-10.00

Anna Sfard, University of Haifa, Israel and Michigan State University, USA

There is nothing more practical than a good research:

On the mutual relation between research and practice in mathematics education

On behalf of Survey Team 1:

The relations between research and practice in mathematics education

Team Chair: *Anna Sfard*, University of Haifa, Israel

Team Members: *Yoshihiko Hashimoto*, Yokohama National University, Japan

Gelsa Knijnik, University of Vale do Rios dos Sinos, Porto Alegre, Brazil

Aline Robert, IUFM de Versailles, France

Ole Skovsmose, Aalborg University, Denmark

P4 – Plenary lecture – Wednesday 7, 09.00-10.00

Erno Lehtinen, University of Turku, Finland

Mathematics education and learning sciences

P5 – Plenary interview session – Wednesday 7, 14.30-16.00

Moderator: *Michèle Artigue*, University of Paris VII, France

Interviewees: *Ubiratan D'Ambrosio*, UNICAMP, São Paulo, Brazil

Gila Hanna, University of Toronto, Canada

Jeremy Kilpatrick, University of Georgia, Athens, USA

Gérard Vergnaud, University of Paris VIII, France

P6 – Plenary lecture – Friday 9, 09.00-10.00

Jill Adler, University of the Witwatersrand, Johannesburg, South Africa

Research on mathematics teacher education: Mirror images of an emerging field

On behalf of Survey Team 3:

The professional development of mathematics teachers

Team Chair: *Jill Adler*, University of the Witwatersrand, Johannesburg, South Africa

Team Members: *Deborah Ball*, University of Michigan, Ann Arbor, USA

Konrad Krainer, University of Klagenfurt, Klagenfurt, Austria

Fou-Lai Lin, National Taiwan Normal University, Taipei,

P.R. China, Taiwan

Jarmila Novotna, Charles University, Prague, The Czech Republic

P7 – Plenary lecture – Saturday 10, 09.00-10.00

Andreas Dress, University of Bielefeld, Germany

Structure formation in nature as a topic of mathematics

P8 – Plenary lecture – Sunday 11, 09.00-10.00

Ferdinando Arzarello, University of Torino, Italy

Mathematical landscapes and their inhabitants: Perceptions, languages, theories



I C M E
1 0
2 0 0 4

P

Plenary sessions



I C M E
1 0
2 0 0 4

R – Regular lectures

There are five one-hour time slots for Regular lectures.
In each slot it is possible to choose between around 17 lectures.
The abstracts are to be found in the *Abstract book for Plenary and Regular lectures*.

R

Regular
lectures

The Regular lectures are listed below in alphabetical order
by the name of the lecturer.

Regular lectures – Slot I – Tuesday July 6, 10.30-11.30

Karoline Afamasaga-Fuatai, National University of Samoa, Samoa
Concept maps and Vee Diagrams in undergraduate mathematics problem solving
Place: Building 306, A33

Dimitrii Anosov, Russian Academy of Sciences, Moscow
300 years of Russian mathematical education:
European traditions and national peculiarity
Place: Building 306, A34

Christer Bergsten, University of Linköping, Sweden
Exploiting the gap between intuitive and formal knowledge in mathematics
Place: Building 303, A44

Cinzia Bonotto, University of Padova, Italy
On the relationships between informal out-of-school mathematics and formal
in-school mathematics in the development of abstract mathematical knowledge
Place: Building 421, A72

Cho, Seungje, Seoul National University, Republic of Korea
Teacher education in Korea
Place: Building 208, A51

Doug Clarke, Australian Catholic University, Fitzroy, Australia
Understanding, assessing and developing young mathematical thinkers
Place: Building 208, A53

Geoffrey Howson, University of Southampton, United Kingdom
Klein and Freudenthal
Place: Building 101, Main Hall

Christoph Kirfel, Bergen University College, Norway
Mathematics in time. The potential of calendar-mathematics in the classroom
Place: Building 303, A49

Lee, Ngan Hoe, NIE, Nanyang Technological University, Singapore
Nation building initiatives: Impact on school mathematics curriculum
Place: Building 308, A13

Romulo Lins, State University of São Paulo at Rio Claro, Brazil
Characterising the mathematics of the mathematics teacher
from the point of view of meaning production
Place: Building 341, A21



I C M E
1 0
2 0 0 4

R

Regular
lectures

Maria Alessandra Mariotti, University of Pisa, Italy
Reasoning, proof and proving in mathematics education
Place: Building 116, A81
Transmission, if necessary, to A82

Michael Mitchelmore, Macquarie University, Sydney, Australia
Paul White, ACU National, Sydney, Australia
Teaching mathematical concepts: Instruction for abstraction
Place: Building 306, A32

Rafael Nuñez, University of California, San Diego, USA
Language, gesture, and the embodied mind:
Cognitive science and the foundations of mathematics
Place: Building 303, A42

Luis Puig, University of Valencia, Spain
History of algebraic ideas and research on educational algebra
Place: Building 303, A45

Anna Sfard, University of Haifa, Israel
Meet the plenary speaker
Place: Building 306, A31

Heinz Steinbring, University of Dortmund, Germany
Conscious reflection on own activities – An essential source for
improving learning and teaching of mathematics
Place: Building 421, A73

Gilbert Strang, Massachusetts Institute of Technology, Cambridge, USA
Linear algebra: A happy chance to apply mathematics
Place: Building 308, A12

Julianna Szendrei, Eötvös Loránd University, Budapest, Hungary
How do teachers understand the written work of their pupils?
Place: Building 341, A22

Regular lectures – Slot II – Wednesday July 7, 10.30-11.30

Hyman Bass, University of Michigan, Ann Arbor, USA
Meet the plenary speaker
Place: Building 306, A32

Rolf Biehler, University of Kassel, Germany
Variation, co-variation, and statistical group comparison – Some results from
epistemological and empirical research on technology supported statistics education
Place: Building 303, A42

Jo Boaler, Stanford University, USA
Promoting equity in mathematics classrooms
– Successful teaching practices and their impact on student learning
Place: Building 101, Main Hall



I C M E
1 0
2 0 0 4

R

Regular
lectures

Marcelo de Carvalho Borba, State University of São Paulo, Rio Claro, Brazil
Humans-with-media and mathematical thinking:
 Orality, writing and technologies of information and communication
Place: Building 303, A45

Berinderjeet Kaur, Nanyang Technological University, Singapore
Teaching of mathematics in Singapore schools
Place: Building 306, A35

Christine Keitel-Kreidt, Free University of Berlin, Germany
The shaping of mathematics education through testing
Place: Building 116, A81
 Transmission, if necessary, to A82

Erno Lehtinen, University of Turku, Finland
Meet the plenary speaker
Place: Building 306, A31

Liu, Yizhu, People's Education Press, Beijing, P. R. China
The design of practice in mathematics textbook
Place: Building 341, A22

Nicolina A. Malara, University of Modena & Reggio E., Italy
Early Algebra: From teachers' education to classroom culture
Place: Building 306, A33

Judy Mousley, Deakin University, Geelong, Australia
Developing mathematical understanding: Situating cognition
Place: Building 303, A44

Eric Muller, Brock University, St. Catharines, Canada
Future teachers use technology to explore concept development in mathematics
Place: Building 341, A21

Vladimir Protassov, Moscow State University, Russia
Does the school of 21st century need geometry?
Place: Building 308, A13

Zbigniew Semadeni, Warsaw University, Poland
The triple nature of mathematics:
 Deep ideas, surface representations, formal models
Place: Building 421, A72

Ole Skovsmose, Aalborg University, Denmark
Globalisation, ghettoising and uncertainty:
 Challenges for critical mathematics education
Place: Building 306, A34

K. Subramaniam, Homi Bhabha Centre for Science Education, Mumbai, India
Reasoning about and with expressions
Place: Building 308, A12

Masahiko Suzuki, Osaka Kyoiku University, Kashiwara, Osaka, Japan
The progress of mathematics education in Japan
 – From the standpoint of practical studies
Place: Building 421, A74

Renuka Vithal, University of KwaZulu-Natal, Durban, South Africa
Analysing mathematics teacher education from a critical perspective:
 The case of project work
Place: Building 208, A53

Dianzhou Zhang, East China Normal University, Shanghai, P.R. China
Zaiping Dai, Institute for Education in Zhejiang, Hangzhou, P.R. China
“Two Basics”: Mathematics teaching approach and open-ended problem-solving in China
Place: Building 421, A71

Regular lectures – Slot III – Friday July 9, 10.30-11.30

Jill Adler, University of the Witwatersrand, Johannesburg, South Africa
Meet the plenary speaker
Place: Building 306, A31

Jin Akiyama, Tokai University, Tokyo, Japan
Mathematics for mass media
Place: Building 341, A23

Jonathan M. Borwein, FRSC, Dalhousie University, Halifax, Canada
Mathematics by experiment: Plausible reasoning in the 21st century
Place: Building 306, A32

Guy Brousseau, University of Bordeaux 2, France
Research in mathematical education
Place: Building 303, A42

Margerida César, University of Lisbon, Portugal
Come away with me: Statistics learning through collaborative work
Place: Building 341, A21

Maria Luiza Cestari, Agder University College, Norway
From the mathematics classrooms: Dialogues and tasks under analysis
Place: Building 303, A45

Jean-Luc Dorier, IUFM de Lyon and Equipe DDM, Laboratoire Leibniz, Grenoble, France
Mathematics in its relation to other disciplines:
 Some examples related to economics and physics
Place: Building 306, A33

Willibald Dörfler, University of Klagenfurt, Austria
Mathematical reasoning: Mental activity or practice with diagrams
Place: Building 303, A44

Peter Galbraith, University of Queensland, Australia
Applications and modelling in mathematics education:
 Progress to celebrate – so much more to do
Place: Building 421, A72

Tony Gardiner, University of Birmingham, United Kingdom
What is mathematical literacy?
Place: Building 208, A53



I C M E
1 0
2 0 0 4

R

Regular
lectures



I C M E
1 0
2 0 0 4

R

Regular
lectures

Rosella Garuti, Italian School of Addis Ababa, Ethiopia/N.R.D. University of Genova, Italy
From research in mathematics education to teacher training through the Internet:
The case of the SeT Project
Place: Building 421, A72

Patricio Herbst, University of Michigan, Ann Arbor, USA
Proof, proving and the work of teachers and students in classrooms
Place: Building 308, A12

Shigeru Iitaka, Gakushuin University, Tokyo Japan
On a new subject called Fundamentals of mathematics in Japanese high schools:
Easing the pains of students who hate mathematics
Place: Building 303, A49

Pekka Kupari, University of Jyväskylä, Finland
Discussing factors behind mathematics performance in
Finnish comprehensive-school education
Place: Building 306, A35

Frederick Leung, University of Hong Kong, S.A.R., China
Information and communication technology in mathematics education
Place: Building 116, A81
Transmission, if necessary, to A82

Carolyn A. Maher, Rutgers University, New Brunswick, USA
The development of mathematical reasoning: A sixteen-year study
Place: Building 306, A34

Alexander I. Samylovskiy, State University – Higher School of Economics, Moscow, Russia
Mathematical education for future economists and managers: The benchmark, the
models, and the technologies. Training or coaching?
Place: Building 308, A13

Alan H. Schoenfeld, University of California, Berkeley, USA
Theory meets practice: What happens when a mathematics educator tries to make a
difference in the real world?
Place: Building 101, Main Hall

Regular lectures – Slot IV – Saturday July 9, 10.30-11.30

Deborah Loewenberg Ball and *Heather C. Hill*, University of Michigan, Ann Arbor, USA
A longitudinal multi-method study of instructional improvement: Challenges for
practice, theory, and research
Place: Building 303, A42

Carmen Batanero, University of Granada, Spain
Statistics education as a field for research and practice
Place: Building 306, A32

Nadine Bednarz, University of Québec at Montréal, Canada
Collaborative research and professional development of teachers in mathematics
Place: Building 303, A45



I C M E
1 0
2 0 0 4

R

Regular
lectures

Albrecht Beutelspacher, “Mathematikum”, Giessen, Germany
Hands-on mathematics. Concepts and experiences from the “Mathematikum”
Place: Building 421, A72

Andreas Dress, University of Bielefeld, Germany
Meet the plenary speaker
Place: Building 306, A31

Koeno Gravemeijer, Freudenthal Institute, Utrecht University, The Netherlands
Creating opportunities for students to reinvent mathematics
Place: Building 306, A33

Celia Hoyles, Institute of Education, London, United Kingdom
Reflections and transformations: A mathematical autobiography
Place: Building 101, Main Hall

Salvador Llinares, University of Alicante, Spain
Place: Building virtual learning communities and learning of mathematics teacher
students
Place: Building 421, A71

Liping Ma, The Carnegie Foundation for the Advancement of Teaching, Menlo Park, USA
Arithmetic: A subject for learning mathematics
Place: Building 306, A34

John Mason, The Open University, Milton Keynes, United Kingdom
Doing \neq constructing and doing + discussing \neq learning: The importance of the structure
of attention
Place: Building 116, A81
Transmission, if necessary, to A82

Han Shick Park and *Hyunyang Shin*, Korea National University of Education,
Republic of Korea
Training and re-training of mathematics teachers in Korea
Place: Building 208, A54

Erkki Pehkonen, University of Helsinki, Finland
State-of-the-art in mathematical belief research
Place: Building 306, A35

David Pimm, University of Alberta, Edmonton, Canada
Discourse analysis and mathematics education: An anniversary of sorts
Place: Building 208, A53

Mamokgethi Setati, University of the Witwatersrand, Johannesburg, South Africa
Mathematics education and language:
Policy, research and practice in multilingual contexts
Place: Building 303, A44

Evgeny Shchepin, Steklov Mathematical Institute of the Russian Academy of Sciences,
Moscow, Russia
Teaching the Calculus: Euler versus Weierstrass
Place: Building 308, A13



I C M E
1 0
2 0 0 4

R

Regular
lectures

Michael O.J. Thomas, University of Auckland, New Zealand
Versatile interactions with concept representations and the role of
computer algebra system calculators
Place: Building 308, A12

Ngai-Ying Wong, The Chinese University of Hong Kong, S.A.R., China
Confucian heritage, a cultural learner's phenomenon:
What lesson can mathematics education learn from it?
Place: Building 421, A73

Regular lectures – Slot V – Sunday July 11, 10.30-11.30

Ferdinando Arzarello, University of Torino, Italy
Meet the plenary speaker
Place: Building 306, A31

Mike Askew, King's College, London, United Kingdom
Developing teaching and learning in primary mathematics: Lessons from England's
national reform
Place: Building 306, A32

Werner Blum, University of Kassel, Germany
The SINUS Project – “Quality Teaching” in mathematics for school classrooms
and for teacher education
Place: Building 116, A81

Raymond Duval, ULCO University, Dunkerque, France
A crucial issue in mathematics education: The ability to change representation register
Place: Building 303, A49

Paula Ensor, University of Cape Town, South Africa
Empowering mathematics education
Place: Building 308, A12

Daniel Goroff, Harvard University, Cambridge, USA
Educational decision-making in policy and practice
Place: Building 303, A42

Vagn Lundsgaard Hansen, Technical University of Denmark, Kgs. Lyngby, Denmark
The dual nature of mathematics
Place: Building 306, A34

Rina Hershkowitz, The Weizman Institute, Rehovot, Israel
Creating curricula for technological environments:
A designer-teacher-learner-researcher activity
Place: Building 306, A35

Victor J. Katz, University of the District of Columbia, Washington DC, USA
Stages in the history of algebra with implications for teaching
Place: Building 303, A45

Anna Kristjánsdóttir, Agder University College,
Norway and Iceland University of Education, Iceland
Theories of learning mathematics and development of
powerful ICT environments – competitors or collaborators?
Place: Building 303, A44

Richard Noss, Institute of Education, London, United Kingdom
Designing a learnable mathematics: A fundamental role for the computer?
Place: Building 101, Main Hall

Michaela Singer, Institute for Educational Sciences, Bucharest, Romania
The dynamic structural learning: From theory to practice
Place: Building 303, A41

Vera W. de Spinadel, University of Buenos Aires, Argentina
Intersections of mathematics and art
Place: Building 116, A82

Jane M. Watson, University of Tasmania, Hobart, Australia
Assessment in statistics education: Obstacle or opportunity?
Place: Building 306, A33

Woo, Jeong Ho, Seoul National University, Republic of Korea
School mathematics as a subject for humanity education
Place: Building 116, A83



I C M E
1 0
2 0 0 4

R

Regular
lectures



I C M E
1 0
2 0 0 4

TSG

Topic Study
Groups

TSG – Topic Study Groups

Each TSG is allotted four time slots:

- TSG I – Tuesday July 6, 12.00 -13.00,
- TSG II – Wednesday July 7, 12.00 -13.00,
- TSG III – Friday July 9, 12.00 -13.00 and
- TSG IV – Saturday July 10, 12.00 -13.30.

Within these frames the Organising Teams have put together the following programmes.

Topic Study Group 1

New development and trends in mathematics education at pre-school and primary level

Main Room: Building 208, A53

Rooms for subgroups: Building 210, G008, G012, G112, G118

- Team Chairs: *Graham Jones*, Griffith University, Gold Coast, Australia
Sally Peters, University of Waikato, Hamilton, New Zealand
- Team Members: *Abdur Rahman As'ari*, University of Negeri Malang, Indonesia
Marit Johnsen-Hoines, Bergen University College, Landaas, Norway
Vitalii Tarakanov, UVK 1874 Primary School, Moscow, Russia

Programme

The program for TSG 1 will comprise four sessions. *Session 1* (1 hour) will be an overview and plenary session. *Sessions 2 and 3* (each 1 hour) will be smaller group simultaneous sessions. These sessions will incorporate the presentation and discussion of a number of papers on modern developments and trends in curriculum, instruction, and assessment for preschool and primary education. The *Final* session (1 hour 30 minutes) will consist of two whole-group presentations with discussion, as well as brief feedback from Sessions 2 and 3.

Session 1

- **Overview of TSG 1:** *Graham Jones* (Griffith University, Australia) and *Sally Peters* (University of Waikato, New Zealand) [CoChairs of TSG 1].
- Key Note: *Carole Greenes* (Boston University, USA): “Challenging Young Children Mathematically: The Big Math for Little Kids Approach
- Response: *Herbert Ginsburg* (Teachers College, Columbia University, USA)

Session 2

Participants will choose from three simultaneous sessions that focus on various themes in preschool and primary education. These sessions and the presentations are listed below.

Theme 1: Powerful Mathematical Ideas (1)

- *Yukio Sugawara* (Tayama Elementary School, Japan): Developing elementary mathematics lessons and curriculum standards to foster children’s mathematical thinking and expression abilities
- *Gill Waters* and *Lyn English* (Queensland University of Technology, Australia): Mathematical patterning in precompulsory educational settings



I C M E
1 0
2 0 0 4

TSG

Topic Study
Groups

Theme 2: Problem Solving (1)

- *Tom Lowrie* (Charles Sturt University, Australia): Authentic problem solving: The influence of cultural artifacts on sense making
- *Noor Azlan Ahmad Zanzali* (Universiti Teknologi Malaysia): Problem posing abilities on mathematics of Malaysian Year 5 children: An exploratory study

Theme 3: New mathematical Ideas for the Early Years (1)

- *Sue Brown* (University of Houston-Clear Lake, USA): Algebraic thinking and primary students
- *Chrisanthi Skoumpourdi* (University of the Aegean, Greece): The teaching of probability theory as a new trend in Greek primary education

Session 3

The arrangement of simultaneous sessions is similar to that of Session 2.

Two of the themes from Session 2 continue.

Theme 1: Powerful Mathematical Ideas (2)

- *Margaret Curry*, *Michael Mitchelmore*, and *Lynne Outhred* (Macquarie University, Australia): Conceptual understanding of spatial measurement
- *Christina Misailidou* and *Julian Williams* (University of Manchester, United Kingdom): Improving performance on ‘ratio’ tasks: Can pupils convert their ‘additive approach’?

Theme 2: New Mathematical Ideas for the Early Years (2)

- *Frantisek Kurina* (Czech Republic): Primary school geometry
- *Zhonghe Wu* (Texas A & M University, USA): The study of elementary school students’ algebraic thinking

Theme 3: Trends in Teacher Education (2)

- *Shiree Babbington* and *Gregor Lomas* (Auckland College of Education, New Zealand): Mathematical content knowledge and pedagogy in New Zealand early childhood education
- *Kwok-cheung Cheung* (University of Macau, Macao): Teach with multiple intelligences for concepts with understanding
- *Saulius Zybartas* (Vilnius Pedagogical University) & *Allan Tarp* (Grenaa International Baccalaureate, Denmark): One digit mathematics

Session 4

This is a general interest session for the whole group. We start with two speakers and conclude TSG 1 with feedback and discussion on the themes from Sessions 2 and 3.

- *Mike Askew* (King’s College, University of London, United Kingdom): Teaching and learning primary numeracy
- *Sally Peters* (University of Waikato, New Zealand): Making the links between early childhood mathematics and school mathematics
- Feedback and discussion on TSG 1 themes: powerful mathematical ideas, problem solving, new mathematical ideas for the early years, and trends in teacher education.



I C M E
1 0
2 0 0 4

TSG

Topic Study
Groups

Topic Study Group 2

New development and trends in mathematics education at secondary level

Main room: Building 116, A81

Rooms for subgroups: Building 116, A83

Team Chairs: *Dirk de Bock*, Catholic University of Leuven, Belgium
Masami Isoda, University of Tsukuba, Japan

Team Members: *Juan Antonio Garcia Cruz*, University of La Laguna, Canary Islands, Spain
Athanasios Gagatsis, University of Cyprus, Nicosia, Cyprus
Elaine Simmt, University of Alberta, Edmonton, Canada

Aims, scope and goal of TSG 2

Several movements characterized secondary mathematics education during the past decades. Most of them are deeply related to changing societies and technological worlds and at the same time, they are often inspired by the results of leading research in mathematics education. There is much diversity in mathematics education research depending on communities and academic societies in the world, but the common aim of mathematics education research has been improving on curricula, teachers' practices, students' learning, evaluation and teachers' education. There are several trends and projects in the world that influence the reform of mathematics education at the secondary level, such as: policy, curriculum or textbook developmental research; developing the teaching practices based on classroom research such as lesson studies and the development of teaching-learning environments for mathematics using new technologies; and the results and the impact of international comparative studies. TSG 2 will focus on the next movements in mathematics education at secondary level and will exemplarily illustrate these movements by presentations on:

1. Research projects for curriculum development having the potential to influence mathematics education in the next decades;
2. Policies of secondary schools' reforms having the potential for new trends in secondary mathematics education;
3. Developmental studies of teaching new contents in mathematics;
4. Developmental studies of new ways of teaching mathematics;
5. Influential research results in mathematics education for secondary school level.

First session: Keynote presentations by:

- *Paul Drijvers* (Freudenthal Institute, the Netherlands): The integration of technology in secondary mathematics education: a future trend or an utopia?
- *Florence Glanfield* (University of Saskatchewan, Canada): Secondary Mathematics Education Curriculum Developments: A Canadian Perspective
- *Ross Turner* (Australian Council for Educational Research, Australia): PISA and Secondary Mathematics Education

Second session: Curricular developments and new contents:

- *Guo Rong Xu* and *Stephan Lerman* (London South Bank University, United Kingdom): The small tip of a large iceberg? The problems in Chinese education reform
- *Kwok-cheung Cheung* (University of Macau, China): New development in mathematics education at obligatory education level in People's Republic of China
- *Maitree Inprasitha* (Khon Kaen University, Thailand): Movement of lesson study in Thailand

- *Sofia Anastasiadou* (Aristotle University of Thessaloniki, Greece): Perceptions, attitudes and conducts of the Greek mathematicians for statistics in secondary education
- *Allan Tarp* (Grenaa International Baccalaureate, Denmark): Adding per-numbers

Third session: Learning from research and classroom practice:

- *Wim Van Dooren*, *Dirk De Bock*, *An Hessels* and *Lieven Verschaffel* (University of Leuven, Belgium): Studying and remedying secondary school students' modelling skills: A case study
- *Modestou* and *Athanasios Gagatsis* (University of Cyprus, Greece): Students' improper proportional reasoning: A multidimensional statistical analysis
- *Yuriko Yamamoto Baldin*, *José Antonio Salvador* and *Pedro Luiz Aparecido Malagutti* (Universidade Federal de São Carlos, Brazil): Developing interdisciplinary activities in secondary school classrooms
- *Jiansheng Bao* (Soochow University, China): A comparative study on composite difficulty between new and old Chinese math textbooks
- *Alexander Khait* (Jerusalem College of Engineering, Israel): An important point in the space of mathematics education

Fourth session: General discussion initiated by the members of the organizational team



I C M E
1 0
2 0 0 4

TSG

Topic Study
Groups



I C M E
1 0
2 0 0 4

TSG

Topic Study
Groups

Topic Study Group 3

New developments and trends in mathematics education at tertiary levels

Main Room: Building 116, A82

Team Chairs: *Derek Holton*, University of Otago, Dunedin, New Zealand
Rina Zazkis, Simon Fraser University, Burnaby, Canada

Team Members: *Meira Hockman*, University of the Witwatersrand, Johannesburg, South Africa
Karen King, Michigan State University, East Lansing, USA
Alexei Sossinsky, Independent University of Moscow, Russia

The topic of our study group is extremely broad not only because of our geographical variety, but also because of variety in content. We will balance our desire to provide a comprehensive description of the state-of-the-art with an understanding that the time frame allows only for a quick overview of several major important themes. Of particular concern are the challenges for both students and instructors in transition to the University in terms of both content and pedagogy. Technology is one of the key themes because of the way it is changing what we teach and how we teach it and how students learn. Acknowledging the major role of teachers in students' acquisition of knowledge base as well as attitudes, we will place some emphasis on the education of pre-service teachers. Finally, we will engage in discussion of what is foreseeable and what is desirable in the tertiary mathematics education in 2024.

July 6: Setting the stage

- 12.00-12.05 Welcome (*Derek Holton* and *Rina Zazkis*)
12.05-12.30 *Selden, Annie*: New developments and trends? Or more of the same?
12.30-12.30 *Paramonova, Irina*: Mathematics syllabus innovation in Russia: The Moscow experience
12.40-12.50 *Hillel, Joel*: Trends in the teaching of linear algebra and the role of technology
12.50-13.00 Questions/answers and discussion

July 7: Challenges in transition to undergraduate mathematics

- 12.00-12.10 *Lovric, Miroslav*: Transition from secondary to tertiary mathematics; McMaster University experience
12.10-12.20 *Luk, Hing Sun*: Gap between secondary school and university mathematics
12.20-12.30 *Nishimori, Toshiyuki*: The deterioration problem of university students' capacity to study mathematics in Japan from 1993 to 2003 and a recent inquiry
12.30-12.40 *Hockman, Meira*: Success at all costs or the cost of success?
12.40-13.00 Questions/answers and discussion

July 9: Issues in teacher education

- 12.00-12.10 *Martines Luaces, Victor*: Teacher training for problem solving and modelling
12.10-12.20 *Wittmann, Erich Ch.*: Learning mathematics for teaching mathematics: The notion of operative proof
12.20-12.30 *Leikin, Roza*: Professional dialogue. Its components and qualities: From graduate research on teaching to an undergraduate teachers' programme
12.30-12.40 *Zazkis, Rina*: Representing numbers: Prime and irrational
12.40-13.00 Questions/answers and discussion

July 10: Four T's: Technology, Teaching and Twenty Twenty-four

- 12.00-12.10 *Gorev, Dvora; Gurevich, Irene; Barabash, Marita*: How is the efficiency of the computer usage in geometry related to the levels of students' learning abilities?
12.10-12.20 *Engelbrecht, Johann; Harding, Ansie*: Taxonomy of online undergraduate mathematics courses
12.20-12.30 *King, Karen*: Students' participation in mathematics as a scientific discipline: What is a mathematical question of significance
12.30-12.40 *Liljedahl, Peter*: AHA! The effect and affect of mathematical discovery on undergraduate mathematics students
12.40-13.05 Questions/answers and discussion
13.05-13.25 *Holton, Derek*: Tertiary mathematics education for 2024
13.25-13.30 Farewell comments



I C M E
1 0
2 0 0 4

TSG

Topic Study
Groups



I C M E
1 0
2 0 0 4

TSG

Topic Study
Groups

Topic Study Group 4

Activities and programmes for gifted students

Main room: Building 303, A41

Team Chairs: *Ed Barbeau*, University of Toronto, Canada
Hyunyong Shin, Korea National University of Education,
Republic of Korea

Team Members: *Alex Friedlander*, The Weizmann Institute of Science, Rehovot, Israel
Shailesh A. Shirali, Rishi Valley School, Chittor District, India
Emiliya A. Velikova, University of Rousse, Bulgaria

The participants in the group will consider first the characteristics and identification of gifted students. Gifted students must be accommodated in regular classes as well as through various programs outside of the school that are targeted for them. We wish to look at both these dimensions, to learn what is available and to assess their effectiveness. Finally, we will examine examples of mathematics presented to gifted students.

Session 1

Tuesday July 6, 12.00-13.00

- *George Gotoh*, Japan: The quality of the reasoning in problem solving processes
- *Djordje Kadijevich* and *Zora Krnjaic*, Serbia and Montenegro: Is cognitive style related to link between procedural and conceptual mathematical knowledge?
- *Hye Sook Park* and *Kyoo-Hong Park*, Korea: Analysis on the mathematical disposition of the mathematically gifted students in the middle school of Korea
- *Brenda Bicknell*, New Zealand: Addressing mathematical promise in the New Zealand context
- *Bettina Dahl*, Norway: How do gifted students become successful? A study in learning styles
- *Kathy Gavin* and *Linda Sheffield*, USA: Project M3: Mentoring mathematical minds

Session 2

Wednesday July 7, 12.00-13.00

- *Carmel Diezmann* and *James J. Watters*, Australia: Challenge and connectedness in the mathematics classroom: Using lateral strategies with gifted elementary students
- *Mark Saul*, USA: The unity of mathematics education
- *Bharath Sriraman*, USA: Differentiating mathematics via use of novel combinatorial problem solving situations: A model for heterogeneous mathematics classrooms
- *Viktor Freiman*, Canada: Mathematical giftedness in early grades: Challenging situation approach
- *Alex Friedlander*, Israel: High-ability students in regular heterogeneous classes

Session 3

Friday July 9, 12.00-13.00

- *Anatolii Chasovskikh* and *Yury Shestopalov*, Russia: The advanced education and science centre of the M.V. Lomonosov Moscow State University – The Kolmogorov College
- *Kakahana Kyoko* and *Suteo Kimura*, Japan: Activities in new curriculum for gifted students – Trials in super science high schools in Japan
- *Peter Körtesi*, Hungary: Self made mathematics
- *Elena Levit* and *Larisa Marcu* and *Orna Schneiderman*, Israel: Process of training and admission to a Mofet science class
- *Kang Sup Lee* and *Dong Jou Hwang* and *Woo Shik Lee*, Korea: Development of enrichment programmes for the mathematically gifted students: Focused on the conic section
- *Miriam Amit*, Israel and *Alex Belov*, Russia: Unlocking interlocking mathematical structures – An experiment at the Kidmatika Math Club
- *Gregory Makrides* and *Emiliya Velikova and partners*, Cyprus: Project Matheu – Identification, motivation and support of mathematical talents in European schools

Session 4

Saturday July 10, 12.00-13.30

- *Hanhyuk Cho* and *Hyuk Han* and *Manyoung Jin* and *Hwakyung Kim* and *Minho Song*, Korea: Designing a microworld for mathematical creative and gifted students
- *Ziva Deutsch* and *Akiva Kadari* and *Thierry Dana-Picard*, Israel: “ALEF EFES” students of education create and publish a mathematical quarterly and an interactive site
- *Alexander Soifer*, USA: One beautiful olympiad problem: Chess 7x7
- *Sang-Gu Lee*, Korea: Activity of a gifted student who saw linear algebraic solution of blackout puzzle



I C M E
1 0
2 0 0 4

TSG

Topic Study
Groups



I C M E
1 0
2 0 0 4

TSG

Topic Study
Groups

Topic Study Group 5

Activities and programmes for students with special needs

Main room: Building 306, A36

Team Chairs: *Sinikka Huhtala*, Helsinki City College of Social and Health Care, Finland
Petra Scherer, University of Bielefeld, Germany
Team Members: *Ronnie Karsenty*, The Weizmann Institute of Science, Rehovot, Israel
Elisabeth Moser Opitz, University of Freiburg, Switzerland
Susan A. Osterhaus, Texas School for the Blind and Visually Impaired, Austin, USA

The plan of presentation will be as follows:

Tuesday 6, Session 1

1. Middletown Mathematics
Olof Magne, Malmö and *Arne Engström*, Örebro (Sweden)
Discussion
2. Measuring the Consequences. Teaching Linear Measurement to Students with Learning Difficulties
Philippa Bragg, Sydney (Australia)
Discussion

Wednesday 7, Session 2

3. There is Something Wrong with the Hundred Square
Or: Observing and understanding mathematics classroom situations
Birgit Werner, Kiel (Germany)
Discussion
4. Learning disabilities in grade 5 and 8:
Some results of a research project in Switzerland
Elisabeth Moser Opitz, Freiburg (Switzerland)
Discussion

Friday 9, Session 3

5. Children who are blind – Children with hearing impairment
– Children without visual or hearing impairments – Experiencing numbers
Ann Ahlberg, Jönköping (Sweden)
Discussion
6. On a Mediating between Concrete and Abstract for the Hearing Impaired in Mathematics Classrooms
Akira Morimoto, Fukushima (Japan)
Discussion

Saturday 10, Session 4

7. Accessible Math Technology for the Blind and Visually Impaired
Susan Osterhaus, Austin (Texas/USA)
Discussion
8. Maths Education and Training for Autonomy in the Mentally Retarded Pupil
Antonella Montone and *Michele Pertichino*, Bari (Italy)
Discussion
Final Discussion



I C M E
1 0
2 0 0 4

TSG

Topic Study
Groups

Topic Study Group 6

Adult and life-long mathematics education

Main room: Building 306, A37

Team Chairs: *Tine Wedege*, Roskilde University, Denmark
Jeff Evans, Middlesex University Business School, London, United Kingdom
Team Members: *Marta Civil*, University of Arizona, Tucson, USA
Gail FitzSimons, Monash University, Australia
Wolfgang Schlöglmann, Johannes Kepler University of Linz, Austria

TSG 6 will focus on important new developments in research or practice related to adults' and lifelong mathematics education from a variety of perspectives. The approaches represented in our discussions embrace a range of disciplines (psychology, sociology, politics, pedagogy, anthropology and androgogy), and a spectrum of concerns about inclusion – along lines of gender, class, ethnicity, age and language group. The contributors come from all six continents.

A range of themes will be addressed in the oral presentations, the web-based contributions, and in the final plenary discussion. These include:

- Overviews of recent developments in adult numeracy and mathematics research and practice
- Parents and community as intellectual resources
- Issues of affect, beliefs, motivation, anxiety and identity in adult learners
- Pedagogic resources: measurement, proportions and reading tables
- Gender “mainstreaming” and movements of the dispossessed
- Issues for pre-service teachers and for professional development
- Roles for functional skills and understanding and commonsense
- Methodological issues, such as designing a classroom observation schedule
- Global issues, including national efforts to survey “skills” in the population

Programme

Tuesday 12.00-13.00

- *Tine Wedege* (Denmark): Setting the scene.
- *Gail E. FitzSimons* (Australia): An Overview of Adult and Lifelong Mathematics Education.
- *John Gillespie* (United Kingdom): The “Skills for Life” national survey of adult numeracy in England. What does it tell us? What further questions does it prompt?
- Comments and discussion

Wednesday 12.00-13.00

- *Gelsa Knijnik* (Brazil): “Profaning the holiness” of school mathematics: Adult Education and oral mathematics in the Brazilian Landless Movement.
- *Javier Díez-Palomar*, *Paloma García Wehrle*, and *Joaquim Giménez Rodríguez* (Spain): Cognitive trajectories in response to proportional situations in adult education.
- Comments and discussion

Friday 12.00-13.00

Diana Coben (United Kingdom): Putting adult numeracy and mathematics research on the map.
Inge Henningsen (Denmark): Gender mainstreaming of adult mathematics education: Opportunities and challenges.
Comments and discussion

Saturday 12.00-13.30

Panel/plenary discussion: Perspectives on adult and lifelong mathematics education
Speakers include: *Marta Civil* (USA), *Jeff Evans* (United Kingdom, chair), *John O'Donoghue* (Ireland), *John Volmink* (South Africa).



I C M E
1 0
2 0 0 4

TSG

Topic Study
Groups

Topic Study Group 7

Mathematics education in and for work

Main room: Building 306, A38

Team Chairs: *Henk van der Kooij*, The Freudenthal Institute, Utrecht, The Netherlands
Rudolf Straesser, Luleå Technical University, Sweden
Team Members: *Susan Forman*, City University of New York, Bronx, USA
Jim Ridgway, University of Durham, United Kingdom
Robyn Zevenbergen, Griffith University, Bundall, Australia

The topic for this study group is Mathematics Education in and for Work. We will try to develop a common notion on why and on what mathematics is needed (to prepare for and) in work. The first focus of the working group will be to identify general characteristics of the nature of mathematics as it appears in or is needed for work. Some characteristic keywords for this may be mathematical literacy, overarching concepts (PISA framework) and mathematics in context. The second focus of the topic study group will be to look into teaching and learning of mathematics at work, in classrooms and other settings if teaching and learning are oriented to prepare for work-place related situations. The overall aim of the topic study group should be to discuss the nature of mathematics and its education in and for work.

Programme (preliminary)

Tuesday 6:

Characteristics of mathematics for work

Some keywords: ‘broad occupational competences’ versus ‘highly occupation-specific skills’, problem-solving skills, flexibility and quality, transfer, quantitative / mathematical literacy, overarching concepts (PISA framework), mathematics in context.

- Introduction (*Henk v.d.Kooij*)
- A perspective on numeracy (*Thornton&Hogan* / Australia)
- Pragmatics of thinking about workplace mathematics (*Clive Kanen* / Australia)
- Mathematical knowledge of Workers at South-African Cultural Villages (*Mogege Mosimege* / South Africa)
- Numeracy in the Workplace: Stimulated Recall (*Zevenbergen&Zevenbergen*)

Wednesday 7:

Teaching for mathematics at the workplace: The perspective of pedagogy

Some keywords: situated learning, situated abstraction, authentic learning

- Key-Note presentation: (*Celia Hoyles* / United Kingdom)
- Mathematics in Italian Vocational Schools (*Piochi&Ancona* / Italy)
- Constructing Mathematical concepts – building on learner’s own experience (*Corinne Hahn* / France)

Thursday 9:

Information and Communication Technology for mathematics at/for work

Some keywords: artefacts, simulation, spreadsheets, data, breakdown

- Introduction (*Rudolf Strässer*)
- Mathematics needs of students in emerging technologies (*May Ann Hovis* / USA)

Friday 10:

Panel and plenary debate

The panel will include all speakers of the three sessions on July 6, 7 and 9.



I C M E
1 0
2 0 0 4

TSG

Topic Study
Groups

Topic Study Group 8

Research and development in the teaching and learning of number and arithmetic

Main room: Building 303, A49

Team Chairs: *Julia Anghileri*, University of Cambridge, United Kingdom
Lieven Verschaffel, Catholic University of Leuven, Belgium
Team Members: *Munirah Ghazali*, Universiti Sains Malaysia, Pulau Pinang, Malaysia
Joaquín Giménez Rodríguez, University of Barcelona, Spain
Wan Kang, Seoul National University of Education, Republic of Korea

Aims and Focus

In this Topic Study Group we will attempt to bring together research developments from different countries relating to teaching number and arithmetic and debate implications classroom practices. We have selected three main topics that will provide a focus for presentations and discussions but hope that any relevant current issues will be considered in discussion. The following three topics dealing with teaching and learning of number and arithmetic will be addressed:

Topic 1: Number sense: What are the relationships between informal methods and formal calculation procedures? What role informal methods can and should play in developing formal calculation methods? What’s the importance of strategy flexibility and how to teach for it? What are the characteristics and effects of programs that develop number sense in an effective way?

Topic 2: Learning arithmetic through problem solving: Is it feasible and effective to take a problem-solving approach to teaching number concepts and operations?

Topic 3: The role of contexts and models in teaching and learning about number and arithmetic: What’s the role of contexts and context-rich problems in teaching and learning how to solve applied arithmetic problems (“modeling and applications”)? What’s the role of didactical tools for the development of arithmetic concepts and skills (“emergent modeling”).

Programme

During the first three sessions Alistair McIntosh, Christoph Selter and Brian Greer will give a ½ hour plenary lecture on one of the three topics mentioned above. The other ½ hour of each session will be reserved for a focussed discussion to include contributions from authors of papers published on the TSG website prior to the sessions. More general participation will be invited from other participants. The fourth and last session will consist of an overview of international perspectives with a ½ hour introduction by Julia Anghileri. Afterwards there will be a ½ hour panel discussion with all plenary lecturers. Finally, we will try to identify the way forward for research over the next four years and look at possible collaborations that may emerge from the conference during a ½ plenary closing discussion with all participants.



I C M E
1 0
2 0 0 4

TSG

Topic Study
Groups

The final program is as follows:

- **July 6, 12.00-13.00 – Session 1** – ‘Developing number sense’ with a plenary key note lecture by *Alistair McIntosh* (University of Tasmania, Australia)
- **July 7, 12.00-13.00 – Session 2** – ‘Learning arithmetic through problem solving’ with a plenary key note lecture by *Christoph Selter* (University of Heidelberg, Germany)
- **July 9, 12.00-13.00 – Session 3** – ‘The role of contexts and models’ – with a plenary key note lecture by *Brian Greer* (San Diego State University, U.S.A.).
- **July 10, 12.00-13.30 – Session 4** – ‘International perspectives on teaching and learning number and arithmetic and future directions’ with a plenary key note lecture by *Julia Anghileri*, followed by a panel discussion with all key note lecturers, chaired by *Lieven Verschaffel* (University of Leuven, Belgium), and a general closing discussion.

Website

Participants have been invited to contribute to the TSG by submitting papers that are directly related to the topic. Following review these selected papers from a range of countries (including Australia, China and Mexico as well as several European countries) will be published on the website and will be actively used in the discussions.



I C M E
1 0
2 0 0 4

TSG

Topic Study
Groups

Topic Study Group 9

Research and development in the teaching and learning of algebra

Main Room: Building 306, A35

Team Chairs: *Daniel Chazan*, University of Maryland, College Park, USA
Eugenio Filloy Yagüe, CINVESTAV, México City, México

Team Members: *Carolyn Kieran*, University of Québec at Montreal, Canada
Carmen Sessa, University of Buenos Aires, Argentina
Rosamund Sutherland, University of Bristol, United Kingdom

Aims and Focus

TSG 9 will investigate recent developments in the teaching and learning of algebra and will provide the participants with a forum for sharing and discussing their research endeavors, development projects, and experiences. School algebra is a difficult area for study because across different countries, and even within countries, what is done in classrooms can be quite different. Against the backdrop of this challenge for international discussions of research and development in school algebra, the research group will focus on three central issues:

- describing and understanding the variation of algebra in schools across the world;
- the theories that influence research and development of school algebra programs across the world; and
- the influence of technological developments on these trends.

Programme

Session 1: Tuesday July 6, 12.00-13.00

International perspectives on algebra

School algebra is a difficult area for study because across different countries, and even within countries, what is done in classrooms can be quite different. In order to create common ground for conversations about school algebra in our study group, we will begin with video presentations of different examples of classroom practice in school algebra.

These video presentations will be followed by a panel discussion in which members of the Organizing Team will indicate how they conceptualize the range of classroom practices that have been presented. Further details about this session remain to be arranged.

Session 2: Wednesday July 7, 12.00-13.00

Theory in algebra learning

In practice in many countries algebra as a school subject and as a way of thinking is postponed until junior secondary school. Much discussion these days among mathematics educators focus on this sort of curricular change, as well as alternative curricular approaches and uses of technology to shape algebra instruction, rather than research on student learning. In the 80s, there were many studies that focused on misconceptions in algebra. With changing views about the nature of learning as a social practice, a question is how current researchers on student learning approach algebra. What do researchers in the field now bring to bear as they think about exploring what makes algebra a challenge for students of different ages to learn. And, how does research on student learning connect with developments and changes in the school algebra curriculum?



I C M E
1 0
2 0 0 4

TSG

Topic Study
Groups

Presentations:

- *Barbara Dougherty*, Mathematics Section Head, The Curriculum Research and Development Group, University of Hawaii (USA): A Quantified Approach to Algebra in Elementary Grades
- *Toshiakira Fujii*, Professor of Mathematics Education, Tokyo Gakugei University (Japan): The importance of generalisable numerical expressions in fostering algebraic thinking

The format for discussion of these issues will be two 20 minute talks followed by small group discussion. Questions for the presenters will be collected by the Organizing Team for use during Session 4.

Session 3: Friday July 9, 12.00-13.00

Roles of technology in school algebra curricula

Development of handheld technology with the capacity to present graphical information and to do symbol manipulation for the user raises important questions about what curricular goals are in school algebra. In the field there has been a dichotomy between making the objects of study in algebra meaningful objects to students (as a way to tackle issues of student motivation) and helping students create meaning for manipulations with these objects. This session will address challenges for researchers and curriculum developers as the focus of school algebra is influenced by technological developments.

Presentations:

- *Michèle Artigue*, Professor, University Paris VII & IREM, Paris (France): Learning algebra in the environment of symbolic calculators: some lessons from research.
- *Michal Yerushalmy*, Mathematics Education, University of Haifa (Israel): Does technology transform the content of algebra curricula? An analysis of critical transitions for learning and teaching.

The format for discussion of these issues will be two 20 minutes talks followed by small group discussion. Questions for the presenters will be collected by the Organizing Team for use during Session 4.

Session 4: Saturday July 10, 12:00-13.30

Short orals and discussion

Short Oral Presentations:

- *Charita A. Luna* and *Lourdes G. Fuscablo*; Mindanao Polytechnic State College; (Philippines) Enhancement of college algebra student problem solving performance through mathematical symbolism
- *Hamid Chaachoua**, *Jean-François Nicaud**, *Alain Bronner***, *Denis Bouhineau**; *IMAG-Leibniz, Université de Grenoble **ERES, LIRDEF, IUFM de Montpellier, (France); APLUSIX, A learning environment for algebra, actual use and benefits
- *Martin van Reeuwijk*; Freudenthal Institute, Utrecht University; (The Netherlands); School algebra struggle. What about algebra computer games?

Panel discussion:

The organizing team will choose questions from participants in Days 2 and 3 and will present them for response.

- *Michèle Artigue*, University Paris VII & IREM, Paris (France)
- *Barbara Dougherty*, University of Hawaii (USA)
- *Toshia Fujii*, Tokyo Gakugei University (Japan)
- *Michal Yerushalmy*, University of Haifa (Israel)



I C M E
1 0
2 0 0 4

TSG

Topic Study
Groups

Topic Study Group 10

Research and development in the teaching and learning of geometry

Main room: Building 306, A33

Team Chairs: *Iman Osta*, Lebanese American University, Chouran Beirut, Lebanon
Harry Silfverberg, University of Tampere, Finland

Team Members: *Verónica Hoyos Aguilar*, CAEMTIC, National Pedagogical University, México
David W. Henderson, Cornell University, Ithaca, USA
Ewa Swoboda, Rzeszów University, Poland

Aims and Scope

In Topic Study Group 10, we will examine and discuss recent research and developments in the teaching and learning of geometry at all levels for schooling from kindergarten to the university. The Group will incorporate short presentations on, and discussions of, new trends in research or practice of geometry learning and teaching, providing a forum for discussion and confrontation of ideas, with an international dimension. Through short presentations and panel sessions based on previously reviewed papers, some topics and issues will be raised and discussed.

The main topics included are the following:

1. Different approaches to teaching and learning Euclidean geometry
2. Using history in the teaching of geometry
3. Three-dimensional (solid) geometry
4. Using Dynamic Geometry Software (DGS) for geometry learning
5. Non-Euclidean geometries
6. Teaching geometry at different age- and experience-levels
7. Formal/axiomatic versus informal/experience based approaches
8. Relationships among different types of geometrical reasoning
9. Cognitive processes of geometry learning
10. Geometry in teacher education
11. Social aspects of geometry class
12. Curricular issues in geometry

Session 1

Theme: Dynamic Geometry Software:

New views on DGS use in geometry teaching / learning

Leader: *Iman Osta*

Format: Presentations, panel discussion and whole group discussion from the audience

Topics:

1. Different approaches to teaching and learning geometry using DGS
2. Experience based approaches with DGS and the fate of axiomatic systems
3. Relationships among different types of geometrical reasoning under DGS use
4. Cognitive processes of geometry learning with DGS
5. Proof and its meanings in the light of DGS use in teaching/learning geometry
6. DGS use and Curricular issues in geometry
7. Teacher education needs vis-à-vis the use of DGS



I C M E
1 0
2 0 0 4

TSG

Topic Study
Groups

Questions for discussion:

What are the best approaches to teaching / learning geometry, using DGS, according to the latest research findings? How does DGS use in the classroom impact the debates between intuitive and formal geometry advocates? Does the use of DGS in the classroom create new types of geometric reasoning or modify the old ones? How is the role and status of proof evolving, as a result of using DGS in geometry teaching? How are the DGS visualization capabilities affecting the necessity (or un-necessity) of providing formal proofs? How can DGS environments be compared to other mediating tools in the teaching of geometry? How would geometry curricular be modified to integrate the use of DGS and to benefit from its potentials? How can teachers be prepared to effectively use DGS in their teaching?

Session 2

Theme: From intuition to formal conceptions in the early grades

Leader: *Ewa Swoboda*

Format: Panel discussion and whole group discussion from the audience

Topics:

1. Geometry in context
2. Intuition in transformation geometry
3. Curricular issues in geometry
4. Geometry and teacher's education

Questions for discussion:

What kind of theory do we need to guide children from their natural intuition to the more formal understanding of geometrical concepts? What kind of methods do we need to use in order to establish geometrical concepts and relations? How do new trends in teaching geometry at this level fit in existing curricula? How to prepare teachers to teach geometry at the early educational level?

Session 3

Theme: Developing mathematical thinking and attitudes through secondary or college level

Leader: *Veronica Hoyos Aguilar* and *Harry Silfverberg*

Format: Panel discussion and whole group discussion from the audience

Topics:

1. Teaching geometry at secondary and college levels
2. Formal/axiomatic versus informal/experience based approaches
3. Relationships among different types of geometrical reasoning
4. Cognitive processes of geometry learning
5. Developmental aspects of geometry learning

Questions for discussion:

What are the major student's approaches to solve problems, make inferences, generalize, and prove in geometry? What new level indicators can be adopted for the first four levels of the Van Hiele model of geometric thinking? How can we contextualize geometric thinking within a broad framework? How can different didactic situations be engineered to promote geometric thinking and learning? How to build positive attitudes toward geometry? How to raise or promote geometrical thinking of high level?



I C M E
1 0
2 0 0 4

TSG

Topic Study
Groups

Session 4

Theme: Geometry outside the formal Euclidean mould

Leader: *David Henderson*

Format: Panel discussion and whole group discussion from the audience

Topics:

1. Four Historical Strands of Geometry (Art/Patterns, Navigation/Stargazing, Building Structures, and Machines/Motion)
2. Using simplified axiom systems
3. The role of intuition and experience
4. Interconnections between geometry and algebra
5. Using Dynamic Geometry Software outside the Euclidean mould

Questions for Discussion:

How can we introduce into the classrooms the power of modern geometry that does not restrict itself within an axiom system? How do we introduce in the classroom the mathematical power of intuition? Do we need axiomatic Euclidean geometry in school classrooms any more? If so, what aspects are most important to keep? How can we still have proofs (as "Convincing communications that answer - Why?") when exploring non-axiomatic geometry?



ICME
10
2004

TSG

Topic Study
Groups

Topic Study Group 11

Research and development in the teaching and learning of probability and statistics

Main room: Building 341, A23

Team Chairs: *Li, Jun*, East China Normal University, Shanghai, P.R. China
Joseph M. Wisenbaker, University of Georgia, Athens, USA
 Team Members: *Dani Ben-Zvi*, University of Haifa, Israel
Manfred Borovcnik, University of Klagenfurt, Austria
Maxine Pfannkuch, University of Auckland, New Zealand

Schedule for Invited Speakers and Oral Presentations

Session 1 (1 hr.) Exemplary Work in Statistics Education		
5 minutes	Wisenbaker and Li	Introduction to the program
25	Watson (Invited speaker)	Tasmanian Research in Chance and Data
15	Gal and Ben-Zvi	Web-based Educational Products from Official Statistics Agencies: A Pilot Survey
15	Starkings	Collaboration by the RSS and the National Academy for Gifted And Talented Youth to encourage students to study Statistics
Session 2 (1 hr.) Research on reasoning about variation and the use of technology in statistics education		
25	Shaughnessy (Invited Speaker)	Investigating Middle and Secondary Students' Thinking in Variation-Rich Contexts.
15	DelMas and Liu	Students' Understanding of Factors that Affect the Standard Deviation
15	Abrahamson and Wilensky	SAMPLER: Collaborative Interactive Computer-Based Statistics Learning Environment
5	Pfannkuch and Ben-Zvi	Discussion
Session 3 (1 hr.) Issues in Teaching Statistics from Multiple Perspectives		
25	Garfield (Invited Speaker)	Exploring the Impact of Lesson Study on Expert and Novice Statistics Teachers
15	Peck	Developing teachers' statistical knowledge and distance education
15	Sorto and White	The Statistical Knowledge of Prospective Teachers and its Application to Teaching
5	Borovcnik	Discussion
Session 4 (1.5 hrs.) Exploring Issues of reasoning about distribution, data and graphs		
25	Gravemeijer (Invited Speaker)	Developing the Notion of Distribution as an Entity
15	Yingkang	Singapore Secondary School Students' Understanding of Statistical Graphs
15	Chick	Representing Association: Children Manipulating Data Sets
15	Monteiro and Ainley	Critical sense in interpretation of graphs: reading through the data
15	Pfannkuch et al	Comparison of data plots: Building a pedagogical framework
5 minutes	Wisenbaker and Li	Wrap-up discussion



ICME
10
2004

TSG

Topic Study
Groups

Topic Study Group 12

Research and development in the teaching and learning of calculus

Main room: Building 421, A71

Team Chairs: *Johan Lithner*, Umeå University, Sweden
Maggy Schneider, FUNDP, Namur, Belgium
 Team Members: *Choe, Young Han*, Korea Advanced Institute of Science and Technology, Daejeon, Republic of Korea
Ana Isabel Sacristán Rock, CINVESTAV, México City, México
David Tall, University of Warwick, United Kingdom

Aim and scope:

The aim is to light future orientations in the practices and researches about calculus learning and teaching. For this, we will bring to the fore the evolution of what is happening in education worldwide and analyse some lectures and other texts putting on the website which present recent works. In final, we will organize a large debate from reactions of a panel about opened questions related to the interventions.

Programme (preliminary):

Tuesday July 6:

12.00-13.00 An overview of the evolution in the practices and researches about calculus teaching and learning. After a short introduction by *Johan Lithner* and *Maggy Schneider*, *David Tall* will present an international review of the development in calculus in the 21st century after the reform movements of the 1990s, and *Isabelle Bloch* and *Maggy Schneider* will consider aspects of the French approach.

Wednesday July 7:

12.00-12.15 *Thalma Leviatan* and *Laure Barthel*: Introducing real numbers: When and how?

12.15-12.30 *Michel Helfgott*: Five guidelines in the teaching of first-year calculus

12.30-12.45 *Victor Giraldo* and *Luiz M. Carvalho*: The role of computational descriptions and conflicts in the teaching and learning of the concept of derivative

12.45-13.00 General discussion and questions

Friday July 9:

12.00-12.15 *Erhan Bingolbali*: The calculus of engineering and mathematics undergraduates

12.15-12.30 *Yury Shestopalov* and *Igor Gachkov*: Teaching computational mathematics in the real-time mode

12.30-12.45 *Isabelle Bloch* and *Imène Ghedamsi*: The teaching of calculus at the transition between upper secondary school and university: Factors of rupture. A study concerning the notion of limit

12.45-13.00 General discussion and questions



I C M E
1 0
2 0 0 4

TSG

Topic Study
Groups

Saturday July 10:

- 12.00-12.15 *Salahattin Arslan*: Reflections on the teaching of differential equations: What effects of a teaching to algebraic dominance?
- 12.15-12.30 *Elfrida Ralha, Keith Hirst, and Olga Vaz*: A Portuguese study on learning concepts and proofs: Multivariable calculus and mathematica
- 12.30-13.30 The last part of the session is mainly devoted to synthesis and discussions about relevant questions raised by the interventions in the TSG 12 and the manner in which they have been treated. The aim is to light future orientations in the practices and researches about calculus learning and teaching. Some of the suggestions could not have been accepted as lectures, but are put on the website and will serve as references in the discussions among all the participants. A few participants will form a panel to discuss opened questions by which the organizers refer to the lectures of the topic study group or to some text or other which is put on the website. The members of the panel are:
De Ting Wu, Mike Thomas, and David Smith.

Topic Study Group 13

Research and development in the teaching and learning of advanced mathematical topics

Main room: Building 210, G142

Team Chairs: *Stephen Hegedus*, University of Massachusetts, Dartmouth, USA
Caroline Lajoie, University of Québec at Montréal, Canada

Team Members: *Ghislaine Gueudet*, University of Rennes I, France
John Hannah, University of Canterbury, Christchurch, New Zealand
Shlomo Vinner, Ben-Gurion University of the Negev, Beer-Sheva, Israel

The main aim of the group is to assimilate and discuss the current state of research and development in the teaching and learning of advanced mathematical topics and to present a broad outlook, and potential research agenda, for new and existing researchers in the international community.

We will cover three broad themes with synthesis on the final day:

- Day 1) Research on the Teaching of Advanced topics;
- Day 2) Research on the Teaching of Advanced topics;
- Day 3) Development in the Teaching and Learning of Advanced Topics.
- Day 4) Synthesis and Projection of New Research

We will design, through discussion, presentation and debate, the main features of contemporary theories of advanced mathematical learning, reasoning and how it builds on the past decade of work, as well as realize new research methodologies, critical perspectives on teaching, particularly in dynamic technological environments, and highlight vital prerequisites for 21st century learning and pedagogy, especially with respect to the integration of such work into mainstream tertiary education. In summary, we will aim to map out new features of R&D in advanced mathematics education research and propose new lines of inquiry related to models of learning, associated pedagogy, and contemporary technological and curricula innovation.

Program Format

The main format of each session will be an interactive panel discussion/debate. We have reviewed paper contributions towards the main themes of the group. These are published on the group's web page with reactors to each session.

These papers will help inspire discussion on each day. We have asked the authors of these papers to join the panel each day to initiate, and inspire discussion of work, with core, concrete examples. All participants will be expected to engage in fruitful discussion of the main themes, following a brief synthesis of the work at the start of each session by one of the main organizers. Each day will be concluded with a reactor, invited from the field, to summarize and guide our thoughts for future productive work.

We will aim to document our discussion each day, report on the web site, and then formalize our discussions into some reportable format (primarily electronic) then later in a journal format for publication. We aim to keep this a main aim, thus focusing our work into an effective and utilizable product for the mathematics education community.

Invited Panel Speakers

Ildar Safjanov, Naberezhnye Chelny, Russian Federation
Yury Shestopalov, Sweden
Claire Cazes, Ghislaine Gueudet, Magali Hersant, Fabrice Vandebrouck, France
Tomoko Yanagimoto, Atsuhiko Nakamoto, Naoyuki Masuda, Japan
Alexander Khait, Israel
Marcelo Salles Batarce, Brazil
Zhangxiong, Wei Yubo, Wei xXaozhang, Wang Jinzhu, Xiong Wenjing, China
S. M. Hashemiparast, Iran

Invited Reactors

Jean-Luc Dorier, France
Shlomo Vinner, Israel
Luis Moreno-Armella, México
David Tall, England
Ted Eisenberg, Israel



I C M E
1 0
2 0 0 4

TSG

Topic Study
Groups



I C M E
1 0
2 0 0 4

TSG

Topic Study
Groups

Topic Study Group 14

Innovative approaches to the teaching of mathematics

Main room: Building 306, A31

Team Chairs: *Claudi Alsina*, Technical University of Catalonia, Barcelona, Spain
Anne Watson, University of Oxford, United Kingdom

Team Members: *Marcos Cherinda*, Pedagogical University, Maputo, Mozambique
Urs Kirchgraber, ETH-Zürich, Switzerland
Wong Khoon Yoong, NIE, Nanyang Technological University, Singapore

The aim of this group is to present some experiences and motivating examples of innovative ways of teaching mathematics with emphasis on the learning possibilities arising from new pedagogic techniques. We have identified five different categories of innovative teaching related to affective engagement, 'new' ways of learning, 'new' ways of teaching, radical changes in mathematical content and uses of technology. Bearing in mind these issues we have prepared a programme which consists of accepted papers (which will be available in the web of ICME10) and a rich collection of presentations as shown in the next table:

Tuesday 6, 12.00-13.00

- 12.00-12.10 Opening by *Anne Watson* and *Claudi Alsina* (chairs)
12.10-12.30 *Laurinda Brown*: Chanting in the classroom
12.30-12.50 *Gary Flewelling*: The approaches (to the teaching of mathematics) may be innovative but do they support the game we need to play?
12.50-13.00 *Jongsoo Bae*: A clown's performance

Wednesday 7, 12.00-13.00

- 12.00-12.45 *Karin Brodie*, *Megan Staples*, *Emily Shahan* and *Anne Watson*: Innovative practice for developing mathematical activity in classrooms
12.45-13.00 *Behiye Ubuz*: Drama based instruction and geometry

Friday 9, 12.00-13.00

- 12.00-12.25 *Joaquin Gimenez*: What innovative teaching experiences mean. The case of Spain
12.25-12.50 *Sonoko Mori*: The state of information technology education in Japan
12.50-13.00 *Sol Garfunkel*: Innovative projects: The modeling our world case

Saturday 10, 12.00-13.30

- 12.00-12.45 *John Mason*: Mathematics teaching practices
12.45-13.00 *Khoo Yoong Wong*: Using multi-modal thinkboard to teach mathematics
13.00-13.30 General discussion and closing by *Anne Watson* and *Claudi Alsina*



I C M E
1 0
2 0 0 4

TSG

Topic Study
Groups

Topic Study Group 15

The role and use of technology in the teaching and learning of mathematics

Main room: Building 303, A42

Rooms for subgroups: Building 303, A44

Team Chairs: *Lulu Healy*, Pontifical Catholic University of São Paulo, Brazil
Jim Kaput, University of Massachusetts, Dartmouth, USA

Team Members: *Rosihan M. Ali*, Malaysia University of Sciences, Penang, Malaysia
Andrej Blejec, National Institute of Biology, Ljubljana, Slovenia
Luc Trouche, University of Montpellier II, France

Goals, Themes and Program Overview:

Because technology and our understandings of it continue to evolve at a rapid pace, we will take a longer-term, future-oriented view with a focus on promising directions and foundational issues, and to use accounts of current work to inform that view.

Work will be organized by 3 themes:

1. Mathematical Thinking, Technology and the Evolution of Mathematics – Clarifying the Reciprocal Relationships Across Multiple Time-Scales.
2. Understanding Mathematics Teaching in Technology-Rich Contexts – Identifying Principles Underlying Complex Interactions Across Multiple Technology Types and Classroom Pedagogies.
3. Understanding Design, Uses and Implications of Emerging Technologies Such as Wireless Classroom Networks, New User-Action Structures, New Representations, and New Device-Types.

Programme:

Session 1:

Three summary plenary 20-minute theme-based presentations by invited speakers addressing one theme and referencing the accepted papers. Participants select a favorite theme and meet informally to discuss it after the session led by that theme's invited speaker.

Session 2:

A dual, parallel poster session: (A) Paper-based posters including papers-for-distribution (where desired) organized according to the three themes and further grouped by student age-level. (B) Repeating 15 minute parallel live demonstrations of new technologies addressing Theme 3.

Session 3:

Invited 15 minute plenary reaction to the Session 1 presentations followed by two 45 minute parallel discussion sessions focused on Themes (1) and (2) as informed by the papers and Theme (3) work. These are intended to yield plans for Session 4 reports, which may include ideas for publishable products.

Session 4:

The two theme-groups each give a 10 minute plenary presentation focused on promising directions and foundational issues. This will be followed by a 20 minute invited reaction identifying cross-cutting issues and summary. Then the entire TSG plans future activity – perhaps a book, monograph, video-conferences and/or synthesis papers, and perhaps a continuing web site.

Several distinguished technology thinkers and innovators have agreed to fill the roles of the invited speakers and reactors.



I C M E
1 0
2 0 0 4

TSG

Topic Study
Groups

Topic Study Group 16

Visualisation in the teaching and learning of mathematics

Main room: Building 308, A13

Team Chairs: *Gerald A. Goldin*, Rutgers University, New Brunswick, USA
Walter Whiteley, York University, Toronto, Canada

Team Members: *Tania Maria Campos*, Pontifical Catholic University of São Paulo, Brazil
Masataka Koyama, Hiroshima University, Japan
Michela Maschietto, University of Modena and Reggio E., Italy

Visualisation and imagery are important aspects of mathematical understanding, insight, and reasoning, while visual presentations and attention to students' diverse ways of thinking are essential to effective mathematics teaching. We shall consider visualisation from multiple perspectives, including (partial list):

- the roles played by visuals and visualisation in mathematics,
- psychological aspects of visual thinking, and related forms of representation,
- effective teaching and learning that makes use of visualisation,
- relations between visual thinking and the mathematics curriculum,
- relations between visualisation and other ingredients of mathematical understanding, such as formal representation,
- theory and practice behind the use of effective technology-based tools for mathematical visualisations.

After initial introductions and overview, we plan oral presentations, comments on oral presentations and written contributions, with much discussion involving all participants. The day-by-day schedule is presently planned to include the following oral presentations:

1. *Gerald Goldin*, Rutgers University, New Brunswick, (USA)
Visual imagery and cognitive representation in "thinking mathematically"
2. *Stefan Halverscheid*, University of Bremen (Germany)
Dynamic Geometry Software as a simulation tool for algebra problems
3. *Tadato Kotagiri*, University of the Ryukyus (Japan)
Developing pictorial ideas in learning numbers and calculations
4. *George Malaty*, University of Joensuu (Finland)
Can visualization promote causal thinking?
5. *John Malone*, Curtin University of Technology (Australia)
The problem of misperception in mathematical visualisation
[joint work with Daniel Boase-Jelinek, Martin Lamb, Sam Leong]
6. *Glenn Gordon Smith*, State University of New York, Stony Brook (USA)
Mental model training wheels: Scaffolding mental imagery with partial sensory support
[joint work with Jim Morey]
7. *Walter Whiteley*, York University (Canada) Commentary, reflections and discussion

Additional oral presentations, comments and discussion are anticipated from *Masataka Koyama*, Hiroshima University (Japan), and *Michela Maschietto*, University of Modena and Reggio E. (Italy), titles to be provided.

Written contributions for group discussion are presently anticipated from:

- *Tania Maria Campos*, Pontifical Catholic University of São Paulo (Brazil), title to be provided
- *Özlem Çeziktürk*, Bogazici University, Istanbul (Turkey): An investigation of the cognitive processes required for a Mathlet
- *Thomas Gawlick*, Landau (Germany): Towards a theory of visualization by dynamic geometry software: Paradigms, phenomena, principles
- *Richard Charette*, Berlin, CT (USA), title to be provided
- *Behiye Ubuz*, Middle East Technical University, Ankara (Turkey): Student's development of geometrical concepts through a dynamic learning environment



I C M E
1 0
2 0 0 4

TSG

Topic Study
Groups

Topic Study Group 17

The role of the history of mathematics in mathematics education

Main room: Building 303, A45

Team Chairs: *Man-Keung Siu*, University of Hong Kong, S.A.R., China
Costas Tzanakis, University of Crete, Rethymnon, Greece

Team Members: *Abdellah El Idrissi*, Ecole Normale Supérieure de Marrakech, Morocco
Sten Kaijser, Uppsala University, Sweden
Luis Radford, Laurentian University, Sudbury, Canada

Aim

The aim of TSG 17 is to provide a forum for participants to share their teaching ideas and classroom experience in connection with the history of mathematics, in the spirit of the 10th ICMI Study on the role of the history of mathematics in the learning and teaching of mathematics (with an ICMI Study Volume titled *History in Mathematics Education: The ICMI Study* published in 2000, edited by John Fauvel and Jan van Maanen), and to learn about work that has been done since then. Roughly put, there are three aspects, which are closely related and yet are separate issues: (1) doing research in the history of mathematics, (2) teaching the history of mathematics, (3) integrating the history of mathematics in the teaching of mathematics. Given the limited time available (in three 60-minute sessions and one 90-minute session) TSG 17 focuses on aspect (3), which can be further refined into three inter-related areas: (a) teaching and/or learning a certain specific topic in mathematics, (b) providing general motivation and enjoyment in studying mathematics, (c) developing a deeper awareness, both of mathematics itself and its social and cultural context.

Programme:

July 6, 12.00-13.00

Opening: Opening remarks (10 min)

Invited talks:

- *Jan van Maanen*, Department of Mathematics, University of Groningen, The Netherlands: History in mathematics education: Frequently asked questions and facts (20 min)
- *Chun-Ip Fung*, Department of Mathematics, Hong Kong Institute of Education, S.A.R., China: How history fuels teaching for mathematising: Some personal reflections (20 min)

Paper by distribution:

Constantinos Tzanakis, Department of Education, University of Crete, Greece:

"The ontogenetic development parallels the historical development" To what extent is this claim true, or false? Remarks and results from some case studies (10 min).



I C M E
1 0
2 0 0 4

TSG

Topic Study
Groups

July 7, 12.00-13.00

Invited talk:

- *Guillermina Waldegg*, Departamento de Investigaciones Educativas, Centro de Investigación y de Estudios Avanzados del IPN, Mexico: Problem solving, collaborative learning and history of mathematics (20 min)

Oral presentations:

- *James Tattersall*, Department of Mathematics, Providence College, USA and *Shawnee L. McMurrin*, Department of Mathematics, California State University, USA: Using the *Educational Times* in the classroom (20 min)
- *Marita Barabash* and *Raisa Guberman-Glebov*, Achva Academic College for Education, Israel: Seminar and graduate project in the history of mathematics as a source of cultural and intercultural enrichment of the academic teacher education program (20 min)

July 9, 12.00-13.00

Invited talk:

- *Michel Helfgott*, Department of Mathematics, State University of New York at Oswego, USA: Two examples from the natural sciences and their relationship to the history and pedagogy of mathematics (20 min)

Oral presentation:

- *Daina Taimina*, Department of Mathematics, Cornell University, USA: History of mathematics and mechanics in digital Releaux kinematic mechanism collection (20 min)

Paper by distribution:

- *Richard J. Charette*, Central Connecticut State University, USA: Integrating the history of mathematics in the teaching of mathematics (10 min)

General Discussion (10 min)

July 10, 12.00-13.30

Invited talk:

- *Fulvia Furinghetti*, Department of Mathematics, University of Genova, Italy: History and mathematics education: A look around the world with particular reference to Italy (20 min)

Oral presentation:

- *Giorgio T. Bagni*, Department of Mathematics, University of Rome “La Sapienza”, Italy: Prime numbers are infinitely many: Four proofs from history to mathematics education (20 min)

Papers by distribution:

- *Alejandro R. Garciadiego*, Department of Mathematics, National University of México, México, Elucidating through history: The case of a well-ordered set (10 min)
- *Oleksiy Yevdokimov*, Kharkov Pedagogical State University, Ukraine: Using materials from the history of mathematics in learning by discovery (10 min)

General Discussion (20 min)

Closing Session: Summary & Conclusions (10 min)



I C M E
1 0
2 0 0 4

TSG

Topic Study
Groups

Topic Study Group 18

Problem solving in mathematics education

Main room: Building 421, A72

Rooms for subgroups: Building 451, G1, G2, G3, G4

Team Chairs: *Jinfa Cai*, University of Delaware, Newark, USA

Joanna Mamona Downs, University of Macedonia, Thessaloniki, Greece

Team Members: *András Ambrus*, Eötvös Loránd University, Budapest, Hungary

Hideki Iwasaki, Hiroshima University, Japan

Alicia Villar Icasuriaga, Institute de Profesores “Artigas”, Montevideo, Uruguay

Aims of TSG 18

The aims of the TSG 18 are to provide a forum for those who are interested in any aspect of problem-solving research at any educational level, to present recent research findings, and to exchange ideas. The primary concerns of this TSG are: (1) To understand the complex cognitive processes involved in problem solving; (2) To explore the actual mechanisms in which students learn and make sense of mathematics through problem solving, and how this can be supported by the teacher; and (3) To identify future directions of problem-solving research. In addition, the question what Problem Solving is, its overall significance in learning Mathematics, and its relation to other Mathematics Education Theories will be discussed.

First session:

Tuesday July 6, 12.00-13.00

Roundtable discussion: The Identity of Problem Solving.

Moderator: *Joanna Mamona-Downs*, Co-chair.

Panelists: *L. Grugnetti*, (University of Parma, Italy), *K. Nunokawa*, (Joetsu University, Japan), *C. Maher* (Rutgers University, USA)

Reactor: *J. Mamona-Downs* (University of Macedonia, Greece).

Second session:

Wednesday July 7, 12.00-13.00

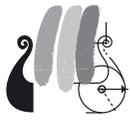
Presentation of research papers (Three concurrent sub-sessions)

Subsession 1: Broad Issues and Research Projects in Mathematical Problem Solving.

- Investigating problem solving: A report of special interest group from Australia. *Beth Southwell*, University of Western Sydney, Australia.
- On mathematical problem solving processes and history of mathematics. *Bernd Zimmermann*, Friedrich-Schiller-University of Jena, Germany.
- The TRANSALPIN Mathematics Rally in primary and low secondary school: A problem-solving and a math education experience *Lucia Grugnetti*, University of Parma, Italy; *François Jaquet*, Math-Ecole, France.

Subsession 2: Problem Solving in an ICT Environment.

- ICT Supports of problem solving in mathematical education. *Sergey Rakov*, Skovoroda State Pedagogical University, Ukraine.
- Geometry problem-solving in a computational environment: advantages and reservations. *Ioannis Papadopoulos*, University of Macedonia, Greece.
- Problem solving in out-of-school settings: Children “playing” in ICT contexts *Tom Lowrie*, Charles Sturt University, Australia



I C M E
1 0
2 0 0 4

TSG

Topic Study
Groups

Subsession 3: Proof, Modeling and Teaching Heuristics in Problem Solving.

- Describing and categorizing the problem-solving processes used by undergraduates when constructing proofs.
Keith Weber, Rutgers University, USA.
- Mathematical modeling and metacognitive Instruction
Zemira Mevarech, Bracha Kramarski, Bar-Ilan University, Israel.
- Learn to solve non-routine problems.
Murat Altun and *Çiğdem Arslan*, Turkey.

Third session:

Friday July 9, 12.00-13.00

Presentation of research papers (Three concurrent sub-sessions)

Subsession 4: Teachers Development and Questions of Design in Problem Solving.

- Creating problem solving repertoires.
Ho Kai Fai, *Teong Su Kwang* and *John Hedberg*, National Institute of Education, Singapore.
- The pedagogical design of problem solving based on teaching unit and generalization.
Takeshi Yamaguchi, Fukuoka University of Education and *Hideki Iwasaki*, Hiroshima University, Japan
- Building preservice teachers' problem solving abilities.
Jeffrey Wanko, Miami University, USA.

Subsession 5: Making Sense (or Suspending it) in Mathematical Problem Solving.

- Seeking mathematical conviction and cognitive reassurance during problem solving
Maria de Hoyos, University of Warwick, England.
- The use of word problems to engage children in critical thinking
Ban-Har Yeap, Nanyang Technological University, Singapore.
- Enhancement of student problem solving through mathematical symbolism
Charita A. Luna, Lourdes G. Fuscabl, Mindanao Polytechnic State College, Philippines

Subsession 6: Issues in Mathematical Exploration.

- A conceptual framework of exploring mathematical exploration
Vic Cifarelli, University of North Carolina, Charlotte, USA, *Jinfa Cai*, University of Delaware, USA.
- Experimentation: The hidden part of problem solving process
E. Koleza, *M. Iatridou*, University of Ioannina, Greece.
- Developing a framework for mathematical enrichment
J. Piggott, University of Cambridge, England.

Fourth session:

Saturday July 10, 12.00-13.30

Plenary addresses: Future directions for mathematical problem-solving research.

Moderator: *Jinfa Cai* (University of Delaware, USA),

Co-Chair: *E. Silver* (University of Michigan, USA):

Learning to solve problems and teaching mathematics through problem solving:

Where have we been and where might we want to go next?

K. Stacey (University of Melbourne, Australia):

Future directions for research on problem solving as a fundamental but elusive goal of mathematics teaching.

Topic Study Group 19

Reasoning, proof and proving in mathematics education

Main room: Building 306, A34

Team Chairs: *Guershon Harel*, University of California, San Diego, USA
Sri Wahyuni, Gadjah Mada University, Yogyakarta, Indonesia

Team Members: *Gudmundur Birgisson*, Iceland University of Education, Reykjavik, Iceland
Christine Knipping, Carl-von-Ossietzky University, Oldenburg, Germany
David A. Reid, Acadia University, Nova Scotia, Canada

Theme

Transition from informal argumentation to formal proof in mathematics classrooms, including classrooms where technology is used.

Programme

TSG 19 will meet four times: three 1-hour and one 90-minute sessions. Two papers will be presented on each session. On the final session the discussant, Gudmundur Birgisson, will speak for 15 minutes, followed by 15 minutes of general discussion among all participants.

	July 6 (Tues)	July 7 (Wed)	July 9 (Fri)	July 10 (Sat)
12.00	1A L. Alcock	2A A. Khait	3A S. Epp	4A V. Deloustal-Jorrand
12.20	Question & Answer			
12.30	1B K. Nordström	2B M. Raman	3B R. Guberman and M. Barash	4B T. Miyakawa
12.50	Question & Answer			
13.00				Discussion
13.15 pm				Discussion

The papers are listed in the order in which they will be presented.

- 1A. Mathematicians' perspectives on the transition to formal proof
Presenter: *Lara Alcock*
- 1B. A pilot study on five mathematicians' pedagogical views on proof
Presenter: *Kirsti Nordström*
- 2A. Proofs as a tool to develop intuition
Presenter: *Alexander Khait*
- 2B. Key ideas in the context of a proof from collegiate calculus
Presenter: *Manya Raman*
- 3A. The role of logic in teaching proof
Presenter: *Susanna Epp*
- 3B. Improving reasoning abilities of 5th-6th grade pupils using a specially designed teaching unit in pre-formal logic
Presenters: *Raisa Guberman*, *Marita Barabash*
- 4A. Polyminos: A way to teach the mathematical concept of implication
Presenter: *Virginie Deloustal-Jorrand*
- 4B. The nature of students' rule of inference in proving:
The case of reflective symmetry
Presenter: *Takeshi Miyakawa*



I C M E
1 0
2 0 0 4

TSG

Topic Study
Groups



I C M E
1 0
2 0 0 4

Topic Study Group 20

Mathematical applications and modelling in the teaching and learning of mathematics

Main room: Building 308, A12

Team Chair: *S. Kenneth Houston*, University of Ulster, Jordanstown, Northern Ireland
 Team Members: *Toshikazu Ikeda*, Yokohama National University, Japan
Nikos Klaoudatos, University of Athens, Greece
João Filipe Matos, University of Lisbon, Portugal

Programme

In each of the three 60 minute sessions, a number of papers will be discussed. Session 1 will be on the theme “Sharing Good Classroom Ideas” and will deal with both secondary and tertiary sectors. The theme of Session 2 is “Empirical and Theoretical Studies” at the secondary level, and Session 3 will deal with a similar theme at tertiary level, including initial teacher training. The final 90 minute session, Session 4, will look at global issues and will bring together the discussions of the previous three sessions. This will be a plenary session incorporating a panel discussion.

Session 1	Tuesday July 6, 12.00 to 13.00	Sharing Good Classroom Ideas	
Session presenter: <i>Peter Galbraith</i>			
First author	Second author	Title of paper	Sector
<i>Farnsworth, Ralph Edward</i>		The use of geometry and proportional reasoning techniques at the U.S.A. Department of Agriculture	Secondary
<i>Ferreira, Denise Helena Lombardo</i>	<i>Wodewotzki, Maria Lúcia Lorenzetti</i>	The treatment of environmental issues through mathematical modelling: work developed with elementary and junior high school students	Secondary
<i>Krevisky, Stephen</i>		Trees, probability and prediction	Secondary
<i>Chaachoua, Hamid</i>	<i>Saglam, Ayse</i>	Modelling by differential equations	Tertiary
<i>Erickson, Tim</i>		Stealing from physics: modeling with mathematical functions in data-rich contexts	Tertiary
<i>Jacobini, Otávio Roberto</i>	<i>Wodewotzki, Maria Lúcia L.</i>	Mathematical modelling: a path to political reflection in a mathematics class	Tertiary
<i>Sigurðsson, Thorir</i>		Could a mathematics student have prevented the collapse of the Atlanto-Scandian herring?	Tertiary



I C M E
1 0
2 0 0 4

TSG

Topic Study Groups

Session 2	Wednesday July 7, 12.00 to 13.00	Empirical and Theoretical Studies: Secondary	
Session presenter: <i>Gabriele Kaiser</i>			
First author	Second author	Title of paper	Sector
<i>Kaiser, Gabriele</i>		Development of mathematical literacy – results of an empirical study	Secondary
<i>Legé, Jerry</i>		Approaching minimal conditions for the introduction of mathematical modelling	Secondary
<i>Lin, Fou-lai</i>	<i>Yang, Kai-Lin</i>	Distinctive characteristics of mathematical thinking in an environment which is unfriendly towards modelling	Secondary
<i>Maaß, Katja</i>		Barriers to, and opportunities for integration of modelling in mathematics classes – results of an empirical study	Secondary
<i>Tarp, Allan</i>		Applying mathematics, metamatics or mathematism	Secondary

Session 3	Friday July 9, 12.00 to 13.00	Empirical and Theoretical Studies: Tertiary and ITT	
Session presenter: <i>Chris Haines</i>			
First author	Second author	Title of paper	Sector
<i>Kadijevich, Djordje</i>	<i>Haapasalo, Lenni</i>	Using technology in applications and modelling	Tertiary
<i>Haines, Christopher</i>	<i>Crouch, Ros</i>	Applying mathematics: making multiple-choice questions work	Tertiary
<i>Lingefjärd, Thomas</i>	<i>Holmquist, Mikael</i>	To assess students’ attitudes, skills and competencies in mathematical modelling	Tertiary
<i>Peretz, Dvora</i>		Inverse mathematical model – yet another aspect of applications and modelling in undergraduate mathematics for prospective teachers	Tertiary

Session 4	Saturday July 10, 12.00 to 13.30	Plenary Session with Panel Discussion	
Chair	<i>Ken Houston</i>	Panel: <i>Toshikazu Ikeda, Nikos Klaoudatos, João Filipe Matos, Chris Haines, Peter Galbraith, Gabriele Kaiser</i>	



I C M E
1 0
2 0 0 4

TSG

Topic Study
Groups

Topic Study Group 21

Relations between mathematics and other subjects of art and science

Main room: Building 305, G53

Team Chairs: *Marta Anaya*, University of Buenos Aires, Argentina
Claus Michelsen, SDU-Odense University, Denmark

Team Members: *Helmer Aslaksen*, National University of Singapore, Singapore
Nicoletta Lanciano, University of Roma “La Sapienza”, Italy
Joseph Malkevitch, City University of New York, USA

Programme

Tuesday July 6, 12.00-13.00:

Chair: *Claus Michelsen*

Mathematics and VISUAL ARTS:

- *Wanko* (USA) – Mathematics as underlying structure in the arts:
A capstone course for preservice teachers
- *Sriraman* (USA) – Re-creating the Renaissance
- *Corbalán* (Spain) – mARTmatics

Wednesday July 7, 12.00-13.00

Chair: *Helmer Aslaksen*

Mathematics and LITERATURE

- *Safuanov* (Russian Federation) – Mathematics, Mathematicians, Literature and art

Mathematics and MUSIC

- *Maher* (United Kingdom) – Mathematics and music: some educational considerations

Mathematics, Interdisciplinary competences and SCIENCES (teacher education):

- *Baggett* and *Ehrenfeucht* (USA) – Math and science
- *Guberman* (Israel) – An inter-disciplinary approach to math teaching:
Mathematical ideas in sciences taught by future school math teachers

Friday July 9, 12.00-13.00

Chair: *Nicolette Lanciano*

Mathematics, Interdisciplinary competences and SCIENCES (upper secondary and tertiary education):

- *Michelsen*, *Glaargaard* and *Dejgaard* (Denmark) – Interdisciplinary competences – integrating mathematics and other subjects of science
- *Pedersen* (Denmark) – Attaining mathematical competencies via the use of other subjects in a first year mathematics course at an agricultural university
- *Shestopalov* and *Persson* (Sweden) – Courses on mathematical modeling with information literacy: succesful attempts at Karlstads university
- *Aslaksen* (Singapore) – Cultural Astronomy and Mathematics in Art and Architecture:
Two general education courses at the National University of Singapore

Saturday July 10, 12.00-13.30

Chair: *Marta Anaya*

Keynote lecture:

- *Wijers* (The Netherlands) – Attaining mathematical competencies via the use of other subjects in a first year mathematics course at an agricultural university

The TSG 21 papers:

- Discussion



I C M E
1 0
2 0 0 4

TSG

Topic Study
Groups

Topic Study Group 22

Learning and cognition in mathematics:

Students' formation of mathematical conceptions, notion, strategies and beliefs

Main room: Building 421, A73

Rooms for subgroups: Building 421, A74

Team Chairs: *Terezinha Nunes*, Oxford Brookes University, United Kingdom
Dina Tirosh, Tel Aviv University, Israel

Team Members: *Farida Abdulla Khan*, Delhi University, India
Willy Mwakapenda, University of the Witwatersrand, Johannesburg, South Africa
Günter Törner, Gerhard Mercator University of Duisburg, Germany

In TSG 22 we shall examine and discuss recent developments in four main aspects of learning and cognition in mathematics:

1. Models of Mathematical Thinking and Understanding;
2. Learning and Instruction: the Role of Technology;
3. Teachers' Cognition and Students' Formation of Mathematical Conceptions; Notions, Strategies and Beliefs;
4. Difficulties in Learning Mathematics.

Session 1. Models of Mathematical Thinking and Understanding.

July 6, 12.00-13.00 (Chair: *Terezinha Nunes*)

In this session Anna Sierpiska, Celia Hoyles and Richard Noss, and Günter Törner will present and discuss three main current issues in mathematics education: The respective roles of theoretical and practical thinking in mathematics learning, the notion of situated abstraction and its relevance to mathematical understanding, and the epistemological dimensions of knowledge systems as reflected in the case of linear functions. By the end of this session seven short papers (about six pages each) will be distributed among the participants. These papers will be read and discussed during the conference.

Time Table and Presentations

Opening

12.00-12.20	The complementary roles of theoretical and practical thinking in mathematics learning. <i>Anna Sierpiska</i> , Department of Mathematics and Statistics, University of Concordia, Montreal, Canada.
12.20-12.40	Situated abstraction: Mathematical understandings at the boundary. <i>Celia Hoyles</i> and <i>Richard Noss</i> , Institute of Education, University of London, United Kingdom
12.40-13.00	Epistemological dimensions for knowledge systems of teachers – the case of linear functions. <i>Günter Törner</i> , University of Duisburg, Duisburg, Germany.

Questions and short discussion and distribution of selected papers:

- The tacit-explicit perspective for the cognition in school mathematics. *Cristina Frade*, Universidade Federal de Minas Gerais, Brazi.
- Deaf children's concept formation in mathematics. *Elsa Foisack*, Malmö University, Sweden.



I C M E
1 0
2 0 0 4

TSG

Topic Study
Groups

- Convenient calculations strategy training and processin mechanism of primary school students. *Liu Jing* and *Song Nai-qing*, School of Mathematics and Finance, Southwest Normal University, Chongqing, P. R. China.
- Measuring structural understanding of functions. *Pal Lauritzen*, The Norwegian School of Management, Norway.
- On Students' Ability to Understand by Themselves: a Formal Definition – The Case of Quadratic Forms in Two Variables. *Jonathan Stupp*. College of Management and The Hebrew University, Israel.
- A croos-sectional study of understanding fractions concepts: Three groups of students (primary school students, secondary school students, university students). *Suhaidah Tahir* and *Md Nor Bakar*, United Kingdom.
- Towards helping students learn how to read problems in mathematics. *Hak Ping Tam*, National Taiwan Normal University, China – Taiwan.

Session 2. Learning and Instruction: the Role of Technology

July 7, 12.00-13.00 (Chair: *Günter Törner*)

In this session three researchers will present their views regarding the role of technology in learning and cognition in mathematics. The researchers will define, discuss and contrast psychological, philosophical, systemic and instructional issues related to the role of technology in mathematics education.

Time Table and Presentations

- | | |
|-------------|--|
| 12.00-12.20 | Manipulatives, limit objects and mathematics learning. <i>Ricardo Nemirovsky</i> , <i>Tracy Noble</i> , <i>Cara DiMattia</i> and <i>Apolinario Barros</i> , TERC and International High School Boston, USA. |
| 12.20-12.40 | New technologies as a means of observing students' conceptions and making them develop: The specific case of dynamic geometry. <i>Colette Laborde</i> , Université Joseph Fourier, Institut National Polytechnique de Grenoble, Institut Universitaire de Formation des Maitres, France. |
| 12.40-13.00 | The instrumentation of mathematical activity and capability: Some thoughts on instructional adaptation and learning facilitation. <i>Kenneth Ruthven</i> , University of Cambridge, United Kingdom. |

Session 3. Teachers' Cognition and Students' Formation of Mathematical Conceptions, Notions, Strategies and Beliefs

July 9, 12.00-13.00 (Chair: *Willy Mwakapenda*)

In this session we shall refer to the relationship between teachers' cognitions and students' formation of mathematical conceptions, notions, strategies and beliefs. The presenters will focus on various aspects of teachers' cognitions and discuss their role in mathematics learning and instruction.

Time Table and Presentations

- | | |
|-------------|---|
| 12.00-12.20 | How math lessons are constructed: Teachers' beliefs and practice in the classroom. <i>Farida Abdula Khan</i> , University of Delhi, Delhi, India |
| 12.20-12.40 | Teacher's conceptions of fractions and their teaching strategies. <i>Tânia Campos</i> and <i>Sandra Magina</i> , Pontificia Universidade Católica de São Paulo, Brazil. |
| 12.40-13.00 | What types of content knowledge are needed to teach mathematics: The layer's model. <i>Pessia Tsamir</i> and <i>Dina Tirosh</i> , Tel-Aviv University, Israel. |

Session 4. Difficulties in Learning Mathematics

July 10, 12.00 –13.30 (Chair: *Dina Tirosh*)

The first part of this session will be devoted to two presentations. The first of these describes children's understanding of multiplication as reflected in their work with hand held computers. The second discusses the role of schema and working memory in primary school children's mathematical difficulties. The second part of this session will consist of short presentations of eight selected papers. In the third part of the session we shall summarize the work of our TSG and discuss possible directions for future work.

Time Table and Presentations

- | | |
|-------------|--|
| 12.00-12.20 | I didn't know they knew that! Using hand held computers to investigate children's understanding of multiplication <i>Herbert Ginsburg</i> , Teachers' College, University of Columbia, New York, USA |
| 12.20-12.40 | The role of schemes and working memor in primary school children's mathematics difficulties. <i>Terezinha Nunes</i> , <i>Peter Bryant</i> , and <i>Ursula Pretzlik</i> , Oxford Brookes University and University of Oxford, United Kingdom. |
| 12.40-13.20 | <p>Presentations of selected papers.</p> <ul style="list-style-type: none"> • Fractions as the coordination of multiplicatively related quantities: A cross-sectional study of children's thinking. <i>Susan B. Empson</i>, <i>Debra L. Junk</i>, <i>Higinio Dominguez</i>, <i>Kevin LoPresto</i>, and <i>Erin Turner</i>, The University of Texas at Austin • Mathematical thinking styles. <i>Rita Borromeo Ferri</i>, Universität Hamburg, Germany. • Students' views on their mathematical learning: Insights from a longitudinal study on the development of mathematical ideas. <i>John Francisco</i> and <i>Carolyn Maher</i>. University of Rutgers, USA. • Is elementary geometry "easy"? A comparative study with Portuguese teachers from preschool to university. <i>Alexandra Gomes</i> and <i>Elfrida Ralha</i>, Universidade do Minho, Braga, Portugal. • College students' conceptions of mathematics: A comparison of Korean students and American students. <i>Ok-Ki Kang</i>, Sungkyunkwan University, Seoul, Korea. • Studying student understanding of mathematical concepts through the use of concept mapping. <i>Willy Mwakapenda</i>. School of Education, Wits University, South Africa • Children's constructions about the dimensionality of mathematical objects. <i>Mihaela Singer</i>, Institute for Educational Sciences, Romania, and <i>Cristian Voica</i>, Department of Mathematics, University of Bucharest, Romania. • Girls making meaning of proportion: A study in two Icelandic classrooms. <i>Olof Björg Steinthorsdóttir</i>, <i>Kristjana Skuladóttir</i> and <i>Maria Sophusdóttir</i>, University of North Carolina – Chapel Hill, USA, and <i>Melaskoli</i> (Compulsory School, Grades 1–10), Reykjavik, Iceland. |
| 13.20-13.30 | Summary and conclusions. |



I C M E
1 0
2 0 0 4

TSG

Topic Study
Groups



I C M E
1 0
2 0 0 4

TSG

Topic Study
Groups

Topic Study Group 23

Education, professional life and development of mathematics teachers

Main room: Building 306, A32

Team Chairs: *Milan Hejny*, Charles University of Prague, The Czech Republic
Barbara Jaworski, Agder University College, Kristiansand, Norway
Team Members: *Sandy Dawson*, Pacific Resources for Education and Learning, Honolulu, USA
Li, Shiqi, East China Normal University, Shanghai, P.R. China
Ali Rejali, Isfahan University of Technology, Iran

This group will take as its main focus:

The nature of being and of developing as a mathematics teacher or teacher educator.

We published a first announcement in early September 2003, with a call for papers. 27 papers were submitted. 24 of these went through a review process in which each paper was reviewed independently by two reviewers. A cover review by a member of the leadership team then brought all recommendations together and a final judgment was made by the team. 9 papers were accepted outright, 5 were accepted subject to required revisions and 10 were recommended for major revision. The papers can be found on the ICME-10 website for pre-reading by participants. Papers will NOT be presented orally in the sessions.

We will group the accepted papers according to the themes which emerge and different themes will be considered on different days. We have invited 4 scholars, experienced and eminent in our field, to respond critically to groups of papers. We are delighted to welcome *Tom Cooney*, *Terry Wood*, *Romulo Lins* and *Jeppe Skott* to our group as critical respondents. Their job will be to read and comment on a set of papers and to raise critical questions and issues related to the papers. Each respondent will contribute their critical response in one of our meetings.

There will then be opportunity in the meeting for discussion among participants in both small group and plenary format on different days.

The group leaders will synthesis ideas and issues from these discussions; they will summarise each day and will offer an overall summary on the final day, when we will discuss the nature of our contribution to the proceedings of ICME-10.

Thus, the plan for one of our working sessions will follow a pattern such as the following:

1. Brief introduction by one group leader, setting up the focus for the session.
2. Oral contribution by one respondent, presenting an account of the ideas and issues raised by the set of papers: offering a critical response and raising questions for discussion.
3. Discussion among participants, either in small groups or in plenary. Guidance for discussion will be provided by the group leaders.
4. Brief synthesis, by the group leader, of the discussion in the session.



I C M E
1 0
2 0 0 4

TSG

Topic Study
Groups

Topic Study Group 24

Students' motivation and attitudes towards mathematics and its study

Main room: Building 208, A54

Rooms for subgroups: Building 208, A61, A62, G63

Team Chairs: *Philip C. Clarkson*, Australian Catholic University, Fitzroy, Australia
Markku Hannula, University of Turku, Espoo, Finland
Team Members: *Astrid Brinkmann*, University of Duisburg, Germany
Gudbjörg Pálsdóttir, Iceland University of Education, Reykjavik, Iceland
Tim Rowland, University of Cambridge, United Kingdom

The aim of the TSG 24 "Students' motivation and attitudes towards mathematics and its study" is to generate discussion around this broad field of related phenomena with a special emphasis on the practitioners (teacher's / teacher educator's) needs. We shall nominate respondent to all presentations in order to enable deeper levels of critical discussion during the conference. The activities of the group during the conference will include few lecture-type presentations and the centre of attention will be in discussions around accepted papers.

Session 1:

Opening TSG 24

Douglas B. McLeod: Students' motivation and attitudes towards mathematics and its study; An overview
Overview of the TSG 24 programme

Session 2:

Beliefs

Peter Op't Eynde and *Erik De Corte*: Junior high students' mathematics-related belief systems
Helen Forgasz: Year 11 students' beliefs
Andrea McDonough: Investigating children's beliefs

Motivation

Markku S. Hannula: Regulating motivation in mathematics
Angelika Bikner-Ahsbals: Interest-dense situations and their mathematical valences

Session 3

Interpreting mathematics

Tim Rowland: Propositional attitude
Astrid Brinkmann: The experience of mathematical beauty

Changing attitudes

George Frempong: Influence of practice on attitudes and confidence
Sirkka-Liisa Uusimäki and *Gillian Kidman*: Challenging maths-anxiety
Margaret Glendis and *Brenda Strassfeld*: Emotions and Motivation: Changing Goals

Session 4

Discussion: Theory into Practice
Douglas B. McLeod: Reflections



I C M E
1 0
2 0 0 4

TSG

Topic Study
Groups

Topic Study Group 25

Language and communication in mathematics education

Main room: Building 208, A51

Rooms for subgroups: Building 210, G162, G168

Team Chairs: *Norma Presmeg*, Illinois State University, Normal, USA
Siegbert Schmidt, University of Cologne, Germany
Team Members: *Viviane Durand-Guerrier*, IUFM de Lyon, France
Linda Galligan, The University of Southern Queensland, Toowoomba, Australia
Carl Winslow, University of Copenhagen, Denmark

Aims, Scope, and Goals:

This Topic Study Group aims to address issues concerning the roles of language and communication in the teaching and learning of mathematics. Three plenary presentations involve mathematics learning by speakers of languages other than the language of instruction, a model for semiotic analysis of mathematical writing involving computers, and use of personal metaphors in the learning of mathematics.

The themes of three subgroups are as follows:

- (1) Semiotic and interactionist perspectives on learning mathematics;
- (2) Bilingual learning and other aspects of mathematics classroom communication;
- (3) Language and logic in mathematics discourse, and associated challenges in doing and formulating mathematics. A goal of the Topic Study Group is to encourage as much discussion of relevant issues as time permits.

Programme

1st session: Tuesday July 6, 12.00-13.00

Chair: *Norma Presmeg*

Introduction: Topics and schedule for the work of the TSG 25

Plenary presentation 1: *Bill Barton* and *Pip Neville-Barton*

2nd session: Wednesday July 7, 12.00-13.00

Subgroup 1A	Subgroup 2A	Subgroup 3A
Chairs: <i>Carl Winslow</i> Semiotic aspects of mathematics learning	<i>Linda Galligan</i> Bilingual learners of mathematics	<i>Viviane Durand-Guerrier</i> Language and logic in mathematics discourse
Subgroup Presentations:		
<i>Silke Ruwisch</i> , <i>Hiro Ninomiya</i>	<i>Linda Galligan</i> , <i>Lena Khisty</i> & <i>Hector Morales</i>	<i>Viviane Durand-Guerrier</i> , <i>Ben Kilani Imed</i>
Relevant Papers by Distribution:		
<i>Herbert Gerstberger</i> , <i>Filip Roubicek</i>	<i>Sergé Hazanov</i> , <i>Soledad Ulep</i>	<i>Maria Ajello</i> , <i>Filippo Spagnolo</i> & <i>Zhang Xiaogui</i> <i>Faiza Chellougui Leigh Wood</i>

3rd session: Friday July 9, 12.00-13.00h

Subgroup 1B	Subgroup 2B	Subgroup 3B
Chairs: <i>Carl Winslow</i> Mathematics learning in an interactionistic perspective	<i>Linda Galligan</i> Mathematics classroom communication	<i>Viviane Durand-Guerrier</i> Challenges in doing and formulating mathematics
Subgroup Presentations:		
<i>Götz Krummheuer</i> , <i>Marei Fetzer</i> & <i>Christof Schreiber</i>	<i>Rosa Ferreira</i> & <i>Norma Presmeg</i> , <i>Michaela Kaslova</i>	<i>Allan Tarp</i> , <i>Paul Ernest</i>
Relevant Papers by Distribution:		
<i>Florenda Gallos</i> , <i>Cristina Tavares</i> & <i>Márcia Pinto</i>	<i>Ho Kyoung Ko</i> , <i>Minoru Ohtani</i> , <i>Michelle Wallace</i> & <i>Nerida Ellerton</i>	<i>David Wagner</i>

4th session: Saturday July 10, 12.00-13.30

Chair: *Siegbert Schmidt*

Plenary Presentation 2: *Morten Misfeldt*

Plenary Presentation 3: *Norma Presmeg*

Brief reports from the subgroups, and closing.



I C M E
1 0
2 0 0 4

TSG

Topic Study
Groups



I C M E
1 0
2 0 0 4

TSG

Topic Study
Groups

Topic Study Group 26

Gender and mathematics education

Main room: Building 308, A11

Team Chairs: *Liv Sissel Grønmo*, University of Oslo, Norway
Hanako Senuma, National Institute of Educational Research,
Tokyo, Japan

Team Members: *Stephen Lamb*, University of Melbourne, Australia
Roberta Mura, Laval University, Québec, Canada
Ferdinand Rivera, San José State University, USA

Topic Study Group 26 will explore pluralism and multiculturalism in mathematics education from a gender perspective, and the ways in which they work upon mathematics understanding, attitudes and participation. With our concern being gender and mathematics in the areas of learning, attitudes and participation, we need to take into account the way cultural, economic and other background factors influence the formation of female and male differences in these areas. An awareness and acceptance of differences in relation to gender, culture, economy, and background and how to give everyone the opportunity to understand, participate in and appreciate mathematics will form the basis for TSG 26. We are happy to present papers from many different countries all over the world in our sessions, countries which differ a lot in relation to all factors mentioned above. We hope that participants from even more countries will take part in the sessions' discussions, to help us enlighten gender issues from as many perspectives as possible.

Session 1

Mathematics and computers – male domains?

Papers to be presented:

- *Gerd Brandell*, *Peter Nyström*, and *Christina Sundqvist* (Sweden): Mathematics – a male domain
- *Helen Forgasz* (Australia): Computers for mathematics learning and gender stereotypes
- *Xin Ma* (USA): Current trend in gender differences in mathematics performance: An international update

Session 2

Affective factors among students and teachers

Papers to be presented:

- *Sechaba MG Mahlomaholo* and *Maureen Mathamela* (South Africa): Demystification of the learning of mathematics: Analysis of narratives from feminist perspective
- *Sechaba MG Mahlomaholo* and *MZ Sematle* (South Africa): Gender differences and black learners' attitudes towards mathematics in selected secondary schools
- *Bhangy Cassy* (Mozambique): Pupils' gender and attitude towards mathematics in Mozambique
- *Riitta Soro* (Finland): Teachers' beliefs about girls and boys and equity in mathematics



I C M E
1 0
2 0 0 4

TSG

Topic Study
Groups

Session 3

Cooperative learning and Mathematical Experiments

Papers to be presented:

- *Mary Barnes* (Australia): Student-student interactions during collaborative learning: How does gender influence participation?
- *Huang Xiong* (China): Mathematical experiments; a survey of difference between girls and boys in middle school in China"
- *Zhang Xiong* (China): Trend of mathematical education reform in China

Session 4

Gender equity in high schools and universities/colleges

Papers to be presented:

- *Mohammad Hossein Pourkazemi* (Iran): Gender and mathematical education
- *Indira Chacko* (South Africa): Going from TIMSS-R to the problem solution

Perspectives in research – actions for equity

Papers to be presented:

- *Joanne Rossi Becker* and *Ferdinand Rivera* (USA): Emerging perspective of research on gender and mathematics: A global synthesis."
- *Heather Mendick* (United Kingdom): Objective subjectivities, subjective objectivities and guilty pleasures: exploring the possibilities of deconstructing the separated/connected opposition for thinking about gender and mathematics
- *Lynda R. Wiest* (USA): The critical role of informal mathematics programs for girls



I C M E
1 0
2 0 0 4

TSG

Topic Study
Groups

Topic Study Group 27

Research and development in assessment and testing in mathematics education

Main room: Building 341, A21
Rooms for subgroups: Building 341, A22

Team Chairs: *Marja van den Heuvel-Panhuizen*, University of Utrecht, The Netherlands
Tom Romberg, University of Wisconsin, USA
Team Members: *Vladimir Burjan*, EXAM, Bratislava, The Slovak Republic
Thabiso Nyabanyaba, Joint Education Trust, Johannesburg, South Africa
Yoshinori Shimizu, Tokyo Gakugei University, Japan

TSG 27 will investigate recent developments in assessment and testing in mathematics education and will provide the participants with a forum for sharing and discussing their research findings and experiences. The study group will deal with a broad spectrum of assessment and testing topics ranging from policy issues, theoretical considerations to promising practices of the alignment of assessment and testing and the goals of mathematics education. The spotlight will be on tools and procedures for judging student progress and for making decisions about students rather than on tests that are focused on schools, states, and countries.

Session I

- 12.00-12.20 **Opening and overview of Topic Study Group 27**
Tom Romberg, Wisconsin Center for Educational Research,
University of Wisconsin – Madison, USA
- 12.20-12.40 **Overview lecture on External Assessment:**
Research and development in external assessments in mathematics,
Max Stephens, Faculty of Education, Science and Mathematics
Education, The University of Melbourne, Australia
- 12.40-13.00 **Overview lecture on Internal Assessment**
David Webb, Wisconsin Center for Educational Research,
University of Wisconsin – Madison, USA

Session II. External assessment. Internal assessment

- 12.00-12.15 Assessment in a computer-based environment: semantic knowledge of low achievers in calculus, *Dvora Gorev*, Department of Math Teaching, Achva Academic College of Education, Israel (E)
Using assessment to inform instructional decisions: How hard could it be? *Ruhama Even*, Weizmann Institute of Science, Israel (I)
- 12.15-12.30 Discussion (E)
Thabiso Nyabanyaba, Joint Education Trust, South Africa
Discussion (I)
Yoshinori Shimizu, Tokyo Gakugei University, Japan
- 12.30-12.45 How might the assessment of mathematics through dynamic interactive computer items be different from that in conventional tests?
John Threlfall, *Peter Pool*, Assessment and Evaluation Unit, School of Education, University of Leeds, United Kingdom (E)
Assessment instruments for classes integrating mathematics and foreign language teaching, *Marie Hofmannová*, *Jarmila Novotná*, *Renata Pípalová*, Faculty of Education, Charles University in Prague, The Czech Republic (I)

- 12.45-13.00 Discussion (E)
Tom Romberg, Wisconsin Center for Educational Research,
University of Wisconsin – Madison, USA
Discussion (I)
Marja van den Heuvel-Panhuizen, Freudenthal Institute,
Utrecht University, The Netherlands

Session III. External assessment. Internal assessment

- 12.00-12.15 The action map as a tool for assessing situated mathematical problem solving performance, *Murad Jurdak*, American University of Beirut, Lebanon (E)
Development and implementation of a competency-based performance assessment to measure high school mathematics pre-service teachers' mathematical knowledge, skills, and dispositions, *Hari P. Koirala**, *Marsha J. Davis***, *Department of Education, Eastern Connecticut State University, USA, **Department of Mathematics and Computer Science, Eastern Connecticut State University, USA (I)
- 12.15-12.30 Discussion (E)
Thabiso Nyabanyaba, Joint Education Trust, South Africa
Discussion (I)
Yoshinori Shimizu, Tokyo Gakugei University, Japan
- 12.30-12.45 Developing mathematical assessment for 4- to 8-year-olds, *Brian Doig*, Deakin University, Australia (E)
Teachers and assessment – A description and interpretation of teacher's actions in various assessment situations connected with the mathematics assessment in school year 5, *Lisa Björklund*, Stockholm Institute of Education, Sweden (I)
- 12.45-13.00 Discussion (E)
Tom Romberg, Wisconsin Center for Educational Research,
University of Wisconsin – Madison, USA
Discussion (I)
Marja van den Heuvel-Panhuizen, Freudenthal Institute,
Utrecht University, The Netherlands

Session VI

- 12.00-12.30 **Summary on External Assessment**
A summary will be given of the papers on external assessment that are presented orally or by distribution
Thabiso Nyabanyaba, Joint Education Trust, South Africa
- 12.30-13.00 **Summary on Internal Assessment**
A summary will be given of the papers on internal assessment that are presented orally or by distribution
Yoshinori Shimizu, Tokyo Gakugei University, Japan
- 13.00-13.30 **Concluding remarks and visions for the future**
General discussions on both themes
Marja van den Heuvel-Panhuizen, Freudenthal Institute, Utrecht University, The Netherlands



I C M E
1 0
2 0 0 4

TSG

Topic Study
Groups



I C M E
1 0
2 0 0 4

TSG

Topic Study
Groups

Topic Study Group 28

New trends in mathematics education as a discipline

Main room: Building 210, G042
Rooms for subgroups: Building 210, G048

Team Chairs: *Tommy Dreyfus*, Tel Aviv University, Israel
Domingo Paola, Liceo Scientifico "A. Issel", Alassio, Italy
Team Members: *Yves Chevallard*, IUFM d'Aix-Marseille, France
Sangsook Choi-Koh, Dankook University, Seoul, Republic of Korea
Erna Yackel, Purdue University, Hammond, USA

The aims of TSG 28 are to portray some new trends in mathematics education research. The Team chose two topics, which will constitute the focus of discussion.

In Topic 1, *Mathematics and cognitive science, with particular attention to the theories of embodiment in mathematics education*, we will deal with questions like "what are the bodily and biological mechanisms underpinning cognition?" and, as concerns mathematics in particular, "what are the grounding metaphors used in the construction, systematization and communication of mathematical thinking?"

In Topic 2, *Combining quantitative and qualitative research methods in mathematics education*, we will discuss how to transcend the dichotomy of quantitative versus qualitative research methods and which combinations of the two could yield results that are more useful and more valid than those obtained from either type of method separately.

Programme

Tuesday, July 6

- 12.00-13.00 **Opening session on Topic 2:** Combining quantitative and qualitative research methods in mathematics education (Chair: *Tommy Dreyfus*)
- 12.00-12.20 Invited Plenary. *Kurt Reusser* and *Barbara Vetter* (University of Zurich, Switzerland): Combining quantitative and qualitative analyses of lessons in (large scale) mathematics video studies. Insights from research and some potentials for teacher education
- 12.20-12.30 Questions and discussion
- 12.30-12.50 Invited Plenary. *Jo Boaler* (Stanford University): Studying a complex practice – using multiple methods to capture the relationships between teaching & learning
- 12.50-13.00 Questions and discussion

Wednesday, July 7

- 12.00-13.00 **Opening session on Topic 1:** Mathematics and cognitive science, with particular attention to the theories of embodiment in mathematics education (Chair: *Domingo Paola*)
- 12.00-12.20 Invited Plenary. *Nathalie Sinclair* (Faculty of Education, Simon Fraser University, Burnaby): Embodied and evolutionary perspectives in mathematics education
- 12.20-12.30 Questions and discussion
- 12.30-12.50 Invited Plenary. *Rafael Nunez* (Dept. of Cognitive Science of the Univ. of California, San Diego): What embodiment for mathematics education? Issues and controversies from the perspective of cognitive science
- 12.50-13.00 Questions and discussion

Friday, July 9

12.00-13.00 Parallel sessions

Topic 1 (Chair: *Yves Chevallard*).

- 12.00-12.10 *Laurie D. Edwards* (Saint Mary's College): Embodiment, conceptual linguistics and geometry
- 12.10-12.20 *Ornella Robutti* (University of Torino): The Construction of athematical knowledge through multiple perspectives
- 12.20-12.30 *Francesca Ferrara* (University of Torino and TERC): Bodily experiments, metaphors, gestures and artefacts in grasping the meaning of a motion graph: A case study
- 12.30-12.40 *Janete Bolite Frant*, *Maria Cecilia Barto*, *Claudio Dallanese* and *Antonio Mometti* (Catholic University in Brazil): Reclaiming visualization: When seeing does not imply looking
- 12.40-13.00 Discussion

Topic 2 (Chair: *Sangsook Choi – Koh*)

- 12.00-12.15 *Mi-Kyung Ju* (Ewha Womans University) and *Oh Nam Kwon* (Seoul National University): Mixed method: different ways of talking about students' views about mathematics
- 12.15-12.20 Discussion
- 12.20-12.35 *Peter Petocz* and *Anna Reid* (Macquarie University), *Leigh Wood* and *Geoff Smith* (University of Technology, Sydney): On becoming a mathematician: an international perspective for future professionals in the mathematical sciences
- 12.35-12.40 Discussion
- 12.40-13.00 General discussion

Saturday, July 10

- 12.00-13.30 Integrating closing session (Chair: *Erna Yackel*)
- 12.00-12.20 Invited Plenary. *Jeremy Kilpatrick* (University of Georgia): Methods as ideologies: Is our research scientific or political?
- 12.20-12.40 Discussion
- 12.40-13.00 Invited Plenary. *Marianna Bosch* (University Ramon Llull, Barcelona): Mathematical cognition and the anthropological approach to didactics
- 13.00-13.20 Discussion
- 13.20-13.30 Summary and conclusions



I C M E
1 0
2 0 0 4

TSG

Topic Study
Groups



I C M E
1 0
2 0 0 4

TSG

Topic Study
Groups

Topic Study Group 29

The history of the teaching and the learning of mathematics

Main room: Building 210, G148

Team Chairs: *Gert Schubring*, University of Bielefeld, Germany
Yasuhiro Sekiguchi, Yamaguchi University, Japan
Team Members: *Hélène Gispert*, University of Paris-Sud, France
Hans Christian Hansen, KDAS, Copenhagen, Denmark
Herbert Khuzwayo, University of Zululand, KwaDlangezwa, South Africa.

The history of the teaching and learning of mathematics is an interdisciplinary field of study. It constitutes a part of the history of mathematics, of the history of education and of sociology. The broad range of relevant topics includes the evolution of programs in the various countries, the status of mathematics as a teaching subject, the cultural and social role of mathematics, policy in teacher education, evolution of the profession of mathematics teachers, teachers' associations, journals on mathematics education, and textbooks. Given this broad range of topics, the TSG will now focus on institutionalised forms of teaching and learning in schools equivalent to primary and secondary levels, including the respective teacher education.

Most of the relevant studies deal with national histories, there are only few studies on international and comparative issues. This TSG is the first international activity in this field. The TSG should contribute to gather the researchers working in this field, establish common patterns in the history as well as revealing differences, and develop research programmes which enhance international perspectives and the study of the "general" within nationally specific histories.

Programme

First Session, July 6:

Modernisations of mathematical curricula

- *Shinya Yamamoto*, Japan: The process of adapting a German pedagogy for the modern mathematics teaching in Japan.
- *Nikos Kastanis* (together with *Iason Kastanis*), Greece: Transmissions of mathematics into Greek education, 1800-1840: From individual choices to institutional frames.
- *Kristin Bjarnadóttir*, Iceland: From isolation and stagnation to 'modern' mathematics – A reform or confusion?

Second Session, July 7:

Teaching practice, textbooks, teacher education

- *Eileen Donoghue*, USA: The Education of mathematics teachers in the United States: David Eugene Smith, an early twentieth century pioneer.
- *Circe Mary Silva da Silva*, Brazil: The history of mathematical teaching in Brazil: The Faculty of Philosophy in the XX Century.
- *Harm J. Smid*, The Netherlands: Between the market and the state: The emergence of mathematics instruction and of its teachers as a result of state initiative and of pressure by the market.

Third Session, July 9:

Cultural, social and political functions of mathematics instruction

Mahdi Abdeljaouad, Tunisia: Issues about the status of mathematics teaching in Arab countries – Elements of its history and some case studies.

Livia Giacardi, Italy: From Euclid as textbook to the gentile reform: Problems, methods, and debates in mathematics teaching in Italy 1859 to 1923.

Alexander Karp, Russia: "Universal Responsiveness" or "Splendid Isolation"? Episodes in the history of mathematics education in Russia.

Fourth Session, July 10:

Synthesis and general discussion



I C M E
1 0
2 0 0 4

TSG

Topic Study
Groups



I C M E
1 0
2 0 0 4

DG

Discussion
Groups

DG – Discussion Groups

Each DG is allotted three time slots:

- DG I – Monday July 5, 16.30-18.30,
- DG II – Wednesday July 7, 16.30-18.30,
- DG III – Saturday July 10, 15.00-16.00.

Within these frames the Organising Teams have put together the following programmes.

Discussion Group 1

Movements, processes, and policy in curriculum reform

Main room: Building 208, A54

Team Chairs: *Huang, Xiang*, Chongqin Normal University, P.R. China
Zalman Usiskin, University of Chicago, USA

Team Members: *Bengt Johansson*, University of Gothenburg, Sweden
Eizo Nagasaki, National Institute for Educational Policy Research, Tokyo, Japan
Fidel Oteiza, University of Santiago de Chile, Chile

The purpose of DG 1 is for participants to share their knowledge and views about the goals, issues, processes, and recent developments in mathematics curriculum development and reform, in their own countries and other countries with which they might be familiar. Not enough papers were produced before the congress to be posted on the web site, so participants are asked to supply references to relevant existing papers that might be shared with others after the Congress.

The programme for each session (to the extent it has been settled), containing possible sub-themes for the session, including possible break-out sessions, names of speakers (applies only to the TSGs and the Themes) and the titles of their talks. In the DG's there will be no oral presentations, except for the introductions given by/on behalf of the OT itself.

The program for DG 1 has not been developed in detail and is very likely to change once it is underway. Depending on the number of people who are participating, it is possible the group will be split to make it possible for more individuals to become involved in the discussions. Some or all of the following seven questions, more than can be adequately discussed in the time available, will be used to shape the discussions.

1. Consider the individuals responsible for driving or inhibiting mathematics curriculum reform (in your country or in countries familiar to you). What is the relative importance of research mathematicians, users of mathematics in business and industry, mathematics educators, general educators, legislators and other government personnel, school administrators, teachers, the public and (perhaps) others in driving or inhibiting mathematics curriculum reform? To what extent do these individuals change as the grade levels increase from kindergarten to university and adult education?

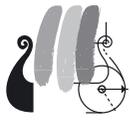
2. Who bears ultimate responsibility for curriculum reform (in your country...)? How do those individuals most responsible for curriculum reform get together? What is the relative importance of governmental committees, school-wide committees, commercial publishers and other commercial enterprises, professional organizations of mathematics educators, teacher organizations, other professional organizations, parent groups and (perhaps) other groups in driving or inhibiting mathematics curriculum reform? How are conflicts between individuals and between groups resolved?
3. In the recent past (no more than ten years back), what have been the goals of mathematics education reform (in your country...)? How are these goals publicized? What progress, if any, has been made on reaching these goals, and what is the evidence that progress has or has not been made?
4. What is the role of curriculum frameworks, standards, and other documents in mathematics curriculum reform? How detailed are these documents? Do these documents provide minimal standards or standards for completion of levels of schooling, or are they meant to be goals to which mathematics education should strive? Is there differentiation among students dependent on their interests, experiences, or perceived abilities?
5. What forces inside education and mathematics education have had significant effects on mathematics curriculum reform (in your country...)? How does research in mathematics education affect curriculum reform? In what ways, if any, do results of achievement tests influence reform, and if so, what tests have impacted reform and in what ways have they had impact? What has been the impact of international tests such as TIMSS and PISA?
6. What forces outside of mathematics (e.g., the economy, equity issues, etc.) have had significant effects on mathematics curriculum reform (in your country...)? How do these forces come to affect what goes on in mathematics curriculum?
7. What are the most recent developments in mathematics curriculum reform (in your country...)? What are the prospects that these reforms will take hold? How will progress towards these reforms be measured? What are the future prospects for mathematics education reform?



I C M E
1 0
2 0 0 4

DG

Discussion
Groups



I C M E
1 0
2 0 0 4

DG

Discussion
Groups

Discussion Group 2

The relationship between research and practice in mathematics education

Main room: Building 306, A31

Rooms for subgroups: Building 306, A35, A36, A37 and A38

Team Chairs: *Luciana Bazzini*, University of Torino, Italy
Kenneth Ruthven, University of Cambridge, United Kingdom

Team Members: *Kiril Bankov*, University of Sofia, Bulgaria
Nuria Gorgorio, The Autonomous University of Barcelona, Spain
Cassius Lubisi, Special Advisor to the Minister of Education, South Africa

Aims and Scope

This Discussion Group will examine the relationship between educational/didactical research and professional practice/policy in mathematics education. In advance of the conference, a number of submitted papers will be posted on the DG 2 page on the conference website, each reporting and analysing an example of work involving interaction between research and practice/policy.

The programme has not yet been finalised, but is expected to incorporate the following three sessions:

- A session mapping out different sites and forms of interaction between educational/didactical research and professional practice/policy.
- A session considering the earlier plenary lecture reporting the work of the ICME Survey Team on 'The relations between research and practice in mathematics education'.
- A session organised as a paper discussion session.

Discussion Group 3

Mathematics education for whom and why?

The balance between 'mathematics education for all' and 'for high level mathematical activity'

Main room: Building 116, A83

Rooms for subgroups: Building 116, G017

Team Chairs: *Lena Lindenskov*, Danish University of Education, Copenhagen, Denmark
Martha Villavicencio, Ministry of Education, Lima, Peru

Team Members: *Solomon Garfunkel*, COMAP, Lexington, USA
Gerardus Polla, Bina Nusantara University, Jakarta Barat, Indonesia
Anita Rampal, Delhi University, India

Programme

DG 3 is focusing on ensuring mathematics education for all and learning opportunities for high mathematical performance.

The aims of the DG 3 is to:

- Exchange different views about the issues, challenges, dilemmas, and answers to questions related to the focus.
- Formulate recommendations to relevant categories of policy or decision makers.
- Exchange information on how the focus is discussed and handled –theoretically and in practice- in different national and institutional contexts.

Session 1 (Plenary)

A. 20 min. Somebody from Organizing Team address the main topics of 'Aims and Focus' (A)
B. 10 min. Somebody from OT briefly focus on papers placed on the DG 3 website (P)
C. 90 min. Plenary group discussion (D) – interrupted by small group talks – about the themes on (A) and (P), considering issues and questions as:

- 1) **Mathematics education from several different perspectives:**
 1. the school mathematics curriculum (would it be better set up local, national and globalized world curriculum, respectively, for critical mathematical literacy?)
 2. the role and function of mathematics in society
 3. the state and policymaking
 4. mathematics itself
- 2) How to provide real mathematics to all the students and not a substitute version? Is it valid for kindergarten, primary and high school?
- 3) How to teach essentially the same mathematics for all, but not all the way through school?
- 4) How can we make mathematics challenging and exciting for all given the range of needs and interests across the population?

Session 2 (Small groups of 6-8 people)

90 min. Small groups of 6-8 persons discussion about the topics of (D), (A) and (P).
30 min. Small groups set up conclusions and any recommendations for action.

Session 3 (Plenary)

Full group meeting to gather together issues and decide on any conclusions and recommendations for action.

40 min. Small group speaker presents the conclusions and recommendations for action.
20 min. The Organizing Team summarizes the discussions, conclusions and recommendations for action.
30 min. Final observations.



I C M E
1 0
2 0 0 4

DG

Discussion
Groups



I C M E
1 0
2 0 0 4

DG

Discussion
Groups

Discussion Group 4

Philosophy of mathematics education

Main room: Building 208, A51
Rooms for subgroups: Building 208, A61

Team Chairs: *Maria Viggiani-Bicudo*, State University of São Paulo, São Paulo, Brazil
Susanne Prediger, University of Bremen, Germany,
Team Members: *Paul Ernest*, University of Exeter, United Kingdom,
Lars Mouwitz, University of Gothenburg, Sweden,
Zheng Yuxin, Nanjing University, P.R. China

Aims and Focus

The aim of Discussion Group 4 is to explore the nature, role and state of Philosophy of Mathematics Education (PhoME) and particular themes focused on the perspective of PhoME. Obvious avenues of approach to this area are from the directions of the individual disciplines of philosophy, mathematics and education and from philosophical reflections on practices of mathematics education.

Programme

The Group will meet three times in two two-hour blocks and one one-hour block. It will be assumed that all participants will have familiarized themselves with the contributed papers from the web-site prior to coming to the meeting.

The initial part of the first session will be given over to an 'orientation' with an introductory overview "What is philosophy of mathematics education?" given by *Paul Ernest*, followed by a discussion (chair: *Maria Viggiani-Bicudo*).

The second session "Strands and issues for discussion within PhoME" will take place in smaller groups addressing different questions:

- What are the conceptions of mathematics and mathematical knowledge underlying different learning theories?
- What role do philosophies of mathematics play in the teaching and learning of mathematics? How do they relate to mathematics curriculum, teaching reforms and classroom practices?
- What structures currently exist for the effective inclusion of PhoME in the total spectrum of mathematics education activities? How might these structures best be supported or improved?

The final gathering will take the form of a plenary, synthesis session. Some participants have submitted interesting papers in order to prepare the discussions. There will be no oral presentation of the papers, but the reviewed and accepted contributions can be found on the Discussions Group's website.



I C M E
1 0
2 0 0 4

DG

Discussion
Groups

Discussion Group 5

International co-operation in mathematics education

Main room: Building 208, A53

Team Chairs: *Bill Atweh*, Queensland University of Technology, Australia
Paolo Boero, University of Genova, Italy
Team Members: *Murad Jurdak*, American University of Beirut, Liebanon
Bienvenido Nebres, Ateneo de Manila University, Quezon City, The Philippines
Paola Valero, Aalborg University, Denmark

DG 5 International co-operation in mathematics education Mathematics education is perhaps the most internationalised subject in higher education. Intensive international contacts between mathematics educators have increased exponentially during the past fifty years.

However, this phenomenon has not attracted much direct discussion and research about their benefit or their negative effects.

Therefore, this Discussion Group aims to provide a forum for:

- sharing experiences and learnings by mathematics educators from around the world arising from their international contacts;
- identifying benefits and problems arising from such contacts; and
- developing some guidelines/recommendations for research and action towards making such contacts more socially just and more effective for achieving the interests of all participants. In particular this discussion group will consider issues such as:
 - What are the goals of international co-operation?
 - Should co-operation be global or regional?
 - What forms could such co-operation take, and how could it be organised and implemented?
 - What are the barriers to international co-operation?
 - How can a cooperative preparation of researchers in mathematics education contribute to the development of a genuine and equitable cooperation?
 - Is there a danger that international co-operation may lead to excessive homogenisation of mathematics education?



I C M E
1 0
2 0 0 4

DG

Discussion
Groups

Discussion Group 6

The education of mathematics teachers

Main room: Building 116, A81

Rooms for subgroups: Building 116, G009, G013, G019, G040

Team Chairs: *Claire Margolinas*, University of Provence, Clermont-Ferrand, France
Derek Woodrow, Manchester Metropolitan University, United Kingdom

Team Members: *Thomas Cooney*, University of Georgia, Athens, USA
Lin, Pi-Jen, National Hsin-Chu Teacher College, China – Taiwan
Anu Pietilä, University of Helsinki, Finland

Aims and Focus

This discussion group will consider issues such as:

- What mathematics should teachers in training and teachers already in service study?
- To what extent should mathematics teacher education be focused on pedagogical skills or didactical knowledge or mathematical considerations?
- What roles do mathematics teachers play and what roles should they play?
- What should teachers know about student learning?
- What practices seem to hold the best hope of reforming the teaching of mathematics and how are those practices best presented in teacher education programs?

Programme

A set of indicative questions will be available under each of these themes though it is not intended that these define the areas of discussion – that will be done by the participants in their groups. Each group will include about 30 participants. The questions for possible discussion and number of selected papers have been made available prior to the meetings on the website relating to the group and abstracts and questions arising from these papers will be available for members of the group as an aid to initiating discussion. Note, however, that papers will not be formally presented in the meetings of the discussion group.

Discussion Group 7

Public understanding of mathematics and mathematics education

Main room: Building 303, A41

Team Chairs: *Chris J. Budd*, University of Bath, United Kingdom
Lim, Chap Sam, Malaysia University of Science, Penang, Malaysia

Team Members: *Andy Begg*, The Open University, Milton Keynes, United Kingdom
Jean-Michel Kantor, University of Paris VI, France
Torgeir Onstad, University of Oslo, Norway

This Discussion Group (DG 7) seeks to provide a platform for the participants to discuss issues and problems related to the public understanding of mathematics and mathematics education. The discussion will focus on five main themes:

- The meaning of public understanding of mathematics and mathematics education;
- Issues and problems associated with the prevalent public understanding of mathematics in culture and society;
- Public perceptions of the nature of mathematical literacy and its relation to learning of mathematics
- The roles of mathematics education community in promoting public understanding of mathematics
- Strategies of popularising mathematics

Tentative Programme:

Session 1: Monday 5 July

16.30-17.00 Introduction to the group
17.00-18.00 Open discussion in subgroups divided by themes
18.00- 18.30 Brief report from each subgroup

Session 2: Wednesday 7 July

16.30-17.00 A brief presentation of fun mathematics or strategies for popularising mathematics session
17.00-18.00 Open discussion in subgroups divided by themes
18.00- 18.30 Summary report from each subgroup

Session 3: Saturday 10 July

15.00-16.00 Open discussion for future proposal



I C M E
1 0
2 0 0 4

DG

Discussion
Groups



I C M E
1 0
2 0 0 4

DG

Discussion
Groups

Discussion Group 8

Quality and relevance in mathematics education research

Main room: Building 210, G162

Team Chairs: *Margaret Brown*, King's College London, United Kingdom
Rosetta Zan, University of Pisa, Italy

Team Members: *Cyril Julie*, University of Western Cape, Bellville, South Africa
Frank K. Lester, Indiana University, Bloomington, USA
Perla Nesher, University of Haifa, Israel

Aims

Our aim is to share knowledge and experiences in small groups of 6-8 people to deepen our own understanding of how the quality and relevance of mathematics education research is, and could be, judged. This should help us, individually and collectively, to improve the quality of our research and make it more relevant to practice.

We will base our discussion on our experiences of doing or reading mathematics education research. We will also be informed by two specially written brief papers, contributed by Rosetta Zan and Frank Lester, and by some alternative examples of criteria for quality and/or relevance. All these will be posted on the DG 8 website by May 31st so that participants can study them beforehand. Each small group will help participants whose English is not very fluent.

Session 1

Questions for discussion: Which criteria do we each use for distinguishing outstanding pieces of research from more average research? How do we recognise weak research? In the lists given in the literature, are some criteria more important than others? If so, which ones and why? What, if anything, makes these criteria especially relevant for mathematics education? Is it reasonable to expect one set of criteria to be suitable for every type of research? Are the criteria used by those with power (e.g. editors and reviewers for journals, books, conferences) fair to all researchers? How could we achieve more equity?

Session 2

Questions for discussion: Who are the different stakeholder groups in mathematics education, and what do they each mean by relevance? Suggest some research studies in mathematics education that have addressed different audiences. Are there different types of research for different audiences? Should the set of criteria for quality of research be specific to the audience the research is meant to influence? What are the tensions between different stakeholders and how do they affect status and funding? What can be done to achieve more agreement?

Session 3

Short full group meeting to gather together to discuss issues and decide on any recommendations for action.



I C M E
1 0
2 0 0 4

DG

Discussion
Groups

Discussion Group 9

Formation of researchers in mathematics education

Main room: Building 210, G168

Team Chairs: *Gilah Leder*, La Trobe University, Bundoora, Australia
Luis Rico Romero, University of Granada, Spain

Team Members: *Abraham Arcavi*, Weizmann Institute of Science, Rehovot, Israel
Gerd Brandell, Lund University, Sweden
George Ekol, Kyambogo University, Kampala, Uganda

Our time slots will be used to explore becoming a researcher in mathematics education from different perspectives. Particular issues to be discussed will include:

- What academic and professional backgrounds should be expected for individuals admitted to graduate programs in mathematics education?
- What should be the nature of the course work in higher research degrees in education and the most appropriate balance between time spent on this course work and the dissertation?
- What is the role of mathematicians as (co-) supervisors for dissertations in mathematics education?
- Should emerging researchers in mathematics education be encouraged to gain experiences in a wide range of geographic and educational contexts?
- Should there be an international "standard" for the training of researchers in mathematics education?

To facilitate productive discussions, the organizing team has recommended a number of references as useful pre-reading. These can be found on the ICME-10 website, www.ICME-10.dk



I C M E
1 0
2 0 0 4

DG

Discussion
Groups

Discussion Group 10

Different perspectives, positions, and approaches in mathematics education research

Main room: Building 308, A13
Rooms for subgroups: Building 308, G2

Team Chairs: *Lyn English*, Queensland University of Technology, Brisbane, Australia
Anna Sierpiska, Concordia University, Montréal, Canada
Team Members: *Jere Confrey*, University of Washington at St. Louis, USA
Maria-Jeanne Perrin Glorian, IUFM Nord-Pas de Calais, France
Tatyana Oleinik, Skovoroda Pedagogical University, Kharkov, Ukraine

The main concern of DG 10 will be the problem of accumulating knowledge in relation to diverse approaches to mathematics education research (m.e.r., for short). The diversity of approaches in m.e.r. is an advantage because it provides us with a more complete picture. On the other hand, the fragmentation creates an obstacle for m.e.r. to become recognized as a discipline, characterized by a coherent body of knowledge.

In particular, giving examples of concrete results is difficult without a lengthy presentation of the theoretical underpinnings. The fashion waves in m.e.r. also have their advantages; by focusing attention on a single aspect, they allow this aspect to be thoroughly examined. Too often, however, when the fashion fades, the deep results obtained during this period are forgotten. This way, we miss the chance of forming a strong and lasting foundation of research for understanding of educational phenomena.

Programme of sessions

Session 1

Part I. Panel discussion focused on the following questions:

1. Do the advantages from having a diversity of approaches in mathematics education outweigh the disadvantages?
2. Are we giving adequate attention to the accumulation of knowledge in mathematics education?
Panelists will include Steve Lerman and members of the organizing team.

Part II. Organization of the sub-group discussion to take place in session 2.

Session 2

Sub-group discussions.

Session 3

Part I. Presentation of results of sub-group discussions.
Part II. Synthesis



I C M E
1 0
2 0 0 4

DG

Discussion
Groups

Discussion Group 11

International comparisons in mathematics education

Main room: Building 341, A21

Team Chairs: *Bao, Jiansheng*, Suzhou University, P.R. China
Michael Neubrand, Carl-von-Ossietzky –
University of Oldenburg, Germany

Team Members: *Irina Paramonova*, Independent University of Moscow, Russia
Astrid Pettersson, Stockholm Teacher Training College, Sweden
Ross Turner, Australian Council for Educational Research,
Camberwell, Australia

The last decades have seen a growing interest in international comparisons around the world. Whereas the public interest is mainly bound to large scale achievement studies as TIMSS and PISA, in the Mathematics Education community also comparative studies of smaller scales were greatly appreciated. It is still a matter of discussion what the balance between these two types of studies should be.

The Discussion Group 11 deals therefore with international comparisons in Mathematics Education under a broad perspective, and is intended to provide a Forum for the exchange of a variety of ideas.

The discussion in DG 11 will focus on the following aspects:

- Overview on recent international comparisons in Mathematics Education, large and small scale.
- Overview on topics addressed in comparative studies, as e.g. achievement, textbooks, beliefs of teachers and students, etc.
- What can we learn from international comparisons for the development of Mathematics teaching and learning?

The Discussion Group has three time slots, planned to be covered by the following topics:

Monday July 5, 16.30 to 18.30:

Collecting information on recent smaller and bigger comparative studies. Attendees are invited to contribute by exhibiting also their own comparative projects in short statements.

Wednesday July 7, 16.30 to 18.30:

Collecting the thematic fields of comparative studies, as studies on lesson structures, studies on teaching materials, studies on beliefs, studies on outcomes, and the specific issues of that topics.

Saturday July 10, 15.00 to 16.00:

Discussion on the problematics of international comparative research in Mathematics Education.

This is a discussion group, so that reading and listening to papers is not the normal focus of the sessions. Rather are the attendees expected that they have read the submitted papers which have been distributed on the DG's web pages in the ICME-website www.ICME-10.dk, and bring along their own views, experiences and issues.



I C M E
1 0
2 0 0 4

DG

Discussion
Groups

Discussion Group 12

Assessment and testing shaping education, for better and for worse

Main room: Building 116, A82

Rooms for subgroups: Building 116, G042, G044, G049

Team Chairs: *Glenda Lappan*, Michigan State University, East Lansing, USA
Dylan William, Learning and Teaching Research Center, ETS,
Princeton, USA

Team Members: *Sean Close*, St. Patrick's College, Dublin, Ireland
Gabriele Kaiser, University of Hamburg, Germany
Vijayluxmi Reddy, Human Sciences Research Council, South Africa

Outline

All over the world, in the last 30 years, there has been increasing awareness that the use of assessment results in high-stakes settings can impact the validity of the assessments themselves, and also produce profound changes in patterns of curriculum and instruction. That assessment (including tests and examinations) does shape education is now almost universally accepted. What is much less clear is whether such effects are beneficial or detrimental to the education of students of mathematics. Where the outcomes of assessment have profound consequences (either for students or for teachers), then some degree of 'teaching to the test' is inevitable. Whether this is seen as good or bad depends on one's view of whether the tests in place are tests worth teaching to.

In the first two sessions (Monday and Wednesday) DG 12 will be organized into four sub-groups (if numbers in a particular sub-group are large, that sub-group itself may be sub-divided in order to allow for greater participation). While there are inevitable considerable overlaps between the four sub-groups, it is intended that each sub-group, as far as is practicable, focuses discussion on its theme in order to make as much progress as possible.

The focus for each of the sub-groups is as follows:

- 1. Designing effective assessment systems:** How can assessment systems be devised and organized so as to develop and strengthen the teaching and learning of mathematics? What is the optimal balance between assessment carried out by external agencies and that carried out by the teacher. Who should score the assessments, and what kinds of items should be used?
- 2. Alignment of standards, curricula and instruction:** Are current modes of assessment, compatible with the aims of mathematics education and current instructional practice? Where assessments, instruction, and standards are not well aligned, how do teachers resolve the tensions and conflicts?
- 3. Innovation in assessment:** What are the alternatives to traditional timed tests, and what are the barriers to their adoption in terms of technical adequacy, manageability, and cost-benefit trade-offs. How much instructional time should be taken up with assessment? What proportion of the total budget for education is it reasonable to spend on assessment?



I C M E
1 0
2 0 0 4

DG

Discussion
Groups

4. Social consequences of assessment: How do these modes and instruments influence the teaching and learning of mathematics? Do what extent is it true that "What you test is what you get?" Is it possible to mitigate the impact of 'high-stakes' assessments on curriculum and instruction?

The third session of DG 12 (Saturday) will be a plenary session in which we will summarize the discussions in the sub-groups, and identify ways forward.

In order to maximize the opportunity for discussion, formal presentations will be kept to a minimum. A number of general readings will be posted on the DG 12 web-site by June 1st, and these papers will form the basis for the discussion, and so will need to be read before the first meeting of the discussion group. There will also be additional readings for each sub-group.

It is hoped that ICME-10 attendees intending to participate in DG 12 will choose their sub-group before arriving at ICME-10, although no formal registration for a particular sub-group will be required. However, it is expected that any participants in DG 12 will attend the same sub-group on Monday and Wednesday.

Programme

Session 1: Monday July 5;	16.30 to 18.30	Meet in sub-groups
Session 2: Wednesday July 7;	16.30 to 18.30	Meet in sub-groups
Session 3: Saturday July 10;	15.00 to 16.00	Plenary session



I C M E
1 0
2 0 0 4

DG

Discussion
Groups

Discussion Group 13

Evaluation of teachers, curricula, and systems

Main room: Building 208, A62

Team Chairs: *Claude Gaulin*, Laval University, Québec, Canada
Max Stephens, University of Melbourne, Australia

Team Members: *Hugh Burkhardt*, University of Nottingham, United Kingdom
Einar Jahr, Hedmark College, Hamar, Norway
Eduardo Mancera, Iberoamerican University, Mexico City, Mexico.

Evaluation of teachers, curricula and systems is not taken as seriously as it should be. Who, for example, could disagree that new initiatives in education should be evaluated, absolutely and in comparison with current practices? But would you fly in airplanes, or let your children take medicines, that had been as lightly evaluated, during and after development, as many initiatives in education? How can such evaluation best be done? That is the focus of this discussion group.

Generally, simple evaluation distorts systems. Balanced evaluation of teachers, curricula and systems that covers all the goals requires a broader spectrum of evaluation methods. This needs a wide range of methods and instruments, and the skills to use them and interpret the results. These are not easy to find. The process takes time and costs money. Such issues of methodology are central to our discussions.

Programme of sessions

Session 1

Part I. Panel discussion focused on the following questions:

1. What do we now know and what have we learned about the evaluation of teachers, curricula and systems?
2. How can the evaluation of teachers, curricula and systems serve the fundamental goal of improving mathematics education of young people?
3. Where are the promising models? What issues do they raise? How applicable are they to countries of different social and economic backgrounds?

Panelists will include *Barbara Clarke*, *Norman Webb* and members of the organizing team.

Part II. Organization of the sub-group discussion to take place in session 2. At this stage, one sub-group will focus on the evaluation of teachers and a second sub-group will focus on the evaluation of curricula and systems.

Session 2

Sub-group discussions.

Session 3

Part I. Presentation of results of sub-group discussions.

Part II. Synthesis



I C M E
1 0
2 0 0 4

DG

Discussion
Groups

Discussion Group 14

Mathematics textbooks

Main room: Building 303, A45

Team Chairs: *Fan, Lianghuo*, Nanyang Technological University, Singapore
Stefan Turnau, University of Rzeszów, Poland

Team Members: *Shelley Dole*, RMIT University, Bundoora, Australia
Emanuila Gelfman, Tomsk State Pedagogical University, Russia
Yeping Li, University of New Hampshire, Durham, USA

The general aim of DG 14 is, in the international mathematics education community, to increase awareness of the importance of textbooks in the process of teaching and learning of mathematics, to promote exchanges and collaborations in the area of mathematics textbooks, and hence to raise the level of research, development, and evaluation of mathematics textbooks. More specifically, DG 14 is intended to provide an international forum for all participants to

- (1) share experiences in developing, using, and evaluating mathematics textbooks,
- (2) disseminate findings from their research about mathematics textbooks,
- (3) exchange ideas about mathematics textbook research, development, and evaluation, and
- (4) Identify various issues concerning research in mathematics textbooks.

Three sessions are programmed for this Discussion Group's activities during the congress as shown in the following timetable.

Session	Date/Time	Focus (Chairperson; email address)
I	July 5 (Mon.) 16.30-18.30	1. Development of mathematics textbooks in different countries (<i>Lianghuo Fan</i> ; lhfan@nie.edu.sg) 2. Relationship between mathematics curriculum standards/syllabi and textbooks (<i>Stefan Turnau</i> ; sturnau@atena.univ.rzeszow.pl)
II	July 7 (Wed.) 16.30-18.30	3. Role of textbooks in the teaching and learning of mathematics (<i>Shelley Dole</i> ; shelley.dole@rmit.edu.au) 4. Evaluation of mathematics textbooks (<i>Emanuila Gelfman</i> ; gelfman@mpi.tomsk.su)
III	July 10 (Sat.) 15.00-16.00 pm	5. Research in the area of mathematics textbooks (<i>Yeping Li</i> ; yeping@hypatia.unh.edu)



I C M E
1 0
2 0 0 4

DG

Discussion
Groups

Discussion Group 15

Ethnomathematics

Main room: Building 308, A12
Rooms for subgroups: Building 308, A11

Team Chairs: *Franco Favilli*, University of Pisa, Italy
Abdulcarimo Ismael, Pedagogical University, Maputo, Mozambique
Team Members: *Maria Luisa Oliveras Contreras*, University of Granada, Spain
Rex Matang, University of Goroka, Papua New Guinea
Daniel Clark Orey, California State University, Sacramento, USA

Aims and programme

The DG 15 activities will mostly aim to discuss the following issues:

- What is the relationship between ethnomathematics, mathematics and anthropology, and the politics of mathematics education?
- What evidence is there, and how do we get more, that school programmes incorporating ethnomathematical ideas succeed in achieving their (ethnomathematical) aims?
- What are the implications of existing ethnomathematical studies for mathematics and mathematics education?
- What is the relationship of different languages (or other cultural features) to the production of different mathematics?

The DG 15 activities are organised as follows:

- The first hour of the first session (Monday) will be devoted to a short introduction to the DG activities and a general comment, by the DG chairs, on the papers accepted for contribution to the DG 15.
- For each of the four above DG issues, a sub-group will then be organised to discuss the contributions from the authors of the accepted papers that are considered more relevant to the sub-group specific issue. The activities in each sub-group are coordinated by a member of the OT.
- The four sub-groups meet during the second hour of the first session and the whole second session (Wednesday).
- A short report from each sub-group will be presented for a discussion to the plenary meeting of the DG in the final session (Saturday), when the final synthesis of the DG 15 activities, issues and research outcomes will be outlined.

Contributions to the discussion from all participants will be very welcome.



I C M E
1 0
2 0 0 4

DG

Discussion
Groups

The discussion will be mainly based on the following papers submitted to and accepted by the OT and made available to the public in the DG 15 webpage:

- *Pierre Clanché* and *Bernard Sarrazy* (France): Occurrence of typical cultural behaviours in an arithmetic lesson: how to cope?
- *Philip Clarkson* (Australia): Multicultural classrooms: contexts for much mathematics teaching and learning
- *Maria do Carmo Santos Domite* (Brazil): Notes on teacher education: an ethnomathematical perspective
- *Maria Cecilia de Castello Branco Fantinato* (Brazil): Quantitative and spatial representations among working-class adults from Rio de Janeiro
- *Franco Favilli* and *Stefania Tintori* (Italy): Intercultural mathematical education: Comments about a didactic proposal
- *Giuseppe Fiorentino* and *Franco Favilli* (Italy): The electronic Yupana: A didactical resource from an ancient mathematical tool
- *Gelsa Knijnik* and *Fernanda Wanderer* (Brazil): The art of tiles in Portugal and Brazil: Ethnomathematics and traveling cultures
- *Hsiu-fei Sophie Lee* (China – Taiwan): Ethnomathematics in Taiwan – A Review
- *Issic K.C. Leung*, *Siu-hing Ling* and *Regina M.F. Wong* (Hong Kong S.A.R., China): Students' Mathematics Performance in Authentic Problems
- *Jerry Lipka* and *Barbara L. Adams* (USA): Some Evidence of Ethnomathematics: Quantitative and Qualitative Data from Alaska
- *Laura Maffei* and *Franco Favilli* (Italy): Piloting the software SonaPolygons_1.0: A didactical proposal for the GCD
- *Rex Matang* and *Kay Owens* (Papua New Guinea): Rich Transitions from indigenous counting systems to English arithmetic strategies: Implications for Mathematics Education in Papua New Guinea
- *Mogege Mosimege* (South Africa) and *Abdulcarimo Ismael* (Mozambique): Ethnomathematical studies on indigenous games: examples from Southern Africa
- *Daniel Clark Orey* and *Milton Rosa* (USA): Ethnomathematics and the teaching & learning mathematics from a multicultural perspective
- *Charoula Stathopoulou* (Greece): Mathematical cognition in and out of school for Romany students



I C M E
1 0
2 0 0 4

DG

Discussion
Groups

Discussion Group 16

The role of mathematical competitions in mathematics education

Main room: Building 303, A49

Team Chairs: *André Delidicq*, University of Paris VII, France
Peter Taylor, University of Canberra, Australia

Team Members: *Titu Andreescu*, University of Nebraska, USA
Petar Kenderov, Bulgarian Academy of Science, Sofia, Bulgaria
Frédéric Gourdeau, Laval University, Québec, Canada

Aims and Focus

This discussion group will have two main themes, one to define the concept of competition in a rather broad sense, and second to consider how the range of activities so defined relate to the processes of teaching and learning mathematics.

The group will try to address fundamental questions such as

1. Do mathematics competition contribute to widening the gap between mathematics for all and mathematics for the elite, or can the opposite be the case?
2. How can competitions motivate and foster mathematical creativity with students at large?

The first two periods have particular themes. The first one will define competitions for the purpose of discussion, with certain speakers identified to lead discussion with specific examples, showing a rather broad meaning for the term. The second period will have similar structure but will analyse the question of how these activities relate to mathematics education. The final session will summarise and make conclusions.

We do note that the World Federation of National Mathematics Competitions, on its web site www.amt.edu.au/wfnmc.html has a rather broad definition of competitions and related activities, including

- Mathematical competitions of various kinds
- Mathematical aspects of problem creation and solution, a dynamic branch of mathematics.
- Research in mathematics education related or pertaining to competitions or the other types of activities listed here.
- Enrichment courses and activities in mathematics.
- Mathematics Clubs or *Circles*.
- Mathematics Days.
- Mathematics Camps, including live-in programs in which students solve open-ended or research-style problems over a period of days.
- Publication of Journals for students and teachers containing problem sections, book reviews, review articles on historic and contemporary issues in mathematics.
- Support for teachers who desire and/or require extra resources in dealing with talented students.
- Support for teachers, schools, regions and countries who desire to develop local, regional and national competitions.



I C M E
1 0
2 0 0 4

DG

Discussion
Groups

- Topics in informatics parallel to those in mathematics. It takes into account that the disciplines are closely related, that many journals cover both topics, and that in many countries the organisation of competitions in mathematics and informatics, and mathematics and informatics themselves, are closely related.
- Recreational mathematics, including mathematical puzzles, particularly as they might inspire the creation of mathematics problems.

Programme

A – Tuesday July 6, 16.30-18.30

Discussion on particular examples of competitions and related activities and description of their pedagogic purposes.

Peter Crippin (University of Waterloo, Canada) and *Andris Cibulis* and *Dace Bonka* (Latvia) have agreed to lead discussion in this session, contributing examples where a range of competition-related activities exist in their countries.

B – Wednesday July 7, 16.30-18.30

How do competitions and their related activities contribute to education?

With which aims?

Andy Liu (Canada) has agreed to lead discussion in this session.

C – Thursday July 10, 15.00-16.00

Discussion, conclusions and propositions.



I C M E
1 0
2 0 0 4

DG

Discussion
Groups

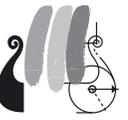
Discussion Group 17

Current problems and challenges in pre-school mathematics education

Main room: Building 210, G042

Team Chairs: *Ann Anderson*, The University of British Columbia, Vancouver, Canada
Robert D. Speiser, Brigham Young University, Provo, USA
Team Members: *Carol Aubrey*, University of Warwick, United Kingdom
Ingvill M. Stedøy, Norwegian University for Science and Technology, Trondheim, Norway
Marj Horne, Australian Catholic University, Fitzroy, Australia

DG 17 aims to support productive dialogue about important current problems, issues and challenges relevant to young children's mathematical development. Building from research that emphasizes listening to and observing young children closely in everyday practice, we would like to co-construct what such research (i) might tell us about young learners' mathematical development and (ii) might imply for policy and practice. Our goal is to determine what we know (or need to know) about young children's mathematical engagement and learning (i.e. where, how, who, when, what and why) to inform researchers and policy makers at local, national and international levels. Against this background, we hope to explore to what extent is it desirable to have an institutionalized mathematics 'curriculum' (or an institutionalized statement of mathematical outcomes) or to expose pre-school children to structured mathematics teaching?



I C M E
1 0
2 0 0 4

DG

Discussion
Groups

Discussion Group 18

Current problems and challenges in primary mathematics education

Main room: Building 421, A72

Room for subgroups: Building 451, G2

Team Chairs: *Giancarlo Navarra*, University of Modena and R. Emilia, Italy
Catherine P. Vistro-Yu, Ateneo de Manila University, Quezon City, The Philippines
Team Members: *Jerry P. Becker*, Southern Illinois University, Carbondale, USA
Klaus Hasemann, University of Hannover, Germany
Victor Polaki, National University of Lesotho, Lesotho

The discussions in this group will address the following issues: social aspects of mathematics learning at the primary level, the primary learner's motivations, strategies, learning and understanding of mathematics – contents and construction of sense, individual development of mathematical thinking, curricular and pedagogical concerns, teacher preparation, and technologies. Some examples of basic questions that the group will focus on include how opportunities of pupils who enter primary school compare in different parts of the world, how the different viewpoints of mathematics influence the educational programs in different countries, what the non-negotiable contents and skills in primary mathematics and effective curricular frameworks are, and how to utilize children's informal mathematics to help them move towards, cope with and succeed in formal school mathematics.

The schedule of discussions will be as follows:

Monday July 5, 16.30-18.30 – Plenary

- A. 20 minutes Discussion on the main topics of 'Aims and Focus' placed on the DG 18 website (A)
- B. 10 minutes Focus discussion on papers placed on the DG 18 website (P)
- C. 90 minutes Discussion (D) on (A) and (P)

Wednesday July 7, 16.30-18.30 – Sub-groups

- D. 2 hours Discussion by sub-groups on topics of (D)(A)(P)

Saturday July 10, 15.00-16.00 – Plenary

- E. 40 minutes Summary by the OT of the discussions/conclusions of sub-groups
- F. 20 minutes Final observations on E.



I C M E
1 0
2 0 0 4

DG

Discussion
Groups

Discussion Group 19

Current problems and challenges in lower secondary mathematics education

Main room: Building 421, A71
Room for subgroups: Building 451, G1

Team Chairs: *Maryvonne Le Berre*, IREM of Lyon, France
Gard Brekke, College of Telemark, Notodden, Norway
Team Members: *Suwattana Eamoraphan*, Chulalongkorn University, Bangkok, Thailand
Merrilyn Good, University of Queensland, Brisbane, Australia
Keiichi Shigematsu, Nara University of Education, Japan

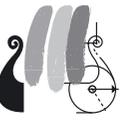
Session 1 (2 hours):

Introduction/explanation of program.
Panel discussion (~ 60 minutes) where each team member presents a 10 minute overview of one of the 5 issues we identified in our call for papers. Follow with questions and discussion of other issues identified by participants (moderated by a team leader).

Session 2 (2 hours):

Whole group breaks into 5 sub-groups based on issues, each led by a team member. Where a paper has been submitted, discussion can start there. Otherwise it's up to the team member to provide material and/or elicit ideas from participants to get discussion started. If the previous session has identified additional issues that people want to discuss, then session 2 could be organised in 2 x 1 hour blocks, with the first hour devoted to "our" issues and the second to "extra" issues.

Session 3 (1 hour): Team leaders report back to whole group, summarising discussion on all issues and identifying new questions/research directions.



I C M E
1 0
2 0 0 4

DG

Discussion
Groups

Discussion Group 20

Current problems and challenges in upper secondary mathematics education

Main room: Building 421, A74
Room for subgroups: Building 451, G4

Team Chairs: *Olive Chapman*, University of Calgary, Canada
Ornella Robutti, University of Torino, Italy
Team Members: *Kabelo Chuene*, University of the North, Sovenga, South Africa
Gloria Stillman, University of Melbourne, Australia
Carlos E. Vasco, Bogotá, Colombia

Focus

DG 20 provides a forum for participants to discuss current issues in upper secondary mathematics education. The guiding questions are:

- What are the most important problems and challenges pertaining to the teaching and learning of mathematics at the upper secondary level and where are they located?
- Are there issues or dilemmas of a controversial nature?
- How should these problems/issues and challenges be dealt with?

The focus will be on the following four themes:

- (A) Research to Practice and Vice Versa
How do/can we make theoretical principles real in teaching upper secondary mathematics?
How can practice inform and develop theory?
How can new theoretical trends influence practice?
Are there any trends in pre-service and in-service teacher education that can influence mathematics education research?
- (B) Teachers and Learners
How does teachers' knowledge influence teaching and learning?
What are valuable mathematical and pedagogical competencies of upper secondary mathematics teachers?
How do the different beliefs, values and cultural backgrounds of teachers or students affect teaching and learning?
What are appropriate/meaningful models of instruction and perspectives of learning for upper secondary mathematics?
- (C) Tools and Technology
What are appropriate/meaningful uses of technology for upper secondary mathematics?
What can be the different roles of tools and technologies in the mediation of learning?
How can the use of tools and technologies influence students' cognitive processes?
- (D) Curriculum
What are appropriate content for students with different post-secondary goals [e.g., math-related field versus non-math related field]?
Can new theoretical trends influence school curricula?
What are the new curricular trends recently developed in different countries?



I C M E
1 0
2 0 0 4

DG

Discussion
Groups

Programme

The following is the general outline of the format of the DG:

Session 1 [2 hours]: The first hour will be devoted to opening and overview of the DG. A panel of the organizing team of the DG will address the themes. The group will divide into smaller groups according to the themes. In the second hour, the smaller groups will begin discussion of the themes.

Session 2 [2 hours]: In the first hour, the smaller groups will continue discussion of the themes. In the second hour, representatives of the small groups will highlight the main points of their discussion in a large group sharing.

Session 3 [1 hour]: This session will be devoted to a synthesis of the discussions and will focus on formulating statements about the possible common threads of issues in upper secondary mathematics education and consider how this work might be taken forwards.

Papers

Papers accepted for the group are posted on the web. Participants have been encouraged to read them prior to attending the DG. These papers will be integrated into the themes they fit. There will be no paper presentation in the DG.

Discussion Group 21

Current problems and challenges in non-university tertiary mathematics education

Main room: Building 210, G048

Team Chairs: *Sergiy Klymchuk*, Auckland University of Technology, New Zealand
Marilyn Mays, North Lake College (DCCCD), Irving, USA

Team Members: *Helen McGillivray*, Queensland University of Technology, Brisbane, Australia

Susanti Linuwih, Department of Technology Sepuluh Nopember

Surabaya, Indonesia

Yoshitaka Sato, Tokyo National College of Technology, Japan

Leaders and participants will discuss topics of particular interest to the institutions mentioned, many of which are of interest to faculty at other post-secondary institutions. Some relate to issues and concerns raised during the presentations in a similar group at ICME-9 and in the discussions that followed.

These include

- (1) the need to guarantee the professional growth of faculty at their institutions,
 - (2) the need to design curricular programs that motivate students to engage in meaningful learning and prepare them for the workplace,
 - (3) the need to obtain and disseminate research-based information to create and maintain curricular programs responsive to the needs of the community.
- Additional topics such as articulation with other institutions will be covered.



I C M E
1 0
2 0 0 4

DG

Discussion
Groups



I C M E
1 0
2 0 0 4

DG

Discussion
Groups

Discussion Group 22

Current problems and challenges in university mathematics education

Main room: Building 421, A73

Rooms for subgroups: Building 451, G3

Team Chairs: *Oh Nam Kwon*, Seoul National University, Republic of Korea
Stavros Papastavridis, University of Athens, Greece
Team Members: *Kjeld Bagger Laursen*, University of Copenhagen, Denmark
Chris Rasmussen, Purdue University, Hammond, USA
Nguyen Dinh Tri, Hanoi National University of Technology, Vietnam

The aims of DG 22 are to examine some current problems and challenges in university mathematics education, with a focus on the following four themes:

- In Theme 1, we will address challenges encountered by the fact that more students are now entering university, often with different and under-prepared backgrounds.
- In Theme 2, we will explore ways of enhancing the relative attractiveness of mathematics teaching as a career.
- In Theme 3, we will consider ways of raising the profile of the teaching component of a University career in order that it receives greater recognition.
- In Theme 4, we will investigate ways of disseminating the findings of undergraduate and relevant K-12 mathematics education research to mathematicians.

Programme

The Discussion Group 22 will meet on three occasions

Monday July 5, 16.30-18.30

Plenary session of DG 22. There will be a short introduction on the four themes under Aims and Focus and general discussion will follow.

Wednesday July 7, 16.30-18.30

DG 22 will split into four or more subgroups, corresponding to the themes that will be incorporated. Each subgroup will report to the plenary session.

Saturday July 10, 15.00-16.00

Plenary session of DG 22. Reports by the four subgroups, general discussion

Discussion Group 23

Current problems and challenges concerning students with special needs

Main room: Building 113, G011

Team Chairs: *Ann Gervasoni*, Australian Catholic University, Ballarat, Australia
Jens Holger Lorenz, University of Education, Heidelberg, Germany
Team Members: *Ann Ahlberg*, College of Learning and Communication, Jönköping, Sweden
George Malaty, University of Joensuu, Finland
Elena Yurhenko, Moscow Center for Continuous Mathematics Education, Russia.

The discussion group is designed to gather congress participants interested in exchanging ideas, and exploring and discussing substantial issues and dilemmas related to students with special learning difficulties in mathematics. The focus of the discussion group will be elementary students who have a specific difficulty, not a general learning disability. The group aims to collect recent research and developments in the diagnosis and teaching of these students, particularly in the early (possibly preschool) identification, in successful teaching programs and in the various national and institutional settings provided in different countries. The group will encourage participants to participate in common projects and, hopefully, will initiate research activities in relevant desiderata.



I C M E
1 0
2 0 0 4

DG

Discussion
Groups



I C M E
1 0
2 0 0 4

DG

Discussion
Groups

Discussion Group 24

Current problems and challenges in distance teaching and learning

Main room: Building 305, G53

Team Chairs: *Alexander Afanasiev*, The Russian Academy of Science, Moscow, Russia
David Crowe, The Open University, Milton Keynes, United Kingdom
Team Members: *Ryosuke Nagaoka*, University of the Air, Chiba City, Japan
Merilyn Taylor, University of Waikato, Hamilton, New Zealand

DG 24 is created to collect the participants of the congress interested in exchanging ideas, researching problems connected with distance teaching and learning. DG 24 is to discuss current general researches and particular experiences in the field of distance teaching and learning. We will focus on new powerful means and techniques that let override the problem of distance in the processes of teaching and learning as well as on perspectives of developing software products in the area.

1. Common principles and differences in various modern concepts of distance teaching and learning (DTL).
2. New technologies to be used in DTL in the nearest future.
3. Successes and difficulties in present DTL researches and experiences.

TA – Thematic Afternoon

Friday July 9 the afternoon time slots from 14.30-16.00 and from 16.30-18.30 are allotted to five special themes.

The Organising Teams have put together the following programmes for each of the five themes.

Thematic Afternoon Theme A

Teachers of mathematics: Recruitment and retention, professional development and identity

Place: Building 306

Team Chairs: *Glenda Anthony*, Massey University, Palmerston North, New Zealand
Mellony Graven, University of the Witwatersrand, Johannesburg, South Africa
Team Members: *Toshiakira Fujii*, Tokyo Gakugei University, Japan
Barbro Grevholm, Agder College, Kristiansand, Norway
Peter Sullivan, La Trobe University, Bendigo, Australia

Aims and Focus

The thematic afternoon *Teachers of Mathematics* provides a further opportunity to focus on both research and development in teacher education and explore issues and problems (and solutions) of significant interest to the international community. Presentations and discussion are organised into four distinct but related parallel strands.

- Strand I: Recruitment, supply and retention of mathematics teachers
- Strand II: Professional development
 - Pre service education of mathematics teachers
 - In-service education of mathematics teachers
- Strand III: Mathematics teachers' identity
- Strand IV: The mathematical competency of teachers
 - Issues related to teacher knowledge
 - Issues related to teacher competencies (e.g. appraisal, accreditation etc.)

Additionally, we will offer a workshop on writing and publishing in the area of Teacher Education and this will be led by editorial members of the *Journal of Mathematics Teacher Education*.

The thematic afternoon concludes with a common plenary panel session involving invited discussants representing each of the four stands.



I C M E
1 0
2 0 0 4

TA

Thematic
Afternoon



I C M E
1 0
2 0 0 4

TA

Thematic
Afternoon

Programme Schedule: Teachers of Mathematics

	Strand I: Retention and recruitment Auditorium A31	Strand II: Pre and in-service Auditorium A32	Strand III: Teacher identity Auditorium A33	Strand IV: Mathematics competency Auditorium A34
14.30-16.00	Parallel papers and discussion			
16.00-16.30	Coffee/tea break			
16.30-17.10	Writing for JMTE (workshop) Auditorium A35	Parallel papers and discussion		
17.10-17.15	Move to plenary panel venue: A34 with transmission to A35			
17.15-18.30	Plenary Panel speakers Retention and Recruitment: <i>Sue Johnston-Wilder</i> Pre and In -service: <i>Laura Van Zoest</i> Teacher Identity: <i>Peter Winbourne</i> Mathematics competency: <i>Babis Sakonidis</i>			
Theme chairs	<i>Toshiakira Fujii</i>	<i>Glenda Anthony</i>	<i>Mellony Graven</i>	<i>Barbro Grevholm</i>

Accepted Papers

Strand I: Recruitment, supply and retention of mathematics teachers (Auditorium A31)

- *Corinne Angier*: From structures to storied: Understanding the experience of a flexible teacher training route
- *Hans Thunberg*: Recruiting new groups of students to teacher training in science and mathematics
- *Yun Zhang*: Combating the shortage of mathematics teachers

Strand II: Professional development (Auditorium A32)

- *Susie Groves*: The influence of subject cultures on the teaching of an integrated pre-service unit in mathematics, science and technology
- *Mark Arvidson*: The Dilemma of Under-prepared teachers of elementary mathematics
- *Blake Peterson*: Mathematics student teaching in Japan: Where's the management?
- *Will Morony*: Professional development potential of teacher developed professional standards for excellence in teaching mathematics
- *Paola Sztajn, Dorothy White, Amy Hackenberg, and Martha Alexsaht-Snyder*: Developing trusting relations in the in-service education of elementary mathematics teachers
- *Sikunder Ali Baber*: Networks of learning: Professional association and the continuing education of teacher of mathematics in Pakistan

Strand III: Mathematics teachers' identity (Auditorium A33)

- *Diane Parker*: Official pedagogic identities from South African policy – some implications for secondary mathematics teacher education practice
- *Steve Thornton*: Standards for excellence, sustainable assessment and the development of teacher identity
- *Jerome Proulx*: Future teachers' perceptions of their mathematics education program
- *Joao Pedro da Ponte*: Distance education and teacher professional identity
- *K. Garegae*: Mathematics teachers' identity: Exploring Botswana teachers' lukewarmness in the implementation of curriculum reform

Strand IV: The mathematical competency of teachers (Auditorium A34)

- *Helen Forgasz*: Teachers' and pre-service teachers' gendered beliefs: Students and computers
- *Christopher Fraser and Will Morony*: Assessing teachers against teacher developed professional standards for excellence in teaching mathematics
- *Iben Christiansen*: Mathematical competencies and awareness in a teacher education practice
- *M. Kaldrimidou, H. Sakonidis, and M. Tzekaki*: Teachers' management of the meaning construction in the mathematics classroom
- *Youngyoul Oh*: Korean pre-service elementary teachers' understanding of fraction concepts
- *Solange Amota*: Improving student teachers' mathematical knowledge



I C M E
1 0
2 0 0 4

TA

Thematic
Afternoon



I C M E
1 0
2 0 0 4

TA

Thematic
Afternoon

Thematic Afternoon Theme B

Mathematics education in society and culture

Place: Building 208 and Building 210

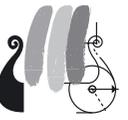
Team Chairs: *Alan Bishop*, Monash University, Australia
Pedro Gómez, University of Los Andes, Bogotá, Colombia
Team members: *Barry Cooper*, University of Durham, United Kingdom
Katsuhiko Shimizu, Tokyo University of Science, Japan
Margaret Walshaw, Massey University, Palmerston North, New Zealand

Theme B focuses on the complex relationships between mathematics education, society and culture, highlighting current research and developments in each of 4 sub-themes:

- (1) Multilingual and multicultural classrooms
- (2) Mathematics education within and across different cultures and traditions
- (3) Social and political contexts for mathematics education
- (4) Equity in mathematics education.

The draft programme is:

14.30-15.00	Introduction to the programme and the theme Building 208: A53 (with transmission to A54, if necessary)
15.00-16.00	Subthemes 1 and 3 in parallel , with Panels of 4 Speakers + Chair. (1) Multilingual and multicultural classrooms (A53) (3) Social and political contexts for mathematics education (A54)
16.00-16.30	Discussion Groups (4 or more) + Chairs. Building 208: A51, A53 and A54; Building 210: G142, G148, G162, G168
16.30-17.00	Coffee break
17.00-18.00	Subthemes 2 and 4 in parallel , with Panels of 4 Speakers + Chair (2) Mathematics education within and across different cultures and traditions (A53) (4) Equity in mathematics education (A54)
18.00-18.30	Discussion groups (4 or more) + Chairs Building 208: A51, A53 and A54; Building 210: G142, G148, G162, G168



I C M E
1 0
2 0 0 4

TA

Thematic
Afternoon

Thematic Afternoon Theme C

Mathematics and mathematics education

Place: Building 116

Team Chairs: *Jean-Pierre Bourguignon*, Institut des Hautes Études Scientifiques, France
Fritz Schweiger, University of Salzburg, Austria
Team Members: *Ricardo Cantoral*, DME – Cinvestav, México City, México
Tom Lindström, University of Oslo, Norway
Tösun Terzioğlu, University of Sabanci, Tuzla, Turkey

Aims and Focus

This thematic afternoon will focus on several aspects of the relationship between mathematics and mathematics education such as:

- how do and how should new developments in mathematics influence the teaching of mathematics?
- how are teachers in mathematics trained in mathematics?
- how can one create fora where mathematicians, experts in mathematics education, users of mathematics and mathematics teachers can meet and how can one get them to have a sustained activity?
- how can mathematicians and educators collaborate to construct better curricula and improve teaching methods?
- analyze the gap between mathematics and mathematics education? Do their representatives have the same overall aims and perspectives, and can they share strategies for reaching them?

The following issues will be addressed:

1. The present situation

- a) Facts
 - Content of the training and the continued training of teachers, and its impact on the relation of teachers to mathematics
 - Contacts with present-day mathematics:
 - which documents are available?
 - how are replies to requests for contacts and explanations answered?
 - Contacts with research mathematicians:
 - conferences and workshops,
 - cooperative projects in schools,
 - internships in research labs,
 - other modes of exchanges.
 - Access to information on present-day uses of mathematics in society at large (outside schools).
- b) Attempt of an analysis of difficulties or insufficiencies:
 - at the training level
 - in the contacts with present-day mathematics and mathematicians



I C M E
1 0
2 0 0 4

TA

Thematic
Afternoon

2. Looking towards the future

a) Testimonies:

Some examples of attempts and/or experiments to circumvent some of the difficulties mentioned before

b) Plans for the future:

- Are there web-resources that can contribute? If yes, in what format?
- What kind of events, or structures can meet the needs?
- Getting users of mathematics to testify about their uses.
- New ideas!

Tentative programme:

There is only one, subdivided, plenary session and no parallel sessions in Theme C. Auditorium A81 will be used for plenary session, if necessary with transmission to A82 and A83. Furthermore group room G009, G013, G017, G019 and G040 are available for paper presentation and group discussions.

- 14.30-15.00: Introduction to the topic. *Jean-Pierre Bourguignon*, IHES, Bures-sur-Yvettes, France
- 15.00-16.00: Presentations by *Lucia Grugnetti* (University of Parma, Italy): The long way (from primary school to the end of secondary school) for constructing the concept of limit, and *Vagn Lundsgaard Hansen* (Technical University of Denmark, Lyngby): Education in mathematics – mathematics in education
- 16.00-16.30: Coffee break
- 16.30-18.30: Presentations by *Ricardo Cantoral* (CINVESTAV, Mexico City, Mexico): Math and math education: A vision for its evolution, *Urs Kirchgraber*, ETH, Zürich, Switzerland: Popularization: The case of ill-posed problems”, and *Giorgio T. Bagni* (University of Rome, “La Sapienza”): Similar problems in different contexts: An example from model theory to linear algebra.

Paper and discussion documents

The following papers are available on the TA-C section of the ICME-10 web site: *Lucia Grugnetti, Carlo Marchini, Angela Rizza*: The long way (from primary school to the end of secondary school) for constructing the concept of limit
Vagn Lundsgaard Hansen: Education in mathematics – mathematics in education
R. Cantoral, K: Math and math education: A vision for its evolution
Urs Kirchgraber: Popularization: The case of ill-posed problems
Giorgio T. Bagni: Similar problems in different contexts: An example from model theory to linear algebra.

Thematic Afternoon Theme D

Technology in mathematics education

Place: Building 303

Team Chairs: *Paul Drijvers*, Freudenthal Institute, Utrecht, The Netherlands
Kaye Stacey, University of Melbourne, Australia

Team Members: *Jean-Baptiste Lagrange*, IUFM de Reims, France
Shoichiro Machida, Saitama University, Japan
Richardo Nemirovsky, TERC Inc., Cambridge, USA

The thematic afternoon on *Technology in Mathematics Education* offers opportunities to find out about current and future technologies, to focus on how ICT can be used for teaching and to engage with current research perspectives from around the world. Novice users of technology in education can use an opportunity to see the potential of ICT to enrich mathematics teaching and to consider how implementation is being addressed around the world. Others can explore research issues and dilemmas of practice in depth. There are sessions of relevance to those interested in elementary, secondary and tertiary education and teacher education. Some sessions address use of the internet for enriching classroom experiences and for delivery of distance education; others consider ICT as a tool for research and teacher professional development.

The thematic afternoon provides a choice of sessions in five lecture halls and three computer laboratories.

Computer laboratory sessions

Data lab.	Time	Presenters	Title
D43	14.30-16.15	<i>Peter Boon, Martin van Reeuwijk</i> , The Netherlands	Algebra with applets, concept development and practice
D43	16.45-18.30	<i>Renee Gossez</i> , Belgium	Introduction to computer algebra: getting started with TI-Interactive
D46	14.30-16.15	<i>Federica Olivero</i> , United Kingdom <i>Dan Cogan-Drew</i> , USA	Through the looking glass: developing reflective practice through videopaper
D46	16.45-18.30	<i>Sophie Soury-Lavergne</i> , France	Making use of dynamic geometry in the classroom
D47	14.30-16.15	<i>Steen Grøde</i> , Denmark	Teaching mathematics with Mathcad & SmartSketch – an integrated environment for performing and communicating math-related work
D47	16.45-18.30	<i>Nicholas Jackiw</i> , USA	Introductory dynamic geometry activities – secondary school and elementary school



I C M E
1 0
2 0 0 4

TA

Thematic
Afternoon



I C M E
1 0
2 0 0 4

TA

Thematic
Afternoon

Lecture hall sessions

Auditorium	Time	Session title
A41	14.30-16.15	The teacher and the tool Chair: <i>Paul Drijvers</i> (Netherlands) Speakers: <i>R. Zbiek, B. Barzel, L. Ball</i>
A41	16:45-17:35	Instrumentation and CAS Chair: <i>Paul Drijvers</i> (The Netherlands) Speakers: <i>P. Drijvers, L. Trouche</i>
A41	17:40-18:30	Algebra and IT (second part) Chair: <i>Jean-Baptiste Lagrange</i> (France) Speakers: <i>R. Sutherland, A. Bronner</i>
A42	14.30-16.15	Algebra and IT (first part) Chair: <i>Jean-Baptiste Lagrange</i> (France) Speakers: <i>C. Kieran, J. Olive, J-B. Lagrange, B. Gruegon and E. Delozanne</i>
A42	16.45-18.30	Advances in undergraduate education with ICT Chair: <i>Robyn Pierce</i> (Australia) Speakers: <i>R. Pierce, J. Bookman, N. Challis, P. Igodt</i>
A44	14.30-16.15	Mathematics learning and experimenting with physical phenomena Chair: <i>Ricardo Nemirovsky</i> (USA) Speakers: <i>O. Robutti, K. Marrongelle, M. Yerushalmy & B. Shternberg, A. Barros</i>
A44	16.45-18.30	IT in teacher professional development Chair: <i>Ricardo Nemirovsky</i> (USA) Speakers: <i>C. Kynigos, D. Clarke, R. Tinker</i>
A45	14.30-16.15	Distance education, digital learning environments and CSCL Chair: <i>Shoichiro Machida</i> (Japan) Speakers: <i>S. An, L. Leventhal, S. Machida, M. Isoda</i>
A45	16.45-18.30	Internet Resources for Teaching Mathematics Chair: <i>Shoichiro Machida</i> (Japan) Speakers: <i>D. Thomas, A. Tanaka, V. Jonker, D. Smith</i>
A49	14.30-16.15	Introducing ICT: Experiences and Issues Chair: <i>Kaye Stacey</i> (Australia) Speakers: <i>K. Y. Wong, Y. Baldin, L. de las Penas, P. Flynn, P. Durham, L. Kaino</i>
A49	16.45-18.30	Teaching Primary and Junior Secondary Mathematics with ICT: Changing Pedagogy and Learning Chair: <i>Kaye Stacey</i> (Australia) Speakers: <i>K. Stacey, D. Butler, T. Erickson, J. Way</i>



I C M E
1 0
2 0 0 4

TA

Thematic
Afternoon

Thematic Afternoon Theme E

Perspectives on research in mathematics education from other disciplines

Place: Building 421 and building 451

Team Chairs: *Brent Davis*, University of Alberta, Edmonton, Canada
Paul Ernest, University of Exeter, United Kingdom

Team Members: *Adam Gamoran*, University of Wisconsin, Madison, USA
Paulus Gerdes, Pedagogical University, Maputo, Mozambique
Georgiy Sharygin, Inst. of Theoretical and Experimental Physics, Moscow, Russia

The thematic afternoon on perspectives on research in mathematics education from other disciplines provides a further opportunity to focus on issues, problems, and methodologies that are of significance to the international community, but that may be underrepresented in the current mathematics education research literature. Presentations and discussions will be organised into four distinct but related parallel strands. These strands (and possible sub-strands) are:

Strand 1: The perspective of psychology and cognitive science in research in mathematics education (Building 421, A71)

- post-positivist developments in psychology
- contributions of neurology and neurophysiology
- contributions of linguistics and cultural studies
- work in and/or oriented by artificial intelligence studies
- research informed by ecological and complexity discourses

Strand 2: The perspective of philosophy in research in mathematics education (Building 421, A72)

- post modern developments in philosophy of mathematics
- post modern developments in philosophy
- contributions of social epistemology
- forms of knowledge and education
- modes of being and education

Strand 3: The perspective of anthropology and sociology in research in mathematics education (Building 421, A73)

- social stratification and educational achievement
- gender, race and class in mathematics education
- anthropological insights on mathematics
- anthropological methods for studying classrooms
- curriculum differentiation in secondary school mathematics
- social and anthropological theories of learning

Strand 4: The perspective of general education in research in mathematics education (Building 421, A74)

- developments in research methodologies
- developments in adult education
- developments in critical education
- studies of identity development
- research in science education
- research in teacher education

This list of strands and sub-strands should not be interpreted as exhaustive, prescriptive, or exclusive. Submissions that draw on other discourses and domains will be considered, provided that those contributions are consistent with the overarching theme of perspectives on research in mathematics education from other disciplines.

Paper presentations and panel discussion within each of the four strands will take place in the mentioned auditorium. In addition group rooms G1, G2, G3 and G4 in building 451 will be available for small group discussions.



I C M E
1 0
2 0 0 4

NP

National
Presentations

NP – National Presentations

On **Tuesday July 6** the afternoon time slots from 14.30 -16.00 and from 16.30 -18.30 are allotted to five National Presentations running in parallel.

Korea, Mexico, Romania and Russia have prepared the following programmes for their presentations. In addition to this there will be a common presentation by the hosting Nordic countries: Denmark, Finland, Iceland, Norway and Sweden. *The programme for the Nordic presentation* is given in a special booklet to be found in the Congress bag.

National Presentation of Korea

Place: Building 208, A53, A54, and building 210, G112 and G118.
Exhibition in the foyer area of building 208.

The Korean Presentation (KP) team will introduce mathematics education in Korea. We invite all participants of ICME-10 to our presentation and welcome any questions and comments sharing ideas on improving mathematics education in the international context. This article is a brief overview of the presentation about mathematics education in Korea.

1. Background

The International Program Committee of ICME-10 requested Korea Sub-commission of ICMI (KSICMI) to introduce Korean mathematics education to all participants of ICME-10. KSICMI accepted the invitation judging that it gives an invaluable opportunity for the Korean mathematics education community to present the essential features of Korean mathematics education to the world. Based on the recommendation of the five societies of mathematics education in Korea, KSICMI organized the presentation team consisting of the following 10 members:

Lew, Hee-chan, Chair, Korea National University of Education,
Cho, Jung Su, Youngnam University
Jung, Moon Sook, Seoul Pulkwang Junior High school
Kwon, Oh Nam, Seoul National University
Lee, Kyung-hwa, Korea National University of Education
Paik, Seouk-yun, Seoul National University of Education
Park, Kyung Mee, Hong-ik University
Park, Man Goo, Seoul Nangok Elementary school
Pang, Jeong-suk, Korea National University of Education
Whang, Woo Hyung, Korea University

2. Booklet

The KP team plans to produce a booklet written in English to give an overall picture of Korean mathematics education for K-12 based on the following topics and to offer it to all participants as part of the Korean presentation.

3. Topics

The overview of the 7th national curriculum

The philosophy, goals, topics, and characteristics of the 7th national curriculum in Korea including points in teaching and evaluation methods under the current curriculum will be summarized. The past mathematics curricula in the late 20th century and their strengths and weaknesses will be briefly analyzed and compared with the 7th national curriculum. In addition, the mathematics curriculum for special programs like science high schools will be introduced.

Mathematics textbooks

Both the external and internal characteristics of elementary and secondary mathematics textbooks and teachers' guidebooks will be analyzed. The emphasis will be on mathematical applications in real life, activities used to promote mathematical attitude, reasoning ability, problem solving and skill development will be illustrated as the main features of the current textbooks. And the future direction for improving weak aspects of the textbooks will be examined.

Students' achievement

The results of the recent international mathematical education studies like TIMSS, TIMSS-R and PISA will be summarized. Some factors contributing to Korean students' high achievement in those tests will be discussed. The national enthusiasm for education, students' eagerness for study, and the ethics of hard work will be discussed with relation to the college entrance examination. Also, competence of mathematics teachers will be introduced in terms of the effective pre-service and in-service training programs, and the keen competition for becoming mathematics teachers by the demanding entry test.

Gifted education

The curriculum, school structure, supporting system, and policy of gifted education of mathematics in Korea will be introduced. There will be a particular discussion of the 16 science high schools established by the ministry of Education in 1983 and the mathematics classes for the gifted developed by the new Gifted Education Act passed in 2002.

Mathematics classroom culture

Video films showing the real picture of mathematics classrooms will be presented. The videos will show Korean classroom culture and the variety of teaching methods and learning activities used.

Mathematics teacher education

The mathematics curriculum in teachers' colleges and in-service education institute for elementary and secondary teachers will be introduced. the teacher employment process and the employment test by the government will be also be analysed.

Evaluation system of mathematics education

Various evaluation methods used in mathematics classrooms in elementary and secondary schools will be introduced and college entrance systems such as the college entrance examination will be discussed.

Social recognition toward mathematics

Korea has a unique educational culture in the sense that extra private education is very popular. The positive and negative impacts of the private education on the public education will be analyzed.



I C M E
1 0
2 0 0 4

NP

National
Presentations

Some issues on mathematics education

The current instructional issues related to the use of technology, the emphasis of modelling, performance assessment, and open education will be introduced.

4. Lecture

The KP team will give a lecture for about three and a half hours on Tuesday 14.30 to 18.30 with 30 minutes coffee break.

5. Exhibition

Various elementary and secondary school textbooks based on the 7th national curriculum and various computer software developed by the Korea Educational Resource and Information Service (KERIS) will be exhibited. Particularly the computer software will be setup on computers for every participant to have hands on experience of them. A sample of college entrance examination will also be exhibited. Compact disks containing educational materials such as the above college examination sheets will also be distributed to the participants on a first-come-first-served basis.

6. Video show

Videotapes showing Korean mathematics classrooms, general Korean culture and a tour will be played during the whole period of ICME-10.

7. Discussion Time

During ICME-10, everybody will be welcome to discuss Korean mathematics education and members of the Korean presentation team will be available for discussions.

National Presentation of Mexico

Place: Building 116, A81, A82, and A83.
Exhibition in the foyer area of building 116.

The Mexican National Presentation will take place in building 116, Auditoriums 81, 82 and 83, on Tuesday July, 6. During the congress, an exhibit will be organized; it will contain several educational materials including textbooks, videos, software, etc.

General Programme

Hour	Room 1 (Building 116, Aud. 81)	Room 2 (Building 116, Aud. 82)	Room 3 (Building 116, Aud. 83)
14.30 -16.00	Overview and general aspects		
16.00 -16.30	Coffee Break		
16.30 -18.30	1.- Mathematics in elementary and secondary education in Mexico (K-9)	2.- Mathematics in pre-university and undergraduate levels in Mexico	3.- Diverse topics

Overview and general aspects

Marcela Santillán and *Natalia de Bengoechea* (Universidad Pedagógica Nacional)

In this talk we will present a general scheme of Mexican Education and of Mathematical Education in particular. In the last 90 years, Mexico has made an effort to have a major social equality through equity in access to education. In order to provide basic education

to everybody, Mexican education system has acquired some particular characteristics, specially the nation-wide use of a single free textbook for all children. The presentation includes the projection of a promotional video.

Programme by Room

Room 1 (Building 116, Auditorium 81)

1.- Mathematics in elementary and secondary education in México (K-9)

Olimpia Figueras (CINVESTAV, Instituto Politécnico Nacional)

Silvia Alatorre and *Mariana Sáiz* (Universidad Pedagógica Nacional)

1a) Elementary and secondary education

1b) The use of curriculum development in the solution of educational problems

1c) Teacher education

1d) Research in Mathematical Education: elementary level

1e) Research in Mathematical Education: secondary level

The exposition in this section aims to present a general overview of the situation of Mathematical Education in the first ten years of schooling (kindergarten, primary and secondary; 5 to 15 years old), as well as to communicate important contributions of the research activities in this level carried out by Mexican educators and researchers.

Time Schedule:

Hour	Room 1 (Building 116, Aud. 81)
	1.- Mathematics in elementary and secondary education in Mexico
16.30 -16.45	1a) Elementary and secondary education
16.45 -17.25	1b) The use of curriculum development in the solution of educational problems
17.25 -17.40	1c) Teacher education
17.40 -18.10	1d) Research in Mathematical Education: elementary level
18.10 -18.30	1e) Research in Mathematical Education: secondary level

Room 2 (Building 116, Auditorium 82)

2.- Mathematics in pre-university and undergraduate levels in México

2a) Global overview of Mexican research in Mathematical Education

Ricardo Cantoral and *Rosa María Farfán* (CINVESTAV, Instituto Politécnico Nacional)

The Mexican higher education, which forms around 1,800,000 professionals, possesses a robust cultural inheritance that enhances the educative scope, but it is also rich in contrasts. We can have carefully formed and highly specialized programs that competes in the international concert, next to others that are barely taken care of. Nevertheless, education constitutes the hope of the Mexican society for the construction of a better future.

In this space we will discuss about the way Mathematical Education fits in this Mexican system as well as of its characteristics, approaches, potentialities, challenges and opportunities. We will also discuss about the pre-university level, which is, in some cases, taken as a terminal programme for technical professionals. The study of the didactic phenomena that takes place in the Mexican university classrooms is potentially rich because the researchers have access to multiple training programs, to a vast variety of text books and to engage in an open dialog with teachers and students of diverse socio-cultural scopes. All these factors make possible that the results of the investigations are robust and with high possibility of transference.

In this presentation we will deal with some of these results.

2b) The education of mathematicians in Mexico

Lourdes Palacios and *Carlos Signoret* (Universidad Autónoma Metropolitana – Iztapalapa)
Mathematics has been present in the professional field in Mexico since early forties. First professionals with high level of mathematical knowledge were engineers, but professional education of mathematics started with the foundation of the Faculty of Sciences at the National University. Nowadays there are more than 50 programs in some fields of mathematics at different levels. This talk will present an overview of the situation of mathematicians in Mexico.

2c) The education of mathematics teachers of high school and college level

Fernando Brambila (Consejo Nacional de Ciencia y Tecnología / Facultad de Ciencias Universidad Nacional Autónoma de México) and *Alejandro Diaz-Barriga* (Instituto de Matemáticas, Universidad Nacional Autónoma de México)

For all of its importance, teaching has been relegated to the position of “support job” for a long time. Indeed, a good portion of teachers were actually professionals who needed another job to increase their income; however, they in general were not used to teach. As a result, the students frequently lost interest in the subject. Nowadays, in Mexico we have graduate studies in Mathematical Education and pedagogy. As a result, a certain portion of inexperienced teachers now has access to a database containing both theoretical information for the subject they are teaching and instructions on how to teach it. In the nearby future, we expect all mathematics teachers: firstly, to have either Master or Ph.D; secondly, to have a solid knowledge of the mathematical concepts they will teach; third, to know how to teach such concepts.

Time schedule:

Hour	Room 2 (Building 116, Aud. 82)
	2.- Mathematics in pre-university and undergraduate levels in Mexico
16.30 -17.30	2a) Global overview of Mexican research in Mathematical Education (intermediate and higher levels)
17.30 -18.00	2b) Education of mathematicians in Mexico
18.00 -18.30	2c) Education of mathematics teachers of high school and college level

Room 3 (Building 116, Auditorium 83)

3.- Diverse topics

3a) Educational Innovations in Mathematics

Teresa Rojano (CINVESTAV, Instituto Politécnico Nacional)
This section aims to share experiences from a group of current innovative educational projects in Mexico. Issues emerged from these projects are considered significant for the present and future educational developments in mathematics in the country. Likewise, some outcomes and characteristics of such innovations may result of interest for other educational systems and for an international mathematical education audience. It is worth it to be mentioned that in all the cases, this type of projects have been an opportunity to bring together a variety of communities in mathematics and mathematical education. Six projects have been chosen for the presentation:

- Teaching Applied Mathematics. *Fernando Brambila* (Consejo Nacional de Ciencia y Tecnología), *Alejandro Diaz Barriga* (Sociedad Matemática Mexicana)
- EMAT: Teaching Mathematics using Technology. *Teresa Rojano* (The Ministry of Education in Mexico (SEP), CINVESTAV, Instituto Politécnico Nacional), The Latin American Institute of Educational Communication (ILCE)

- My Assistant. *Natalia de Bengoechea* (Universidad Pedagógica Nacional)
- Science into your School. *José Antonio de la Peña*. (Instituto de Matemáticas Universidad Nacional Autónoma de México)
- Teaching Mathematics with the e-kreide blackboard. *José Carlos Gómez-Larrañaga* (Centro de Investigación en Matemáticas)
- Computer Algebra Systems in Mathematics Middle School. *Tenoch Cedillo* (Universidad Pedagógica Nacional)

3b) Mathematical Research in Mexico

José Antonio de la Peña (Instituto de Matemáticas, Universidad Nacional Autónoma de México)

Although there were some few distinguished mathematicians in Mexico at colonial times, modern mathematical research only started at the middle of the 20th century. The first group of Mexican mathematicians were formed under the influence of some of the greatest mathematicians of the century such as Birkhoff and Lefschetz. Since then, mathematical research in Mexico has grown at UNAM (starting at 1942), CINVESTAV (starting at 1962), CIMAT (starting at 1980) and other centres. We will present some of the most important contributions by Mexican mathematicians.

3c) Latin-American Research in Mathematical Education

Ricardo Cantoral and *Rosa María Farfán* (Centro de Investigación y de Estudios Avanzados, Instituto Politécnico Nacional)

The Latin American countries share deep historical and cultural roots that naturally influence education. However, it is clear that the specificity of each country also determines singularities, in such a way that to conceive a Latin-American academic community requires, in addition to a common goal, the recognition of plurality. The Latin-American Mathematical Education Committee (CLAME, for its Spanish acronym) is an academic movement whose aim is to benefit the educational systems of Latin-America by means of establishing academic projects. In this presentation we will expose the principal results of research of the community CLAME as well as its main academic projects.

Time schedule:

Hour	Room 3 (Building 116, Aud. 83)
	3.- Diverse Topics
16.30-17.30	3a) Educational Innovations in Mathematics
17.30-18.00	3b) Mathematical Research in Mexico
18.00-18.30	3c) Latin-American Research in Mathematical Education

“National” presentation from the Nordic countries

Place: Building 303, 306, and 308.

Exhibition in the foyer areas of building 303 and 306.

A united presentation from the Nordic countries, Denmark, Finland, Iceland, Norway, and Sweden, will be held. Detailed information can be found in the special programme booklet for the Nordic presentation and at www.ICME-10.dk



ICMSE
10
2004

NP

National
Presentations

National Presentation of Romania

Place: Building 421, A72, A73 and A74 with exhibition in the foyer area

The Romanian presentation is organised in the following three parallel sections:

- (1) Curriculum development in Romania – between ideal and reality;
- (2) The role of mathematics competition in developing the Romanian mathematics education system and
- (3) The Romanian mathematical higher education system

Section 1: Curriculum development in Romania – between ideal and reality

Authors: *Mihaela Singer* and *Cristian Voica*

Place: Building 421, A72

The aim of this presentation is to show the new trends in mathematics curriculum development in Romania in the context of the general evolution of our society, focusing on the recent educational reform.

No	14.30-18.30	Topic	Resources
1	15 min	Romanian education system at a glance	Power Point Presentation – map, statistical data
2	30 min	Short historical perspective of mathematics education – significant moments First Universities Mathematical Gazette Mathematical Gazette Contest The 70's-industrial high school The 80's-new textbooks – very academic and based in theory	Gazeta Matematica- copies Old textbooks
3	30 min	The curriculum reform Perspective on the recent history Institutional structures and mechanisms of the curriculum reform Conceptual development of the National Curriculum	Power Point Presentation New National Curriculum (book – in English) Leaflets about the curriculum reform
4	15 min 30 min 60 min	The mathematics curriculum (programs of study + textbooks) Break Primary Lower secondary Upper secondary University level	The mathematics curriculum- books in Romanian Romanian Mathematics Curriculum- book in English (to be distributed) Textbooks & Auxiliaries University textbooks
5	30 min	Relationship between curriculum and assessment National assessment system School assessment	Power Point Presentation Assessment tests Assessment items
6	30 min	Teacher training Pre-service In-service Teachers' appraisal –inspection Research in mathematics education	Power Point Presentation Methodological teachers' guides Programme for in-service examinations



ICMSE
10
2004

NP

National
Presentations

Section 2: The role of mathematics competitions in developing the Romanian mathematics education system

Authors: *Titu Andreescu*, *Madalina Berinde* and *Vasile Berinde*

Place: Building 421, A73

No.	14.30-18.30	Topic	Resources
1	15 min	The beginnings of the modern Romanian mathematics education system	Power Point presentation
2	15 min.	The first mathematical competitions	Power Point presentation
3	30 min.	The foundation of "Gazeta Matematica" journal and Annual Contest of "Gazeta Matematica". Its history	Power Point presentation Old issues of G.M. Old problem books
4	15 min	The Romanian Mathematical Olympiad: a competition for pre-university students Competitions for university students	Power Point presentation Booklets (to be distributed to attendance) Problems books
5	30 min	Break	
6	45 min	The creation of the International Mathematics Olympiad in Romania Romania's results during the 40 editions of IMO and their influence on the mathematics system of education	Power Point presentation Booklets (to be distributed to attendance) Selected Problems book (to be distributed to attendance)
7	75 min	The influence of a mathematics competition climate in teacher training education, mathematics education research, fundamental research, mathematics publications etc. Conclusions: trends and perspectives	Power Point presentation Textbooks University textbooks Statistics

Section 3: The Romanian mathematical higher education system

Authors: *Vasile Berinde*, *Andrei Horvat*, *Nicolae Pop* and *Petrica Pop*

Place: Building 421, A74

No.	14.30-18.30	Topic	Resources
1	30 min	The actual system of mathematics education in Romania	Power Point presentation
2	60 min.	The evolution of the Romanian mathematics higher education system during the 20th century. Present trends and perspectives	Power Point presentation
3	30 min	Break	
4	45 min	The teacher training component of the Romanian mathematics education system: main chronological reference points mathematics system of education	Power Point presentation Booklets (to be distributed to attendance) Sample Textbooks
5	75 min	Teacher training; research in mathematics education; fundamental research activity in universities and research institutes. Conclusions: trends and perspectives	Power Point presentation Sample Textbooks Sample University textbooks Statistics



I C M E
1 0
2 0 0 4

NP

National
Presentations

National Presentation of Russia

Place: Building 308, A11, A12, A13 and G1. Exhibition in the foyer area.

1. Aims and Focus

The Russian mathematical education will be presented at ICME-10 in the building 308. The presentation will consist of an exhibition and talks in time slots on Tuesday 14.30 - 16.00 and 16.00 - 18.30 (followed by a reception). A math competition and hands-on computer demonstrations will run in parallel. We invite all the Congress participants to meet us and to share their vision on the future of math education and the role of Russia in it.

In our presentation we will present an overview of the whole spectrum of math education in Russia focusing on:

- Higher education in various fields (including computer science) and opportunities for international students
- Pre-university elite math education (schools for gifted, Olympiads, etc.)
- Mathematical literature (from elementary school and popular math to lecture notes and research)
- International role of Russian mathematical education and educators
- Information and communication technology support to maths education
- Importance of Geometry and Mathematical Informatics in school
- Problems of evaluation and “international comparative studies” in Russia

2. Information resources

The presentation has been devised such that booklets, CDs, posters and additional information will be available at the exhibition booths. Materials will be placed on the Internet site of the Russian presentation www.icme-10.ru.

3. Exhibition

The exhibition will expand the themes of the oral presentations as well as provide opportunity for direct contact and discussions. Computer demonstrations, big screen videos of top-level mathematicians interacting with students will be part of it. The exhibition is open from 10.00 to 18.00 Monday to Wednesday, Friday and Saturday.

4. Computer demonstrations and hands-on activities

Short introductions of computer products and methods will be given in a slot of oral presentation. In a special room (computer lab) there will be more than a dozen workplaces where you can try the most popular products, and see examples of students work in virtual realities of mathematics.

5. Publishers

Russia publishes hundreds of first-rank mathematical titles a year. A number of short self-introductions of the major publishing houses are included in the program of talks. In the exhibition they will have their booths as well as samples of the products and sample translations and representatives will be available for discussions.

6. Competitions

The level of the Russian mathematical team at the International Olympiads in Math and Informatics is well known. Olympiads are prominent factors in attracting and developing young Russian mathematicians. You will have a chance to meet the team members and trainers and to solve problems aimed at different ages and complexity levels as well as problems of the famous Olympiad in Mathematics and Linguistics. The awards include mathematical literature, toys, and traditional Russian souvenirs!

7. Programme (preliminary)

Lectures in auditorium A12 with transmission to A13, 14.30-16.00.

- 14.30 -14.45 *V. A. Sadovnichii:* Russian Mathematical Education
 14.45 -15.00 *V. M. Tikhomirov, L. D. Kudryavtsev:* Higher Education
 15.00 -15.15 *A. L. Semenov, V. V. Firsov, M.I.Bashmakov:* Pre-university Education
 15.30 -15.45 *V.A. Vasilyev, A. B. Sosinsky:* International role of Russian Mathematical Education
 15.45 -16.00 *V.I. Arnol'd:* Title missing
 16.00 -16.30 Coffee-break

Lectures in auditorium A12, 16.30-18.00

- 16.30 -16.40 *B. M. Davidovich, A.A. Nikitin, R.G. Khazankin, I.V. Yaschenko:* Elite Mathematical High-schools
 16.40 -16.50 *A.A. Chasovskikh:* Kolmogorov School
 16.50 -17.00 *I.S. Rubanov, S.E. Rukshin, N.N. Konstantinov:* Mathematical competitions
 17.00 -17.10 *N.Kh. Agakhanov:* Russia in the International Math Olympiads
 17.10 -17.20 *G.V. Dorofeyev, I.N. Sergeev:* Methods of Evaluation and International Comparative Studies
 17.20 -17.30 *I.M. Gelfand, V.F. Ovchinnikov, Zh.M. Rabbot:* Schools by Correspondence
 17.30 -17.40 *N.P. Dolbilin:* Geometry in Russian School Math
 17.40 -17.50 *E.I. Smirnov:* Math Teachers' Education in Russia
 17.50 -18.00 *S.S. Demidov:* History of Mathematical Education in Russia
 18.00 -18.30 Math literature in Russia: 5-minutes Publishers' Presentations

Lectures in auditorium A13, 16.30-18.00

- 16.30 -16.40 *Yu. I. Zhuravlev:* Studying of Informatics in Research Context
 16.40 -16.50 *V.P. Sherstyuk, A.A. Sal'nikov:* Education in the Field of Information Security
 16.50 -17.00 *A.T. Fomenko:* Computer Geometry
 17.10 -17.20 *V.V. Voyevodin, V.D. Arnol'd:* Internet Resources in Mathematical Education
 17.20 -17.30 *A.L. Skubachevskii:* Mathematics for Engineers
 17.30 -17.40 *V. A. Uspensky:* Mathematical Education for Linguists
 17.40 -17.50 *A.G. Kushnirenko:* Fundamentals of computer science in Math Education
 17.50 -18.00 *A.V. Mikhalev:* Algebra in Russia

Lectures in auditorium A11, 16.30-17.00

- 16.30 -16:35 *R.K.Gordin, S.A. Shestakov, I.R. Vysotsky:* All problems in Elementary Math Available
 16.35 -16.40 *V.N. Dubrovsky, V.I. Ryzhik, G.B. Shabat:* Discovery Learning based on Geometer's ScatchPad
 16.40 -16.45 *G. Pachikov:* Virtual Reality for Education
 16.45 -16.50 *A.S. Podkolzin:* The Solver of Mathematical Problems
 16.50 -16.55 *S.I. Kublanovsky:* An Interactive Talking Problem Book
 16.55 -17.00 *A. Pazhitnov:* Tetris
 17.00 -17.05 *N.N. Andreev:* Mathematical Etudes

Other activities

Demonstration of educational software in computer rooms.
 Mathematical competitions for participants of the Congress (A11).
 Exhibition in the foyer area in building 308 will be open at 10.00 -18.00 during the entire Congress except on the excursion day and the closing day.



I C M E
1 0
2 0 0 4

NP

National
Presentations



I C M E
1 0
2 0 0 4

SGA

Workshops

SGA – Workshops

Four time slots:

SGA I: Monday 5 July, 16.30-17.30;
SGA II: Tuesday 6 July, 16.30-17.30
SGA III: Wednesday 7 July, 16.30-17.30 and
SGA VI: Saturday 10 July, 15.00-16.00

are allotted to Workshops and Sharing Experiences Groups proposed by the participant.

There are 46 Workshops and 12 Sharing Experiences Groups altogether. Each group will have two sessions, either in SGA I and II or in SGA III and IV, with the exception of three workshops which have only one session in SGA I.

The following pages give you a short description of the activities in these groups.

Workshops, slot I and II

1. Doing more with less: Using low-end graphics calculators

Barry Kissane

School of Education, Murdoch University, Australia

Time: July 5, 16.30-17.30 and July 6, 16.30-17.30

Place: Building 101, G1

This is a hands-on workshop to explore the place of relatively inexpensive technology in learning and teaching mathematics, intended for those interested in secondary mathematics teaching and curriculum in less affluent countries, districts or schools or when infrastructure such as computers or telecommunications is unavailable. We will use relatively unsophisticated graphics calculators since these are more likely to be affordable in contexts of limited financial resources. Participants will explore some new kinds of opportunities made available by graphics calculator access. Previous graphics calculator experience unnecessary.

2. Speak, write, reflect, revise: Tools for a powerful mathematics lesson

Robyn Silbey

Montgomery Country Public School, USA

Time: July 5, 16.30-17.30 and July 6, 16.30-17.30

Place: Building 210, G142

Do you know what every student in your class learned in math today? If not, how can you find out? In this session, we will simulate a lesson to experience how all students can successfully respond to math prompts verbally and in writing. We will analyze student products and discuss instructional implications. You will leave with a bank of problems that you can start using tomorrow, along with strategies for including all students and making them successful problem solvers. Handouts.



I C M E
1 0
2 0 0 4

SGA

Workshops

3. Revealing untapped resources for spreadsheet-enabled mathematics education

Steve Sugden

Information Technology, Bond University, Australia

Co-author: *Sergei Abramovich*

Time: July 5, 16.30-17.30 and July 6, 16.30-17.30

Place: Building 116, D048

It has been more than 10 years since spreadsheets gained widespread recognition as an amplifier of student mathematical thinking across the curriculum. The workshop stems from recent joint work setting up an e-journal Spreadsheets in Education. Several topics will be introduced: construction of recurrences, conditional formatting, virtual 3-dimensional computing, and tabular/graphical dynamic representations of verbally defined functions. Hands-on interactive learning of these features will be situated in different problem solving contexts associated with algebra, number theory, modular arithmetic and finance.

4. Discovery projects

Gail Kaplan

Mathematics Department, Towson University, USA

Time: July 5, 16.30-17.30 and July 6, 16.30-17.30

Place: Building 101, G2

Discovery projects create independent learners and enable students to participate actively in the learning process. Students “do” mathematics by creating, testing, and modifying conjectures. Participants will experience two projects. The first explores the shapes of functions whose domain is any angle and whose range is the length of a piece of pasta. Pasta is used to measure lines and create trigonometric curves. The process enables participants to “discover” properties of trigonometric graphs. The second project appears to be a brain teaser involving the movement of a pile of coins. After “playing” with coins and analyzing the outcomes, participants create and explore exponential graphs.

5. Understanding the place value concept in base ten through learning the Soroban

Kouzi Suzuki

Chairman of the board members,

NPO Institute for International Culture Exchange, Japan

Co-author: *Satoru Akiyama*

Time: July 5, 16.30-17.30 and July 6, 16.30-17.30

Place: Building 101, G3

It's fun to study soroban. Children like to work some tools instead of having seats and listening lectures. That motivates their active attitude toward study. You can take not only abacus lessons but also “ANZAN” = mental calculations through soroban study. You can operate invisible, untouchable and imaginative soroban's beads as if you have real soroban in your head. Soroban is universal number communication language! And an educational tool for without boundary!



I C M E
1 0
2 0 0 4

SGA

Workshops

6. E-learning beyond MCQ

Chris Sangwin

School of Mathematics and Statistics, University of Birmingham, United Kingdom

Co-author: *Joe Kyle*

Time: July 5, 16.30-17.30 and July 6, 16.30-17.30

Place: Building 116, D088

Recent developments in computer aided assessment exploit computer algebra to evaluate students' free text answers. Such systems can check algebraic equivalence and mathematical properties symbolically. This moves well beyond the well-aided limitations of the MCQ format, which is the current paradigm.

This workshop will engage with one freely available CAA system based on computer algebra, to learn how mathematics may be assessed with such a tool through practical activities, and to discuss new pedagogical issues raised. Participants are strongly encouraged to bring activities from their teaching, to bring relevance and variety to these interactive sessions.

7. Action research and renewal of mathematics teaching and learning

Bill Atweh

School of Mathematics, Science and Technology Education,
Queensland University of Technology, Australia

Co-authors: *Judy Mousley* and *Robyn Zevenbergen*

Time: July 5, 16.30-17.30 and July 6, 16.30-17.30

Place: Building 101, G4

Action Research is an effective way to (a) research mathematics education from the insider classroom perspective, (b) involve the teachers themselves in process of reforming mathematics education and (c) assure a connection between the theory generated by research and the practice in the classroom. This session is designed towards supporting mathematics teachers and those who work with them, to develop an understanding and related skills in the design of action research programs as professional development of teachers, and or as practice based curriculum development in the schools. Experienced action researchers who like to discuss their projects in the session are invited to contact Bill Atweh on (b.atweh@qut.edu.au).

8. You'll find linear models in the most unusual places

Joice Conway

Mathematics, Tallmadge High School, USA

Time: July 5, 16.30-17.30 and July 6, 16.30-17.30

Place: Building 101, G5

Tie knots in rope, decipher phone bills, predict the height of a plastic cup holder, and create a new side for a Monopoly board game! What does this all have to do with linear equations? Come and find out. Handouts will be provided.

9. Grasp the language/grasp the mathematics

Lee Page

Valle Imperial Mathematics, USA

Time: July 5, 16.30-17.30 and July 6, 16.30-17.30

Place: Building 101, G6

Learn the skill of integrating mathematics word problem solving with oral and written language acquisition. How students understand mathematical concepts in a context can be correlated to understanding language. This workshop, designed for teachers who teach both mathematics and language, will involve participants in creating math word problems that will help students gain language fluency and enhance oral and written language skills. Problem solving strategies will be discussed, student work analyzed, and participants will walk away with a set of problems and strategies for immediate use in the classroom.

10. The hexaflexagon and its relatives

Rob Smith

Mathematics, Gippsland Grammar School, Australia

Time: July 5, 16.30-17.30 and July 6, 16.30-17.30

Place: Building 101, G9

The Hexahexaflexagon and The Family of Hexaflexagons is a two-session workshop (each of one hour) that will introduce participants to an area of mathematics that is not only fun, but will also allow for numerous avenues of exploration. For many people, hexaflexagons are something they have heard about or read about, but have rarely got around to actually doing. In addition to learning how to make the hexahexaflexagon, and other members of the family, participants will be shown some of their more important and interesting features and gain an understanding of the basis on which they are all constructed.

11. Interconnections within mathematics:

The case of parabola and similarity

Hamutal David

Department of Education in Technology and Science, Technion, Israel

Co-author: *Atara Shriki*

Time: July 5, 16.30-17.30 and July 6, 16.30-17.30

Place: Building 116, D089

According to the NCTM Standards: Thinking mathematically involves looking for connections, and making connections builds mathematical understanding.

In the suggested workshop we focus on interconnections within two fundamental concepts:

1. Interconnections between the algebraic representation and the geometrical representation of the 'parabola';
2. Interconnections within the concept of similarity and its connection to the concept of parabola.

We demonstrate the geometrical nature of the parabola by means of paper folding. In addition, we use dynamic geometry software in order to deepen the geometrical investigation and deduce the surprising fact that all the parabolas are similar!



I C M E
1 0
2 0 0 4

SGA

Workshops



I C M E
1 0
2 0 0 4

SGA

Workshops

12. Working out and use of the pedagogical diagnostic system

Alexander Kolgatin

The Computer Science Chair of the Physics and Mathematics Department,
The Kharkov State Pedagogical University named after G. Skovoroda, Ukraine

Co-authors: *L. Byelousova, A. Kolgatin* and *L. Kolgatina*

Time: July 5, 16.30-17.30 and July 6, 16.30-17.30

Place: Building 208, G63

The technology of pedagogical diagnostics and original free software are presented. Workshop participants work at the local computers of the computer network. At first they are testing on some mathematical topic by Information System of the Pedagogical Diagnostics “Expert 2.03” as pupils. The specialities of the adaptive algorithm of testing are discussed. The form of displaying the structure of knowledge and skills is discussed. Participants work as teachers. They organise appellation, analyse the tables of the results, difficulty of every question. By such way the participants analyse the structure of training of pupils group. The results, obtained at approbation of our tests in our university, will be presented for analysis. Then participants and chair discuss the principles of working out the test tasks for adaptive testing system and create the new test with “Expert 2.03”.

13. Multidimensional approaches to classical topics of school mathematics by the creation of multimedial learning environments

Bertram Burgner and *Michael Meyer*

Fachbereich Mathematik, Volkshochschule Wesel, and Bischfliches Willigis-Gymnasium Mainz, Germany

Time: July 5, 16.30-17.30 and July 6, 16.30-17.30

Place: Building 210, D052

According to their leading concept of mathematical education the chairs will demonstrate the benefit of creating multimedial learning environments to offer multidimensional approaches to one and the same mathematical problem. By this way of learning the pupils become acquainted with various ways of solving, in which complementary mathematical concepts are involved. The examples are taken from the chairs own practice as teachers. Different approaches to the problems can be unfolded by using dynamic-geometry-software, computer-algebra-systems or MS-Excel-sheets, finding approximate solutions by methods of trial, error and measurement or the general solution by Algebra or Calculus computations.

14. CAS-aided calculus teaching

Judith Hector

Mathematics, Walters State Community College, USA

Time: July 5, 16.30-17.30 and July 6, 16.30-17.30

Place: Building 116, G045

Good problem solvers are in short supply for careers in science, mathematics, engineering and technology. This workshop will help instructors integrate programming in Calculus to enhancing problem solving skills and mathematical understanding. Participants will enter, debug, and run several programs to perform familiar algorithms from Calculus. The programs will make use of the standard programming structures of sequence, selection and repetition. The presenter will use the TI-92 graphing calculator language for ease of transport to the conference. The presenter has no commercial relationship with Texas Instruments and will discuss other calculator and computer languages appropriate for integrating programming in Calculus.

15. Using the features and some surprising answers of a graphic and symbolic calculator to study theoretically a mathematics subject: the example of sequences and real numbers

Ruhal Floris

Math Education, University of Geneva, Switzerland

Time: July 7, 16.30-17.30 and July 10, 15.00-16.00

Place: Building 327, G10

This workshop is addressed to high school teachers and can also be attended by participants with no knowledge of graphics or symbolic calculator (GSC). The workshop has two goals : the first is to present briefly the way to study sequences of numbers with a GSC and the second to work on some examples of sequences and student sheets showing how to exploit some ambiguous answers of the calculator to lead the students to improve their mathematical knowledge about real numbers through convenient questions. The examples are drawn from classroom practice in Geneva. The workshop will alternate large time of workgroup and general discussion.

16. Go forth and generalise

Jennifer Piggott

Education, University of Cambridge, United Kingdom

Co-author: *Liz Pumfrey*

Time: July 5, 16.30-17.30 and July 6, 16.30-17.30

Place: Building 210, D152

There is a common misunderstanding that mathematical enrichment is only for the most able but we believe this view simply denies opportunities for stimulating and enjoyable mathematical experiences for students of all abilities. Our work is based on a definition of mathematics enrichment which encompasses curriculum content and a constructivist view of learning.

The workshop will be based on an exemplar resource which aims to support students in developing their ability to generalise. Participants are invited to engage in some of the problem solving activities and unpick our understanding of mathematic(s) enrichment.



I C M E
1 0
2 0 0 4

SGA

Workshops



I C M E
1 0
2 0 0 4

SGA

Workshops

17. Supporting mathematical discourse in the primary grades

Steven Bluestone

Rye City Schools, USA

Time: July 5, 16.30-17.30 and July 6, 16.30-17.30

Place: Building 101, G11

The importance of discourse in the formation and support of conceptual understanding in mathematics has been clearly demonstrated. Mathematics is a human endeavor involving the essentially human capacity and need for communication. The solitary and frequently silent work many students engage in is an injustice to the complexity of mathematical ideas. Participants will engage with mathematical tasks that are rich in potential meaning, affording opportunities to explore the range and depth of discourse possible in the classroom. Participants will identify the interpersonal factors that support, as well as those that serve as impediments to, the development of mathematical concepts.

18. CAS's program function and application in teaching of mathematics

De Ting Wu

Mathematics, Morehouse College, USA

Time: July 5, 16.30-17.30 and July 6, 16.30-17.30

Place: Building 208, D52

In this hands-on workshop mathcad's program function will be introduced and some of application in teaching of Differential Equation and Numerical Analysis will be illustrated.

19. Cancelled

20. Manipulatives

Norma Noguera

Mathematics and Statistics, California State University, Long Beach, USA

Co-authors: *Mutindi Ndunda* and *Maritza Jimenez Zeljak*

Time: July 5, 16.30-17.30 and July 6, 16.30-17.30

Place: Building 210, G018

The use of concrete objects as a tool in the learning process provides a deeper understanding of the abstract world of mathematics. Manipulatives such as geoboards, pattern blocks and tangrams are being used by the presenters to teach topics such as fractions, polygons, decimals and many more but mainly problem solving skills. Attendees will gain hands-on experience about the usage of these manipulatives by playing the role of students as the presenters do sample lessons. Geoboards will be available to the attendees to use during the workshop. Sample pattern blocks and tangrams will be provided to take home to provide some ideas on how to obtain these materials inexpensively.

21. Solving non-routine problems with young learners

Jill Cheeseman

Independent Mathematics Educator, Australia

Time: July 5, 16.30-17.30 and July 6, 16.30-17.30

Place: Building 210, G012

There has been a long history of problem solving as one of the goals of mathematics and yet its application is open to question, especially with children in the early years of schooling.

This workshop will share ways of posing problems with young learners. I hope to convince participants that problem solving is possible and a very productive and enjoyable way to present mathematical challenges to young children. Practical examples related to Number will illustrate strategic approaches that can readily be adapted by teachers. A range of contexts including games, real life examples, and mathematical problems that have childrens literature as their stimulus will be discussed.

22. Developing learning communities

Dixie Billheimer

Regional Education Service Agencies I & II, USA

Co-authors: *Deborah Clark* and *Dee Cockrille*

Time: July 5, 16.30-17.30 and July 6, 16.30-17.30

Place: Building 210, G008

Join D3 (Dixie Billheimer, Deborah Clark, and Dee Cockrille) as they share how they have established learning communities, both online and through study group format across rural, southern West Virginia. Using interactive strategies Dixie, Deborah, and Dee will share how: (1) teachers collaborate to develop strategies that integrate technology and address content standards as they assess student work and (2) study groups utilize Classroom Instruction That Works: Research-Based Strategies for Increasing Student Achievement by Robert Marzano, Debra Pinkering, and Jane Pollock in an examination of research based strategies to increase achievement.



I C M E
1 0
2 0 0 4

SGA

Workshops



I C M E
1 0
2 0 0 4

SGA

Workshops

23. Making a football and finding our mathematics

Shin Wanabe

Tokai University, Japan

Time: July 5, 16.30-17.30

Place: Building 210, G002

Making the football with paper and solving the number of points, edges and surfaces on it. The small regular triangle changes to the regular hexagon with the centre of gravity of triangles. We want to teach the method of the mathematical thinking and solving problems. Making the football, students can get the numbers of the point, edge and surfaces. We think to make the football that they can see mathematics on it. And they are saying that they like mathematics.

24. Symmetry: The mathe-chemistry connection

Timothy Craine

Department of Mathematical Sciences, Central Connecticut University, USA

Co-author: *Leslie E. Craine*

Time: July 5, 16.30-17.30

Place: Building 210, G112

Did you realize that some molecules are “right handed” and others “left handed” and that it makes a difference which one you have? Did you know that three-dimensional geometry can be applied to chemistry? Learn about this topic through hands-on activities using Miras, two-dimensional cut-out figures, three-dimensional polyhedral models, and molecular models constructed from toothpicks and gumdrops. We’ll even show you a classic parlor trick with apples known as the “royal cut.” No commercial product will be promoted at this workshop.

25. Using children’s literature to bring life to mathematics lessons

William Lacefield

Tift College of Education, Mercer University, USA

Time: July 5, 16.30-17.30

Place: Building 210, G118

This workshop will focus on the integration of childrens literature into mathematics lessons. The session will begin with a rationale for the use of childrens literature as a stimulator of communication and mathematical learning. Participants will have the opportunity to work together in small groups to study examples of childrens literature from around the world and to design and share appropriate mathematics lessons stemming from these books. Workshop participants will leave the session with handouts and with a variety of strategies that can easily be put into practice.

Workshops, slot III and IV

26. Origami – a mathematical idiom

I. Pythagoras theorem and extensions

II. Golden section and the pentagon

Norio Torimoto

The Nippon Origami Association (NOA), Sweden

Time: July 7, 16.30-17.30 and July 10, 15.00-16.00

Place: Building 101, G1

Mathematics is the archetypical difficult subject, but a visually presented solution engenders understanding. If you regard the square root of two merely as the number 1.414..., your understanding is poor. But a five-year-old child can fold a square piece of paper to create this length. The A4 shape has interesting properties too and can illustrate the Golden section. Pythagoras theorem can be demonstrated by origami. Even the construction of a regular pentagon is possible with a few origami folds.

27. Using the Soroban to develop strategies for mental calculations

Tom Macintyre and Ruth Forrester

Curriculum Research and Development, University of Edinburgh, Scotland, United Kingdom

Time: July 7, 16.30-17.30 and July 10, 15.00-16.00

Place: Building 101, G2

At the Edinburgh Centre for Mathematical Education we have been investigating the use of a Japanese abacus, the soroban, as a means of developing mental calculation skills. Using a soroban encourages mental imagery and computation in conjunction with the physical movement of the beads. It therefore offers opportunities for learners to engage with the concept of number and strategies for mental calculation. Workshop participants are invited to experience the practical operation of a soroban with a view to discussing potential impact on classroom learning. A particular focus will be on relationships between practical skills, mental images and mental calculation strategies.

28. Multivariate calculus in 3D

David Warren

Development of Technology in Education, ITESM-CCM, Mexico

Time: July 7, 16.30-17.30 and July 10, 15.00-16.00

Place: Building 116, D048

In the Workshop we will use Maple V as the technological tool.

The topics covered will be:

- parametric curves in 2d and 3d, velocity and acceleration vectors, double integration of volumes and generation of these volumes in 3D.

Participants will learn techniques that can be exported to other topics.



I C M E
1 0
2 0 0 4

SGA

Workshops



I C M E
1 0
2 0 0 4

SGA

Workshops

29. Using a graphic calculators CD ROM workshop

Allan Duncan

School of Education, University of Aberdeen, Scotland, United Kingdom

Time: July 7, 16.30-17.30 and July 10, 15.00-16.00

Place: Building 116, D088

The Using Graphic Calculators CD-ROM is designed to help teachers to think about ways of using graphics calculators to enhance secondary school mathematics teaching (age 12 to 18).

The CD-ROM has been designed as a support for teachers and can be used in a variety of different ways; as a graphic calculator tutor, as a library of materials, to plan lessons, to plan CPD.

After a brief guided tour of the CD-ROM participants can familiarise themselves with the resource. A variety of tasks relating to the different uses will be set in order to focus the work but a choice will be available covering various mathematics topics.

30. The METE project

Paul Andrews

Faculty of Education, University of Cambridge, United Kingdom

Co-authors: *Jose Carillo, Sari Palfalvi, Erik De Corte and George Malaty*

Time: July 7, 16.30-17.30 and July 10, 15.00-16.00

Place: Building 210, G142

The mathematics education traditions of Europe (METE) project is a five way, EU-funded, study of classrooms in Belgium, England, Finland, Hungary and Spain. It aims to produce a database of video-recorded sequences of lessons on topics common to curricula in the age range 10-14 and a descriptive framework intended to facilitate a multinational teams meaningful analysis of mathematics classroom activity. This workshop, through the use of video clips of mathematics lessons and the sharing of these frameworks, will attempt to determine the degree to which consensus, in respect of the description and analysis of mathematics classroom activity, can be achieved.

31. How to teach wavelets and their applications

Abul Hasan Siddiqi

Department of Mathematical Sciences, King Fahd University of Petroleum and Minerals, Saudi Arabia

Time: July 7, 16.30-17.30 and July 10, 15.00-16.00

Place: Building 101, G3

The speakers in the workshop will focus their attention on issues such as the level at which an introductory course on wavelets and their applications should be introduced, and the content and prerequisites of such a course. The methodology adopted for teaching wavelets to professional mathematicians and those who are interested in its applications only, like metrologists, economists, engineers, physicists, biologists, should be different as their mathematical background is not of the same level. The speakers will also express their point of view on appropriate techniques adopted for teaching wavelets to these sets of different groups of learners.



I C M E
1 0
2 0 0 4

SGA

Workshops

Besides the fundamental concepts like wavelet transforms, multiresolution analysis, special features of wavelet coefficients, applications to area like detection of abnormalities in heart functioning, detection in abrupt changes in rainfall data in particular and any environment data in general and financial data will be discussed. Study of long term behaviour of any real world problem represented by a time series will also be taken up.

The deliberation of the workshop will be concluded by suggesting an ideal syllabus of an introductory course on wavelets keeping in mind the prevailing situations in developing countries of the world, and taking various related issues in to consideration.

32

Model-eliciting activities

Patricia McNicholas

Mathematics, Robert Morris College, USA

Co-authors: *Judith Zawojewski and Marta Magiera*

Time: July 7, 16.30-17.30 and July 10, 15.00-16.00

Place: Building 101, G4

Model-eliciting activities (MEAs) are real-life problems that require mathematical models to be developed for a client with a specified purpose. MEAs require that students select their own tools, make their own assumptions and create their own models. These are capabilities critical to technology-based professions in the 21st century. Participants will work in small groups to solve an MEA, learn how these problems have been designed, and how they have been used with non-traditional college, inner-city urban high school, and teacher education students. The session will end with a discussion of issues and ideas for implementing MEAs in various environments.

33

Teaching and learning of calculus

Dario Sacchetti

Dipartimento di Statistica, University of Rome – “La Sapienza”, Italy

Co-author: *Roberto Cavaliere*

Time: July 7, 16.30-17.30 and July 10, 15.00-16.00

Place: Building 210, G148

Our workshop intends to stimulate a debate on a non-traditional approach to teaching and learning of Calculus theory. The idea is to visualise theoretical concepts (theorems/ definitions) by means of interactive computer graphic simulations, able to build up a base for formal mathematics. The workshop is organised as a classroom lesson, split in two parts. The first is focused on the proof of the fundamental theorem of integral calculus. Here, participants play the role of learners, experiencing the understandability of concepts shown throughout graphic simulations. In the second part, there will be a review of the same topic, by means of active contribution of participants, that may explore the validity of the system through examples and counterexamples.

34. Exploring the role of technology in the teaching and learning of algebraic concepts

Linda K. Griffith

Mathematics, University of Central Arkansas, USA

Time: July 7, 16.30-17.30 and July 10, 15.00-16.00

Place: Building 210, G018

Participants will engage in four investigations about algebraic concepts using technology. A discussion of the role the technology and how it contributed to or detracted from the opportunity to develop conceptual understanding will follow each investigation. Each participant will be encouraged to share their views and experiences from the classroom. The four investigations will focus on the development of understanding of the concepts of slope of a line as a constant rate of change, the role of transformations in graphing equations, systems of equations as a tool for problem solving and finding maxima and minima to solve problems.

35. Recreational mathematics

Poh Yew Teoh

Centre for Instructional Technology and Multimedia, University of Science, Malaysia

Time: July 7, 16.30-17.30 and July 10, 15.00-16.00

Place: Building 210, G012

In this workshop participants will discover motivational ideas to inspire children of different grades and varying levels of ability. This workshop suggests creative ways of facilitating the learning of mathematics:

- with amazing mathematical magic, games, and puzzles related to number sense, algebra, and pattern recognition
- by exploring the possibilities of using the same magic for different age groups and for different objectives
- with hands-on activities using cards to develop problem solving strategies and conceptual understanding of algebra and arrangement

This workshop also discusses:

- the importance of creativity
- the five steps to creativity
- the barriers to creativity

36. Historical modules for the teaching and learning of secondary mathematics

Victor Katz

Mathematics, University of the District of Columbia, USA

Co-author: *Karen Michalowicz*

Time: July 7, 16.30-17.30 and July 10, 15.00-16.00

Place: Building 210, G008

This workshop uses materials from the CD developed by the Historical Modules Project. Sponsored by the National Science Foundation and the Mathematics Association of America, the project was designed to demonstrate to teachers the rationale for and how to use material from the history of mathematics in teaching numerous topics from the secondary and college curriculum. The two directors of the project will discuss the CD with its wealth of materials and lead the participants through selected activities. Workshop participants will receive a copy of the CD to use in their own schools.

37. Cancelled

38. The 'Mathematics of chaos' workshop

David Miller

Education, Keele University, United Kingdom

Co-authors: *John Bradshaw, Keith Jones, Doug Averis, Joe Miller and Barry Kissane*

Time: July 7, 16.30-17.30 and July 10, 15.00-16.00

Place: Building 210, D052

The broad aim of 'THE MATHEMATICS OF CHAOS WORKSHOP' is to show to an interested audience how developments in the world of mathematics can be adapted to help inform teachers' and children's understanding of the 'wonder of mathematics' and thereby enthuse the next generation of mathematicians. An important feature of the workshop is to give a flavour of the work that has been undertaken by UK and Australian teachers, either in classrooms or at courses and conferences for school teachers. The workshop will be made up of pencil and paper, calculator and computer activities. There will be full colour posters displaying some of the ideas. The workshop will repeat some of the ideas used in Quebec, Seville and Tokyo, but some different material will also be used. No previous knowledge is required.

39. Developing mathematical creativity in young children

Linda K. Sheffield

College of Education and Department of Mathematics and Computer Science, Northern Kentucky University, USA

Co-authors: *Hartwig Meissner and Foong Pui Yee*

Time: July 7, 16.30-17.30 and July 10, 15.00-16.00

Place: Building 101, G5

Participants in this session will actively explore methods for developing mathematical creativity. They will take traditional closed problems that expect one right answer and one method of solution and turn these into rich learning tasks that encourage students to take an open approach, thinking deeply about mathematics. We will share student work and discuss experiences of teachers in different countries who have used open problems. This session also will include information on print and electronic resources and a very short summary of recent international efforts and future activities concerning mathematical creativity and encourage participants to join in this work.



I C M E
1 0
2 0 0 4

SGA

Workshops

40. Introducing Minkowsky geometry using dynamical geometry programs

Bjørn Felsager

Haslev Gymnasium & HF, Denmark

Time: July 7, 16.30-17.30 and July 10, 15.00-16.00

Place: Building 210, D152

The purpose of the workshop is to get a hands-on experience of Minkowskian Geometry using a dynamic geometry program such as Geometers Sketchpad to solve a series of exercises in Minkowskian and Euclidean Geometry in parallel. The Minkowskian geometry is conceptually the simplest non-Euclidean geometry that you can present to future teachers in Mathematics at various levels. Due to modern technology it is now experimentally accessible as well. This gives a unique possibility of confronting the students directly with the basic structures of geometry in a non-trivial way and put the basic concepts such as angles in a fresh perspective.

41. Solids of revolution and the revolution of solids

Michel Roelens

Lerarenopleiding Secundair Onderwijs groep 1, Katholieke Hogeschool Limburg, Belgium

Time: July 7, 16.30-17.30 and July 10, 15.00-16.00

Place: Building 210, G118

Solids of revolution are well-known study objects in secondary school mathematics. Generally, they appear among the applications of integral calculus and they are generated by the revolution of a plane curve or figure around an axis in the same plane. In this workshop, participants will revolve entire solids instead of plane curves and they will describe the generated solids. These problems are designed for upper secondary school pupils and future mathematics teachers. New objects will emerge of this investigation, a historical sketch of which will lead to a Belgian three-dimensional proof, of 1826, of some properties of conic sections.

42. Matrices eigenvalues and the growth of the Belgian population

Johan Deprez

Faculteit Onderwijs – en informatiewetenschappen, University of Antwerp, Belgium

Time: July 7, 16.30-17.30 and July 10, 15.00-16.00

Place: Building 101, G6

The participants investigate an application of matrices and eigenvalues, namely modelling the evolution of a population using matrices and using its eigenvalues to study this evolution. We focus on two interesting aspects. First, we draw the attention to simplifications that are made when constructing the matrix model. Therefore the participants work with detailed realistic data (obtained from the Belgian statistical institute) for a while before the matrix model is introduced. Secondly, we zoom in on the evolution on the long term. The participants will meet exponential growth and their study leads them to the concepts of eigenvalue and eigenvector.

43. Geometrical reasoning in lower secondary school

Peter Ransom

Mathematics, The Mountbatten School and Language College, United Kingdom

Time: July 7, 16.30-17.30 and July 10, 15.00-16.00

Place: Building 341, A22

Three teachers will demonstrate the work they developed on geometrical reasoning with lower secondary school pupils. Delegates will be expected to participate in some of these activities. One activity focuses on the properties of the diagonals of quadrilaterals. Another deals with developing written reasoning using peer assessment. The third concentrates mainly of the verbal reasoning with lower attainers through the use of a two piece tangram. Some of the activities involve the use of dynamic geometry software. A chaired discussion will take place. Handouts will be available and there will be video clips of the work in the classroom.

44. A non-traditional approach to the learning of factorisation

Anthony Harradine

Mathematics, Prince Albert College, Noel Baker Centre for School Mathematics, Australia

Time: July 7, 16.30-17.30 and July 10, 15.00-16.00

Place: Building 101, G9

A hands on workshop in which you will experience a non-traditional approach to the learning of factorisation. The approach includes a study of belly button heights and the use of electronic technology to search for interesting cases in expressions (eg. x^2+5x+4) and to help students understand different representations of the same thing. It leads students to construct an approach for factorising quadratics. Challenges where their approach falls down are then offered fuelling the need for refinement. In addition to experiencing the non-traditional approach we will consider the use of a CAS once a student has a sound understanding of factorisation.

45. Fractals generations by iterated function systems

Katherine On Ki Fok

Mathematics, Island School, Hong Kong, S.A.R., China

Time: July 7, 16.30-17.30 and July 10, 15.00-16.00

Place: Building 208, D52

Fractals are self-similar geometric objects which can be seen throughout nature. Using the concept of Iterated Function Systems (IFS) and the Collage Theorem, many beautiful fractal images can be generated by applying transformations over and over again. Fractals generation therefore provides an extremely interesting application of transformations in secondary classrooms. However, once started the images generated by IFS will soon become too complicated to explore by paper and pencil. This workshop introduces a free software, Dominic, which is developed to enable students at all levels to experience the joy of designing or discovering fractal images within seconds.



I C M E
1 0
2 0 0 4

SGA

Workshops



SGA – Sharing Experiences Groups

Sharing Experiences Groups, slot I and II

SGA

Sharing
Experiences
Groups

1. Addressing challenges in primary mathematics education through peer coaching model

Yuri Okajima

Elementary Mathematics, Los Angeles Unified School District, USA

Co-authors: *Christine Curtis, Mary Clare Curtis, Marvin Horner Sharon Ishii and Mary Major*

Time: July 5, 16.30-17.30 and July 6, 16.30-17.30

Place: Building 327, G11

Los Angeles Unified School District has engaged in aggressive instructional reform centered on professional development of all of its mathematics teachers through the use of peer coaches. The purpose of our group is to share the benefits of the peer coaching model to meet the challenges of primary mathematics education. Participants will gain an understanding of peer coaching as a teacher training tool for both experienced and novice teachers alike.

2. MES – Mathematics education and society group

Tony Cotton

Faculty of Education, Nottingham Trent University, United Kingdom

Time: July 5, 16.30-17.30 and July 6, 16.30-17.30

Place: Building 327, G12

The Mathematics Education and Society group (MES) has successfully held three international conferences. 1998 in Nottingham, 2000 in Portugal and 2002 in Denmark. MES 4 is planned for 2005 in Australia.

MES is an international grouping allowing mathematics educators from around the world to share their ideas, perspectives and reflections concerning the social, political, cultural and ethical dimensions of mathematics education and mathematics education research.

The purpose of this SEG is to allow current members of MES to meet to discuss their work and to set up new areas of work with any members of the mathematics education community sharing the groups interests.

3. Forming models and modeling research collaborations in mathematics education multi-tiered design studies

Judith Zawojewski

Department of Mathematics and Science Education, Illinois Institute of Technology, USA

Co-authors: *Marta Magiera, Patricia McNicolas and Richard Lesh*

Time: July 5, 16.30-17.30 and July 6, 16.30-17.30

Place: Building 326, G026

Collaboration is sought among beginning and experienced researchers who are interested in using a models and modeling perspective to study the interacting development of students, teachers and classroom learning communities. The session begins with five-minute introductions to four themes: collaboration, teacher learning, student learning, and researcher learning. Small groups will discuss and raise questions about multi-tiered design studies where teachers implement mathematical model-eliciting activities with their students. Later, each participant will describe the nature of the collaboration they seek. Notes about each participants' interest will be sent to all participants via e-mail.

4. What should teachers know about the history of mathematics?

– The knowledge of pre-service elementary school teachers

Avikam Gazit

Education & Psychology, The Open University of Israel, Israel

Time: July 5, 16.30-17.30 and July 6, 16.30-17.30

Place: Building 326, G105

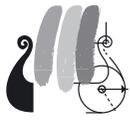
This study was designed to investigate the quality and the extent of difference between mathematics and non-mathematics pre service elementary school teachers in their knowledge of the history of math.

Mathematics is almost always represented in the classroom in a sterile, rigid, step-by-step way that is somewhat alien to students. Monk and Osborne (1997) give two reasons why science development should be introduced to the instructional schema of the teachers. First of all, history of science has a consistent rationality which is complimentary to teachers' main aims in creating a rich curriculum. Secondly, including such historical topics will contribute to significant acquisition of concepts by the learner. Other researchers emphasize teaching history of math in a cultural context (Zaslavsky, 2002), or encourage including historical topics so as to promote a positive change in students' attitudes toward mathematics (Fauvel and Van-Maannen, 1997; Ponza, 1998). If so, what is the extent of pre-service teachers' knowledge and what are their attitudes toward teaching the history of math?



SGA

Sharing
Experiences
Groups



I C M E
1 0
2 0 0 4

SGA

Sharing
Experiences
Groups

5. Experiences with interactive video environments in teacher education

Maarten Dolk

Freudenthal Institute, The Netherlands

Co-authors: *Tony Cameron, Sherrin Hersh and Parul Sleepers*

Time: July 5, 16.30-17.30 and July 6, 16.30-17.30

Place: Building 302, D93

Mathematics in the City – a project between the City College of the City University of New York and the Freudenthal Institute in the Netherlands – has been investigating the design and use of a digital interactive video environment as a tool for the professional development of teachers. In our SEG, participants will experience several activities built into the environments and discuss how (student) teachers work in our digital interactive video environment. We will discuss the development of long-term sequences of activities aligned with teacher development. A research question still to be explored is how interactive video can be used to help student teachers to become better teachers.

6. Experiences from the Institute for Advanced Study/Park City Mathematics Institute international seminars

Joan Ferrini-Mundy

IAS/Park City Math Institute, Institute for Advanced Study, USA

Co-author: *Gail Burrill*

Time: July 5, 16.30-17.30 and July 6, 16.30-17.30

Place: Building 101, G10

During 2001-2003, the Institute for Advanced Study/Park City Mathematics Institute sponsored international seminars focused on mathematics education, and in particular, teacher preparation and development. Representatives from these seminars will share experiences and issues that emerged during the seminars. Participants in this session will have the opportunity to discuss these and other issues in mathematics education common to many countries and ways to highlight examples and features of high-quality mathematics teacher preparation and development from the international community and to offer suggestions to guide the future agendas and operating mechanisms of the international seminars.

Sharing Experiences Groups, slot III and IV

7. Mathematics education and society

Janet Barnett

Department of Mathematics and Physics, Colorado State University – Pueblo, USA

Time: July 7, 16.30-17.30 and July 10, 15.00-16.00

Place: Building 341, A23

Like all persons, mathematicians live in society and respond to social questions of their times. Yet mathematics itself is often viewed as neutral and value-free. As educators, we have an obligation to examine how and what our discipline teaches students about our society and world. Those involved with teacher preparation must also consider what it means to prepare others to teach students to think independently and critically about public discourse, especially in times of war and social injustice. Participants will share experiences and resource ideas for preparing teachers to address these concerns at the practical level of the classroom.

8. Influencing national and regional policy

Sue Sanders

ACME, The Royal Society, United Kingdom

Co-authors: *Celia Hoyles and Chris Belsom*

Time: July 7, 16.30-17.30 and July 10, 15.00-16.00

Place: Building 302, D92

Our purpose is to disseminate experiences from groups who have successfully worked together across the mathematics community and influenced national or regional mathematics education policy, based on our experience of the Advisory Committee on Mathematics Education (ACME). We will post a report on the ACME web-site www.acme-uk.org and set up an email discussion group to continue the policy influencing debate. Thus we will endeavour to provide a forum for others who wish to set about influencing national and regional mathematics education policy.

9. Project WebLabs

Joao Filipe Matos

Faculty of Sciences – Department of Education, University of Lisbon, Portugal

Time: July 7, 16.30-17.30 and July 10, 15.00-16.00

Place: Building 302, D93

Project WebLabs uses ToonTalk as a tool for children construct objects and procedures to solve problems and investigations through innovative representations in science and mathematics. Communication and discussion among children communities is made through the publication of webreports on the internet. One of the aims of the project is to understand how children evolve along the work, construct and share knowledge within the communities. Using the notion of community of practice within a situated approach to learning, researchers are producing analytical descriptions of children activities. Participants in this group will have the opportunity to make sense and share our experience.



I C M E
1 0
2 0 0 4

SGA

Sharing
Experiences
Groups



I C M E
1 0
2 0 0 4

SGA

Sharing
Experiences
Groups

10. The role and purpose of informal mathematics education

Lynda Wiest

Educational Specialities, University of Nevada, Reno, USA

Time: July 7, 16.30-17.30 and July 10, 15.00-16.00

Place: Building 326, G105

This group will explore significant issues related to informal mathematics education, that is, structured mathematics experiences that occur outside of formal schooling. Participants will discuss questions concerning development and implementation of informal mathematics education experiences, including informal education's role in serving underrepresented students in mathematics. Participants will share theoretical and practical ideas from international perspectives and network with others involved in or interested in becoming involved in informal mathematics education.

11. Modern mathematics curriculum: Fiction or reality?

Miroslav Lovric

Department of Mathematics and Statistics, McMaster University, Canada

Time: July 7, 16.30-17.30 and July 10, 15.00-16.00

Place: Building 210, G112

The session will start with a short description of the course "Inquiry in Mathematics" that the SEG leader will be teaching to first-year university students in 2004/2005. Major features of the planned design and delivery of the course, as well as course objectives, will be presented.

In the first hour, discussion will focus on building the course content (lesson plan); the participants will be encouraged to suggest appropriate topics that will help develop students' mathematics knowledge and basic skills.

In the second hour, starting from the lesson plan, we develop teaching strategy. Decisions as to how to approach certain topic (group work, computer lab, lecture, etc.) will have to be made. The planned outcome of this quick brainstorming is a rough lesson plan for the course.

12. Teaching Zimbabwean teachers about the use of technology in the mathematics classroom

Jim Tarvin

Grossmont College, USA

Co-authors: *Ravindraw Bappoo, Stuart Moskowitz and Lovemore Nyaumwe*

Time: July 7, 16.30-17.30 and July 10, 15.00-16.00

Place: Building 101, G11

Lifelong learning is essential to teachers of mathematics all over the world. For most mathematics teachers around the world professional development opportunities are either unheard of or are considered only something for teachers in the more affluent countries. The Bindura University Technology Workshops have provided an example of how US educators have on several occasions distributed approximately 200 donated hand held teaching and learning devices (commonly known as 'graphing calculators') to teachers in Zimbabwe and now South Africa. The Bindura University Technology Workshops are guided by the fact that there is always 'castaway' technology in the most



I C M E
1 0
2 0 0 4

SGA

Sharing
Experiences
Groups

affluent countries in the world with the advent of newer more advanced technological learning devices. These 'castaway' devices are being collected from the more affluent countries (albeit on a small scale at the moment) and are now being brought to Zimbabwe and South Africa with trained experts who can assist African mathematics teachers in understanding how they may be able to utilize such devices in their mathematics classrooms. The Bindura University Technology Workshops will continue to evolve and grow to include other African universities interested in preservice and inservice mathematics teachers. This Sharing Experiences Group invites all those interested from the non-affluent, the lesser-affluent, and affluent countries of the world to hear about this amazing project and how it has enriched the lives of all those involved.

Poster exhibition and Round Table sessions

As an important part of the scientific programme ICME-10 hosts a poster exhibition with more than 220 posters. The posters are divided into four groups:

RT-posters: Posters to be discussed in Round Table sessions. These posters will be exhibited in building 208.

Group 1- posters: Posters that will be exhibited in building 116 and presented by the authors on Tuesday July 6, 17.30-18.30.

Group 2- posters: Posters that will be exhibited in building 101 and presented by the authors on Saturday July 10, 16.30-17.30.

Non-reviewed posters: Posters that, because of their late arrival, have not been reviewed by the poster committee. These posters will be exhibited in building 306, and presented by the authors on Saturday July 10, 17.30-18.30.

Abstracts for RT-posters and group 1 and 2 posters can be found in the *Abstract book for Posters*.

ASG – ICMI Affiliated Study Groups

The five Study Groups officially affiliated to ICMI are allotted three slots for their meetings during ICME-10:

ASG I – Monday July 5, 17.30-18.30,

ASG II – Wednesday July 7, 17.30-18.30

ASG III – Saturday July 10, 16.30-18.30

For the meetings in WFNMC an exception from this schedule has been made, see the WFNMC programme.

HPM

(The International Study Group on the Relations between History and Pedagogy of Mathematics)

Chair: *Fulvia Furinghetti*, furinghe@dimma.unige.it

Place: Building 303, A44

The aims of HPM are well illustrated in recent publications, such as: J. Fauvel & J. Van Maanen (editors), *History in mathematics education: the ICMI Study*, Kluwer, Dordrecht / Boston / London. In addition, the HPM Newsletter, published three times per year, covers the activities carried out all around the world; see www.mathedu-jp.org/hpm/index.htm. To provide further clarification we quote from the forthcoming HPM 2004 presentation (ICME 10 Satellite Meeting in Uppsala, Sweden, www-conference.slu.se/hpm/index.html) including the following (by Sten Kaijser): “The spirit of HPM is much more than the use of history in the teaching of mathematics...”

- it is the conception of mathematics as a living science, a science with a long history, a vivid present and an as yet unforeseen future
- together with the conviction that this conception of mathematics should not only be the core of the teaching of mathematics, but it should also be the image of mathematics spread to the outside world.

Through our common history we see that...

- mathematics is the result of contributions from many different cultures
- the teaching of mathematics has developed through the ages
- mathematics has been in constant dialogue with other sciences
- mathematics has been a constant force of scientific, technical, artistic and social development.”

The three timeslots scheduled in the program of ICME 10 will offer the opportunity to gather ideas in preparation of the Uppsala meeting. The two poles of the ASG meeting in Copenhagen will be the past (a balance of what happened) and the future (projects and perspectives).

Session 1 – Monday July 5, 17.30-18.30

Florence Fasanelli (Associate Program Director AAAS, USA)

will give a talk about the history of HPM.

Chair: *Fulvia Furinghetti*, University of Genova, Italy.



I C M E
1 0
2 0 0 4

ASG

ICMI
Affiliated
Study
Groups

Session 2 – Wednesday July 7, 17.30-18.30

Jan van Maanen (University of Groningen, The Netherlands) will give a talk centred on a survey of what happened after the publication of the ICMI Study, and on the potential production of a new journal.

Chair: *Costas Tzanakis*, University of Crete, Greece.

Session 3 – Saturday July 10, 16.30-18.30

Fulvia Furinghetti and *Victor Katz* will report on what has happened in the past four years. Victor Katz will survey the future of HPM (plans, works in progress, discussion of new proposals of activities). In this session the group as a whole should be involved in making more suggestions and – hopefully – volunteering to try to make some of the suggestions a reality.

Chair: *Man-Keung Siu*, University of Hong Kong, S.A.R., China.

ICTMA

(International Community of Teachers of Mathematical Modelling and Application)

Chair: *Peter Galbraith*, p.galbraith@mailbox.uq.edu.au

Place: Building 306, A32

Session 1 – Monday July 5, 17.30-18.30

- Who we are? (*Peter Galbraith* – Australia)
- How we got here? (*Ken Houston* – Ulster)
- What we study? (*Werner Blum* and *Gabriele Kaiser* – Germany)
- Where are we going? (*Chris Haines* – England)

Session 2 – Wednesday July 7, 17.30-18.30

Brief presentations of a selection of ICTMA work will be used to stimulate discussion – presenters will describe the work of other colleagues in the field.

1. Applications and modelling related belief systems (Presenter: *Katja Maass* – Germany)
2. Models that matter(ed) (Presenter: *Toshiakazu Ikeda* – Japan)
3. Assessing students' modelling capacities and activities (Presenter: *Gloria Stillman* – Australia)

Session 3 – Saturday July 10, 16.30-18.30

Presentation of ICMI-study 14 (see ICMI-Studies)

IOWME

(International Organization of Women and Mathematics Education)

Chair: *Jo Boaler*, joboaler@stanford.edu

Place: Building 306, A33

Session 1 – Monday 5 July, 17.30-18.30

Theme 1: Gender Equity in Elementary and Secondary Classrooms.

- 17.30-17.40: Introduction and Welcome. *Jo Boaler*, Stanford University.
- 17.40-18.00: Paper presentation: Towards gender equity in education: How early childhood research can inform the greater mathematical community. *Anna Rogers*, University of South Australia
- 18.00-18.20: Paper presentation: Showcasing recent Australian research in gender and mathematics. *Colleen Vale*, Victoria University, *Helen Forgasz*, Monash University and *Marj Horne*, Australian Catholic University
- 18.20-18.30 Discussion.

Session 2 – Wednesday July 7, 17.30-18.30

Theme 2: Gender Equity in Undergraduate Classrooms.

- 17.30-17.50: Paper presentation: Gender imbalance in engineering mathematics courses: Can we increase female representation by introducing collaborative learning methods? *Sabita D'Souza*, University of Technology, Sydney, Australia
- 17.50-18.00: Discussion
- 18.00-18.20: Paper presentation: 'I can do it, but it'll be a battle': finding her place as an undergraduate mathematician *Corinne Angier* and *Hilary Povey*, Sheffield Hallam University, United Kingdom
- 18.20-18.30: Discussion.

Session 3 – Saturday 10 July, 16.30-18.30

Theme 3: New initiatives in promoting gender equity.

- 16.30-16.40: Paper presentation: Increasing women's participation in mathematics: The role of networking *Barbro Grevholm*, Agder University College, Norway
- 16.40-17.00: Paper Discussion
- 17.00-17.30: Summary Discussion: Where are we now? Issues for the future?
- 17.30-18.30: Annual AGM.

PME

(International Group for the Psychology of Mathematics Education)

Chair: *Rina Hershkowitz*, rina.herskovitz@weizmann.ac.il

Place: Building 306, A34

The aims of PME are to promote international contact and debate about the Psychology of Mathematics Education, to promote interdisciplinary research and to deepen an understanding of the psychology of teaching and learning of mathematics. It is our desire to foster these aims by bringing the existence and, more importantly, the work of PME members to the attention of a wider audience. PME has a rich history and a prolific archive of research, of which many outside the PME community may not be aware. The ICME-10 Congress Programme has scheduled four time slots of about one hour each for presenting PME research work to ICME participants.

For ICME-10, four key areas of PME research and theoretical base have been chosen as exemplars of PME's contribution to knowledge and its work as a collaborative community. In each of these four areas, a member or members of PME were asked to present a review of the PME research. The following are the area headings together with the presenters, and the timings at ICME-10:

Session 1 – Monday July 5, 17.30-18.30

Children's Early Mathematical Development.

Joanne Mulligan, Australia, and *Gerard Vergnaud*, France.

Session 2 – Wednesday July 7, 17.30-18.30

The Influence of Social Context on the Teaching and Learning of Mathematics.

Peter Gates (Coordinator), United Kingdom; *Jill Adler*, South Africa; *Stephen Lerman*, United Kingdom and *Robyn Zevenbergen*, Australia.



I C M E
1 0
2 0 0 4

ASG

ICMI
Affiliated
Study
Groups

Session 3 – Saturday July 10, 16.30-17.30

The Development of Algebraic Thinking and Symbolization.
Carolyn Kieran, Canada

Session 4 – Saturday July 10, 17.30-18.30

The Impact of New Technologies upon Pedagogy in Mathematics Education.
Ricardo Nemorovski (Coordinator), USA; *Chronis Kynigos*, Greece; *Michal Yerushalmy*, Israel;
Ornella Robutti, Italy; *Dave Pratt*, United Kingdom, and *Francesca Ferrara*, Italy.

Each of these reviews is planned in the form of a 40 -minute presentation with up to 20 minutes of questions and discussion.

WFNMC

(World Federation of National Mathematics Competitions)
Chair: *Peter Taylor*, pjt@olympiad.org

Please note that the timeslots differ somewhat from those of the other ICMI – Affiliated Study Groups.

Place: Building 208, A51

Session 1 – Tuesday July 6, 14.30-16.30

14.30-14.45. *Paul Erdős*, Awards of WFNMC
14.45-15.45. *Alexander Soifer* (USA), One Result – Three Lives:
Issai Schur, Pierre Joseph Henry Baudet, Bartel Leendert van der Waerden
15.45-16.00. *Harold Reiter* (USA), Games and Number Representations

Session 2 – Tuesday July 6, 17.30-18.30

17.30-17.45. *Svetoslav Jordanov Bilchev* (Bulgaria),
About an Unexpected Transition from Algebra to Geometry
17.45-18.00. *Alan Nambiar* (South Africa), Untitled
18.00-18.15. *Litwin Cheng* (Hong Kong), On Hong Kong Mathematics Competitions
18.15-18.30. *Paul Igodt* (Belgium), Presentation of USolv-IT

Session 2 (extension) – Tuesday July 6, 19.30-20.30

Further Discussion of Talks

Session 3 – Saturday July 10, 16.30-17.30

General Membership Meeting

- Elections
- Discussion of Constitution
- General Information
- Announcements

ICMI-studies

In the time slot on Saturday July 10, 16.30-18.30 three recent or almost complete ICMI-studies will be presented in parallel.

ICMI-Study 12: The future of the teaching and learning of algebra

Presenters: *Kaye Stacey*, *Helen Chick* and others.

Place: Building 208, A53

Approximately 100 participants attended the study conference on “The Future of the Teaching and Learning of Algebra” in December 2001 in Australia. This presentation will outline the conclusions of the nine working groups, which addressed issues related to curriculum goals, teaching approaches and student learning at all levels, from the earliest years of school when a more algebraic approach holds promise, to the teaching of tertiary algebra and teacher education. The potential of technology for improving the teaching of algebra and its impact on curriculum was the concern of two groups. Other groups studied the use of history in teaching and fundamental issues related to values and goals, symbols and language. The presentations aim to give an overview of the major trends, which are predicted to influence future development in teaching and learning algebra.

ICMI-Study 13: Mathematics education in different cultural traditions:

A comparative study of East Asia and the West

Presenter: *Frederick K.S. Leung*

Place: Building 208, A54

The ICMI 13 study will be presented

ICMI-Study 14: Applications and modelling in mathematics education

Presenters: *Werner Blum* and others

Place: Building 306, A32

The study conference on this 14th ICMI Study was held in Dortmund, Germany, in February 2004, with almost 90 invitees from all over the world. The conference was held on the basis of a discussion document (which was circulated widely in 2003), papers submitted in reaction to it, and papers and lectures commissioned by the International Programme Committee. The study volume is now being edited and is expected to appear in 2005-06 in the New ICMI Study Series. The presentation will outline the way in which the Study was conceived by the International Programme Committee and highlight major trends and main points from the study conference, based on the papers and working groups.

ICMI General Assembly

Place: Building 208, A53

Rooms for subgroups: Building 210

Time: Friday July 9, 19.30 to 22.00.

In accordance with the Terms of Reference for ICMI, the General Assembly of ICMI will meet during ICME-10.

The General Assembly consists of the ICMI Representatives, each representing a member country of ICMI, and the members of the ICMI Executive Committee. Should an ICMI Representative be unable to be present at the GA, he or she is kindly asked to arrange for the appointment of a substitute. In addition to the formal members of the GA, representatives of the five ICMI Affiliated Study Groups (HPM, PME, IOWME, WFNMC and ICTMA) are invited to participate to the meeting as observers, as well as the former members of the ICMI Executive Committee. Any group wishing to have an observer invited to the GA should contact the ICMI Secretary-General, *Bernard R. Hodgson* (bhodgson@mat.ulaval.ca).

Newcomers

In co-operation with *Bernard Hodgson*, ICMI Secretary-General, the Nordic Contact Committee has organised a programme for ICME-Newcomers at ICME-10. The Newcomers programme is for all participants registered as newcomers.

The programme consists of the following four elements:

1. Newcomers lunch:

On the opening day the Newcomers meet for lunch. According to the information given upon registration Newcomers have been divided into groups of around 8 persons, each guided by a mentor who is experienced ICME-participants. For the lunch meeting it is necessary to provide for your own lunch. Lunch boxes will be available in the building where the lunch takes place.

Time: Monday July 5, 13.00-14.30

Group 1-31 meet in building 342.

Group 32-56 meet in building 358.

2. Welcome reception:

The Newcomers groups experience the welcome reception together with their mentor, if they decide so during the lunch meeting.

Time: Monday July 5, 18.30-19.30

3. Meeting for Newcomers:

Introduction to ICME congresses and to ICME-10 in particular.

by *Morten Blomhøj*, Chair of the LOC, *Gerd Brandell*, Chair of the NCC, *Bernard Hodgson*, ICMI Secretary-General, and *Anna Kristjansdóttir*, member of NCC.

Contact person: Gerd Brandell, gerd.brandell@math.lth.se

The meeting takes place Monday July 5 at 19.30-20.30.

Place: Building 101, Main Hall

4. Hereafter each newcomers group decides about when/where they meet.



I C M E
1 0
2 0 0 4

Special
meetings and
events

Special meetings and events

Meetings on Monday July 5

YERME seminar (Young European Researchers in Mathematics Education). You do not strictly have to be either young or European to participate! The idea is to provide a forum in which people who are new to research in mathematics education can communicate with each other, offering support as well as practical advice. Konrad Krainer (Editor of the Journal of Mathematics Teacher Education) will give a lecture on How to initiate and conduct a research study in mathematics education and we will also talk about the Summer School arranged by YERME in the Czech Republic in August 2004. The seminar takes place in the lunch break 13.30-14.30. Contact person: *Konrad Krainer* konrad.krainer@uniklu.ac.at
Place: Building 208, auditorium A53

Meeting of the IPC of ICMI Study 16
“Challenging Mathematics in and beyond the classroom”.
The meeting is scheduled at: 19.30-21.00.
Contact person: *Peter Taylor*, pjt@olympiad.org
Place: Building 101, room M2

Meeting for Ph.D.-supervisors in the Nordic Countries. All interested are welcome.
Contact person: *Barbro Grevholm*, barbro.grevholm@hia.no
The meeting is scheduled at: 19.30-20.30.
Place: Building 101, room M1

International Project on Mathematical Attainment, (IPMA),
(see www.ex.ac.uk/cimt/ipma/index.htm). All interested are welcome.
Contact person: *David Burghes*, d.n.burghes@exeter.ac.uk
The meeting is scheduled at: 19.30-20.30.
Place: Building 210, room G162

Meetings on Tuesday July 6

A lunch break seminar presenting the study:
Learning to Teach Mathematics: An IEA Cross-National Study of Primary and Secondary School Teachers.
Presenters: *Maria Teresa Tatto*, *Joan Ferrini-Mundy*, *William Schmidt*, Michigan State University
The seminar is scheduled at: 13.30-14.30.
Contact person: *Maria Teresa Tatto*, mttatto@msu.edu
Place: Building 116, auditorium A82



I C M E
1 0
2 0 0 4

Special
meetings and
events

Meeting of the chief-editors of mathematics education journals.
Contact person: *Gerhard König*, gerhard.koenig@fiz-karlsruhe.de
The meeting is scheduled at: 19.30-20.30.
Place: Building 101, room M1

The MATHeCADEMY.net presents ‘Mathematics from below – the natural method’ and PYRAMIDeDUCATION, a free web-based teacher education.
Contact person: *Allan Tarp*, Allan.Tarp@MATHeCADEMY.net
The meeting is scheduled at: 19.30-20.30
Place: Building 210, group room G048

Nordic KappAbel – a different math competition
KappAbel is a mathematics competition for 14 to 15 year old students in the Nordic countries. During ICME-10, the national champions from each of the five Nordic countries will meet for the Nordic final. On Tuesday July 6 at 18.30- 20.30 the teams will present their class projects about *Mathematics and Music*, and on Wednesday July 7 at 18.30- 21.00 the teams will compete in a problem solving session. We welcome everybody interested in the Nordic final, which will be in English. An exhibition of the projects will be open visitors to the Mathematical Circus on campus. The final will be lead by *Ingvill Merete Stedøy*, NSMO at NTNU Trondheim, Norway.
Time: Tuesday July 6 at 18.30-20.30 and Wednesday July 7 at 18.30-21.00
Place: Building 101, Main Hall

Meetings on Wednesday July 7

The Abel Prize and the Abel Foundation: Supporting research and education.
Lecture by *Arild Stubhaug*, Norway.
The lecture will take place during the lunch break from 13.30-14.15.
There will be time for discussion.
Contact person: *Arild Stubhaug*, arilds@math.uio.no
Place: Building 303, auditorium A44

Meeting in the International Programme Committee for ICME study 17
(Technology revisited).
Contact person: *J.B. Lagrange*, jb.lagrange@reims.iufm.fr
The meeting is scheduled at: 18.30-20.30.
Place: Building 101, group room G9

Nordic KappAbel final: Problem solving session.
See description under Tuesday 6.
Wednesday July 7 at 18.30-21.00
Place: Building 101, Main Hall



I C M E
1 0
2 0 0 4

Special
meetings and
events

Meetings on Friday July 9

Meeting of the editors, the editorial board, and the scientific committee of the international journal *Recherches en Didactique des Mathématiques, Investigaciones en didáctica de las matemáticas, Research in the Didactics of Mathematics*. Our journal is published in French, Spanish, and English. If you would like to attend this meeting, or to have any information about our publication, I would be very pleased to see you at the French booth.

Contact person: *Claire Margolinas*, Editor in Chief, clarie.margolinas@wanadoo.fr
The meeting is scheduled at: 19.30-20.30.

Place: Building 101, room M2

Meetings on Saturday July 10

The MATHeCADEMY.net presents 'Mathematics from below – the natural method' and PYRAMIDeDUCATION, a free web-based teacher education.

Contact person: *Allan Tarp*, Allan.Tarp@MATHeCADEMY.net

The meeting is scheduled at: 19.30-20.30

Place: Building 210, group room G048

See also sponsor symposia and workshops on page 165.

Mathematical Circus

During the Congress days of ICME-10 there will be a Mathematical Circus taking place in three big tents located west of building 101.

The idea is to attract local families, teachers and families of participants as a welcoming way to experience mathematical activities. The activities will be organised so that some children engage directly in an activity, and become a part of the performance, while other children will be audience.

Opening hours

There will be different activities taking place in the circus during the following 10 time slots:

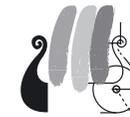
- I. Monday, July 5: 12.00-14.00
- II. Monday, July 5: 16.00-18.00
- III. Monday, July 5: 18.30-19.30 (Stage performance during Happy Hours)
- IV. Tuesday, July 6: 12.00-14.00
- V. Tuesday, July 6: 16.00-18.00
- VI. Wednesday, July 7: 12.00-14.00
- VII. Wednesday, July 7: 16.00-18.00
- VIII. Friday, July 9: 12.00-14.00
- IX. Friday, July 9: 16.00-18.00
- X. Friday, July 9: 18.30-19.30 (Stage performance during Happy Hours)

Schedule

There will be three tents and a stage in front of the tents.

The numbers in the table refer to the activities 1 – 35 listed below.

Slot	Tent 1	Tent 2	Tent 3	Stage
I	9, 14	5, 16, 20, 26	8, 11, 32	
II	14, 30	5, 7, 28, 29	18, 32	10
III				10, 15 *
IV	2, 12, 14, 21, 22	6, 13, 16, 17	18, 32	
V	9, 14, 23, 30	1, 3, 25, 26, 28, 31	11, 24, 27	10
VI	2, 14, 21, 22	5, 13, 17, 20	32	
VII	2, 14, 23, 30	5, 6, 25, 29	8, 19, 24, 27	10
VIII	2, 12	4, 26, 33		
IX	2, 30	1, 3, 7, 26, 28, 31		
X				34, 15



I C M E
1 0
2 0 0 4

Mathematical
Circus



I C M E
1 0
2 0 0 4

Mathematical
Circus

1. *Vivek Moreshwar Wagh*: Games for introducing and practicing calculations and anchoring concepts. (Puzzles and games.)
2. *Yutaka Nishiyama*: Let's Boomerang! (Mathematics and entertainment.)
3. *Lucia Grugnetti* and *François Jaquet*: Transalpine Mathematics Rally (RMT), games and manipulation. (Puzzles and games.)
4. *Lucia Grugnetti* and *François Jaquet*: A mathematical competition for solving problems in groups. (Mathematical competitions.)
5. *M. Klungland* and family: Math with Coke. (Mathematical competitions.)
6. *Yun Zhang*: Your fortune is told. (Mathematics and entertainment/Mathemagic.)
7. *Yun Zhang*: The Vanishing Chocolate Bar. (Mathematics and entertainment.)
8. *Bodil Branner*: Geometry of honeybee combs. (Mathematics in daily life – in nature.)
9. *Steen Markvorsen*: The Return of the Boomerang: A Geometric Challenge. (Techno-mathematics/Mathematics and Sports.)
10. *Poul Hjorth*: Moons and Lion's Tales. (Mathematics and entertainment.)
11. *Norio Torimoto* (Origami master of Nippon Origami Association): The ICME logotype Viking ship as origami. (Etno-mathematics.)
12. *Norio Torimoto* (Origami master of Nippon Origami Association): Homing paper plane. (Mathemagic.)
13. *Marj Horne*: Games in the classroom. (Games.)
14. *Bjarne K. Ersbøll* and *Mikkel B. Stegmann*: An exciting face simulator. (Mathematics and entertainment/Mathemagic.)
15. *Lily Yen*: "Mathemusical Symmetry". (Mathematics in daily life.) (Lecture)
16. *Andy Liu* and *Lily Yen*: Puzzles with live playing pieces. (Puzzles and games.)
17. *Gerd Nilsen*, *Vegard Engstrøm* and *Kristin Melgårdsbakken*: Three-dimensional pentomino and beyond. (Puzzles and games.)
18. *Ola Bolstad*: Chip Carving and geometry). (Etno-mathematics.)
19. *Mona Røsseland* and *Tone Buien*: Mathematics in Christmas decorations. (Mathematics in daily life.)
20. *Guri A. Nortvedt*: Mathematical quizzes and puzzles that suit all (age 7-99). (Puzzles and games.)
21. *Henrik Kirkegaard*: Geometric patterns on kites (that flies). (Mathematics and art.)
22. *Martin R. Lamb*: Musicland. (Mathematics and art.)
23. *Martin R. Lamb*: Angel Fish. (Mathematics and art.)
24. *Daina Taimina*: Crocheted hyperbolic planes. (Mathematics and art.)
25. *Dr. Michael Naylor*: Patterns of Patterns, the Mathematics of Juggling. (Mathematics and entertainment.)



I C M E
1 0
2 0 0 4

Mathematical
Circus

26. *Lars H. Laustsen*: The strong chessman of the Mathematical Circus. (Games.)
27. *Phong Lee Koay*: Constructing envelopes with compass and ruler. (Mathematics in daily life/Mathemagic.)
28. *May Renate Settemsdal* and *Toril Sivertsen*: Practical problem solving. (Puzzles and games.)
29. *Volker Berthold*: DICE-PYRAMIDE and DICE-CHESS. (Puzzles and games.)
30. Freudenthal Institute (Sonia Palha): Falling numbers and other math-applets! (Techno-mathematics of Mathematical competitions.)
31. *Claire Berg*: Exploratory activities with Cuisenaire rods. (Games.)
32. *Chris Zaal*: No Left Labyrinth. (Mathematics and entertainment / Puzzles and games.)
33. *Chris Zaal*: Life Size Wooden Puzzles. (Puzzles and games.)
34. *Helmer Aslaksen*: Observing the Sun and the Moon in Different Parts of the World. (Mathematics in daily life.)
35. *Franka Miriam Brucklar*:

Lyngby Storcenter

A special presentation of some of the activities of the Mathematical Circus is to take place in Lyngby City Centre on Saturday, July 3. Possible events for Lyngby Storcenter 5, 8, 9, 10, 14.

The Mathematical Circus is directed by *Vagn Lundgaard Hansen*, DTU, Denmark. and *Ingvill Merete Stedoy*, NSMO at NTNU Trondheim, Norway.

Why Math?

During the entire Congress period a new and exciting mathematics exhibition will be shown in the foyer area in building 208. The exhibition 'Why Math?' is developed in co-operation between several mathematics organisations and institutions and UNESCO.

Why Math?



Experiencing Mathematics

An International exhibition supported by UNESCO

Why a new exhibition on mathematics?

To show that mathematics is

- astonishing, interesting and useful,
- accessible to everyone,
- plays a large part in daily life
- and has an important role in our culture, development and progress



This new exhibition presents about fifty surprising experiences, models and images of the daily life. The telephone, credits cards, travel, CDrom, weather forecasting, medical prints and many other things, hide their dependance on mathematics from us.

This travelling exhibition is aimed particularly at young people, their parents, their teachers. But it is hoped that the ideas will interest all those who want to learn more about Science in general and Mathematics in particular.

The exhibition consists of posters, more than 40 models and exciting "hands on" experiences created by European and Japan Mathematical Laboratories.

Partners and committee:

Unesco
International Mathematics Union [IMU]
International Commission for Mathematical Instruction [ICMI]
European Mathematical Society [EMS]
The Tokai University [Japan], The Ateneo de Manila [Philippines]
The French Universities of Paris, Orléans, Tours [France]
The working group of World Mathematical Year [WYM2000]
Centre · Sciences, CCSTI of Orléans [France]

To know more: www.MathEx.Org

Contacts:

- Mireille Chaleyat-Maurel, mcm@math.jussieu.fr
- Michel Darche, centre.sciences@wanadoo.fr





I C M E
1 0
2 0 0 4

Non-commercial exhibitors

	Jean-Luc.Dorier@imag.fr www.cfem.asso.fr/	Building 306, 101
CFEM (French Commission for Mathematic Instruction)		French Subcommission of the ICMI.
	Ganløsevej 37 3520 Farum Denmark Tel: +45 44 95 29 57 Fax: +45 44 95 70 81 www.matematik.ffw.dk/	Building 306, 100
Danmarks Matematiklærerforening		Developing Children's Mathematics by using Lego-bricks.
	P.O. Box 9432 3506 GK Utrecht The Netherlands Tel: +31 30 2635555 Fax: +31 30 2660430 fi@fi.uu.nl www.fi.uu.nl/en	Building 116, 401
Freudenthal Insitute, Utrecht University		Institute's activities and publications.
	European Space Agency International Space Station (ISS) Education Office ESTEC, Keplerlaan 1 2201 AZ Noordwijk The Netherlands SSeducationteam@esa.int www.esa.int/spaceflight/education	Building 116, 301
European Space Agency		Demonstration: FREE ISS Education Kit.
	46, rue Felix Viallet 3 Grenoble France Tel:+33 4 76 57 47 75 Fax: +33 4 76 57 46 02 Jean-Francois.Nicaud@imag.fr aplusix.imag.fr/	Building 116, 402
IMAG-LEIBNIZ - Did@TIC		Experiments of apusix in algebra.
	Private Postbox No.18, Koishikawa Post Office 112-8691 Bunkyo-ku, Tokyo Japan Tel: +81-3-3946-2267 Fax: +81-3-3946-3736 info.@sme.or.jp www.sme.or.jp	Building 116, 405
Japan Society of Mathematical Education		To introduce school mathematics in Japan.
MATHeCADEMY	Hornslets Allé 27 8500 Grenaa Denmark Tel: +45 8632 1899 Allan.Tarp@MATHeCADEMY.net www.MATHeCADEMY.net	Building 116, 303
		LAB-based PYRAMIDeDUCATION for teachers.
	1 Straylands Grove YO31 1EB York England Tel: +44 1904 424200 shirley@cariss.freemove.co.uk www.mathemagic.org	Building 116, 302
MatheMagic		Maths for All based in York, England.



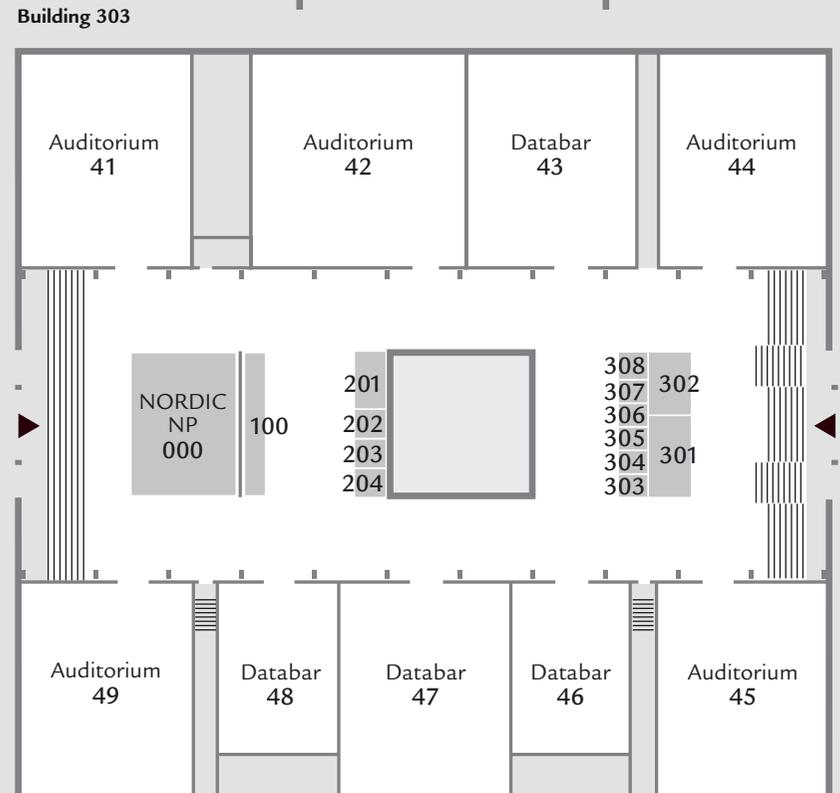
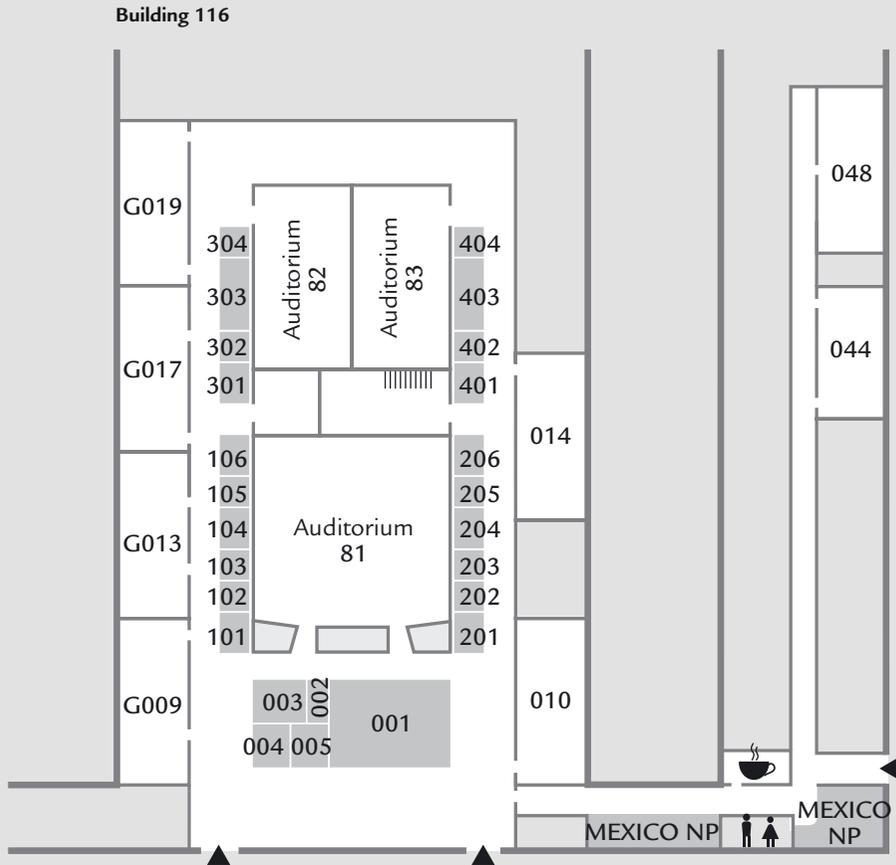
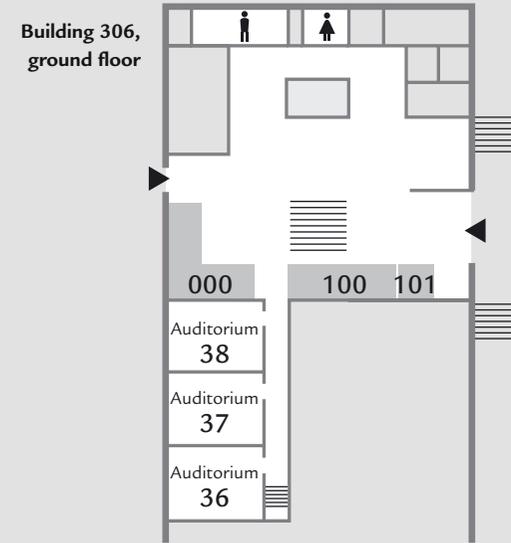
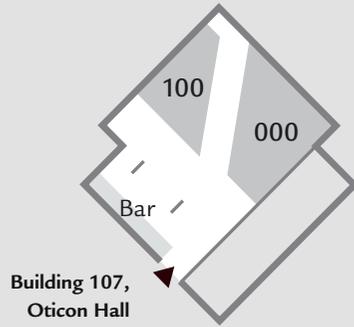
I C M E
1 0
2 0 0 4

	259 London Road LE2 3BE Leicester England www.m-a.org.uk/	Building 116, 403
Mathematical Association		The MA for books journals posters membership.
	Faculty of Education 115 Victoria Pde 3065 Fitzroy, Victoria Australia Tel: +61 3 9953 3269 Fax: +61 3 9953 3372 p.clarkson@patrick.acu.edu.au www.merga.net.au/	Building 116, 205
Mathematics Education Research Group of Australia		Sale books, journals & forms regarding conference.
	Find out about the Australian Mathematical Sciences Institute at www.amsi.org.au	
Australian Mathematical Sciences Institute		
	Piazza Porta S.Donato 5 40126 Bologna Italy Tel: +39 051243190 Fax: +39 0514214169 umi@dm.unibo.it www.dm.unibo.it/umi	Building 116, 204
Ministero universita' e ricerca scientifica-unione matematica italiana		Curriculum of Mathematics.
	Göteborg University, NCM, Nämnaren Box 160, SE-405 30 Göteborg, Sweden Ronnie.Ryding@ncm.gu.se Tel: +46 31 773 22 86, Fax: +46 31 773 22 00 http://ncm.gu.se	Building 306, 000
National Center for Mathematics Education		
	34 Bassett Crescent East, Southampton, SO16 7PB, United Kingdom Tel: 023 8059 3686 Fax: 023 8059 4300 office@smpmaths.org.uk www.smpmaths.org.uk	Building 303, 202
SMP School Mathematics Project		
	University of Nottingham NG8 1BB, Nottingham, United Kingdom Tel: +44 115 951 4410 Fax: +44 115 951 4413 Shell.Centre@nottingham.ac.uk www.mathshell.com	Building 303, 201
Shell Centre for Mathematical Education		Research and development.
	c/o Jill Adler, Education University of Witwatersrand, P Bag 3, Wits 2050, Johannesburg, Gauteng South Africa Tel: +27 11 717 3413 Fax: +27 11 717 3259 adlerj@educ.wits.ac.za www.AMESA.org.za	Building 116, 304
South African Mathematics Education Associations		Math Ed Associations in South Africa.
ZDM/MATHDI	PO-box 2465 D-76012 Karlsruhe Germany	Building 116, 203
		Get 2 round trip airline tickets and a 3 day hotel stay.

Exhibitions

Buildings with commercial and non-commercial exhibitors.
Please see pp 156-157 and 160-164 for number references.

See overview of buildings on page 9.



Exhibitions by location

Building	Booth	Exhibitor	Category
101	-	ICMI	Non Commercial
116	101	Cosmotopia Canada	Commercial
116	103	Muszaki Konyvkiado Kft	Commercial
116	105	Alega Skolmatriel AB	Commercial
116	106	NAG Ltd	Commercial
116	201	Autograph	Commercial
116	202	Claire Publications and Sweet Counter	Commercial
116	203	ZDM/MATHDI	Non Commercial
116	204	UMI	Non Commercial
116	205	MERGA and AMSI	Non Commercial
116	302	MatheMagic	Non Commercial
116	303	MATHeCADEMY	Non Commercial
116	304	AMESA	Non Commercial
116	401	Freudenthal Institute	Non Commercial
116	401	European Space Institute	Non Commercial
116	402	IMAG-Leibniz - Did@TIC	Non Commercial
116	403	Mathematical Association	Non Commercial
116	405	Japan Society of Mathematical Education	Non Commercial
116	600	Mexico	National Presentation
116	001	Texas Instruments	Commercial, Main Sponsor
116	002	Birkhäuser	Commercial
116	003	Wolfram Research	Commercial
116	004	QED Books and Software	Commercial
208	Basement	Korea	National Presentation
208	Ground floor	Why Maths?	Non Commercial
303	100	Abelprisen	Non Commercial, Sponsor
303	201	Shell Centre	Non Commercial
303	202	SMP	Non Commercial
303	301	Egmont Books	Commercial
303	301	Key Curriculum Press	Commercial
303	302	Kluver Academic Publishers	Commercial
303	304	L & R Uddannelse	Commercial
303	305	Horwood Publishing	Commercial
303	308	Gyldendal	Commercial
303	000	Nordic Contries	National Presentation
306	100	Danmarks Lærerforening	Non Commercial
306	101	CFEM	Non Commercial
306	000	NCM	Non Commercial
308	First floor	Russia	National Presentation
421	Ground floor	Romania	National Presentation
Oticon	100	Hewlett-Packard	Commercial
Oticon	000	Casio	Commercial, Main Sponsor



Texas Instruments – Your Partner in Maths and Science Education

Imagine the benefits of innovative educational tools designed specifically to meet the evolving requirements of your classroom! We provide you and your students with a wide range of perfectly compatible handheld technology, computer software and data-collection devices, developed together with leading educators to fit the modern maths and science curriculum at every level.

Our customer service centers and regular teacher training programmes ensure that you have everything you need to make the most of our advanced classroom technology. More information is available at www.education.ti.com

We look forward to welcoming you to our booth presentations. Topics include CAS, SimCalc, Cabri and more!

*TI Technology –
Beyond Numbers*



I C M E
1 0
2 0 0 4

Commercial exhibitors

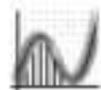


ALEGA Skolmateriel AB

Vasagatan 4
532 32 Skara
Sweden
Tel: +46-511 10411
Fax: +46-511 10419
goran@alega.se

Building 116, 105

See our Pyramid-Math softwares:
The Flying Carpet,
Cherren's Pyramid,
Cheops Pyramid.
Buy CDs at exhibition price.



Autograph

PO Box 46, Oundle
PE8 4JX Peterborough
United Kingdom
Tel: +44 1832 273444
Fax: +44 1832 273529
debutler@argonet.co.uk
www.autograph-maths.com

Building 116, 201

Autograph 3
- the leading UK dynamic software
- for 2D/3D coordinate geometry,
and for probability and statistics.

Birkhäuser

www.birkhauser.ch

Building 116, 002

Birkhäuser is one of the key
addresses in the field of
mathematics based in Switzerland.
Please feel free to contact us:
www.birkhauser.ch

CASIO

Casio

www.casio.co.jp/edu_e/

Oticon Hall, 000

Try 'Mission to Math'
at the Casio booth and join
'Casio Satellite Workshops'.



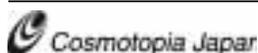
**Claire Publications and
Sweet Counter**

Tey Brook Craft Centre
C061JE Colchester, Essex
United Kingdom
+01206-211020
+01206-212755
mail@clairepublications.com
www.clairepublications.com

Building 116, 202

Claire Publication and Sweet
Counter are major forces in the
production and publication of
Maths resources in the UK.

P.O. Box 472,
Kingston, Surrey. KT2 7ZW
Tel: 07973-152064
Fax: 020-8549-2132



Cosmotopia Canada

212-2255 York Avenue
V6K 1C5 Vancouver
Canada
Tel: +1 604 202 4920
Fax: +1 604 739 2086
nisky@cosmotopiainc.com
www.thesatorumethod.com

Building 116, 101

Please visit us for a demonstration
of our dynamic and effective tool
for math education.



Egmont Books

Alinea
Ewaldsgade 9, Postboks 599
2200 København N
Tel: +45 33 69 46 66
Fax: +45 33 69 46 60
alinea@alinea.dk
www.alinea.dk

Building 303, 301

N.W. Damm & Søn AS
Besøksadresse:
Fridtjof Nansens vei 14,
0055 Oslo
Tel: +45 24 05 10 00
Fax: +45 24 05 10 99
post@damm.no
www.damm.no

forlag Malling Beck
Læhegnet 71
2620 Albertslund
Tel: +45 43 66 77 77
Fax: +45 43 66 77 99
forlag@mb.dk
www.forlagmallingbeck.dk



Gyldendal

Vibeke R. Røhling
Informationsmedarbejder
vibeke_rambach_
roehling@gyldendal.dk
Telefon: 33 75 55 47
Fax: 33 75 57 22

Building 303, 308

GYLDENDAL
Klareboderne 5
1001 København K



Hewlett-Packard

4995 Murphy Canyon Road
Suite 301
San Diego
CA 92123
Tel: 1-858-541-7205
www.hp.com/calculators

Oticon Hall, 100

In 1972, HP invented the world's
first scientific handheld calculator.
Today, HP offers a full range of
11 scientific, graphing and financial
calculators designed for students
and professionals.



Horwood Publishing Ltd

Coll House, Westergate Street,
Westergate
PO20 3QL Chichester,
West Sussex
United Kingdom
Tel: +44 1243 542285
Fax: +44 1243 545042
publish@horwood.net
www.horwoodpublishing.net

Building 303, 305

International Publishers in
Science and Technology.

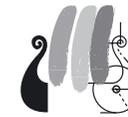


Key Curriculum Press

1150 65th Street
94608 Emeryville
California
USA
Tel: 8009956284
Fax: 8005412442
sales@keypress.com
www.keypress.com

Building 303, 301

Key Curriculum Press is the leading
publisher of innovative mathematics
books and dynamic mathematics
software for students.



I C M E
1 0
2 0 0 4



Kluwer Academic Publishers

P.O. Box 989
3300 AZ Dordrecht
The Netherlands
Tel: +31 (0)78 657 6122
Fax: +31 78 65 76 754
services@wkap.nl
www.wkap.nl

Building 303, 302

Kluwer provides the highest quality information products and services to academic and corporate researchers in various sciences.



L&R Uddannelse

Pilestræde 52, 3.
1112 København K
Tlf. 3343 3399
Fax. 3343 3390
Email: lru@lruddannelse.dk
www.lruddannelse.dk

Building 303, 304



Muszaki Konyvkiado Kft

89-93 Szentendrei ut
1033 Budapest
Hungary
Tel: + 36 1 437 2405
Fax: + 36 1 367 0825
vevoszolg@muszakikiado.hu
www.muszakikiado.hu

Building 116, 103

Muszaki publishes textbooks, workbooks, CDs for primary, secondary, vocational schools, universities and professionals.



NAG Ltd

Wilkinson House,
Jordan Hill Road
OX2 8DR Oxford
United Kingdom
Tel: +44 1865 511245
Fax: +44 1865 310139
sales@nag.co.uk
www.nag.co.uk

Building 116, 106

NAG specialises in the provision of numerical and statistical components to aid the solving of complex math problems.

QED Books and Software

Pentagon Place
195B Berkhamsted Road
HPS 3AP Chesham
United Kingdom
Tel: +44 1494 772973
Fax: +44 1494 793921
qed@talk21.com
www.mathsite.co.uk

Building 116, 004

QED is showing books, posters and software from Tarquin, BEAM, Efofex, Key Curriculum Press, NCTM, Dover and many more.



Texas Instruments

ti-cares@ti.com

Building 116, 001



**Wolfram Research
- Mathematica**

10 Blenheim Office Park,
Lower Road
OX29 8RY Long Hanborough
United Kingdom
Tel: +44 (0)1993 883 400
Fax: +44 (0)1993 883 800
info@wolfram.co.uk
www.wolfram.com

Building 116, 003

Wolfram Research is the world's leading developer of technical computing software.

Sponsor symposia and workshops

CASIO Workshop:

Introduction to probability calculation (with ClassPad)

Hans-Joachim Brenner

Time: Tuesday July 6 at 14.00-16.30

Building 101, room M1

CASIO Workshop:

Simultaneous activation of conceptual and procedural knowledge through ClassPad

Lenni Haapasalo & Michael Fothe

Time: Tuesday July 6 at 16.30-18.30

Building 101, room M1

CASIO Workshop:

The eActivity on ClassPad 300

Tor Andersen

Time: Wednesday July 7 at 16.00-17.30

Building 101, room M1



Hewlett-Packard Satellite Workshop:

Calculators as an aid, not an impediment, in mathematics teaching

Wlodek Mier-Jedrzejowicz

Time: Friday July 9 at 12.00-14.30

Building 101, room M1

CASIO Workshop:

Wei-Chi Yang

Time: Friday July 9 at 16.30-18.30

Building 101, room M1

CASIO Workshop:

The graphics calculator: Making the difference for mathematics education

Barry Kissane

Time: Saturday July 10 at 16.30-18.30

Building 101, room M1

Sponsors

Main Sponsors



Education and research institutions



Technical University of Denmark (DTU) – Campus and technical equipment is placed at the disposal of the congress during the congress period. In addition to this DTU provides meeting facilities during the planning process.



Roskilde University, IMFUFA – Support to the congress in the form of manpower for the secretariat, the chairs of the international programme committee and of the local organising committee, and support the meetings in the international programme committee.

Centre for Research in Learning Mathematics (Danish University of Education, Roskilde University and Aalborg University)

Payment of wages for the secretary of the local organising committee.

Norwegian Centre for Mathematics Education

The congress is supported by all relevant universities, departments and professional associations for teachers from all educational levels in Denmark and in the other Nordic countries. Many parties are supporting the congress directly by paying travel expenses for members of the Nordic committee and the local organising committee and by means of manpower.

Foundations and Organisations



Building 101

See exhibition and book display in building 101 in the registration area.

Carlsbergs Mindelegat for Brygger J.C. Jacobsen



Building 303, 100

See the exhibition about the Norwegian mathematician Niels Henrik Abel and the Abel price.



International Mathematical Union

Public agencies and bodies



The European Commission, the Socrates Programme



Danish Ministry of Education

Danish Ministry of Science Technology and Innovation

Nordic Council of Ministers

Ministry of Education and Research in Norway

Ministry of Education and Science in Sweden

The Ministry of Education, Science and Culture in Iceland

Ministry of Education in Finland

Danish Research Council for the Humanities

Danish Natural Science Research Council

Lyngby Taarbæk Municipality

Social programme and excursions

Social Programme

The ICME-10 Congress will include several cultural and social events.

July 4 – there will be a *registration event* at the Ceremonial Hall at the University of Copenhagen. The University of Copenhagen dates back to 1479, and the Ceremonial Hall will form a historic and spectacular frame for your first meeting with ICME-10.

July 5 – will see the *opening session* in the morning and a *welcome reception* in the evening. During the opening session there will be live musical entertainment by the Royal Danish Brass band.

July 6, 7 and 9 – there will be *Happy Hours* following the day's sessions. Unwind from the many impressions and discussions of the day in a relaxing atmosphere and mingle with the other participants.

July 8 – will be entirely devoted to the *excursions*. Please refer to your registration letter for specific information on your excursion.

July 10 – will be concluded with a *cultural evening*.

July 11 – ends the 10th International Congress on Mathematical Education. Following the last sessions there will be a *closing ceremony* with entertainment by 'Den Unge Danske Strygekvartet' ('The Young Danish String Quartet') and after that a *farewell gathering*.

Welcome reception, Happy Hours, cultural evening and farewell gathering will all take place in building 101 in the canteen area and S-huset as well as in the area outside the Oticon Hall (107).



Visit the Mathematical Circus (see page 151)

Excursions

Excursions are arranged on July 8. Upon registration, you will be given an excursion ticket.

It is very important to observe the specific time and place of departure for your excursion. Also take note of the weather and remember to bring sensible walking shoes. Lunch will be provided as part of the excursion.

For time and place of departure of the mathematical walks during the Congress, please consult the message boards.

You can find more information on sightseeing in and around Copenhagen at the information desk.

Important notice

If going on the excursions to either Ven or Skåne, please remember your passport, as both destinations are in Sweden. This notice does only apply for nationals from non-Schengen member states.